BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE

Faculty of Engineering & Technology
B. Tech. - Electronics & Telecommunication Engineering
New Syllabus

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY) Pune.

Faculty of Engineering & Technology
Programme : B. Tech.(Electronics & Telecommunication Engineering) (2021 Course)
Course Structure & Syllabus
(Choice based credit systems-2021)
B.Tech (Electronics & Telecommunication Engineering) Semester I to VIII

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Executive summary

Students pursuing engineering studies need to be well equipped and state of art with the latest technological trends and industrial requirements. To produce the students with high caliber and technically sound, enrichment in the curriculum content and various quality initiatives are needed. This is possible only when the students undergo studies with an updated and evolving curriculum to match global scenario.

Curriculum Development History

- In ambits of Deemed University- 2000
- Curriculum of SPPU Accepted
- First Revision in 2004
- Second Revision in 2007
- Third Revision in 2011
- Fourth Revision in 2014
- Fifth Revision in 2018 was expected

The proposed curriculum is developed to inculcate the advanced engineering skills to cope up with upcoming industrial and societal needs. Students will be imparted with advanced contents from respective field and innovative delivery methods.

To inculcate the advanced engineering skills and knowledge, branch specific courses have been introduced from the Sem – I itself. There are total 38 theory courses, 4 vocational courses, 3 MOOCs, 2 projects, technical research paper writing, no. of application software courses, no. of practical based courses, 6 Industry taught courses along with 60 days exclusive internship have been incorporated in the curriculum with 230 credits and 6500 Marks.

There will be collaboration with the prominent industries to execute the vocational courses. These industries will deliver the content and execute the hands-on session to inculcate the required engineering skills of particular course. Also, one course per semester will be entirely delivered by the expert/s from the industry of respective field for which blended teaching learning will be adopted.

Students will apply the knowledge of respective courses and develop the prototype/ model as a part of project based learning.

To give the experience of technical writing and research article, students have to develop the two projects in pre final and final year respectively and shall submit the research article to reputed journal for publication. This will inculcate research aptitude among students and will enhance the research profile of institute also. Incorporation of various practical based courses in respective discipline, will give hands on experience to students to understand the engineering concept in better way. Nowadays all practices and process in the field are being computerized and automated. Hence, it was pertinent to increase software content in the curriculum. It was demand from the industry that every engineer should be conversant with Software/Programming/Data analysis and automation process. Hence, courses to such as C, C++, Python, Machine Learning, Artificial Intelligence are added in curriculum of all discipline. Students who wish to develop their career in the IT field, significant courses related to computational engineering and application software have been incorporated in the curriculum of each discipline.

National Education Policy is insisting the Online and Digital Education and Ensuring Equitable Use of Technology. To inculcate the self-learning approach amongst the students, proposed curriculum has introduced Massive Open Online Courses to all the students to provide an affordable and flexible way to learn new skills, advance the career and deliver quality educational experiences at scale.

2. Curriculum Content

- Curriculum derived from Latin word 'Currere', which means a race course or runway on which one runs to reach a goal.
- Curriculum is the instructional and educative programme by following students achieve their goals, ideals and aspirational life.
- Curriculum is a standards based sequence of planned experiences,

  which students practice and achieve proficiency in content and applied learning skills
- Its confidence building process
- Its total learning experience of the individuals
- Its interactive system of instructions and learning with specific goals , contents, strategies, measurements and resources.
- The desired outcome of curriculum is successful transfer / development of knowledge, skills, and attitude.
- Curriculum should lead to transformation of student to contributory member of the society

We tried to develop curriculum , which will meet these concepts.

Curriculum is the outline of concepts to be taught to students to help them meet the content standards. **Curriculum** is what is taught in a given course or subject. It refers to an interactive system of instruction and learning with specific goals, contents, strategies, measurement, and resources. It is a course of study that will enable the learner to acquire specific knowledge and skills. A **curriculum** consists of the "roadmap" or "guideline" of any given discipline. Both the philosophy of teaching of the instructors as well as of the educational institution serve as two of the principles upon which a curriculum is based.

In Engineering, a **curriculum** is the combination of instructional practices, learning experiences, and students' performance assessment that are designed to bring out and evaluate the target learning outcomes of a particular course. It is the goals, assessments, methods, and materials used to teach a particular skill or subject and includes thinking under "skill.". The curriculum needs to be planned and designed in such a way so as to sequentially improve students' knowledge and skills.

Placement is an important parameter and outcome of a good curriculum, which satisfy the need of good placement. The written curriculum is a plan of what is to be taught so that the student gets good placement. For this , a variety of technical and non-technical courses that are required to complete a specific degree so as to help the student for placement are included in the curriculum. In addition to technical knowledge , it should also include social behaviors as well as content and thinking skills.

Overall, the curriculum should be such that it should develop a student in a good job seeker, good entrepreneur and also a good human being.

All the above aspects are taken care in the curriculum of **B. Tech-2021** course. This will develop different abilities in a student.

3. Curriculum Preamble

The curriculum 2021 is formed such that it will develop different abilities in a student. It a combination of blended teaching learning process in which both online and offline teaching is a part of the curriculum. In order to develop affection towards the discipline a student has selected, core discipline courses are included right from first year. This will also help to give the overall idea about the branch / discipline to the student.

Interaction with the industry is increased in this curriculum by introducing two new concepts –

1. **Vocational Course** and 2. Industry Taught Course.

Vocational Course (VC), a student will able to develop a specific skill set from the relevant people/ agency from the industry. This will add in gaining new skill sets required by the industry. Such Vocational Courses are included from Semester III to Semester VI of the curriculum. Department also design vocational course relevant for the discipline, which add practical knowledge to students. The vocational courses should be discipline specific. 4 vocational courses and 8 credits are integrated with curriculum.

Industry Taught Courses (ITC) are the courses which will be taught by the people from industry who are experts in the relevant field, either partially or fully. This will provide a scope to students to gain the latest knowledge as used in industry and also to have direct one on one interaction with the industry. This will develop a confidence among the students. Such teaching by industry experts will be as per their availability, if required online and other than official college hours also. Thus, there is a blend of online and offline teaching, knowledge from academicians as well as from industry. Total six Industry Taught Courses are included in the curriculum.

Industry Internship of 60 days at the end of Semester VI integrated with curriculum, will also add to the interaction with the industry. A student will avail his training in industry or on site or in any design office or research organization as allotted to him/by the institute. A separate logbook will be maintained by the student during this period duly signed daily by the competent authority.

Project Based Learning is a part of almost each course of the curriculum. Small projects on relevant topics will be allotted to the students as a part of term-work of that course. This will inculcate the habit of applying the knowledge learnt to solve practical problems.

Two Projects are included in two stages, one in third year (Sem V and Sem VI) and the second in final year (Sem VII and Sem VIII). Improvement in Research, thinking ability and application of theoretical knowledge to develop practical ideas is the main purpose of these projects.

Publication of a research paper is the outcome expected from the Project work and as a motivation, separate credits are allotted for this. Students are expected to write research article based on Project-I in standard journals in final year. Guide for Project -I will help in writing the research article.

To develop the self studying, self-learning skills, each student has to join the **MOOC/NPTEL** courses and will get the certification of the respective course. This will also give him/her a chance to get the knowledge from teachers from well known institutes of national repute. Three such MOOC/NPTEL courses are included each in Semester III, Semester V and Semester VII and separate credits are allotted to it.

Various new courses are introduced in the curriculum thereby introducing the current and latest technology to students. Basic Science and Engineering Science course contents are designed to match the requirement of the specific disciplines.

Number of software related to that branch/ discipline are included as part of the curriculum. This will help the students to get good placement.

Few soft courses are introduced to non-circuit branches. This will give a soft feel to such branches and also to inculcate confidence among the students.

In addition to technical abilities, a student needs to be developed as a good human being. For this, he will complete social activities in Semester IV and Sem VIII.

Thus Curriculum-2021 satisfies the requirements of National Education Policy-2021.

"Knowledge, Skill, Behavior" are the three attributes that are inculcated in a student when he completes his B.Tech. course under Curriculum-2021.

Recommendations considered

- UGC- Quality mandate
- National Education Policy (NEP)

- AICTE model curriculum
- Curriculum of International Universities
- Curriculum of Indian Universities
- Feedback from HR of industries called for placements
- Market perception

Methodologies Adopted In Designing Curriculum (2021-22)

- 19 Basic Points for design of Curriculum
- Listing of common points (credits, marks, No. of courses, common courses, industry taught courses, vocational Programmes etc.)
- Conducted series of meetings
- Conducted in depth one on one discussions with HoDs
- Planned three workshops,
- Eminent experts from Industry, IITs, IISER, NIT, SPPU, Central Universities were invited for workshops
- First workshop - Course structure, Titles of courses, Industry taught courses, Vocational Courses.
- Second workshop - Content of first and second year courses
- Third workshop - Content of third and fourth year courses- (Planned)

4. Salient features

- Total 250 contact hours teaching are incorporated.
- Credit based 38 theory courses being offered to achieve global standards of quality.
- Curriculum offers practicals to more than 80 % (~ 30 theory courses) theory courses.
- Total 230 credits (6500 marks) are offered for the entire B. Tech. programme.
- Theory courses contains 60% of courses and 20% to practical courses.
- Tutorials (6 Credits), online courses (6 Credits), vocational courses (6 Credits), projects (18 Credits), internship (3 Credits), Research Publication (2 Credits) and social activities assigned (4 Credits) contains remaining 20% of credits
- Blended education policy is adopted considering its importance. 20% courses are taught in online mode.
- Incorporation of 6 industry taught courses is one of the important and strategic step.
- Adopting 4 vocational Programmes in cooperation with industries, renowned agencies, universities will improve skillsets of our students.
- 60 days industrial internship to meet the requirements of industry.
- Including of 2 projects to enhance technical skills & self learning.
- Research paper based on Project-I will inculcate research aptitude among students.
- Project based learning practically for all courses will enhance the ability of application of knowledge and problem solving aptitude.
- NPTEL/ MOOC courses in online mode are introduced as integrated part of the course structure.
- To understand social responsibility and social activities of weightage of 4 credits are integrated part of the course structure.
- Quantitative Techniques and communication courses are introduced to enhance the analytical ability of students and address employability.
- Wide range of elective courses have been offered to provide the choice, to explore the knowledge in their domain of interest.

Salient Features

Sr. No.	UGC (Quality mandate)/ NEP2020- Recommendations	Curriculum (2021-22)
1	Learning Outcome-based Curriculum Framework (LOCF)	a) Programme outcomes and course outcomes are being made ready
2	Imparting Life Skills to Students.	a) Quantitative techniques b) Communication skills c) Bridging gap with Industry by vocational courses d) Self learning by NPTEL/PBL/Two projects
3	Social and Industry Connect	a) 6 Industry taught courses b) 4 Vocational courses c) 60 days internship d) Time and credits for social activities
4	Promotion of Research and the Creation of New Knowledge.	a) Research publications based on projects b) Project based learning
5	Blended Education	a) 15% courses in online mode b) NPTEL/MOOC courses in online mode
6	Technology Enabled Learning/Self Learning	a) NPTEL/MOOCS
7	Software Applications	a) Programme specific softwares and Software application Courses

5. Curriculum Details

5.1. Courses-Theory/Practical's/Tutorials/Units/Co-mapping and Engagement

Courses-Theory/Practical's/Tutorials/Units/Co-mapping and Engagement, University exam and internal assessment

The B.Tech. 2021 offers Credit and Outcome based curriculum with total 230 credits, required for graduation with a Bachelors' degree (B.Tech). The Under-Graduate Programme (B.Tech) is of four years duration i.e of eight semesters (two semesters/year).

Engagement of Courses:

The courses in revised curriculum structure of B.Tech. program are categorized under Core courses, Elective courses, Engineering Science courses and Basic Science courses. These courses are taught to students by engaging them through lectures, practical or tutorials by respective course coordinators. From semester I to VI, there are five (lecture engaged and assessed) courses and in semester VII and VIII there are four (lecture engaged and assessed) courses which are mandatory. All the courses have varying hours of engagement and credits. Theory lecture engagement varies between 3 hours to 4 hours/week, practical engagement varies between 2 hours to 4 hours/week for the respective courses. The contents of every course is divided into six units. Each unit can be covered in 6 hours or 8 hours depending on the total allotted hours/week of lecture engagement for the respective course. Some courses are solely practical oriented. These courses will be only engaged through laboratory sessions.

Outcome Based Curriculum:

Planning and realization of teaching and learning related to outcome-based curricular model requires that initial element shall be an outcome. It serves as a basis for defining modes of evaluation and validation of outcomes. The curriculum defines the Course Outcomes (COs) and course objectives for every course. The outcomes are assessed through various activities and evaluation of learner's performance in various examination schemes i.e Theory/Practical/Oral/Term work.

Credit Calculation:

The course credits are computed based on the teaching hours per week for that course using the formula as mentioned below.

Credits earned by the Student = Credits earned in Theory (Th) + Credits earned in Practical (P) / Oral (O) + Credits earned in Tutorial (T)

Here, as mentioned above, the credit assignment for Th/P/O/T of any course is based on number of teaching hours of that course. It is as mentioned here:

Number of Credits for Theory (Th) courses = Number of classroom teaching hours per week for that course (1:1 correspondence)

Number of Credits for Practical (P) / Oral (O) courses = Number of laboratory hours per week for that course / 2 (0.5:1 correspondence)

Number of Credits for Tutorial (T) courses = Number of tutorial hours for that course (1:1 correspondence)

Example: If a course has 4 hours of classroom teaching, 2 hours of laboratory session and 1 hour of tutorial, then the credits assigned for that course will be 4(Th), 1(P/O) and 1(T) respectively.

Examination Pattern:

A) University Examination (UE)

The pattern for theory examination is of 60:40, where the learner can earn 60 Marks (maximum) through University Examination (UE) and 40 marks (maximum) are assigned for Internal Assessment (IA). For the UE of Practical/Oral assessment, the total marks allotted are 50. The laboratory assessment is divided into three assessment heads viz. Term work (TW), Practical (P) and Oral (O). The students will be assessed through TW or P or O or combination of any of these for the courses that have practical assessment. 25 Marks are assigned to TW/P/O each, so when a learner is assessed for practical through TW and P heads, he/she will be assessed for 50 marks.

B) Internal Assessment (IA)

The Internal Assessment (IA) for the respective courses will be performed through Unit Tests (UT) and Assignments. Total two UTs of 20 marks each will be conducted and the average marks of these two UTs will be considered. Similarly, course coordinators will design the class assignments in terms of exercises, case studies, real world problems or mini projects, which the learners have to submit from time-to-time, as mentioned by the deadline of each assignment. While designing the assignment, the course coordinators will provide the assessment criteria to the learners and maximum score (marks) for the assignment as well. If there are multiple assignments, then the average of score (from score attained in all assignments) will be calculated and considered as IA marks. This way, the learner will be assessed for 20 marks (maximum) for assignments.

Hence, total marks for UT and assignments are 20 each and so, IA will be of 40 marks. The score for IA is calculated as:

IA Score attained by learner (Max 40) = Average Score attained in UTs (Max 20) + Score attained in Assignments (Max 20)

5.2. Credit Concept: Equivalence

In CBCS 2021 Course structure, the allotment of credits are as follows:

Theory class of 1 hour: 1 Credit

Practical class of 2 hours: 1 Credit

Tutorial class of 1 hour: 1 Credit

Project, Research Paper & Social Activity: 1 Credit

5.3. Vocational course

Vocational learning opportunities play a important role in skill development and employability of student. Vocational courses are ways of implementation of theoretical knowledge in the practice.The importance of vocational development can largely be summed up as the difference between theoretical knowledge vs. practical skills. The vocational courses are based on the teaching of practical skills. These courses are designed to introduce the manual skills in the professional education in addition to the theory. These courses will serve as bridge courses for professional growth and career improvement.

Aims & objectives of vocational courses:

- To provide students with technical knowledge and skills necessary for progressive education in engineering profession.
- To give a better understanding of the emerging of technology.
- To train the student with necessary skills leading to skilled personnel who will be enterprising and self-reliant.
- To enhance the skill of students for becoming self-sustained engineer.
- To reduce the mismatch between the demand and supply of skill man-power.

In this curriculum at B.Tech Programme, there are four vocational courses introduced i.e. in Semester III, IV, V and VI. The courses offered at these semesters are as per the requirement of the programme.

Methodology:

The vocational courses shall be conducted in association with the companies through MoUs. The candidate shall be provided training in the industries in respective area. The training can also be given by the company experts in the college with appropriate infrastructure. Departments can design vocational programme/course as per employability skills for an engineer of respective discipline required. The student shall have to attend the training sessions for at least 4 hours per week. The training sessions shall be organized on weekends or on the extended hours of the college timing.

A faculty-in-charge will be appointed to monitor the functioning of the vocational course as well as monitor the performance of the student for the said course.

The student has to maintain proper record of the training attended throughout the semester and submit the report on the work carried out. The record has to be checked and signed by the faculty –in-charge.

Assessment:

The assessment of the performance of the candidate for the vocational courses shall be in the form of term work and oral. The term work and oral carry 50 marks. The candidate performance shall be evaluated based on the training undertaken by the candidate throughout the semester. Student shall give presentation of skills he learned through vocational courses followed by viva. External examiner for the same shall necessarily from relevant industry.

A total of 2 credits shall be allotted per vocational course per semester.

Certificate:

Every candidate shall be awarded a certificate after successful completion of the vocational course as per the rules & regulations.

The certificate shall be jointly signed by concerned authorities of college and the company.

5.4. Industry Taught Courses

PREAMBLE:

The concept of Industry Offered Courses enables bridging of technological gaps between students and state-of-the-art technologies used current in the industry.

OBJECTIVES: To

i. Impart the state-of-art technology course existing in the industry.

ii. Expose students to application of technologies adopted by industry.

iii. Train students for solving real-world projects in respective industries by applying technical knowledge gleaned from an industry expert

iv. Make students draw benefit from the experience of veterans from industry. Knowledge sharing by industry experts.

v. Align student's mind-set towards industrial environment through the instructor from industry. Provide industry instructor lead courses.

CREDIT/HRS.:

Percentage of Industry Taught Courses in the programme =……………. %

METHODOLOGY:

A) A faculty shall be appointed as course co-ordinator. Roles and responsibilities of Course coordinator are as follows:

(i) Act as a liaison between identified Industry expert and department.

(ii) Arrange schedule of lectures in consultation with identified Industry expert.

(iii) Keep record of students' attendance.

(iv) Collect feedback from students and suggest changes and modifications in lecture delivery method by industry subject expert.

(v) Keep record of Unit Test Performance and Practicals along with experts.

(vi) Organise visit to the industry relevant to the course.

B) Execution:

(i) The Identified industry expert can conduct theory classes on weekends or as per convenience of Industry experts either through offline or online mode. The courses which are to be taught by expert from industry are already identified and confirmed in workshop-I

(ii) Practical sessions will be conducted by course coordinator. Panel of experts from Industry shall be identified to teach the course before the commencement of the respective semester and submitted for the approval of the Head of the Institution with financial layout.

BHARATI VIDYAPEETH

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COLLEGE OF ENGINEERING, PUNE – 411043.

Approval format for Expenditure for Industry Taught Course

Date:

Name of the Department: ____

1. Budgetary allocation for industry expert (As per Budget 2021-22) Please mention total amount (in Rupees) and other bifurcations, if made---------------- (to be filled at college level)

2. No. of Lectures (Industry offered Course wise / Subject wise) required with specific subjects:

Sr.No.	Title of the course	Name of Department	Semester	Work Load per week	Details of Industry Expert(s)				Total Remuneration
					Name & Designation of Expert	Name of the company	Contact Details	Honorarium per lecture	
1									
2									
3									

Recommendation for Course Coordinator
Recommendation for HoD
Recommendation for Principal

3. Total financial Outlay for honorarium of Faculty: (Industry taught courses-Subject wise): with number of lectures (in Hours) in UG sections

Sr. No.	Name of industry Expert	Honorarium	Financial Outlay (in rupees)
1			
Total			

Signature of HoD **Signature of Principal**

Request format-To Industry Expert

To

……

Subject: Industry Taught Course (ITC) for B.Tech (…..) , Sem-____

Dear Sir,

Greetings from Dept. of _________, Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune

Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune, BV(DU)COEP an AICTE approved institution, was established in the year 1983 and is a constituent unit of Bharati Vidyapeeth (Deemed to be University), accredited (3rd Cycle) with 'A+' grade by NAAC and NBA.

In the national arena, BV(DU)COE Pune has been among top 100 Engineering Colleges of India, consecutively for five years (99th ranking in 2020) by MHRD in June 2020. It has also been ranked 20th at national level by AICTE Internshala for internships. Our reputation as India's premier engineering institution is further enhanced by being honored with the Platinum category by AICTE-CII survey. College is proud to be ranked 11th across India by the prestigious magazine India Today. DATAQUEST a leading journal, ranked BV(DU)COEP in 3rd position amongst the Top 50 Private T - Institutes of India. The college ranked 17th position in the survey conducted by Times of India in 2019.

----Brief about dept-----

The course curriculum has a multi-dimensional approach, it not only implements a dynamic, qualitative, and evolved structure and syllabus, but also incorporates a good and healthy mix of theoretical and practical exposure. In this regards the institute promotes and encourages courses in line with industry expectations and forthcoming challenges which should ease the students for undergoing industry offered courses for practical exposure of applications of Education system. This is much required to bridge the gap between Industry and Academia and by promoting industry orientation for creating a complete industry ready professional.

To fulfil these objectives, curriculum design, which will be implemented from the academic year 2021-22, B.Tech. program includes 6 courses taught by industry experts. With reference to the subject mentioned above, we request you to teach… ….. Total…… number of lectures (60 min each) are required to be delivered. A blended learning, to be offered for the students through combining online or offline teaching wherever and whichever is best possible. Therefore, I request you to send acceptance letter, mode of teaching, convenient day and time slot to teach the said course. Enclosed please find herewith standard format for reply.

With Thanks and Regards,

Sign and stamp of Head, Dept of ________

Enclose:- Course content

Reply

To

The Principal

BV(DU)

COE,

Pune.

Subject: - Acceptance for delivering/ conducting lecture of the course--------- of B.Tech(-----), Sem(---).

Ref.: - Your letter ------------------- dated-

Dear Sir,

This has a reference of your letter mentioned above. It gives me immense pleasure to accept your invitation to deliver lectures in the said course. Following will be the time-table for the lecture.

Sr. No.	Title of Course	Time	Days						
			Mon	Tue	Wed	Thu	Fri	Sat	Sun

Sincerely

<Signature >

< Name of Expert>

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COLLEGE OF ENGINEERING, PUNE – 411043.

Date:

AGREEMENT TIME-TABLE

Name of department:

Name of industry taught course:

Sr. No.	Day	Date	Time Slot

(Name & sign. of HOD with date & stamp) (Name & Sign. of Concerned Person)

Industry Taught Courses (Assessment- Theory/ Practical)

- One course coordinator should be appointed for the course. All documents related to assessment of the course will be maintained by the course coordinator.
- Total assessment of Industry Taught Course -Theory is of 100 Marks.
- Assessment of this course consists of Internal Assessment and End Semester Exam which carry 40 Marks and 60 Marks, respectively.
- Internal Assessment consists of assignments and mini projects.
- One real world project (mini project) is considered as part of Internal Assessment.
- Students should give presentation on given topic.
- Industry expert should set question papers.
- In case of practical exam, industry expert can take oral exam (may be online) and students will perform the experiments in the presence of course coordinator in the department.

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B.Tech (Brach Name) Sem __

Title of ITC: - _________

Record of Lecture Taken

Sr. No.	Lecture No.	Unit no.	Date of Conduction	Topic Covered	No. of Students Attended	Sign

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Bill format for remuneration for Industry Taught Courses

(The bill should be submitted directly to the concerned department on or before 5th of every month)

1. Name of industry expert: ______________________________

   Company/Industry name:

2. Name of the Department: ______________________________
3. Remuneration for the Month: ______________________________
4.

Name of the Bank	Branch	A/C No.	IFSC

5. Contact Details: -

Email	Cell Phone No.

6. Details of lectures delivered:

Sr. No.	Title of the Course	Class	Date	No. of lectures	Total Remuneration (Rs./lecture)
			Total		

Date: ____________

____

Signature of the Industry expert

Certified that has been appointed by the ----- dept as an industry expert for the course vide order No. ______________________

dated. ________________________ has delivered _____ lectures/taken classes during the month/ Sem ____________________

and is entitled to honorarium of Rs. ___________________(@Rs. ------- /- per lecture/per day)

Course Coordinator: __________________________

____

Signature of the Head of the Department with Seal

Date:

Receipt: -

Received with thanks ₹-------- from BVDUCOE, Pune towards conduct of -------- lectures of the course ------------- of B.Tech(-------), Sem--- --.

Signature of Industry Expert

BHARATI VIDYAPEETH
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COLLEGE OF ENGINEERING, PUNE – 411043.

Payment Record
(Copy to be maintained in the Department)

Sr. No	Name of Department	Name of course	Name of Industry Expert	Name of company	Email	Mo. No	Address	Amount	Remark/ check number transaction id

Encl:
1) College voucher copy
2) NEFT/RTGS copy

5.5 MOOCs Implementation

To inculcate the self-learning approach amongst the students, proposed curriculum has introduced Massive Open Online Courses to all the students. It will provide an affordable and flexible way to learn new skills, advance the career and deliver quality educational experiences at scale.

Also, National Education Policy is insisting the Online and Digital Education and Ensuring Equitable Use of Technology.

A massive open online course (MOOC) is an online course aimed at large-scale interactive participation and open access via the web. In addition to traditional course materials such as videos, readings, and problem sets, MOOCs provide interactive user forums that help build a community for the students, professors, and teaching assistants (TAs).

BV(DU)COE Pune is having active NPTEL local chapter-partnership. Proposed curriculum has introduced three MOOCs at B.Tech Sem – III, Sem V and Sem VII with following objectives.

1. To provide e-learning through online web and video courses in Engineering by experts in the country in that subject.
2. To develop self-learning attitude in students.
3. To provide platform for knowledge enhancement of student's as per their area of interest.
4. To update students with advanced technologies.
5. To make the students more employable.
6. To prepare the students for competitive exams like GATE and also for higher studies.

Methodology of Assessment:

- Department shall publish list of NPTEL courses in every semester. Student can refer selected one of them in respective semester.
- Considering pre-requisite, proposed curriculum has provided with the various subject baskets as per the courses available.
- Students need to enroll for the course in each academic year as mentioned in the structure.

- Students need to attend all online lectures and complete all assignments as per schedule for registered course.
- Student will register and appear for exam conducted by NPTEL and shall submit the copy of course completion certificate received after passing the exam for registered course.
- Accordingly, the credits will be allotted to the student for respective MOOCs.
- Students have the flexibility to attempt the said course during the entire B.Tech Programme to earn the credits of respective MOOCs.
- NPTEL courses relevant to respective branch are only expected to select by students. Credits will not be awarded if general/ non engineering courses opted.

5.6 Project I and II

Project Stage I Objectives:

Provide help to the students

- In generating a new idea or modify existing system for solving societal, industrial and/or institutional problem.
- In review of literature that aligns with new idea and/or existing systems and clearly defining the problem
- In developing a workflow process/methodology for the desired system.
- In designing various components of the system assembly
- In developing a CAD model of the desired system.
- In writing the technical report based on the work completed

Project Stage II Objectives:

Provide help to the students

- In fabrication of the experimental setup/new system and/or purchase of standard components
- In pilot run and/or validation of new system for its performance
- In modifying the system if required to improve its performance.
- In detailed parametric studies of the modified system and analyzing the results
- In writing the technical report, research article and/or filing a patent.

Particular	Hours per week	Credits allotted
Project I stage I	2	4
Project I stage II	2	4
Project II stage I	4	4
Project II stage II	4	6

Assessment & Evaluation:

For Project-I Stage I & II		
	Assessed through	**Marks**
Assessment Tools	Presentation 1	10
	Presentation 2	10
	Presentation 3	10
	Continuous Assessment by guide	10
	Final Project demonstration, presentation & viva voce (University Examination)	60
	Total Marks	**100**

For Project-II Stage I & II		
	Assessed through	**Marks**
Assessment Tools	Presentation 1	20
	Presentation 2	20
	Presentation 3	20
	Continuous Assessment by guide	20
	Final Project demonstration, presentation & viva voce (University Examination)	120
	Total marks	**200**

Minimum number of in-sem. project presentations: 03

Parameters for evaluation of project in University examination

1. Idea of Project/Topic
2. Technical content
3. Innovation
4. Experimentation/Model development/Software development/Simulation development etc.
5. Participation as an Individual
6. Research Potential
7. Project Hardware/Software
8. Fabrication/Model/Equipment development
9. Data Analysis
10. Attendance
11. Timely completion
12. Report writing
13. Presentation

Prepare a format for report card of indicating progress, assessment and progressive evaluation of the project. This progressive evaluation record (PER) is prerequisite for university examination.

Progressive Evaluation Record (PER) shall be submitted in the department at the end of the semester and made available at time of university examination.

Format for Internal Examination for Project- I & II
B.Tech (------), Sem--------

Roll No.	PRN	Name of student	Term Work Marks			
			Presentation-I (10%)	Presentation-II (10%)	Presentation-II (10%)	Continuous Assessment by Guide (10%)

Format for University Examination for Project- I & II

Roll No.	PRN	Name of student	Parameter for assessment of project and marks for examination													Total out of 100	Any five parameters out of remaining
			Idea of Project/Topic	Technical content	Innovation	Experimentation/Model development/Software development/Simulation development etc	Participation as an Individual	Research Potential	Project Hardware/Software	Fabrication/Model/Equipment development	Data Analysis	Attendance	Timely completion	Report writing	Presentation		
			10	10	10	10	10	10	10	10	10	10	10	10	10		

Out of 13 parameters, parameters no. 1,3,4,6 & 8 are mandatory and may be considered for assessment of the project. Each parameter will carry 10 marks for Project-I & 20 marks for Project-II.

5.7 Social Activities for the Learners

A) Introduction

The prime objective of Bharati Vidyapeeth (Deemed to be University) College of Engineering, Pune is holistic development of students. The learner achieves the status as "whole" when he/she has not only achieved success in academics but also has succeeded in bringing the nation up by connecting with socially left-out elements and bringing ray of hopes into their lives. In this respect, the new curriculum encourages the learner on the social activities. In this case, student's social activities are provided by the colleges, but not limited to them. Total of four credits assigned for these activities.

B) Objectives

a) To make people create balances, so they do not only focus on academic aspects, but there can also be other aspects to have in life.

b) To build better relationship with others.

c) To create great balance with the academic aspects.

d) To learn and understand society.

e) To develop the nature of help and enhance the ethical norms for behaviors.

f) Teamwork

C) Outcome of Social Activities:

The social activities make a good impact on learners. The learner:

a) Will be able to understand the needs of society.

It enables a learner to consider the perspective of other people and understand their needs by interacting with people from diverse backgrounds.

b) Will be able to understand different perspectives and engage other cultures.

Social events develop social skills and empathy—the outward-oriented dimensions of emotional intelligence (EQ). The interactions or conversations elicited by events helps students build relationships, understand different perspectives and engage other cultures. Social events provide an opportunity to expand one's social circle.

c) Will be able to maintain positive outlook towards life.

With high adaptability to diverse situations and a good level of understanding of other's opinions, socially aware learners are less likely to indulge in negative behavior. They are also less vulnerable to stressful situations and have fewer chances of getting involved in undisciplined behavior. These students also have a more positive outlook on life.

d) Will be able to maintain good emotional health.

Social activities keep the learners sharp and mentally engaged, and this is important to prevent the onset of serious diseases like dementia or Alzheimer. Connecting with others helps keep you in a positive mood, which in turn wards off depression by improving physical health and maintaining good emotional health as well.

D) Sample list of Social Activities (not limited to them)

a) Organizing Educational Camps

Educational camps may be organized for the socially and economically week elements, especially in rural areas or even in the slum areas of the city, by making them aware of the importance of education and their own human rights.

b) Tree Plantation Drive

There are so many health benefits to having plants around – like fresher air, improved emotional state, and reduction of illness in and around the society. Tree plantation in this respect plays a crucial role. Just planting the tree is not enough but it should be made to grow to its extent.

c) Offer Helping Hand for Martyrs Family by Fundraisers

Soldiers fight for our country, securing our borders. They don't think of their family and sacrifice their lives for us, and what we do for them? Packages are announced every time after the death of our worriers but rarely reaches them. Families keep waiting for years. In this regard, few of these forgotten families can be visited and a small helping hand can be lend to them, to make them lead their further life peacefully. Fundraising in this respect, is a great student society social idea. It is incredible to see how people can bring positive change if they work together. The youth can make a team with an external organization to take part in a purposeful community event as mentioned above.

d) National Service Scheme

It will help in the overall personality development of a learner by participating in projects that benefit the community. This extra-curricular activity is sponsored by the Ministry of Youth Affairs and Sports.

e) Felicitations of People who have contributed to the society but now forgotten by the society

There are so many intellectuals in our society who have achieved great heights in their field, who are stalwarts in different field but never came into limelight, their contribution is not recognized. Few of these can be invited publicly or visited at individual level by making a team and felicitate to appreciate their contribution towards the society or nation. Some of these stalwarts may be like Anand Kumar who teaches underprivileged students for IIT-JEE without a penny, Shekhar Naik who is the Captain of Indian Blind Cricket Team, Ranjeet Singh Desale who even being a rural teacher, is awarded by UNESCO with Global Teacher Prize, Ritu Biyani who fought cancer, traveled across the country to spread awareness.

f) Street Play on Social Awareness

This is also typically known as “Nukkad Natak”. This form has been used to propagate social and political messages and to create awareness amongst the people regarding social issues. What is important is that the plays make the people think. The play is seen by many people of different age groups who then question and discuss the contents of the play. There have been several plays exposing the mechanism of black marketing and hoarding. Some talk of the use of political power for pressurizing people. Others highlight caste conflicts or ideas about hygiene and health. Street plays are also used to encourage literacy amongst villagers. Street plays on some of the topics like degradation of Indian media, hypocrisy, responsibility towards environmental concerns, brain drain, dilapidated educational structure, safety issues and rights for women. child labor, organ/human trafficking etc., can be thought of. The learners can participate in street play festivals like Manthan Mahotsav, the largest street play festival in India.

g) Poster Exhibition on Contributions of Heroes of India

The learners can organize an exhibition to not only display but explain the contribution of Indian Heroes who have been forgotten and remained in the book of history. Some of these inspiring heroes may be Mihir Sen, Khashaba Dadasaheb Jadhav, Anandibai Joshi – First woman doctor from India, Bhikaji Cama, Khudiram Bose, Baba and Prakash Amte etc. Such exhibitions make inspired, the youth of today's generation.

h) Waste Clean Drive

i) Educating literacy-poor societies about disposal of nature-harming objects

j) Distributing needful items for living in economically backward societies

k) Organizing early completion on national issues.

l) Cleaning of Public Places/ Traffic Management/ Police Mitra.

m) Organizing activities under engagement of people with Science and Technology.

Report of social activities conducted each student shall be prepared in standard format. Appropriate documentary evidences shall be part of report of students correspondence with respective authorities for social activities, permissions, certificates from Institutes/Organization/Local Government are essential documents for award of credits under this head.

E) Summary

Thus the interactions or conversations elicited by such social events help students to build relationships, understand different perspectives and engage other cultures and these events not only will uplift the moral of the society but also ignite minds of generations ahead to provide their support and enthusiastically participate in such activities. Such interactions will certainly provide an opportunity to expand their own social circle.

5.8 Internship

Internship of 60 days is incorporated as an integrated part of curriculum structure-2021. The primary objective of internship is to make students familiar with industry environment and to take up on- site assignment as trainees or interns in order to bridge the gap between theory and industrial practices. It is mandatory for students to undergo in-plant training after completion of semester VI in reputed industrial organization. The student shall submit the "Intern Certificate" issued by the industry organization as well as a technical report not exceeding 30 pages within the stipulated time to be eligible for making a presentation before the committee constituted by the department. On the basis of daily work carried out in the industry, student shall prepare a record book. This record book shall be checked and signed by his/her supervisor from the industry where he/she is doing internship on daily basis.

University examination carries 50 marks and after successful completion, student may be awarded 3 credits for the internship work. Standard format for record book shall be as below. Marks will be awarded out of maximum 50 and three credits will be given upon completion of internship towards the degree requirements, as per the regulations. Internship will ultimately assist students to apply theory learned in classroom to industrial practices so as to understand engineering/technical solutions in a global, economic, environmental and societal context.

5.9 Research paper publication

Research paper publication is one of the innovative features of programme curriculum- 2021.

1. It has been & introduced in 7th semester. Two credits are awarded for the same subject to publish of research paper. Student shall publish a research paper in peer reviewed/ Standard journal(not in paid journals) based on research work carried out for Project-I. Guide for Project-I shall be responsible for Writing manuscript, Selection of journal for publication, Submission of manuscript to the journal. Progress report of publication of research paper shall be prepared in standard format and submitted for the award of credits. Students shall be first author of research papers. No name either of faculty members except guide or other students shall be added without any contribution in research/project work. Format for progress report of research paper published (To be maintained by Guide). A departmental committee comprising of head of department, project guide, and one senior professor will review the progress of this activity periodically (not exceeding three months). The suggestions/comments offered by committee will be incorporated in due course of time to accomplish the task within a predetermined period.

2. Research paper publication as a integrated part of the course structure, will inculcate research aptitude among students. This will help there in seeking admissions in reputed International Universities for higher studies. Further, this research aptitude developed may enhance his employability also.

3. This activity is expected to generate 15 to 20 publication per year, which will enhance research profile of department and institute too.

4. Hence, there should be team of maximum 3 to 4 students per project except very exceptional projects. Prior permission to increase team size is essential.

Weekly progress report of the research paper publication.

Title of the project -

Name of the Guide -

Weekly schedule of meeting- Day------- Time-----

Student Details - Name--------- PRN------ Roll No.---

Sr. No.	Week No.	Date	Work completed/done by students per week

B. Tech-Electronics & Telecommunication Engineering

STRUCTURE

Bharati Vidyapeeth (Deemed to be) University, Pune

Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – I (2021 Course)															
Sr. No.	**Name of the course**	**Teaching Scheme (Hrs. / Week**			**Examination Scheme (Marks)**						**Credits**				
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
1	Linear Algebra and Calculus	03	00	01	60	40	00	00	00	100	03	00	01	04
2	Physics for Electronics Engineering	04	02	00	60	40	50	00	00	150	04	01	00	05
3	Electrical Technology	04	02	00	60	40	50	00	00	150	04	01	00	05
4	Elementary Electronics	04	02	00	60	40	25	25	00	150	04	01	00	05
5	‘C’ Programming	04	02	00	60	40	50	00	00	150	04	01	00	05
6	MATLAB Fundamentals	00	02	00	00	00	50	00	00	50	00	01	00	01
	Total	**19**	**10**	**01**	**300**	**200**	**225**	**25**	**00**	**750**	**19**	**05**	**01**	**25**

Bharati Vidyapeeth (Deemed to be) University, Pune.
Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – II (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme (Hrs. / Week**			**Examination Scheme (Marks)**						**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
7	Differential Equations and Complex Analysis	03	00	01	60	40	00	00	00	100	03	00	01	04
8	Chemistry of Electronic Materials	03	02	00	60	40	50	00	00	150	03	01	00	04
9	Digital Electronics	04	02	00	60	40	25	25	00	150	04	01	00	05
10	Semiconductor Devices and Circuits-I	04	02	00	60	40	25	25	00	150	04	01	00	05
11	Python Programming	04	02	00	60	40	50	00	00	150	04	01	00	05
12	Computer Aided Drafting	00	04	00	00	00	50	00	00	50	00	02	00	02
	Total	**18**	**12**	**01**	**300**	**200**	**200**	**50**	**00**	**750**	**18**	**06**	**01**	**25**

Bharati Vidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – III (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme (Hrs. / Week**			**Examination Scheme (Marks)**						**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
13	Advanced Mathematics-for Electronics	03	00	01	60	40	00	00	00	100	03	00	01	04
14	Semiconductor Devices and Circuits-II	04	02	00	60	40	25	00	25	150	04	01	00	05
15	Signals and Linear Systems	04	00	00	60	40	00	00	00	100	04	00	00	04
16	Network Analysis and Synthesis	04	02	00	60	40	25	25	00	150	04	01	00	05
17	Database Management Systems*	04	02	00	60	40	25	25	00	150	04	01	00	05
18	EDA Tool Practices	00	02	00	00	00	50	00	00	50	00	01	00	01
19	Vocational Course - I: PCB Design and Soldering	00	02	00	00	00	25	25	00	50	00	01	00	01
	Total	**19**	**10**	**01**	**300**	**200**	**150**	**75**	**25**	**750**	**19**	**05**	**01**	**25**
	Social Activity- I **	-	-	-	-	-	-	-	-	-	-	-	-	2

*Industry Taught Course – I
** Add on course

Bharati Vidyapeeth (Deemed to be) University, Pune

Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – IV (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
20	Control Systems and Application	04	00	00	60	40	00	00	00	100	04	00	00	04
21	Integrated Circuits and Applications	04	02	00	60	40	25	00	25	150	04	01	00	05
22	Electromagnetics and Transmission Lines	03	00	01	60	40	00	00	00	100	03	00	01	04
23	Analog Communication	04	02	00	60	40	25	25	00	150	04	01	00	05
24	Data Science*	04	02	00	60	40	50	00	00	150	04	01	00	05
25	Advanced Computer Programming	00	02	00	00	00	25	25	00	50	00	01	00	01
26	Vocational Course-II Sensor Modelling and Simulation Laboratory	00	02	00	00	00	25	25	00	50	00	01	00	01
	Total	**19**	**10**	**01**	**300**	**200**	**150**	**75**	**25**	**750**	**19**	**05**	**01**	**25**
	MOOC-I**	--	--	--	-	-	--		--	--	-	-	-	2

*Industry Taught Course – II

** Add on course

Bharati Vidyapeeth (Deemed to be) University, Pune.

Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – V (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
27	Embedded systems	04	02	00	60	40	25	25	00	150	04	01	00	05
28	Digital Communication System	04	02	00	60	40	25	25	00	150	04	01	00	05
29	Power Electronics	04	02	00	60	40	25	25	00	150	04	01	00	05
30	Microwave and Antenna	04	02	00	60	40	25	25	00	150	04	01	00	05
31	Data Communication and Networking *	03	00	01	60	40	00	00	00	100	03	00	01	04
32	Vocational Course-III Microcontroller Programming	00	02	00	00	00	25	00	25	50	00	01	00	01
	Total	**19**	**10**	**01**	**300**	**200**	**125**	**100**	**25**	**750**	**19**	**05**	**01**	**25**
	Environmental Studies**	2	-	-	50	-	-	\-	-	-	-	-	-	-
	Social Activity- II ***	-	-	-	-	-	-	-	-	-	-	-	-	2

*Industry Taught Course – III
***Mandatory audit course
*** Add on course

Bharati Vidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – VI (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**		
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
33	Photonics	04	02	00	60	40	50	00	00	150	04	01	00	05
34	Digital Signal Processing	04	02	00	60	40	25	25	00	150	04	01	00	05
35	CMOS Design	04	02	00	60	40	25	25	00	150	04	01	00	05
36	Quantitative techniques, Communication and Values	04	00	00	60	40	00	00	00	100	04	00	00	04
37	Internet of Things*	03	00	01	60	40	00	00	00	100	03	00	01	04
38	VHDL	00	02	00	00	00	25	00	25	50	00	01	00	01
39	Vocational Course-IV Web App Development	00	02	00	00	00	25	25	00	50	00	01	00	01
	Total	19	10	01	300	200	150	75	25	750	19	05	01	25
	MOOC-II**	--	--	--	-	-	--		--	--	-	-	-	2

* Industry Taught Course – IV
** Add on course

Bharati Vidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

	Programme :B.Tech (E &Tc) Sem – VII (2021 Course)													
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
40	Soft Computing	04	02	00	60	40	25	00	25	150	04	01	00	05
41	Radio Frequency Engineering	04	00	00	60	40	00	00	00	100	04	00	00	04
42	Elective- I	03	02	00	60	40	25	25	00	150	03	01	00	04
43	Industrial Wireless Sensor Network*	04	02	00	60	40	50	00	00	150	04	01	00	05
44	Electronic Product Design	00	02	00	00	00	50	00	00	50	00	01	00	01
45	Project Stage I	00	02	00	00	00	50	50	00	100	00	03	00	03
46	Internship#	00	00	00	00	00	25	25	00	50	00	03	00	03
	Total	15	10	00	240	160	225	100	25	750	15	10	00	25

Elective-I

Sr No	**Subject Name**
1	Telecom Network Management
2	Advanced Embedded System Design
3	Image processing

*Industry Taught Course – V
Period- 60 days

Bharati Vidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

	Programme:B.Tech (E &Tc) Sem – VIII (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
47	Mobile Communication	04	02	00	60	40	25	00	00	125	04	01	00	05
48	Satellite Communication & Radar	04	02	00	60	40	25	00	25	150	04	01	00	05
49	Elective II	03	02	00	60	40	25	00	00	125	03	01	00	04
50	Cyber security*	03	00	01	60	40	00	00	00	100	03	00	01	04
51	Cloud Computing	00	02	00	00	00	25	25	00	50	00	01	00	01
52	Project Stage-II	00	04	00	00	00	100	100	00	200	00	06	00	06
	Total	**14**	**12**	01	240	160	200	125	25	750	**14**	10	**01**	**25**
	Research Paper Publication**	-	-	-	-	-	-	-	-	-	-	-	-	2

Elective-II

Sr No	Subject Name
1	Software Defined Radio
2	Automotive Electronics
3	Computer Vision

*Industry Taught Course – VI
** Add on course

SEMESTER:- I
SYLLABUS

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. I: Electronics & Telecommunication Engineering
SUBJECT: - LINEAR ALGEBRA and CALCULUS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits: 01
		Total Credit: 04

Course Pre-requisites: Class XII Mathematics

Course Objectives:

1.	To teach the differential calculus.
2.	To teach linear algebra and linear transformation.
3.	To introduce ordinary differential equations.

Course Outcomes: After learning this course students will be able to

1	Evaluate the matrices and its application to the system of linear equations.
2	Evaluate vector spaces and linear transformation
3	Solve numerical problems involving differential calculus.
4	Compute maxima, minima, and multiple integrals.
5	Evaluate the theorems in integral Calculus.

6	Use the methods of first order and first-degree differential equation.	
UNIT – I	**Linear algebra: Matrices**	**(06 Hours)**
	Algebra of Matrices, System of Linear Equations, Linear Dependence and Independence, rank, row operations and Gauss elimination, Applications to systems of linear equations, Cayley – Hamilton Theorem	
UNIT – II	**Vector space and Linear Transformations**	**(06 Hours)**
	Vector spaces, subspaces, Eigen values and Eigen Vectors and their basic properties, Linear and Orthogonal Transformations, rank -nullity theorem, Existence and Uniqueness Theorem for Linear Systems, product spaces, Gram-Schmidt process, Diagonalization	
UNIT - III	**Differential Calculus**	**(06 Hours)**
	Limits of sequences and functions, continuity, uniform continuity and differentiability, Mean value theorems, L' Hospital's Rule. Euler's Theorem on Homogeneous Functions. Taylor's theorem with proof, Partial derivatives, Chain rule.	
UNIT -IV	**Maxima and Minima for several**	**(06 Hours)**
	Maxima, minima, saddle points. gradient, directional derivatives, Lagrange multipliers, Exact differentials, Errors, and approximations. Repeated and multiple integrals applications to volume, surface area, moments of inertia, etc.	

UNIT -V	**Integral Calculus**	**(06 Hours)**
	Riemann integral and the fundamental theorem of integral calculus, Rolle's theorem, Applications to length, area, volume, surface area of revolution. Moments, centers of mass and gravity.	
UNIT -VI	**Ordinary differential equation**	**(06 Hours)**
	Ordinary differential equations of the 1st order, exactness and integrating factors,applications of first order and first-degree differential equation in orthogonal trajectories and electrical circuits. Picard's iteration method.	

Topics for projets based learning*
1. Cramer’s rule
2. System of linear equations solution
3. Rank of matrix
4. Gauss elimination
5. LU-decomposition method
6. Dimension and basis
7. Gram Schmidt Orthogonalization
8. rank -nullity theorem
9. Euler's Theorem on Homogeneous Functions
10. Maxima and minima for two variable function
11. Eigen values and Eigen vectors
12. Multiple integrals applications
13. Formation of differential equation
14. Linear differential equation
15. Kirchhoff’s voltage law
*Students in a group of 3 to 4 shall complete any one project from the above list

Textbooks/Reference Books
1.'Advanced Engineering Mathematics' by Erwin reyszig
2.'Advanced Engineering Mathematics' by Dennis G. Zill and Warren S. Wright
3.AppliedMathematics(VolumesIandII)byP.N.Wartikar&J.N.Wartikar
4.HigherEngineeringMathematicsbyB.S.Grewal
5.HigherEngineeringMathematicsbyB.V.Ramana
6.AdvancedEngineeringMathematics

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. I: Electronics & Telecommunication Engineering
SUBJECT: - PHYSICS FOR ELECTRONICS ENGINEERING

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 05

Course Pre-requisites:

Basic Physics and Calculus.

Course Objectives:

To impart knowledge of basic concepts in physics relevant to engineering applications in a broader sense with a view to lay foundation for the Electronics and Telecommunication.

Course Outcomes:

After learning this course students will be able to

1	Demonstrate the knowledge of properties of charged particles and their use in modern instruments
2	Solve the quantum physics problemsat micro level phenomena.
3	Explain mechanical properties of solid matter and connect to applications in the field of engineering.
4	Demonstrate the working of PN junctions in semiconductor devices under various conditions.

5	Demonstrate the wave nature of light and apply it to measure stress, pressure and dimension.		
6	Analyze the problems associated with architectural acoustics and give their remedies.		
UNIT – I	**Modern Physics**		**(08 Hours)**
	Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focusing, Electron microscope, Wavelength and resolution, Specimen limitation, Depth of field and focus, TEM, SEM and EDS, Separation of isotopes by Bainbridge mass spectrograph, CRT.		
UNIT – II	**Quantum mechanics**		**(08 Hours)**
	Dual nature of matter, concept of wave packet, group and phase velocity and relation between them, Physical significance of wave function, Schrodinger's time dependent and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box, Applications of Schrodinger's Equation: Infinite Potential Well and the Potential Barrier.		
UNIT - III	**Solid state Electronics-I**		**(08 Hours)**
	Superconductors, properties, Meissner effect, Type I and Type II superconductors, BCS theory of superconductivity (Qualitative) - High Tc superconductors – Applications of superconductors – SQUID, cryotron, magnetic levitation. Formation of Energy Bands, E-k Diagram, Origin of band gap, Energy bands in solids, Effective mass of electron, Fermi-Dirac Distribution, Conductivity in conductor and semi-conductors.		

UNIT -IV	**Solid State Electronics-II**	**(08 Hours)**
	Review of intrinsic and Extrinsic semiconductors, The no and po equations, Drift and Diffusion Currents, Regeneration process, Recombination Process, Derivation of Current Continuity Equation, Position of Fermi level in intrinsic semi-conductors (with derivation) and in extrinsic semi-conductors, Minority Carrier injection and recombination in Homogeneous Semiconductor, p-n junction formation, Band structure of p-n junction diode under forward and reverse biasing, Junction Capacitance, Photovoltaic effect, Solar cell and its characteristics.	
UNIT -V	**Interference, Diffraction and Polarization**	**(08 Hours)**
	Interference: Interference due to thin film of uniform thickness, engineering applications of interference (optical flatness, non-reflecting coatings). **Diffraction**: Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima. **Polarization**: Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism	
UNIT -VI	**Acoustics**	**(08 Hours)**
	Elementary Acoustics, reverberation and reverberation time, Sabine's formula, pressure and intensity level, different types of noise and their remedies, Electro Acoustic transducers	

	(piezoelectric transducers, electrostatic transducer, magnetic transducer, magneto strictive transducer), Types of Microphones, Loudspeaker, stereophony, sound recording and Sound reinforcement systems.	

<u>Lab Experiment :</u>(Any Eight of the Following)

1. Study of Lissajous figure by Cathode Ray Oscilloscope (CRO)
2. Determination of e/m by Thomson method.
3. Plotting the hysteresis loop for given magnetic material.
4. To study Hall effect and determine the Hall voltage.
5. Calculation of conductivity by four probe methods.
6. Study of solar cell characteristics and calculation of fill factor.
7. Determination of band gap of semiconductor.
8. Determination of radius of Plano convex lens/wavelength of light/Flatness testing by Newton's rings
9. Determination of wavelength of light using diffraction grating.
10. Determination of resolving power of telescope.
11. Determination of thickness of a thin wire by air wedge.
12. Determination of refractive index for O-ray and E-ray.
13. To determine the velocity of sound.
14. Measurement of average SPL across spherical wavefront and behavior with the distance.
15. Expansion chamber muffler: investigation of muffler response as a filter in the low frequency approximation by determining insertion loss.
16. Interference of sound using PC speakers.

Assignments

Six assignments to be given by the subject teacher (Theory)-one from each unit/one mini project with report-students can work in group of 4 Maximum

Topics for projets based learning*

1. Design and simulation of automatic solar powered time regulated water pumping

2. Solar technology: an alternative source of energy for national development
3. Comparison of various method used in measuring the gravitational constant g
4. Possible effects of electromagnetic fields (emf) on human health
5. The design and construction of the hearing aid device
6. Design and construction of digital distance measuring instrument
7. Design and construction of automatic bell ringer
8. Design and construction of sound or clap activated alarm
9. Electronic eye (Laser Security) as autoswitch/security system
10. Electric power generation by road power
11. Wireless power transfer
12. Determination of velocity of O-ray and E-ray in different double refracting materials
13. Quantum confinement effect in wide band semiconductors
14. Tesla Coil
15. LiFi- wireless data transfer system using light
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. A Textbook of Engineering Physics, M N Avadhanulu, P G Kshirsagar and TVS Arun Murthy, S. Chand Publishing (2018).
2. Engineering Physics, R K Gaur and S L Gupta, Dhanpat Rai Publishing Co Pvt Ltd (2015)
3. Concepts of Modern Physics, Arthur Beiser, Shobhit Mahajan and S. Rai Choudhury, McGraw Hill Education (2017)
Reference Books:
1. Fundamentals of Physics, Jearl Walker, David Halliday and Robert Resnick, John Wiley and Sons (2013)
2. Optics, Francis Jenkins and Harvey White, Tata Mcgraw Hill (2017)
3. Principles of Physics, John W. Jewett,Cengage publishing (2013)
4. Introduction to Solid State Physics, C. Kittel, Wiley and Sons (2004)
5. Principles of Solid-State Physics, H. V. Keer, New Age International (1993)
6. Laser and Non-Linear Optics, B. B. Laud, New Age International Private Limited (2011)
7. Nanotechnology: Principles and Practices, Dr. S. K. Kulkarni, Capital Publishing Company (2014)
8. Science of Engineering Materials- C.M. Srivastava and C. Srinivasan, New Age International Pvt. Ltd. (1997)
9. Introduction to Electrodynamics –David R. Griffiths, Pearson (2013)

10. Renewable Energy: Power for a Sustainable Future, Boyle, Oxford University Press (2012)

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B. Tech. Sem. I: Electronics & Telecommunication Engineering
SUBJECT: - ELECTRICAL TECHNOLOGY

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 04	End Semester Examination: 60 Marks	Credits :04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credits: 5

Course Pre-requisites:

	Physics and Mathematics

Course Objectives:

1.	To introduce fundamental concepts, various laws-principles and theorems associated with electrical systems.
2.	To impart basic knowledge of all electrical quantities such as current, voltage, power, energy, frequency along with different types of fields.
3.	To provide knowledge about fundamental parameters such as resistance, inductance and capacitance and magnetic circuits, AC and DC circuits
4.	To provide knowledge of Electrical Measurement technique and Electrical Safety Practices.

Course Outcomes: After learning this course students will be able to

1	Calculate the circuit parameters using dc network theorems.
2	Demonstrate the knowledge of various parameters related to magnetic circuit and single-phase ac circuits.
3	Classify the various parameters of 3-phase AC circuits and apply the concepts of single-phase transformer.

4	Demonstrate the knowledge of various power generation and transmission techniques.		
5	Explain the Construction and working principle of DC and AC machines.		
6	Apply the various measurement techniques of circuit parameters and safety norms.		
UNIT – I	**DC Circuit Analysis and Network Theorems:**		**(08 Hours)**
	Circuit Concepts: Concepts of network, Active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, R, L and C as linear elements, source transformation. Kirchhoff's laws; loop and nodal methods of analysis; star-delta transformation; Network Theorems: Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem (simple numerical problems).		
UNIT – II	**Magnetic Circuit and Single-Phase AC Circuits**		**(08 Hours)**
	Magnetic Circuit: Magnetic circuit concepts, analogy between electric & magnetic circuits, magnetic circuits with DC and AC excitations, magnetic leakage, B-H curve, hysteresis and eddy current losses, magnetic circuit calculations, mutual coupling **Single Phase AC Circuits:** AC Fundamentals: Sinusoidal, square and triangular waveforms – average and effective values, form and peak factors, concept of phasors, phasor representation of sinusoidally varying voltage and current. Analysis of series, parallel and series parallel RLC Circuits: apparent, active & reactive powers, power factor, causes and problems of low power factor, power factor improvement; resonance in series and parallel circuits, quality factor (simple numerical problems		
UNIT - III	**Three Phase AC Circuits:**		**(08 Hours)**
	Three Phase AC Circuits: Three phase system-its necessity and advantages, meaning of phase sequence, star and delta connections, balanced supply and balanced load, line, and phase voltage/current relations (Simple derivations), three-phase power and its measurement (simple numerical problems). **Single Phase Transformer:** Principle of operation, construction, e.m. f. equation, equivalent		

	circuit, power losses, efficiency (simple numerical problems), introduction to auto transformer. Three phase transformer and its different winding connections	
UNIT -IV	**Power Generation and Power System**	**(08 Hours)**
	Power Generation: Power Generation techniques using conventional (Hydro, Thermal, nuclear, Gas) & non-conventional resources (Solar, Wind, biogas). **Introduction to Power System:** General layout of electrical power system and functions of its elements, standard transmission, and distribution voltages, layout. Concept of grid (elementary treatment only)	
	DC Machines and AC Machines	**(08 Hours)**
	DC Machines: Principles of electromechanical energy conversion, DC machines: types, Construction & working, e. m. f. equation of generator and torque equation of motor, speed control, characteristics and applications of dc motors (simple numerical problems). **AC Machines:** Single Phase Induction motor: Principle of operation and introduction to methods of starting, applications. Three Phase Induction Motor: Principle of operation, slip-torque characteristics, applications (numerical problems related to slip only	
UNIT -VI	**Electrical Measurement technique**	**(08 Hours)**
	Electrical Measurement technique: Electrical instruments such as wattmeter, energy meter, tong-tester, megger, and power analyzer. Measurement of circuit parameters like resistance, inductance and capacitance using DC and AC bridges. **Electrical Safety Practises:**Electric shock, precautions against shock, First aid for electric shock other hazards of electrical laboratories & safety rules, Objectives of Earthing, types of earthing;	

	pipe and plate earthing, Residual current circuit breaker (RCCB).	

Term Work:

1. Find the current in the given network using Super position Theorem
2. Find the current in the given network using Thevenin's and Notton's Theorem
3. To Plot the B-H characteristics for a magnetic material
4. To find the voltage and current relationships in R-L series, R-C series, R-L-C series circuit
5. To find the voltage and current relationships in R-L-C series resonance circuit.
6. Verification of voltage and current relationships in star and delta connected 3-phase networks
7. To find efficiency and regulation of single-phase transformer
8. To control the speed of DC shunt motor using fulx control and armature voltage control method.
9. To control the speed of DC shunt motor using fulx control and armature voltage control method.
10. Find the unknown resistance using Kelvin's double bridge.
11. Find the unknown inductance using Anderson's bridge.
12. Measurement of power and energy in single phase ac circuit.

Note: The term work shall be the record of minimum eight experiments performed from the above list.

Topics for projets based learning*

1.Design a small circuit for superposition theorem.
2. Design small circuit to study Thevenin's Theorem.
3. Design Small circuit to study Norton's Theorem.
4. Design small circuit to study R-C series circuit.
5. Design small circuit to study R-L series circuit.
6. Design small circuit to study R-L-C series circuit.
7. Design of Tesla Coil.
8. Design small two winding transformer.
9. Design small electromagnet.
10. Design a small doorbell.

11. Design of wireless power transmission.
12. Design of electric buzzer.
13. Design of small wind farm.
14. Design of small solar power plant.
15. Design of small galvanometer.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text-books:
1. Electrical Technology - Edward Huges (Pearson
1. Basic Electrical Engineering - D. P. Kothari, J Nagarath (TMC)
2. Electrical power system technology - S. W. Fordo, D. R. Patric (Prentice Hall)
Reference Books:
1. Principles of Electronics-Dr. H. M. Rai (Satya Prakashan)
2. Electronic Devices and Circuit Theory- R. L. Boylestad and L. Nashelsky (PHI)
3. Electrical, Electronics Measurements and Instruments - (SatyaPrakashan)
4. Principles of Communication Engineering - Anokh Singh, A. K. Chhabra (S Chand)
5. Electrical Technology - Volume I & volume – II by B L Theraja and AK Theraja*(S Chand)*

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B. Tech. Sem. I: Electronics & Telecommunication Engineering
SUBJECT: - ELEMENTRY ELECTRONICS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 05

Course Pre-requisites:

	Physics, Chemistry, Mathematics (Class XII)

Course Objectives:

1.	To teach the construction, working, ratings and application of passive devices like resistors, capacitors, inductors, transformers, and relays
2.	To introduce types of Voltage and current sources
3.	To teach the construction, working and ratings of devices like PNjunction diode, Schottky diode, Zener diode, bipolar junction transistor
4.	To teach the construction, working and ratings of field effect transistor and MOSFET
5.	To teach the construction, working and ratings of optoelectronic devices like LDR, LED, phototransistor, and photovoltaic cell
6.	To introduce the concept of grounding and shielding, PCB layout design, PCB fabrication process, with the aid of an EDA tool.

Course Outcomes: After learning this course students will be able to	
1	Classify resistors, capacitors, inductors, and transformer based on their construction, types and ratings and analyze simple circuits consisting of passive devices
2	Analyze circuits using voltage and current sources
3	Classifyactive devices based on their types and ratings and plot their characteristic curves
4	Classifyoptoelectronic devices based on their types and ratings and plot their characteristic curves.
5	Use the concepts of grounding and shielding while designing PCB, explain the PCB design and fabrication and assembly process
6	Use EDA tools for designing single sided PCB for simple circuits

UNIT – I	**Passive Electronic Components**	**(08 Hours)**
	Introduction to the concept of active and passive electronic devices, Types of resistors, construction, ratings and typical applications, Types of capacitors, construction, ratings and typical applications, Types of inductors, construction, ratings and typical applications, Types of transformers, construction, ratings and typical applications, Construction of relays, types and ratings, Analysis of series and parallel resistors and capacitor circuits	
UNIT – II	**Sources**	**(08 Hours)**
	Types of voltage and current sources (AC and DC), Concept of ideal and non-ideal voltage source, Concept of ideal and non-ideal current source, Series and parallel combinations of sources, Loading effect, Dependent voltage and current sources, Electrochemical cells and batteries, Types and characteristics, Regulation concept (Line regulation, load regulation, temperature stability factor)	

UNIT - III	**Diodes and BJT**	**(08 Hours)**
	Classification of material based on band gap theory, Types of semiconductors (p-type and n-type), PN junction diode and its characteristics, Schottky diode, Zener diode, Diode models, Concept of DC and AC load line and ratings of PN junction diode, Introduction to BJT (NPN and PNP) and its construction and working mechanism, BJT configurations and their input and output characteristics, Types and ratings of BJT	
UNIT -IV	**FET and MOSFET**	**(08 Hours)**
	Construction and working mechanism of FET, Input and output characteristics of FET, FET configurations, Ratings of FET, Construction and working of DMOSFET and EMOSFET, Characteristics of DMOSFET and EMOSFET, Configurations and ratings of EMOSFET	
UNIT -V	**Opto-Electronics**	**(08 Hours)**
	Construction and working of LDR and its characteristics, simple application, Construction and working of LED and its characteristics and ratings, Photo-transistor and its characteristics, Introduction to the concept of electrical isolation and its importance, Construction of opto-isolator(opto-coupler) and its ratings, Construction and working of photovoltaic cell and its characteristics and ratings	
UNIT -VI	**PCB (Printed Circuit Board)**	**(08 Hours)**
	Concept of grounding, shielding and its importance, building blocks of PCB (track, pads, fills) and design rules, PCB fabrication and assembly, Introduction to EDA tool for artwork design of a simple single sided PCB Soldering: Types of solder alloys, soldering equipment, specifications of solder alloys	
List of experiments:		

1. Study of resistors, capacitors, and inductors
2. Plot V-I Characteristics of PN Junction Diode
3. Plot V-I Characteristics of Zener Diode
4. Plot Input and Output Characteristics of BJT in CE Configuration
5. Plot Transfer and output characteristics of FET
6. Plot Transfer and output characteristics of EMOSFET
7. Plot characteristics of LDR
8. Plot characteristics of Opto-isolator
9. Study of Relays
Topics for projets based learning*
1.Survey report of types of resistors, capacitors, transformers their form factors, specifications and price
2.Survey report of types of batteries, their form factors, specifications and price
3.Survey report of types of low power relays, their form factors, specifications and price
4.Survey report of types of diodes, BJT, MOSFET, their form factors, specifications and price
5.Build a shunt regulator and measure its line and load regulation
6.Build a full-wave rectifier with capacitor input filter and test it
7.Build a small signal voltage amplifier (BJT) and test it
8.Build a switch using BJT, MOSFET, relay and test it
9.Build a simple day light switch with an LDR, BJT and Relay
10.Build a motion sensor switch
11.Build a fire alarm circuit
12.Implement and test a given circuit on a general purpose PCB

13.Build a simple water level indicator
14.Build a simple temperature indicator
15.Build a LED Light Bulb Circuit
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books/ Reference Books:
1. Passive Components for Circuit Design, Ian Sinclair,1st Edition 2000, ISBN: 9780750649339, Newnes
2Grob's Basic Electronics, Mitchel Schultz,11th Edition,2010, ISBN-13: 978-0-07-351085-9, McGraw Hill
3.Fundamentals of Electronic Devices and Circuits, David A. Bell, 5th Edition,2008, Oxford University Press,
4Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015,Oxford University Press
5.Linden's Handbook of Batteries, Thomas Reddy,4th Editiion,2010, ISBN: 978-0-07-162419-0, McGraw Hill
6.Printed circuit boards: design, fabrication, assembly and testing, Raghbir Singh Khandpur,2006, ISBN 10:0071464204, McGraw Hill
7. The Circuit Designer's Companion, Peter Wilson, 4th Edition,2017, ISBN: 978-0-08-101764-7, Newnes

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B. Tech. Sem. I: Electronics & Telecommunication Engineering **SUBJECT: - C PROGRAMMING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:

	Flow charts

Course Objectives:

- A student will gain a thorough understanding of the fundamentals of C programming.
- A student will be able to code, compile, and test C programs.
- A Student will be able to solve Problems using C language.

Course Outcomes: After learning this course students will be able to

1	Apply the basic concepts of programming using C language.
2	Write basic programs using conditional statement.
3	Use 2 D Array in programming
4	Create functions and Pass parameters.
5	Construct structures using Pointers.
6	Apply basic concepts of graphics using C language.

UNIT – I	**Introduction Basic of C**	**(08 Hours)**

	Structure of a C program, identifiers, basic data types and sizes. Constants, variables, arithmetic, relational and logical operators Managing input and output operations, Sample programs.	
UNIT – II	**Conditional Statements and Loops**	**(07 Hours)**
	Decision making within a program, conditions, if statement, if-else statement, loops: while loop, do while, for loop. Nested loops, infinite loops, switch statement, sample programs	
UNIT - III	**Arrays & Strings**	
	Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, , Array applications: Matrix Operations.	**(08 Hours)**
UNIT -IV	**Functions & Pointers**	**(07 Hours)**
	Basics, parameter passing, storage classes- extern, auto, register, static, scope rules, user defined functions, , recursive functions, Recursive solutions for Fibonacci series, example c programs. Passing arrays & strings to functions.	
UNIT -V	**Pointers and Structures**	**(10 Hours)**
	Derived types- structures- declaration, definition, and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self-referential structures, bit-fields, program applications. Different types of stacks and queues.	

UNIT -VI	**Basic of Graphics**	**(08 Hours)**
	Introduction, what is computer Graphics? Area of Computer Graphics. Graphics programming, initializing the graphics, C Graphical functions, simple programs	
<u>List of Experiments:</u>		
1.	▪ Write a C program to take user Input and print it on the screen. ▪ Write a C program to perform addition or subtraction of two numbers. ▪ Write a C program to find whether the number is Odd or Even. ▪ Write a C program to find out Prime numbers. ▪ Write a C program to find out Fibonacci series.	
2.	▪ Write C programs to print different patterns. ▪ Write a C program to do factorial using recursion. ▪ Write a C program to find out Armstrong number	
3.	▪ Write a C program to sort the array in Ascending & Descending order. ▪ Write C programs to perform operations on 2-D arrays. ▪ Write a C program to perform different operations on strings.	
4.	▪ Use of Pointers ▪ Write a C program to swap numbers using pointers.	

5.	Write a C program to show the use of pointers in arrays.
6.	Write a C program to use functions using pointers.
7.	Write a C program to create student mark sheet using structures.
8.	Write a C program to show the use of structure using pointers.
9.	Write a program showing functions of Graphics programming
10.	Mini Project.

Topics for projets based learning*

1.Employee Record System Project
2. Build Calculator (GUI Optional)
3. Customer Billing System Project:
4. Medical Store Management System Project
5. Currency Converter (GUI Optional)
6. Modern Periodic Table (GUI Optional)
7. Number System Conversion Project
8. Phone book / Contact Management System
9. 100 Years Calender
10. Hospital Management System Project
11. Customer Billing system
12. Tic Tac Toe Game (GUI Optional)
13. Departmental Store Management.
14. Build Rock , Paper & Scissors Game (GUI Optional)
15. Bank Management System

*Students in a group of 3 to 4 shall complete any one project from the above list

Text Books:

1. Programming in ANSI C – E Balagurusamy (5th Edition-TMH)

2. C Graphics & Projects – By B M Havaldar
Reference Books:
1. Let Us C- Yashwant Kanitkar
2. Computer Graphics – By Hearn & Baker
3. The C Programming Language. 2nd Edition By Brian Kernighan and Dennis Ritchie

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B. Tech. Sem. I: Electronics & Telecommunication Engineering
SUBJECT: -MATLAB FUNDAMENTALS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 01

Course Pre-requisites:

	Mathematics (Class XII) and Linear Algebra and Calculus

Course Objectives:

1.	To teach basics of MATLAB software and programming.
2.	To teach the students Vectors, Arrays and Strings in programming
3.	To introduce Conditional Statements, Loops and Functions
4.	To teach the students to perform different operations on Matrices in programming.
5.	To introduce MATLAB Simulink.
6.	To introduce MATLAB GUI.

Course Outcomes: After learning this course students will be able to

1	Use MATLAB for basic programming.

2	Use Vectors, Arrays and Stringsin programming.
3	Apply knowledge of conditional statements, loops, and functions in programming.
4	Use different operations of Matrices in programming.
5	Design different models using MATLAB Simulink.
6	Design GUI for different applications.

List of experiments:

1. **Introduction to MATLAB**
   a) Basics of MATLAB

2. **Commands, Variables and Operators.**
   a) Write a program to perform arithmetic and logical operations on scalar data.
   b) Write a program to display sine and cos wave of particular amplitude and frequency.

3. **Vectors**
   a) Write a program to find addition, subtraction, multiplication, transpose, and magnitude of given vector.
   b) Write a program to find mean, standard deviation, and variance of given vector.

4. **Conditional Statements and Functions**
   a) Write a program to show use of if-then-else statement and while loop
   b) Write a program to import and export data from .csv file.

5. **Arrays and Strings**
   a) Write a program to display data using string.
   b) Write a program to compare two given arrays or array elements.

6. **Operations on Matrix**

a) Write a program to find transpose, determinant, concatenation, and inverse of given matrix.

b) Write a program to solve given linear equation.

7. GUI

a) To introduce basics of GUI

b) To design GUI for any one of the programs mentioned above.

8. Simulink

a) To introduce basics of Simulink

b) Develop a model to differentiate and integrate sine wave using Simulink.

Text Books:

1. MATLAB for Beginners-A Gentle Approach, Peter I. Kattan, 2010, ResearchGate publication
2. Getting started with MATLAB, RudraPratap, 2010, Oxford university press.

Reference Books:

1. A Guide to MATLAB, Brian R. Hunt, Ronald L. Lipsman, Jonathan M. Rosenberg, 3rd Edition, Cambridge University Press.
2. Introduction to MATLAB for Engineers,WilliamJ.Palm, 3rd Edition, McGraw-Hill Education.

SEMESTER:- II
SYLLABUS

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B. Tech. Sem. II: Electronics & Telecommunication Engineering SUBJECT: - DIFFERENTIAL EQUATIONS AND COMPLEX ANALYSIS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits: 01
		Total Credit: 04

Course Pre-requisites:	
	Class XII Mathematics, Linear Algebra and calculus
Course Objectives:	
1.	To introduce ordinary differential equations for higher order.
2.	To introduce partial differential equations.
3.	To introduce complex analysis and conformal mapping.
4.	To teach sequences, series, and series expansion.
5.	To introduce ordinary differential equations for higher order.
6.	To introduce partial differential equations.
Course Outcomes: After learning this course students will be able to	
1	Solve higher differential equations by different methods

2	Solve partial differential equations by different methods
3	Demonstrate the methods of Complex Analysis technique.
4	Implement the Complex Analysis for potential application
5	Demonstrate the knowledge of series and sequences.
6	Solve series expansion problems.

UNIT – I	**Ordinary linear differential equations**	**(06 Hours)**
	Ordinary linear differential equations of nth order, solution of homogeneous and non-homogeneous equations. Operator method. Methods of undetermined coefficients and variation of parameters, Systems of differential equations. Mass spring system.	
UNIT – II	**Partial Differential Equations**	**(06 Hours)**
	Partial differential equations, variable separable method, complementary function and particular integral, initial and boundary value problems (wave equation,1-D and 2-D heat Equation).	
UNIT - III	**Complex Differentiation and Integration**	**(06 Hours)**
	gebra of Complex Number (Polar and exponential form, Power and roots, Regions in a complex plan), Analytic functions, Cauchy’s integral theorem, Cauchy’s integral formula, Derivatives of analytic functions, Singularities, Residues, Poles and Zeros of Analytic Functions, The Residue Theorem	

UNIT -IV	**Conformal mapping**	**(06 Hours)**
	G Geometry of analytic functions: conformal mapping, points linear fractional transformations, conformal mapping for other function. Conformal mappings to potential problems: electrostatic fields, use of conformal mapping: modelling, heat problems, fluid flow, Poisson's Integral formula for potentials, General properties of harmonic functions, uniqueness theorem for the Dirichlet problem.	
UNIT -V	**Sequences and Series**	**(06 Hours)**
	Review of sequences, series and convergence tests, Power Series, Power Series Expansions of Analytic Functions, Taylor Series (Taylor's Theorem with Proof), Laurent series (Laurent's Theorem without Proof), Leibnitz's Theorem, Maclaurin's Series	
UNIT -VI	**Series Expansion**	**(06 Hours)**
	Multiplication, Division, Integration and Differentiation of Power Series, methods for solutions of ordinary differential equations. Legendre equation and Legendre polynomials, Bessel equations and Bessel functions of first and second kind. Orthogonal sets of functions	

Topics for projets based learning*
1. Use MATLAB to formulate and solve types of differential equations - Initial value problems and Delay differential equations
2. Use MATLAB to formulate and solve types of differential equations - Boundary value problems and Partial differential equations
3. Ordinary Differential Equation (ODE) solvers in MATLAB, solve initial value problems with a variety of properties
4. Ordinary Differential Equations EULER methods

5. Ordinary Differential Equations Using built-in function
6. Differential Equations in Python
7. Differential Equations with ODE in Python
8. Partial Differential Equations in Python
9. Solving partial differential equations
10.Complex Line Integration
11. Multi dimentional Conformal mapping
12. Sequences & Series using matlab
13.Sequences and Series -circle packing method
14. An End-to-End Project on Time Series Analysis and Forecasting with Python
15.Time Series Analysis in Python
16.Time Series Classification (with Python)
17.Taylor series with Python
18. Program to print binomial expansion series
*Students in a group of 3 to 4 shall complete any one project from the above list
Textbooks/Reference Books
1.'Advanced Engineering Mathematics' by Erwin reyszig
2.'Advanced Engineering Mathematics' by Dennis G. Zill and Warren S. Wright
3.AppliedMathematics (VolumesIandII)byP.N.Wartikar&J.N.Wartikar
4.HigherEngineeringMathematicsbyB.S. Grewal
5.HigherEngineeringMathematicsbyB.V. Ramana
6.AdvancedEngineeringMathematics

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B. Tech. Sem. II: Electronics & Telecommunication Engineering SUBJECT: - Chemistry of Electronic Materials		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial:00	TW: 50 Marks	Credit: 01
		Total Credit: 04

Course Pre-requisites:

Basic knowledge of chemistry,Electrochemical series, Electrode potential, Primary and secondary cells,Capacitor, insulator, classification, and properties of polymers.

Course Objectives:

- To develop the interest among the students regarding chemistry and their applications in engineering
- To develop confidence among students about chemistry, how the knowledge of chemistry is applied in technological field.
- The student should understand the concepts of chemistry to lay the groundwork for subsequent studies in the field such as E&TC Engineering

Course Outcomes: After learning this course students will be able to

1	Demonstrate the knowledge of Electrical Insulating Materials with its applications.
2	Demonstrate the knowledge about Dielectric Strength and Insulation Breakdown for various engineering applications.
3	Apply the knowledge of crystallography to study of crystal structure
4	Apply the knowledge Solid Solutions and Two-Phase Solids.
5	Demonstrate the concept of the battery with its applications
6	Demonstrate the concepts of spectroscopy and thermogravimetry for various engineering applications.

UNIT – I	Electronic Materials 1	**(06 Hours)**
	Electrical Insulating Materials: Introduction - Requirements. Classification based on Substances: Gaseous, Liquid and Solid Insulating Materials. Preparation, Properties and Applications of Ceramic Products: White Wares and Glass - Transformer Oil. Electrical Resistivity: Factors influencing Electrical Resistivity of Materials - Composition, Properties and Applications of High Resistivity Materials: Manganin - Constantan - Molybdenum Disilcide – Nichrome.	
UNIT – II	Electronic Materials 2	**(06 Hours)**
	Dielectric Strength and Insulation Breakdown: Dielectric Strength: Definition, Dielectric Breakdown and Partial Discharges: Gases, Dielectric Breakdown: Liquids, Dielectric Breakdown: Solids, Capacitor Dielectric Materials: Typical Capacitor Constructions, Dielectrics: Comparison. Piezoelectricity, Ferroelectricity, and Pyroelectricity: Piezoelectricity: Quartz Oscillators and Filters,Ferroelectricity, and Pyroelectricity Crystals, Introduction to Compound Semiconductors.	
UNIT - III	Electronic Materials 3	
	The Crystalline State: Types of Crystals, Crystal Directions and Planes, Allotropy and Carbon, Crystalline Defects and Their Significance: Point Defects: Vacancies and Impurities, Line Defects: Edge and Screw Dislocations, Planar Defects: Grain Boundaries, Crystal Surfaces and Surface Properties, Stoichiometry, Nonstoichiometric, and Defect Structures, Single- Crystal Czochralski Growth. Glasses and Amorphous Semiconductors: Glasses and Amorphous Solids, Crystalline and amorphous Silicon.	**(06 Hours)**
UNIT -IV	Phase rule and Polymers	**(06 Hours)**
	Solid Solutions and Two-Phase Solids: Isomorphous Solid Solutions: Isomorphous Alloys, Phase Diagrams: Cu–Ni and Other Isomorphous Alloys, Binary Eutectic Phase Diagrams and Pb–Sn Solders. Polymers, Preparation, Properties and Applications of SF6, Epoxy Resin, Conduction Mechanism, Preparation of Conductive Polymers, Polyacetylene, Poly (P- Phenlylene), Polyhetrocyclic Systems, Polyaniline, Poly (Phenylene Sulphide), Poly (1,6-Heptadiyne),	

	Applications.	
UNIT -V	Electrochemistry	**(06 Hours)**
	Introduction, Acids and Bases, Concept of pH and pOH and Numerical Electrode Potential, Electrochemical Cell, Concentration Cell, Reference Electrodes, Overvoltage, Fuel Cells, Construction and Working of - Acid and Alkaline Storage Battery, Dry Cell, Coin Cell Batteries, Ni-Cd Batteries, Ni-MH Batteries, Li-Ion Batteries, Li-Po Batteries.	
UNIT -VI	Instrumental Methods of Analysis	**(06 Hours)**
	Introduction, Absorption of Radiation, Instrumentation and Applications of UV-Visible Spectrophotometer and IR Spectrophotometer. Thermal Methods of Analysis TGA, DTA, DSC, Sensors: Oxygen and Glucose Sensor.	

Term Work:

1. To measure the absorbance of the sample at different wavelengths.
2. Verification of Beer-Lambert's Law.
3. Determination of Viscosity Average Molecular Weight of Polymer
4. Determination of Viscosity of Organic Solvents
5. To find the tensile strength of polymer.
6. To determine the pH value of given solutions using pH meter.
7. To determine pH of soil
8. To find EMF of the cell.
9. To calculate the Equilibrium constant.
10. To predict the spontaneity of the cell reaction.
11. To learn the specific charge/discharge characteristics of a Lithium- ion (Li- ion) battery through experimental testing of a remote triggered Li- ion Battery.
12. To Prepare Phenol formaldehyde/Urea formaldehyde resin.
13. To study set up of Daniel Cell

Topics for projets based learning*
1. To Prepare and for synthesis of the following polymers, a. Bakelite b. Polystyrene c. Epoxy Resin
2. Synthesis properties and applications of polymer.
3. To Prepare one component system with an example
4. To Prepare two component system with an example 5. How to Make a Battery with Metal, Air, and Saltwater 6. Use a Microbial Fuel Cell to Create Electricity from Waste
7. To Prepare fuel cell
8. To prepare lead acid storage battery. 9. To prepare Oxidic Nanomaterials for High Density Storage in Li-ion Batteries
10 Electrochemical forming is a unique additive manufacturing method which uses electrochemical technologies to manufacture, layer-by-layer, parts of complex geometry.
11. The materials chemistry and electrochemistry of the lithium-air battery
12. . Challenges facing all-solid-state batteries
13. The materials chemistry and electrochemistry of lithium and sodium-ion batteries
14 Electroplating- the principles, how different metals can be used and the practical applications.
15. Electroplating, Metal Polishing, Anodizing, Phosphating Metal Finishing
and Powder Coating Projects
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Polymer Science and technology (2nd Edition), P. Ghosh, Tata McGRAW Hill, 2008.
2. Polymers: Chemistry & Physics of Modern Materials (2nd edition) J.M.G.Cowie, Blackie Academic & Professional, 1994.
3. A Text Book of Engineering Chemistry, Shashi Chawla, Dhanpat Rai & Co, 2004
4. Engineering Chemistry (16th Edition) Jain, Jain, Dhanpat Rai Publishing Company, 2013.
5. Chemical sensors and Biosensors, Fundamentals and applications, Florinel Gabriel Banica, Wiley.

6. Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015, ISBN 978–0–19–933913–6,Oxford University Press
Reference Books:
1. Inorganic Chemistry (4th edition), D. F. Shrives and P. W. Atkins, Oxford University, Oxford, 2006.
2. Reactions, Rearrangements and Reagents (4th edition), S. N. Sanyal, Bharti Bhawan (P & D), 2003.
3. Applications of Absorption Spectroscopy of Organic Compounds (4th edition), John R. Dyer, Prentice Hall of India Pvt. Ltd., 1978.

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B. Tech. Sem. II: Electronics & Telecommunication Engineering SUBJECT: - DIGITAL ELECTRONICS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW& OR: 50 Marks	Credit:01
		Total Credit: 05

Course Pre-requisites:

	Fundamentals of Number Systems.

Course Objectives:

1.	To present the Digital fundamentals, Boolean algebra, and its applications in digital systems
2.	To familiarize with the design of various combinational digital circuits using logic gates
3.	To introduce the analysis and design procedures for synchronous and asynchronous sequential circuits
4.	To understand the various semiconductor memories and related technology
5.	To introduce the electronic circuits involved in the making of logic gates

Course Outcomes: After learning this course students will be able to

1	Demonstrate the knowledge of Digital fundamentals and Boolean algebra.
2	Apply different minimization techniques on Boolean expression and design logic diagram
3	Analyze & design digital combinational circuits such as of multiplexers, demultiplexers, encoder, decoder, and arithmetic circuits

4	Demonstrate the knowledge of operations of basic types of flip-flops & the design of FSM.	
5	Analyze & design digital Sequential circuits such as Shift Registers and Counters	
6	Classify the characteristics of different logic families, PLDs, Semiconductor memories and their applications.	
UNIT – I	**Introduction to Digital Systems**:	**(08 Hours)**
	Introduction to Digital electronics Fundamentals **Number Systems**: Introduction to Number Systems-Decimal, Binary, Octal, Hexadecimal, Conversion of number system, Representation of Negative Numbers,1's complement and 2's complement. **Binary Arithmetic**: Binary addition, Binary subtraction, Subtraction using 1's complement and 2's complement, Binary multiplication, and division, **Digital Codes**: BCD code, Excess-3 code, Gray code, Binary to Excess -3 code conversion and vice versa, ASCII code, EBCIDIC code. **Logic Gates**: Logical Operators, Logic Gates-Basic Gates, Active high and Active low concepts, Universal Gates, and realization of other gates using universal gates, Gate Performance Characteristics and Parameters	
UNIT – II	**Boolean Algebra**:	**(08 Hours)**
	Boolean Expressions and Truth Tables, Rules and laws of Boolean algebra, Demorgan's Theorems, Duality Theorem, Simplification of Boolean functions by Boolean laws, Shannon's Theorem. **Boolean Function minimization Technique**: Introduction: Minterms and sum of minterm form, Maxterm and Product of maxterm form, Reduction technique using Karnaugh maps – 2/3/4/variable K-maps, grouping of variables in K-maps, minimize Boolean expression using K-map and obtain K-map from Boolean expression, Quine Mc Cluskey Method	
UNIT - III	**Combinational Logic Design**	
	Introduction to Combinational Circuits, Adders: Half-Adder and Full-Adder, Subtractors-Half and Full Subtractor; Parallel adders: Ripple Carry and Look-Ahead Carry Adders.	**(08 Hours)**

	BCD adder, BCD subtractor, Parity Checker/Generator, Multiplexer, Demultiplexer, Encoder, Priority Encoder; Decoder, BCD to Seven segment Display Decoder, ALU, Code converters, Magnitude comparators	
UNIT -IV	**Sequential Logic Design**	**(08 Hours)**
	Introduction to Sequential Circuits: 1 Bit Memory Cell, Latches: SR latch, Gated latch,Flip-Flops: Types of Flip Flops -RS, T, D, JK, Triggering of Flip Flops, Master-Salve JK Flip flop, Characteristic table of Flip-flop, excitation table of Flip-flop, Study of timing parameters of flip-flop.	
UNIT -V	**Shift Registers and Counters**:	**(08 Hours)**
	Data transmission in shift resister: SISO, SIPO, PISO, PIPO, Bidirectional shift register, universal shift registers. Counters: synchronous counter and asynchronous counter. **Introduction to FSM**: Moore and Mealy State machine, state machine as a sequential controller. Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization, Effect of clock skew and clock jitter on synchronous designs (Metastability)	
UNIT -VI	**Logic Families and Memory Technology:**	**(08 Hours)**
	Logic Family: Digital IC specification terminology, Logic families: TTL, CMOS, ECL families, Interfacing of TTL to CMOS & CMOS to TTL. **Programmable logic devices**: Study of PROM, PAL, PLAs. Designing combinational circuits using PLDs. **Semiconductor memories:** Classification and characteristics of memory, different types of RAMs, ROMs and their applications	
List of Practicals to be performed in the laboratory		

1. Study of basic gates using TTL, CMOS: 7432, 4011, 4050, 4070,4071,40106 and Universal Gates.
2. K map-based implementation of combinational logic
3. Design and implementation of Half and Full Adder, Half and Full Subtractor
4. Study of four-bit parallel Adder / Subtractor using IC 7
5. Design and implementation of Code Converters (Binary to Gray, Excess 3 to Binary)
6. Design and implementation of Magnitude Comparator
7. Implementation of combinational logic using MUX
8. Study of Decoder and DEMUX
9. Study of 7 segment decoder driver.
10. Study of Flip Flops (SR FF, D FF, JK FF, T FF)
11. Study of Shift Registers
12. Study of Up-Down Counter and Johnson Counter.
13. Study of Static I/O and transfer Characteristic of TTL
Note: The term work shall be the record of minimum eight experiments performed from the above list
Topics for projets based learning*
1.Survey report of basic gates ICs 7432, 4011, 4050, 4070,4071,40106
2. Implement combinational logic Circuit of given Boolean Equation.
3. Implement Half Adder and Half Subtractor.
4. Implement Full Adder using two Half Adders
5. Build 4-bit parallel Adder / Subtractor using IC.
6. Build Code Converters: Binary to Gray
7. Build Code Converters: Excess 3 to Binary)
8. Implement Two Bit Magnitude Comparator using IC 7485
9. Implement given combinational logic using MUX
10. Implement 7 segment decoder driver using IC 7447.
11. Build a Decade counter and Up-Down Counter.
12. Build a Shift Registers: SISO and SIPO
13. Implement the Johnson Counter and Ring Counter.

14.Survey Report on Static I/O and transfer Characteristic of TTL and CMOS.
15. Implement given Boolean Function using PLA.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. R.P. Jain, ―Modern digital electronics‖, 3rd edition, 12threprint Tata McGraw Hill Publication
2. Anand Kumar, ―Fundamentals of digital circuits‖ 1st edition, Prentice Hall of India, 2001
3. P.Raja ,- Digital Electronics , Second Edition,Scitech Publication (India) Pvt.Ltd.
Reference Books:
1. A.P. Malvino, D.P. Leach 'Digital Principles & Applications'' –Vith Edition-Tata Mc Graw Hill, Publication.
2. J.F.Wakerly "Digital Design: Principles and Practices", 3rd edition, 4th reprint, Pearson Education, 2

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B. Tech. Sem. II: Electronics & Telecommunication Engineering SUBJECT: - SEMICONDUCTOR DEVICES AND CIRCUITS-I		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:	
	Elementary Electronics, EDA Tool Practice
Course Objectives:	
1.	To introduce the methods of analysis, design, and simulation of diode circuits
2.	To introduce the methods of analysis, design, and simulation of BJT biasing circuits
3.	To introducemethods to analyze and design and simulate BJT amplifier circuits
4.	To introduce methods to analyze and design and simulate JFET circuits
5.	To introduce methods to analyze and design and simulate MOSFET circuits
6.	To introduce the concept ofcurrent mirror and transistorized voltage regulator circuits
Course Outcomes: After learning this course students will be able to	
1	Analyze and design the diode circuits
2	Analyze and design the BJT biasing circuits

3	Analyze and design the BJT amplifier circuits		
4	Analyze and design the JFET circuits		
5	Analyze and design the MOSFET circuits		
6	Analyze and design the current mirror and transistorized voltage regulator circuits		
UNIT – I	**DIODE CIRCUITS**		**(08 Hours)**
	Analysis and design of Rectifier circuits (HWR, FWR, Bridge, Dual Complementary), Capacitor input filter, Clippers, Clampers, Voltage Multipliers, Special diodes (Zener diodes, Schottky diodes, Gold-diffused diodes), Switching circuits, Simple shunt regulator using Zener diode (analysis and design)		
UNIT – II	**BJT CIRCUITS I**		**(08 Hours)**
	Need of biasing circuits, Analysis, and design of BJT biasing circuits like fixed bias, collector to base bias, voltage divider bias, split-supply bias, Concept of DC load line, Concept of stability factor, Derivation of stability factor		
UNIT - III	**BJT CIRCUITS II**		**(08 Hours)**
	Concept of AC load line, BJT as two-port networks, BJT Models small signal models (h-parameter, Ebers-Moll, hybrid –pi and T), Analysis of CE, CB, CC Amplifiers (Derivation of Zi, Zo, Av, Ai and Ap), Frequency response of BJTamplifiers,Single stage CE voltage amplifier design, large signal BJT model, BJT as switch, power BJT		
UNIT -IV	**JFET CIRCUITS**		**(08 Hours)**

	Analysis and design of JFET biasing (Fixed bias, Self-bias, Voltage divider bias), JFET models, Analysis of CS, CD, CG Amplifiers, Frequency response of JFET amplifiers, Single stage CS amplifier design, FET as switch.	
UNIT -V	**MOSFET CIRCUITS (8 Hours)**	**(08 Hours)**
	EMOSFET biasing (Fixed bias, negotiated bias/Voltage divide bias), DC load line,MOSFET models, Analysis of MOSFET amplifiers, Single stage CS amplifier design, Frequency response of MOSFET amplifiers,MOSFET as switch, Power MOSFET	
UNIT -VI	**OTHER TRANSISTOR CIRCUITS**	**(08 Hours)**
	Concept of current mirror, Analysis of Widlar current source (BJT and MOSFET), Wilson current mirror (BJT and MOSFET),Gilbert gain cell,Series pass transistor voltage regulator,Variable output voltage regulator	

List of experiments:

1. Observe and measure outputs for rectifier circuits
2. Observe and measure outputs clipper, clamper, voltage multiplier circuits
3. Construct BJT biasing circuits (Fixed, Collector to base bias circuit, Voltage divider bias circuit and verify the Q-point.
4. Measure and plot the frequency response of single stage CE voltage amplifier
5. Construct FET biasing circuits (Fixed, self-bias circuit, Voltage divider bias circuit and verify the Q-point.
6. Measure and plot the frequency response of single stage JFET CS voltage amplifier

7. Construct MOSFET biasing circuits (Fixed, Voltage divider bias circuit and verify the Q-point.
8. Measure and plot the frequency response of single stage MOSFET CS voltage amplifier
9. Construct BJT and MOSFET switch circuits and compare the performance (power dissipation, transient response)
10. Measure and plot regulation characteristics of shunt regulator, series pass transistorized voltage regulator
Topics for projets based learning*
1.Build a voltage quadrupler circuit
2. Build a low current, regulated power supply
3. Build a diode, BJT tester
4. Latching burglar alarm
5. Moisture detector
6. Voltage controlled variable gain amplifier
7. Wind shield wiper control
8. Metal detector
9. Car battery charger
10. Under-voltage/Over-voltage indicator
11. Crystal oscillator
12. DC Flasher with adjustable ON/OFF times
13. Emergency Light
14. Simple intercom
15. Water level indicator with alarm
*Students in a group of 3 to 4 shall complete any one project from the above list
Reference Books:
1. Fundamentals of Electronic Devices and Circuits, David A. Bell, 5th Edition,2008, ISBN:0195425235, 9780195425239, Oxford University Press.
2. Microelectronics Circuits, Adel S. Sedra& Kenneth C. Smith,7th Edition, 2015, ISBN 978–0–19–933913–6, Oxford University

Press

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B. Tech. Sem. II: Electronics & Telecommunication Engineering **SUBJECT: - PYTHON PROGRAMMING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credits :01
		Total Credits :5

Course Pre-requisites:

	Basic programming.

Course Objectives:

- This course will introduce the concepts of Python language as software development tool.
- To gain practical experience in Python programming including fundamental concepts, OOPs, Exception handling, Graphics.

Course Outcomes: After learning this course students will be able to

1	Apply the basic concepts of Python programming.
2	Write basic programs using control statements.
3	Use exception handling in Python programs.
4	Apply object-oriented programming concepts in Python.
5	Write Python program for simple applications using existing libraries.

6	Write simple graphics programs.	
UNIT – I	**Python Basics**	**(08 Hours)**
	Python Introduction, Python Installation, Relational operators, Bit-wise operators, Logical operators Python Data Types - Numbers (Integer, Floating Point, Complex Numbers), Strings, Lists, Tuples, Dictionaries, List comprehensions, Python Control Statements	
UNIT – II	**Python Core**	**(08 Hours)**
	Python Modules & Functions, Lambda, Scope, Python File Handling, Python Regular Expressions, Sequence Types, Input and output, Recursion, Flow Control, Immutable and Mutable Objects	
UNIT - III	**Python Exception Handling**	**(08 Hours)**
	Meaning of Exception, Exception Hierarchy Diagram, Types of Exception- Checked Exception, Unchecked Exception, Exception Handling -TRY, CATCH, FINALLY, Raising an Exception, User Defined Exceptions	
UNIT -IV	**OOPS, UML & OOAD**	**(08 Hours)**
	Object Oriented Programming (OOPs) - Class & Object, Abstraction, Inheritance, Polymorphism, Encapsulation, Object Oriented (OO) Modelling, Object Oriented Analysis & Design (OOAD)	

UNIT -V	**Python Multi-Threading**	**(08 Hours)**
	Threads in Python (a) Kernel Threads (b) User Space Threads or User Threads, Advantages of Threading, Thread States: Life Cycle of a Thread, Thread & Threading Modules, Forking & Synchronizing Threads,Networking	
UNIT -VI	**Python Packages and Graphics**	**(08 Hours)**
	Numpy: Introduction, data-types, arrays, arrays manipulation, plotting, testing and debugging, Sharing Data using Sockets, Simple applications of python, Scipy, TKinter	

<u>Term Work:</u> Any 8 of below given list

1. Evaluate any given expression involving arithmetic operators.
2. Evaluate any given expression involving logical operators.
3. Develop python functions to produce given patterns such as diamond, pyramid, triangles.
4. Usage of different functions present in “math” module.
5. Write a function that takes two numbers as input parameters and returns their least common multiple.
6. Write a function that takes two numbers as input parameters and returns their greatest common divisor.
7. Write a program that takes a sentence as an input and displays the number of words in the sentence.
8. Ways to sort list of dictionaries by values in Python – Using lambda function.
9. Write program using “matplotlib” module.
10. Write program using “NUMPY” module.
11. Write program using “Scipy” module.

12. Write program using “TKinter” module.

Topics for projets based learning*

1. Create a Tic-tac-toe game (GUI optional)
2. Build a password encryptor with Hashing.
3. Build Product Price Comparison using webscraping.
4. Create a google image downloader
5. Create a Snake & Ladders game (GUI optional)
6. Build a contact book using indexing
7. Build What’s the word game
8. Build Rock, Paper & Scissors game
9. mp3 file organizer - rebuild a music library's structure from mp3 tag data, and reorganize them in folders. Use Multithreading concepts
10. Create an FTP server
11. Build a functional calculator (GUI optional)
12. Python Email Automation
13. Create a Currency converter (GUI optional)
14. Face Detection using Cv2
15. Biometric Fingerprint detection

*Students in a group of 3 to 4 shall complete any one project from the above list

Text Books:

1.Sheetal Taneja,NaveenKumar,PythonProgramming,A modular approach,Pearson publication

Reference Books:

1. Learning Python 5th Edition, Oreilly Publication
2. Beginning Python: From Novic to professional, by Magnus Lie Hetland, Third Edition, Appress Publication
3. Learning with Python by Allen Downey, Jeffrey Elkner, Chris Meyers, Dreamtech Publication

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B. Tech. Sem. II: Electronics & Telecommunication Engineering
SUBJECT: - COMPUTER AIDED DRAFTING

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits:00
Practical: 04	Internal Assessment: 00	
Tutorial: 00	TW: 50 Marks	Credit: 02
		Total Credit: 02

Course Pre-requisites:

	Mathematics (Class XII)

Course Objectives:

1.	To teach the studentsFundamentals of engineering drawing and curves
2.	To introduce the students Isometric views and projection
3.	To teach the studentsProjections of points, lines, planes & solids
4.	To introduce the students Use of CAD tools.

Course Outcomes: After learning this course students will be able to

1	Apply dimensioning methods and drawing of engineering curves.
2	Draw orthographic projections using Istangle and IIIrdangle projection Methods*.
3	Draw Isometric views from given orthographic projections*.

4	Draw projection of Lines, its traces and projections of planes*.		
5	Createprojection of different solids*.		
6	Develop lateral surfaces of solids*.		
*Using CAD tools			
UNIT – I	**Lines and Dimensioning in Engineering Drawing and Engineering Curves**		
	Different types of lines used in drawing practice, Dimensioning–linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension. Ellipse by Arcs of Circles method, Concentric circles method. Involutes of a circle,Cycloid, Archimedean Spiral, Helix on cone & cylinder. Introduction to Auto CAD commands.		
UNIT – II	**Orthographic Projection**		
	Basicprinciples of orthographic projection (First and Third angle method). Orthographic projection of objects by first angle projection method only.Procedurefor preparing scaled drawing, sectional views,and types of cutting planes and their representation, hatching of sections. (Also using AutoCAD commands)		
UNIT - III	**Isometric Projections**		
	Isometric view, Isometric scale to draw Isometric projection, Non-Isometriclines, and construction of Isometric view from given orthographic views and to construct Isometric view.		

	(Also using AutoCAD commands)	
UNIT -IV	**Projections of Points & Lines**	
	Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only) Traces of lines. (Also using AutoCAD commands)	
UNIT -V	**Projections of Planes**	
	Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP. (Also using AutoCAD commands)	
UNIT -VI	**Projections of Solids**	
	Projection of prism,pyramid, cone, and cylinder by rotation method. (Also using AutoCAD commands)	
List of sheets:		
1. Types of lines, Dimensioning practice, free-hand lettering, 1st and 3rd angle methods symbol.		
2. Engineering curves.		
3. Orthographic Projections.		
4. Isometric views.		

5. Projections of Points and Lines and planes.
6. Projection of Solids.
7. Enclosure design
Term work: Term work shall consist of half imperial size or A2 size (594 mm x 420 mm) sheets. All sheets should complete in drawing hall manually and sheet no 2-7 also completed using AutoCAD with printout onA2 size papers.
Text Books/Reference Books:
3. "Elementary Engineering Drawing", N. D. Bhatt, CharotarPublishing house, Anand India,
4. "Text Bookon Engineering Drawing", K. L. Narayana&P. Kannaiah, Scitech Publications, Chennai.
5. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi,
6. "Engineering Drawing and Graphics", Venugopal K., New Age International publishers.
7. "Engineering Drawing",M. B. Shah and B.C. Rana,1st Ed, Pearson Education, 2005
8. "Engineering Drawing (Geometrical Drawing)", P. S. Gill, 10thEdition, S. K. KatariaandSons, 2005
9. "Engineering Drawing", P. J. Shah, C. Jamnadasand Co.,1stEdition,1988

SEMESTER:- III
SYLLABUS

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B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: - ADVANCED MATHEMATICS FOR ELECTRONICS

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credit:01
		Total Credits: 04

Course Pre-requisites:

	Class XII Mathematics, Linear Algebra and calculus, Differential equation, and complex analysis

Course Objectives:

1.	To introduce the concept of Fourier series.
2.	To introduce Transforms like Fourier Transform, Laplace Transform and Z Transform.
3.	To teach vector analysis.
4.	To introduce optimization and graph theory.
5.	To teach probability and statistics.

Course Outcomes: After learning this course students will be able to

1	Apply Fourier series for solving engineering problems.
2	Solve numerical problems involving Fourier Transform.
3	Demonstrate the knowledge of Laplace Transform and Z Transforms.

4	Apply the concept of optimization and graph theory**.**	
5	Applyvector analysis for engineering problems**.**	
6	Solve numerical problems based on probability and statistics**.**	
UNIT – I	**Fourier Series**	**(06 Hours)**
	Definition, Euler's formulae, Conditions for a Fourier expansion, Functions having points of discontinuity, change of interval, expansions of odd and even periodic functions, Half range series. application to difference equations and Markov chains, Fourier series and KL expansion, Fourier series with an emphasis on the application of solving engineering problems, Develop Fourier series expansion of a function over the given interval.	
UNIT – II	**Fourier Transform**	**(06 Hours)**
	PaFourier transforms, Fourier transform of random process, Fourier sine and cosine transforms, Inverse Fourier, Sine and Cosine Transforms, complex form of Fourier integral, Finite Fourier sine and cosine transforms. Properties of Fourier transform.	
UNIT - III	**Laplace Transform & Z Transform**	**(06 Hours)**
	Laplace Transform:Definition, transforms of elementary functions, properties of Laplace transforms, transforms of derivatives, Properties of Laplace transforms, transforms of integral, periodic functions, Inverse Laplace transforms, Inverse Laplace transforms by using partial	

	fractions, Properties of LT. Z Transform: Definition, properties of z transform, Z Transform of basic sequences, Z transform of some standard discrete function inverse Z transform	
UNIT -IV	**Optimization and graphs**	**(06 Hours)**
	Basics of optimization, Unconstrained optimization: method of steepest descent, linear programming, simplex method, and difficulties. G Graphs and digraphs, shortest path problems, complexities, Bellman's principle, Dijkstra's Algorithm, shortest spanning trees: greedy algorithm, Prim's algorithm, flows in networks, maximum flow: Ford-Fulkerson algorithm	
UNIT -V	**Vector Analysis**	**(06 Hours)**
	Coordinate system, inter-conversion of coordinate systems, Vectors in plane and space, vector operations, gradient, divergence and curl, Gauss's, Green's and Stokes' theorems.	
UNIT -VI	**Probability and Statistics**	**(06 Hours)**
	Mean, median, mode, standard deviation, combinatorial probability, probability distributions, binomial distribution, Poisson distribution, exponential distribution, normal distribution, joint and conditional probability, relation of joint and conditional probability, higher order stats	
Topics for projets based learning*		

1. Energy Flow in an Ecosystem: Graphical model
2. Plane Geometry and Vectors
3. Bipartite graph
4. Trellis (graph)
5. Seven Bridges of Königsberg
6. Three-cottage problem
7. Shortest path problem
8. A system of electric charges has a charge density $\rho(x,y,z)$ and produces an electrostatic field $E(x,y,z)$ at points (x,y,z) in space. Gauss' Law states that $\iint \Sigma E \cdot d\sigma = 4\pi \iiint S \rho dV$ for any closed surface Σ which encloses the charges, with S being the solid region enclosed by Σ. Show that $\nabla \cdot E = 4\pi\rho$. This is one of Maxwell's Equations
9. Show that the gradient of a real-valued function $F(\rho,\theta,\varphi)F(\rho,\theta,\varphi)$ in spherical coordinates is:
10. Applications of Vector Fields: in Mechanics
11. Applications of Vector Fields: Electric and Magnetic fields
12. Applications of Vector Fields: Fluids motions
13. Applications of Vector Fields: Heat transfer
14. Routing problems (e.g. Hamiltonian paths, travelling salesman problem)
15. Graph colorings (4-color theorem, chromatic polynomial)
*Students in a group of 3 to 4 shall complete any one project from the above list
Textbooks/Reference Books
1.'Advanced Engineering Mathematics' by Erwin reyszig
2.'Advanced Engineering Mathematics' by Dennis G. Zill and Warren S. Wright
3.AppliedMathematics (VolumesIandII)byP.N.Wartikar&J.N.Wartikar
4.HigherEngineeringMathematicsbyB.S. Grewal
5.HigherEngineeringMathematicsbyB.V. Ramana

6.AdvancedEngineeringMathematics

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B. Tech. Sem. III: Electronics & Telecommunication Engineering SUBJECT: - SEMICONDUCTOR DEVICES AND CIRCUITS II		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & PR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:

Network theory-Current divider rule, Voltage divider rule, KVL, KCL, Network theorems, h-parameters, passive elements and their response (initial final conditions), Semiconductor theory, semiconductor devices like diodes, BJT, FET, MOSFET, Biasing methods, Single stage amplifier-design and analysis

Course Objectives:

The objective of this course is to cover performance evaluation of various amplifiers by

- Introducing a concept of the multistage amplifiers, parameter evaluation and related design aspects of multistage amplifiers with the help of derivations.
- Teaching a concept of the feedback in the amplifiers, feedback topologies with the help of derivations and their advantages and disadvantages.
- Gauging the efficiencies of various types of power amplifiers with the help of derivations.
- Teaching a concept and design of the RC and LC oscillators with the help of derivations.
- Introducing a concept and types of the differential amplifiers, current mirrors.
- Introducing a concept and types of the tuning amplifiers.

Course Outcomes:	**After learning this course students will be able to**
1	Analyze and designdiscrete multistage amplifier.
2	Analyze and design negative feedback amplifier.
3	Classify and analyze discrete power amplifiers.
4	Analyze and design discrete oscillator circuits.
5	Analyze various types of the differential amplifiers.
6	Analyze the effect of tuning in the amplifiers, and the applications where the tuning amplifiers are useful.

UNIT – I	**Multistage Amplifiers**	**(08 Hours)**
	Need of the Multistage amplifiers, Types of Multistage Amplifiers-Cascade and Cascade, Cascade-Coupling methods, Frequency response, Parameter evaluation - Ri, Ro, Av, Ai & Bandwidth for general multistage amplifier, Choice of the transistor configuration in cascade amplifier, Analysis & design of direct coupled, RC coupled (Low frequency, high frequency, and medium frequency analysis), transformer coupled (Low frequency, high frequency and medium frequency analysis) amplifier. Darlington Amplifier, Design of Cascade amplifier	
UNIT – II	**Negative feedback Amplifiers**	**(08 Hours)**
	Types of basic Amplifiers, Concept and types of feedback, Transfer gain with feedback, Negative feedback topologies with their block Schematics, Effect of negative feedback on Input impedance; Output impedance; Gain and Bandwidth with derivation, Analysis of one circuit for each feedback topology for input impedance, output impedance, gain and bandwidth.	

UNIT - III	**Power Amplifiers**	**(08 Hours)**
	Need of Power amplifiers, classification; applications; advantages of power amplifiers - Class A, Class B, Class C, class D and Class AB. Operation of - Class A with resistive load; Transformer coupled class A Amplifier; Class B Push – pull; Class AB Complementary symmetry and Quasi – complementary. Efficiency analysis for Class A transformer coupled amplifier, Class B push – pull amplifier. Comparison of efficiencies of other configurations. Distortion in amplifiers; concept of Total Harmonic Distortion (THD).	
UNIT -IV	**Oscillators**	**(08 Hours)**
	Concept of Positive feedback, Condition, and principle of oscillations (Barkhausen criterion), Classification of oscillators, Design analysis of RC and LC oscillators, RC oscillators: Phase shift, Wien bridge Oscillators; LC Oscillators: Hartley, Colpitt's and Clap; Piezo-electric effect in crystals and Crystal Oscillator.	
UNIT -V	**Differential Amplifiers**	**(08 Hours)**
	Limitations of CE amplifier, Split supply biasing, Differential amplifier configurations, Dual Input, balanced output differential amplifier, Dual input, unbalanced output differential amplifier, Single input, balanced output differential amplifier, Single input, unbalanced output differential amplifier, FET differential amplifiers, Constant current bias, Current mirrors (revision), Differential mode gains, common mode gain, CMRR calculation, Derivation for output voltage, input and output impedances	

UNIT -VI	**Tuned Amplifiers**	**(08 Hours)**
	Introduction, Q-factor, small signal tuned amplifiers, Effect of cascading Single tuned amplifiers on Bandwidth, Effect of cascading Double tuned amplifiers on Bandwidth, Stagger tuned Amplifiers, Comparison of Tuned amplifiers, large signal tuned amplifiers, Stability of Tuned amplifiers, Neutralization	

Term Work: Any 8 of below given list
1. To find the gain and bandwidth of a 2-stage CE RC coupled amplifier.
2. To find the gain and bandwidth of a 2-stage transformer coupled amplifier.
3. To find the gain of a direct coupled amplifier.
4. To find the gain and bandwidth of a voltage series negative feedback amplifier.
5. To find the gain and bandwidth of a voltage shunt negative feedback amplifier.
6. To find the gain and bandwidth of a currentseries negative feedback amplifier.
7. To find the gain and bandwidth of a current shunt negative feedback amplifier.
8. To study the response of a Class A direct coupled/ transformer coupled amplifier.
9. To study the response of a Class B power amplifier.
10. To find the oscillations frequency of the RC amplifiers-RC phase shift/ Wien bridge oscillator.
11. To find the oscillations frequency of LC amplifiers-Colpitt's Oscillator/Hartley Oscillator.
12. To plot frequency response of tuned amplifiers.
Topics for projets based learning*
1.Prepare survey report on types of multistage amplifiers.

2. Build and analyze the 2-stage RC coupled amplifier.
3. Build and analyze the 2-stage transformer coupled amplifier.
4. Build and analyze the 2-stage direct coupled amplifier.
5. Prepare survey report on types of negative feedback amplifiers.
6. Build and analyze 2-stage voltage series negative feedback amplifier.
7. Build and analyze single stage current series negative feedback amplifier.
8. Build and analyze single stage voltage shunt negative feedback amplifier.
9. Build and analyze 2-stage current shunt negative feedback amplifier.
10. Prepare survey report on types of power amplifiers.
11. Implement and analyze class A direct coupled power amplifier.
12. Implement and analyze class B push pull power amplifiers.
13. Prepare survey report on types of oscillators.
14. Implement RC phase shift oscillator and verify it for oscillations frequency.
15. Prepare survey report on types of differential amplifier.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. S. Salivahanan and N Suresh Kumar, 'Electronic devices and circuits', Mc Graw Hill Education India Private Limited, Third Edition.
Reference Books:
1. Ramakant A.Gayakwad "Op-amps and Linear Integrated Circuit Technology"Fourth edition
2. Adel S. Sedra, Kenneth C. Smith "Microelectronic Circuits" Oxford series in Electrical and computer engineering

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B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: - SIGNALS AND LINEAR SYSTEMS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 00		Credit: 00
		Total Credit: 04

Course Pre-requisites:

	Linear algebra,calculus, MATLAB fundamentals,Differential equations, and complex analysis

Course Objectives:

1.	To teach the basic concepts of signals.
2	To introduce the basic concepts of systems analysis
3	To introduce the tools in the time and frequency domain.
4	To provide knowledge of correlation function and sampling.

Course Outcomes: After learning this course students will be able to

1	Characterize and analyze the properties of signals.
2	Classify the systems and analyze in time domain using convolution.
3	Apply Fourier transform for analysis of LTI systems.

4	Apply Laplace transform for analysis of LTI systems.		
5	Apply discrete transforms for analysis of LTI systems.		
6	Evaluate the effects of sampling on signal and describe the auto correlation and cross correlation between signals.		
UNIT – I	**Introduction to signals**		**(08 Hours)**
	Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic, deterministic & non-deterministic, energy & power, elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal, basic operations on signals.		
UNIT – II	**Classification of systems**		**(08 Hours)**
	Definition, Classification of System, System Interconnections, state space analysis, Linear & non -linear, Time-Invariant & Time variant, causal & non-causal, static & dynamic, stable & unstable systems, stability & impulse response of systems to standard signals.		
UNIT - III	**Continuous Time System Analysis**		**(08 Hours)**
	Response of LTI Systems to exponential signals, periodic signals. Derivation Fourier series, Discrete time Fourier series and properties, Fourier Transforms, Duality and Parseval's theorem, Fourier analysis examples: Output of LTI Systems Described by Differential, convolution with FT , unit step response of RC circuit, filtering, FT of Gaussian Pulse, Example of the brain waves.		
UNIT -IV	**Laplace Transform and Application**		**(08 Hours)**
	Review of Laplace transform and properties, Concept of ROC and properties of ROC, pole		

	zero concepts. Transfer function and condition of stability, Application of Laplace transforms to the LTI system analysis, Convolution with LT, Inversion using duality, Laplace Transform of electrical Circuit, example of control system, calculation of harmonic vibration of the beam, Mathematical models of physical system- Electrical & Mechanical System	
UNIT -V	**Discrete Transforms and Applications**	**(08 Hours)**
	Z-Transform: The Region of Convergence for the Z-Transform, Application of Z-Transform to the LTI system analysis. Discrete time Fourier transform, Properties of DTFT, Fast Fourier transform algorithm, Use of FFT in Windows Media Player.	
UNIT -VI	**Correlation and Spectral Density**	**(08 Hours)**
	Definition of Correlation and Spectral Density, correlogram, analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density, Sampling theorem & its proof, aliasing, reconstruction of sampled signals, interpolation.	

Term Work: Any 8 of below given list

1. Perform the operations on signals
2. Perform the convolution of signals using formula using MATLAB.
3. Analyze the synthesis of signals using Fourier Series.
4. Find the Fourier Transform using MATLAB.
5. Find the Laplace Transform using MATLAB.

6. Find the Z-Transform using MATLAB.
7. Find the autocorrelation of sine sequence x[n] with frequency 50Hz and sampling frequency 200Hz, using MATLAB.
8. Find the cross correlation for different signals.
9. Find the Inverse Fourier Transform using MATLAB.
10. Find the Inverse Laplace transform using MATLAB.
11. Find the inverse Z Transform using MATLAB.
12. Find the circular convolution using MATLAB.
Topics for projets based learning*
1. Signals In Natural Domain
2. Signal operations for navigation/obstacle detection
3. Speech production
4. Speech hearing
5. LTI Systems – Eigenfunctions, System Described by differential Equation, Homogenous and Particular Solution
6. LTI Systems-Convolution applications,
7. Periodic Convolution applications,
8. BIBO Stability applications
9. z–Transform Applications– Impulse Response of LTI System Described by Difference Equation
10. Complex Exponential Fourier Series and Trigonometric Fourier Series of Periodic Triangular Wave, Periodic Convolution
11. Real life example on DTFT – Sampling
12. Group/ Phase Delay for LTI systems
13. Implement DFT in Matrix form
14. Implement IDFT in Matrix form
15. FAST FOURIER TRANSFORM ANALYZER
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Roberts M. J., Signals & Systems, TMH.
2. Oppenheim, Wilsely&Nawab, Signals & Systems, MGH.
Reference Books:

1. B.P.Lathi, Signal Processing & Linear Systems, Berkeley Cambridge, 1998 Edition.

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B. Tech. Sem. III: Electronics & Telecommunication Engineering

SUBJECT: - NETWORK ANALYSIS AND SYNTHESIS

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credits: 5

Course Pre-requisites:

Knowledge of KCL and KVL Laws from ‘Electrical Technology’,Linear Differential Equations, Systems of Linear Equations and complex numbers from ‘Differential Equations and Complex Analysis’

Course Objectives:

The objective of this course is to cover various methods to find the network parameters as listed below:

- To teach how to find network parameters (voltages, currents, power) in a given passive circuit by the use of methods- MeshAnalysis, Node Analysis and Network Theorems.
- To teach how to find voltages and currents in a given circuit by formulating the network equilibrium equations by the use of graph theory.
- To teach how to find the transient response of the series RLC circuits by the use of homogeneous and non-homogeneous equations.
- To introduce the resonance phenomenon, curves and related parameters in a given series and a parallel resonant circuit with the help of derivations.
- To introduce the two port network parameters, their interrelationships, and interconnections with the help of derivations.

	• To teach how to design a constant K prototype low pass, high pass, band pass and a band stop passive filters for different bandwidths by using filter topologies.	
Course Outcomes:	**After learning this course students will be able to**	
1	Analyze passive circuits using Mesh Analysis, Node Analysis and Network Theorems.	
2	Apply graph theory by formulating the network equilibrium equations for circuit analysis.	
3	Perform Transient Analysis of the Series Reactive Circuits	
4	Sketch the resonance curves for a given series and parallel resonant circuits.	
5	Compute two port parameters for a given network	
6	Design constant-k prototype low pass, high pass, band pass and band stop passive filters.	
UNIT – I	**DC circuit Analysis and Network Theorems**	**(08 Hours)**
	KCL, KVL, Source Transformation, Source Shifting, Mesh Analysis, Node Analysis, Super Mesh, Super Node, Network Theorems- Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem	
UNIT – II	**Formulation of network equilibrium equations using Graph Theory**	**(08 Hours)**
	Network Graph, tree, co-tree & loop, Incidence Matrix, Tie-set matrix, Cut-set matrix, Formulation of the equilibrium equations in the matrix form, Solution of the resistive and non-resistive networks, Principle of Duality	
UNIT - III	**Transient Analysis of the Series Reactive Circuits**	**(08 Hours)**

	Initial Conditions in the networks, A procedure for evaluating initial conditions, the step response in RC, RL, RLC circuits using classical method and using Laplace Transform for driven and undriven circuits, Time specifications of RLC circuits, Concept of the natural frequency and damping frequency, Zeta.	
UNIT -IV	**Resonance in Series and Parallel RLC Circuits**	**(08 Hours)**
	Resonant condition, Quality factor, Resonant frequency, impedance at resonance, voltage and current variation with frequency, bandwidth, selectivity, magnification factor for series and parallel resonant circuits. Effect of Generator resistance on bandwidth and Selectivity, Comparison of series and parallel resonant circuits, Applications of resonant circuits	
UNIT -V	**Two Port Networks**	**(08 Hours)**
	Concept of Two port network, Z, Y, H, ABCD and other parameters, Relationships between two-port network parameters, Reciprocity and Symmetry conditions, Interconnections of two-ports, Analysis of some circuits using two port network parameters theory.	
UNIT -VI	**Passive Filter Analysis**	**(08 Hours)**
	Filter Fundamentals, Electrical Properties-Image impedance, Characteristic impedance, Propagation constant, Constant K prototype for LPF, HPF, BPF and BSF, m-derived LPF, HPF, Terminating half sections, Composite filters, Applications of passive filters.	

<u>Term Work:</u> Any 8 of below given list
1. To verify Thevenin's and Norton's Theorem for a given circuit.
2. To verify Superposition and Reciprocity Theorem for a given circuit.
3. To find the resonant frequency of a series RLC circuit.
4. To find the resonant frequency of a parallel RLC circuit.
5. To find the Z parameters of a given two port network.
6. To find the Y parameters of a given two port network.
7. To find the H parameters of a given two port network.
8. To find the ABCD parameters of a given two port network.
9. To find the cut-off frequency and to plot the frequency response of a constant-k LPF.
10. To find the cut-off frequency and to plot the response of a constant-k HPF.
11. To find the cut-off frequencies and to plot the frequency response of a constant-k BPF.
12. To find the cut-off frequencies and to plot the frequency response of a constant-k BSF.
Topics for projets based learning*
1.Build and analyze resistive circuit for current usage.
2. Build and analyze resistive circuit for voltage usage.
3. Build and analyze resistive circuit for power usage.
4. Implement the series RL circuit and verify the initial and final conditions of it.
5. Implement the series RC circuit and verify the initial and final conditions of it.
6. Build and verify series resonance circuit.
7. Build and verify parallel resonance circuit.
8. Verify Z parameters for unknown circuit.
9. Verify Y parameters for unknown circuit.

10. Verify H parameters for unknown circuit.
11. Verify ABCD parameters for unknown circuit.
12. Design and implement prototype Low pass filter and verify its bandwidth.
13. Design and implement prototype High pass filter and verify its bandwidth.
14. Design and implement prototype Band pass filter and verify its bandwidth.
15. Design and implement prototype Band stop filter and verify its bandwidth.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. D. Roy Choudhury, 'Network and Systems', New Age International Publishers, Second Edition.
Reference Books:
1. Franklin F. Kuo, 'Network Analysis and Synthesis', John Wiley & Sons (Second Edition)
2. M. E. Van Valkenburg, 'Network Analysis', PHI (3rd Edition)
3. John D. Ryder, 'Networks, Lines and Fields', PHI Learning Pvt. Ltd., Second Edition

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B. Tech. Sem. III: Electronics & Telecommunication Engineering **SUBJECT: - DATABASE MANAGEMENT SYSTEMS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credits: 05

Course Pre-requisites:

	Python Programming

Course Objectives:

1	To provide a strong formal foundation in database concepts, technology, and practice
2	To give systematic database design approaches covering conceptual design, logical design, and an overview of physical design
3	To have good understanding of different type of databases.
4	To learn a powerful, flexible, and scalable general-purpose database to handle big data

Course Outcomes: After learning this course students will be able to

1	Design E-R Model for given requirements and convert the same into database tables.
2	Apply BCNF Algorithm for Decomposition

3	Use SQL for query processing.		
4	Use algorithms to solve scheduling conflict		
5	Apply Concurrency algorithm in distributed database		
6	Use NOSQL in database creation.		
UNIT – I	**Introduction to Databases**		**(08 Hours)**
	Introduction to Database Management Systems, Purpose of Database Systems, Database-System Applications, View of Data, Database Languages, Database System Structure, Data Models, Database Design and ER Model: Entity, Attributes, Relationships, Constraints, Keys, Design Process, Entity Relationship Model, ER Diagram, Design Issues, Extended E-R Features, converting E-R & EER diagram into tables, Introduction to normalization.		
UNIT – II	**Relational Database Design**		**(08 Hours)**
	Relational Model: Basic concepts, Attributes and Domains, CODD's Rules, Relational Integrity: Domain, Referential Integrities, Enterprise Constraints, Database Design: Features of Good Relational Designs, Normalization, Atomic Domains and First Normal Form, Decomposition using Functional Dependencies, Algorithms for Decomposition, 2NF, 3NF, BCNF, Modeling Temporal Data		
UNIT - III	**SQL AND PL/SQL**		
	SQL: Characteristics and advantages, SQL Data Types and Literals, DDL, DML, DCL, TCL, SQL Operators, Tables: Creating, Modifying, Deleting, Views: Creating, Dropping, Updating using Views, Indexes, SQL DML Queries: SELECT Query and clauses, Set Operations, Predicates and Joins, Set membership, Tuple Variables, Set comparison, Ordering of Tuples, Aggregate Functions, Nested Queries, Database Modification using SQL Insert, Update and Delete Queries. PL/SQL: concept of Stored Procedures & Functions, Cursors, Triggers, Assertions, roles and privileges, Embedded SQL, Dynamic SQL.		**(08 Hours)**

UNIT -IV	**Database Transactions and Query Processing**	**(08 Hours)**
	Basic concept of a Transaction, Transaction Management, Properties of Transactions, Concept of Schedule, Serial Schedule, Serializability: Conflict and View, Cascaded Aborts, Recoverable and Non-recoverable Schedules, Concurrency Control: Need, Locking Methods, Deadlocks, Timestamping Methods, Recovery methods: Shadow-Paging and Log-Based Recovery, Checkpoints, Query Processing, Query Optimization, Performance Tuning	
UNIT -V	**Parallel and Distributed Databases**	**(08 Hours)**
	Introduction to Database Architectures: Multi-user DBMS Architectures, Case study- Oracle Architecture. Parallel Databases: Speedup and Scale up, Architectures of Parallel Databases. Distributed Databases: Architecture of Distributed Databases, Distributed Database Design, Distributed Data Storage, Distributed Transaction: Basics, Failure modes, Commit Protocols, Concurrency Control in Distributed Database. Cloud database examples.	
UNIT -VI	NoSQL Database	**(08 Hours)**
	Introduction to NoSQL Database, Types, and examples of NoSQL Database- Key value store, document store, graph, Performance, Structured verses unstructured data, Distributed Database Model, CAP theorem and BASE Properties, Comparative study of SQL and NoSQL, NoSQL Data Models, Case Study- unstructured data from social media. Introduction to Big Data, HADOOP: HDFS, MapReduce. JSON	

List of Experiments:

1. Write a query to display all the columns from salesman table. First create a Salesman table.
2. Design and Develop SQL DDL statements which demonstrate the use of SQL objects such as Table, View, Index, Sequence, Synonym
3. Design at least 10 SQL queries for suitable database application using SQL DML statements: Insert, Select, Update, Delete with operators, functions, and set operator.

4. Design at least 10 SQL queries for suitable database application using SQL DML statements: all types of Join, Sub-Query and View.

5. Unnamed PL/SQL code block: Use of Control structure and Exception handling is mandatory.

Write a PL/SQL block of code for the following requirements: -

1. Schema:

1.Borrower(Rollin, Name, Date of Issue, NameofBook, Status)

2. Fine(Roll.no,Date,Amt)

- Accept roll.no & name of book from user.
- Check the number of days (from date of issue), if days are between 15 to 30 then fine amount will be Rs 5per day.
- If no. of days>30, per day fine will be Rs 50 per day & for days less than 30, Rs. 5 perday.
- After submitting the book, status will change from I to R.
- If condition of fine is true, then details will be stored into fine table.

Frame the problem statement for writing PL/SQL block in line with above statement.

6. Cursors: (All types: Implicit, Explicit, Cursor FOR Loop, Parameterized Cursor) Write a PL/SQL block of code using parameterized Cursor, that will merge the data available in the newly created table Rollcall with the data available in the table Rollcall. If the data in the first table already exist in the second table, then that data should be skipped. **Frame the separate problem statement for writing PL/SQL block to implement all types of Cursors in line with above statement. The problem statement should clearly state the requirements.**

7. PL/SQL Stored Procedure and Stored Function. Write a Stored Procedure namely proc_Grade for the categorization of student. If marks scored by students in examination is <=1500 and marks>=990 then student will be placed in distinction category if marks scored are between 989 and900 category is first class, if marks 899 and 825 category is Higher Second Class Write a PL/SQL block for using procedure created with above requirement. Stud_Marks(name, total_marks) Result (Roll,Name, Class) Frame the separate problem statement for writing PL/SQL Stored Procedure and function, inline with above statement. The problem statement should clearly state the requirements

8. PL/SQL Stored Procedure and Stored Function. Write a Stored Procedure namely proc_Grade for the categorization of student. If marks scored by students in examination is <=1500 and marks>=990 then student will be placed in distinction category if marks scored are between 989 and900 category is first class, if marks 899 and 825 category is Higher Second Class Write a PL/SQL block for using procedure created with above requirement. Stud Marks (name, total marks) Result (Roll, Name, Class) Frame the separate problem

statement for writing PL/SQL Stored Procedure and function, in line with above statement. The problem statement should clearly state the requirements
9. Write a program to implement Mogo DB database connectivity with python Implement Database navigation operations (add, delete, edit etc.) using ODBC/JDBC.
10. Implement MYSQL/Oracle database connectivity with python Implement Database navigation operations (add, delete, edit,) using ODBC/JDBC
11. **Mini Project:**
Topics for projets based learning*
1.Library Management System An online library management system offers a user-friendly way of issuing books and viewing different books and titles available under a category. This type of Management Information System (MIS) can be easily developed. And SQL queries enable quick retrieval of the required information.
2. Centralized College Database A college has academic departments, such as the Department of English, Department of Mathematics, Department of History, and so on. And each department offers a variety of courses. Now, an instructor can teach more than one course. Let’s say a professor takes a class on Statistics and on Calculus.
3. Student Database Management Similarly, you can do a student record-keeping project. The database would contain general student information (such as name, address, contact information, admission year, courses, etc.), attendance file, marks or result file, fee file, scholarship file, etc. An automated student database streamlines the university administration process to a considerable degree.
4. Online Retail Application Database As e-commerce experiences remarkable growth around the world, online retail application databases are among the most popular SQL project ideas.
5.Inventory Control Management Inventory control is the process of ensuring that a business maintains an adequate stock of materials and products to meet customer

demands without delay
6. Hospital Management System It is a web-based system or software that enables you to manage the functioning of a hospital or any other medical setup. It creates a systematic and standardized record of patients, doctors, and rooms, which can be controlled only by the administrator.
7. Railway System Database In this database system, you need to model different train stations, railway tracks between connecting stations, the train details (a unique number for each train), rail routes and schedule of the trains, and passenger booking information.
8. Payroll Management System It is one of the most preferred SQL database project ideas due to its extensive usage across industries. An organization's salary management system calculates the monthly pay, taxes, and social security of its employees.
9. An SMS-based Remote Server Monitoring System Such systems are particularly beneficial for large corporate organizations having massive data centers and multiple servers. Since these servers host many applications, it becomes tricky to monitor their functionality. Usually, when a server is down or has crashed, the clients inform the organization about it.
10. Blood Donation Database This database would store interrelated data on patients, blood donors, and blood banks.
11. Art Gallery Management Database If you are running an art store, you can also organize and manage all your customer information, including names, addresses, the amount spent, liking and interests.
12. Cooking Recipe Portal This is another application of SQL databases in the creative field. You can model a web portal where a stored procedure will display your cooking recipes under different categories.

13. Carbon Emissions Calculator Lately, environmental conservation has been receiving a lot of attention globally. You can also contribute to the cause by developing a web application that measures the carbon footprint of buildings.

14. A Voice-based Transport Enquiry System This innovative tool helps you save time while travelling. You would have noticed long queues outside the transport controller's office at public transport terminals. This is where commuters make inquiries about the different types of transport facilities available. In this scenario, technology-enabled transport enquiry systems can result in huge savings of time and effort. You can develop an automated system for bus stands, railway stations, and airports that can receive voice commands and answer in a voice-based format.
15. Pharmacy Management System Pharmacy Management System is the process of ensuring that a business maintains an adequate stock of medicines and tablets to meet customer demands without delay
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Silberschatz A., Korth H., Sudarshan S., "Database System Concepts", McGraw Hill Publishers, ISBN 0-07-120413-X, 6th edition
2. Connally T, Begg C., "Database Systems", Pearson Education, ISBN 81-7808-861-4
3. Pramod J. Sadalage and Martin Fowler, "NoSQL Distilled", Addison Wesley, ISBN10: 0321826620, ISBN-13: 978-0321826626
Reference Books:
1. C J Date, "An Introduction to Database Systems", Addison-Wesley, ISBN: 0201144719
2. S.K.Singh, "Database Systems : Concepts, Design and Application", Pearson, Education, ISBN 978-81-317-6092-5
3. Kristina Chodorow, Michael Dirolf, "MangoDB: The Definitive Guide",O'Reilly Publications, ISBN: 978-1-449-34468-9.
4. Adam Fowler, "NoSQL For Dummies", John Wiley & Sons, ISBN-1118905628
5. Kevin Roebuck, "Storing and Managing Big Data - NoSQL, HADOOP and More", Emereopty Limited, ISBN: 1743045743, 9781743045749
6. Joy A. Kreibich, "Using SQLite", O'REILLY, ISBN: 13:978-93-5110-934-1
7. Garrett Grolemund, "Hands-on Programming with R", O'REILLY, ISBN : 13:978-93- 5110-728-6

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B. Tech. Sem. III: Electronics & Telecommunication Engineering
SUBJECT: EDA TOOL PRACTICES

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW: 50 Marks	Credit: 01
		Total Credit: 01

Course Pre-requisites:

	Elementary Electronics, Electrical Technology.

Course Objectives:

1	To introduce the students to transient analysis of electronic circuits using simulation software (EDA tool)
2	To teach the students to carry out AC analysis of amplifiers using simulation software (EDA tool)
3	To introduce the students to simulation tools for basic analog electronic circuits
4	To introduce the students to simulation tools for basic digital electronic circuits
5	To teach the students to use virtual instruments in an EDA tool
6	To train the students to troubleshoot basic circuits with an EDA tool

Course Outcomes: After learning this course students will be able to

1	Perform Transient Analysis of simple circuits using EDA tool.
2	Perform AC Analysis of simple circuits using EDA tool.

3	Use an EDA tool for simulating basic analog electronic circuits.
4	Use an EDA tool for simulating basic digital electronic circuits.
5	Use virtual instruments in an EDA tool for analyzing and testing basic electrical and electronic circuits.
6	Use EDA tool for troubleshooting basic circuits.

List of experiments:

1. Study of an EDA tool, concept of simulation, different types of analyses, simulation errors
2. Study and use virtual instruments, signal, and power sources
3. Verify Basic circuit laws and theorems using MULTISIM
4. Construct diode circuits and simulate the same
5. Construct and analyze BJT biasing circuits
6. Construct single stage CE amplifier circuit and carry out transient and AC analysis
7. Implement Boolean equations and implement the same using basic logic gates
8. Implement circuits with multiplexers and decoders
9. Troubleshooting a given circuit using EDA tool

Reference Books:

4. Circuit Analysis with Multisim, David Báez-López Félix E. Guerrero-Castro, Morgan & Claypool Publishers.
5. Advanced Circuit Simulation Using Multisim Workbench, David Báez-López Félix E. Guerrero-Castro, Morgan & Claypool Publishers

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B. Tech. Sem. III: Electronics & Telecommunication Engineering **SUBJECT: - PCB DESIGN AND SOLDERING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit:01
		Total Credit: 01

Course Pre-requisites:

	Elementary Electronics

Course Objectives:

1	To introduce the basic building blocks for PCB artwork design
2	To train the student to create simple PCB artwork design using an PCB design tool
3	To expose the students to soldering process and tools
4	To train the students to make reliable solder joints
5	To train the students to de-solder the solder joints
6	To teach the art of inspecting solder joints

Course Outcomes: After learning this course students will be able to

1	Demonstrate the knowledge of selecting proper PCB primitives (track width, pad size, hole size, clearance between pads and tracks,

	footprints)
2	Use PCB design software for simple single sided PCB artwork design
3	Identify and select appropriate soldering tools for the soldering job
4	Use solder iron for soldering through hole components
5	Use solder iron and de-solder pump /wick for de-soldering through hole components
6	Perform electrical (continuity) and visual inspection for solder joints

List of experiments:

1. Design a simple (only discrete components) single sided PCB using PCB design software (PCB artwork design flow)
2. Design a single sided PCB using PCB design software for a circuit with IC components
3. Design a double-sided PCB using PCB design software
4. Study and use of tools like solder iron (types and temperature profile), wire-strippers, cutters
5. Study of solder alloys, flux and rosin
6. Solder basic electronic components like resistors, capacitors, IC bases (through hole)
7. Use de-solder pump/wick for de-soldering components
8. Carry out electrical continuity test and visual inspection for a soldered board

Reference Books:

1. Getting Started with Soldering: A Hands-On Guide to Making Electrical and Mechanical Connections, Marc de Vinck, Maker Media, Inc, 2017
2. Soldering in electronics assembly, MIKE JUDD, Keith Brindley, Newnes,1999

3.	Printed Circuits Handbook, Clyde F. Coombs, Jr.,McGraw-Hill, 2008
4.	User Manual for the selected PCB Design Software
5.	Getting Started with Soldering: A Hands-On Guide to Making Electrical and Mechanical Connections, Marc de Vinck, Maker Media, Inc, 2017

SEMESTER:- IV
SYLLABUS

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering **SUBJECT: - CONTROL SYSTEMS AND APPLICATIONS**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 00		
		Total Credit: 04

Course Pre-requisites:	
The Students should have knowledge of	
1.	Basic knowledge of signals.
2.	Basic mathematical tools like Laplace transform
3.	Basic knowledge of software like MATLAB

Course Objectives:	
	• To provide in depth knowledge of the various types of control systems and determination of transfer function using different methods. • To analyze the first order and second order system in time domain. • To introduce the concept of different types of controllers and compensators. • To analyze the control system in frequency domain. • To analyze the digital control systems in time domain. • To provide state variable analysis.

Course Outcomes: After learning this course students will be able to	
1	Identify various control systems and determine the ‘Transfer Function’ of a system using block diagram reduction technique and signal flow graph.
2	Determine the time response for different system, the errors in various control systems; evaluate the stability of a system using Routh’s Stability Criterion and analysis graphical technique such as root locus.
3	Demonstrate the knowledge of control actions such as Proportional (P), Integral (I), Derivative (D), PI, PID and compensators.
4	Determine frequency response and different graphical methods like Bode plot and polar plot.
5	Calculate the time response for digital control systems and design digital control system.
6	Implement the state variables for state variable model for linear as well as digital control systems.

UNIT – I	**Introduction to Control System**	**(08 Hours)**
	Introduction to analog as well as digital control system, Classification of Control System, control problem, Feedback and Non-feedback Systems, Transfer Function, Block diagram and signal flow graph analysis, Pulse transfer function, Sampled Signal Flow Graph.	
UNIT – II	**Time Domain Analysis**	**(08 Hours)**
	Time response of first order & second order system using standard test signal, steady state errors and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system, Hurwitz and Routh stability criteria.	
UNIT - III	**Controllers and Compensators**	**(08 Hours)**

	Effect of Poles and Zeros on the System Stability, Types of Compensators, Lead, Lag, Lead-Lag Compensators design, Control actions – On/Off, P, PI, PD, PID. PLC Architecture, Introduction to Ladder Diagram, Examples of ladder diagram.	
UNIT -IV	**Frequency Domain Analysis**	**(08 Hours)**
	Relationship between time & frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist stability criterion.	
UNIT -V	**Digital control systems**	**(08 Hours)**
	Time Response of discrete time systems: Time response specifications, Steady state error, error constants, time response for 1st order and 2nd order systems. Design of sampled data control system: Root locus technique, Bode plot, Nyquist stability criteria, lead compensator design using Bode plot, lead compensator design using Bode plot, lead compensator design using Bode plot.	
UNIT -VI	**State variable analysis**	**(08 Hours)**
	State variable representation-Conversion of state variable models to transfer functions-Conversion of transfer functions to state variable models-Solution of state equations-Concepts of Controllability and Observability-Stability of linear systems-Equivalence between transfer functionand state variable representations-State variable analysis of digital control system-Digitalcontroldesign using state feedback.	

Term Work: Any 8 of below given list
1. Unit Step and Impulse response of the Transfer function using MATLAB.
2. Transient response of second order system using MATLAB
3. To draw Root Locus theoretically (analog and digital) and verify it using MATLAB.
4. To draw Bode plot theoretically (analog and digital) and verify it using MATLAB.
5. Magnitude and phase plot of Lead network (analog and digital).
6. Magnitude and phase plot of Lag network (analog and digital).
7. To study architecture of PLC.
8. Ladder diagram example using Virtual Lab
9. Implementation of DOL Starter Virtual Lab
10. Implementation of On-Delay Timer Virtual Lab
11. Implementation of Off-Delay Timer Virtual Lab
12. Implementation of Up-Down Counter Virtual Lab
13. Implementation of PLC Arithmetic Instructions Virtual Lab
14. Implementation of PID Controller Virtual Lab
Topics for projets based learning*
1. Maintaining constant speed (cruise control) and constant temperature (climate control) and maintaining pressure
2. Engine control, steering control, suspension control
3. Control skidding (antiskid system)
4. Automatic warehousing

5. Inventory control
6. Automation of farming
7. Commercial rail transportation
8. Biomedical CS
9. Design and Experimentation of Cable-Driven Platform Stabilization and Control Systems
10. Minimization of Energy Consumption in Underfloor Heating Systems
11. Automatic Water Pump Controller
12. Design, Analysis and Testing of a Flapping Wing Miniature Air Vehicle
13. Design Cognitive mobile robot model
14. PLC Based Performance Analysis Of Range Sensors For A Real-Time Power Plant Coal Level Sensing System.
15. Mine Water Level Fuzzy Control System Design Based On PLC.
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International Publication
2. Schaum's Series book "Feedback Control Systems".
3. Les Fenical "Control Systems", 1st Edition, Cengage Learning India.
4. R. Anandanatarajan, P. Ramesh Babu, "Control Systems Engineering", Scitech Publications
Reference Books:
1. Norman S. Nise "Control Systems Engineering", 4th edition, Wiley edition.
2. Samarjeet Ghosh, "Control Systems Theory & Applications", 1st edition, Pearsoneducation.
3. S.K. Bhattacharya, "Control Systems Engineering", 1st edition, Pearson education.
4. Hackworth, "Programmable Logic Controller", 1st edition, Pearson education.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - INTEGRATED CIRCUITS AND APPLICATION

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial:00	TW & PR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:

	SDC-I, SDC-2, Electronics Network Theory

Course Objectives:

1.	To introduce the OPAMP and its internal building blocks
2.	To provide the basics of analysis and design of linear and nonlinear applications of Op-Amp
3.	To introduce the students to design of active filters
4.	To introduce the students to analysis and design of OPAMP based waveform generators
5.	To introduce the Timer IC 555 and its applications
6.	To introduce PLL, Three terminal voltage regulators and ADC/DAC and their applications

Course Outcomes: After learning this course students will be able to

1	Visualize the internal blocks of a typical OPAMP IC and interpret the OPAMP parameters
2	Analyze and design linear and nonlinear applications of OP-AMP.

3	Analyze and design first and second order active filters using OP-AMP..		
4	Analyze and design Waveform Generators using OP-AMP.		
5	Design of multivibrators using Timer IC 555		
6	Demonstrate knowledge of Phase Locked Loop IC 565 and its application and design linear power supply using three terminal voltage regulators, classify ADC and DAC devices		
UNIT – I	**OPAMP Internals**		**(08 Hours)**
	Amplifier types (voltage, current, transconductance, trans resistance), Limitations of CE amplifiers, Block diagram of OPAMP, Differential amplifier with and without constant current tail (review), Level Shifter, Complementary Symmetry Output power amplifier, Frequency compensation, Ideal and practical characteristics of OPAMP, Parameters of practical OPAMP, Offset voltage balancing.		
UNIT – II	**Linear Applications of OPAMP-I**		**(08 Hours)**
	DC and AC inverting amplifier, DC and AC Non-Inverting Amplifier, DC and AC Voltage Follower circuit, Summing Amplifier, Difference Amplifier, Instrumentation Amplifier, I-V and V-I converters		
UNIT - III	**Linear Applications of OPAMP-II**		**(08 Hours)**
	Integrator, Differentiator, Active Filters, Log, and anti-log amplifiers		
UNIT -IV	**Non-Linear Applications of OPAMP**		**(08 Hours)**
	Comparator and Schmitt Trigger circuit, Window detector, Precision rectifiers, Peak detector,		

	Sample and Hold circuit	
UNIT -V	**Waveform Generators**	**(08 Hours)**
	Positive Feedback and Barkhausen criteria, Wein bridge oscillator, RC Phase shift oscillator, Colpitts oscillator, Hartley oscillator, square wave generator, Triangular wave generator, IC 555 astable and monostable circuits	
UNIT -VI	**Voltage Regulators, PLL and Mixed Signal Circuits**	**(08 Hours)**
	Three terminal IC voltage regulators, Voltage Controlled Oscillator and Phase Locked Loop, Parameters of DAC, Digital-to-Analog Converters (Binary weighted, R-2R ladder network type), Analog to Digital Converters (Flash, Successive Approximation, Integrating) Parameters of ADC, Introduction to sigma-delta ADC.	

List of experiments:

1. Design, build and test DC inverting, non-inverting, and voltage follower circuits
2. Design, build and test AC inverting, non-inverting and voltage follower circuits, plot frequency response
3. Design, build and test inverting, non-inverting summing amplifier circuits
4. Design, build and test integrator circuit and plot frequency response
5. Design, build and test differentiator circuit and plot frequency response
6. Design, build and test 1st order active LPF and HPF and plot frequency responses
7. Design, build and test Wein bridge oscillator
8. Design, build and test RC phase shift oscillator
9. Design, build and test astable multivibrator using IC555

10. Measure line and load regulation of three terminal regulator
Topics for projets based learning*
1.Audio Mixer
2. Stereo Pre-amplifier
3. Graphic Equalizer
4. Burglar alarm
5. Tachometer
6. Universal Battery charger
7. Function Generator
8. Fixed voltage regulated power supply
9. Variable output voltage regulated power supply
10. Dual polarity regulated power supply
11. Electronic stethoscope
12. Digitally selectable precision attenuator
13. Bridge amplifier for stereo
14. Bar graph battery voltage indicator
15. Touch sensitive switch
*Students in a group of 3 to 4 shall complete any one project from the above list
Textbooks:
1. Operational Amplifiers and Linear ICs, David A. Bell, 3rd Edition,2008, ISBN:0195696131, 9780195696131, Oxford University Press
2. Design with Operational Amplifiers and Analog Integrated Circuits, Sergio Franco, 4th Edition, McGraw-Hill

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<table>
<tr><td colspan="3">B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - ELECTROMAGNETICS AND TRANSMISSION LINE</td></tr>
<tr><td><u>TEACHING SCHEME:</u></td><td><u>EXAMINATION SCHEME:</u></td><td><u>CREDITS ALLOTTED:</u></td></tr>
<tr><td>Theory: 03</td><td>End Semester Examination: 60 Marks</td><td>Credits: 03</td></tr>
<tr><td>Practical: 00</td><td>Internal Assessment: 40 Marks</td><td></td></tr>
<tr><td>Tutorial: 01</td><td></td><td>Credits:01</td></tr>
<tr><td></td><td></td><td>Total Credit: 04</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Course Pre-requisites:</td></tr>
<tr><td></td><td colspan="2">Fundamentals of Vector Analysis and Mathematical Calculus</td></tr>
<tr><td></td><td colspan="2"></td></tr>
<tr><td colspan="3">Course Objectives:</td></tr>
<tr><td></td><td colspan="2">To analyze basic Electrostatic laws such as Coulomb’s law and Gauss law
To compute boundary conditions with electrostatic parameters
To analyze basic Magnetostatic laws such as Biot-Savart’s Law and Ampere’s Law
To evaluate Maxwell’s equation
To demonstrate wave propagation through different media
To examine transmission Line and impedance matching techniques</td></tr>
<tr><td colspan="3"></td></tr>
<tr><td colspan="3">Course Outcomes: After learning this course students will be able to</td></tr>
<tr><td>1</td><td colspan="2">Analyze electric field in different field distributions</td></tr>
</table>

2	Identify the Electrostatic parameters	
3	Analyze magnetostatic field in different field distributions	
4	Evaluate time varying Electric and Magnetic Fields	
5	Characterize wave equation	
6	Compute Transmission Line and its applications	
UNIT – I	**Electrostatic-I**	**(06 Hours)**
	Coulomb's law, Electrostatic Field Intensity, Calculation of Electric field for: infinite line, surface, volume charge distribution, Electric flux density, Concept of Divergence, Gauss Law, Application of Gauss's law for: point, infinite line, infinite sheet, uniformly charged sphere.	
UNIT – II	**Electrostatic-II**	**(06 Hours)**
	Electric Potential, Relation between Electric Field and Potential, Energy Density, Resistance, Capacitance, Boundary Condition	
UNIT - III	**Magnetostatics**	**(06 Hours)**
	Biot-Savart's Law, Application of Biot-Savart's Law, Stoke's Theorem, Ampere's Law, Application of Ampere's Law, Forces due to Magnetic Field, Boundary Conditions, Inductor, and Inductance. Standard inductance configurations: Toroid, Solenoid. Materials in magnetic fields.	

UNIT -IV	**Time Varying Fields and Maxwell’s Equation**	**(06 Hours)**
	Faraday’s Law, Transformer and Motional Electromotive Forces, Displacement Current, Maxwell’s Equation in both differential form and integral form.	
UNIT -V	**Wave Propagation/ Uniform Plane Wave**	**(06 Hours)**
	Wave Propagation in Lossy Dielectrics, Plane Waves in Lossless Dielectrics, Plane Waves in Free Space, Plane Waves in Good Conductors, Power and Poynting Vector, Reflection of a Plane Wave at Normal Incidence.	
UNIT -VI	**Transmission Lines and Impedance Matching Techniques**	**(06 Hours)**
	Transmission Line Parameters, Transmission Line Equations, Input Impedance, Standing Wave Ratio and Power, Smith Chart, Stub Matching Technique, QWT, Single Stub Matching, Double Stub Matching, EMC-EMI, Types of EMC.	
<u>List of Tutorials:</u>		
1. Application of Stoke’s theorem.		
2. Application of Gauss’s law		
3. Energy stored in capacitor.		
4. Application of Poission’s and Laplace’s equations.		
5. Boundary conditions for magnetic fields.		
6. Poynting theorem and their applications.		

7. Applications of Smith Chart.
8. Simulation on Electromagnetic Interference and Compatibility
Topics for projets based learning*
1.Design Electrostatic Speakers using the concept of Electrostatic Forces and Energy
2. Study the Faraday Cage
3. Build Lightning Rod
4. Study and survey on Xerography – Electrostatic Imaging
5. Design any Electrostatic Filters
6. Design a gauge that is sensitive to the fluid level in the capacitive gauge.
7. Calculate characteristic impedance and propagation speed of a coaxial cable based on measured dimensions
8. Design a metal detecting device based on mutual inductance
9. Design a non-contact probe that can detect the presence and polarity of a static (or slowly varying) electric field in air
10. Design a non-contact AC current meter
11. Study and survey on Heart Defibrillators
12. Study and survey on Hard Disk Reading and writing process
13. Design Metal detectors
14. Study and survey on Magnetic Resonance Imaging (MRI)
15. Design Magnetic Brakes
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1.Matthew N. O. Sadiku, “Principles of Electromagnetics”, 4th Edition, Oxford University Press.
Reference Books:
1. John D. Kraus “Electromagnetic”, McGraw Hill.
2. William Hyte “Electromagnetic Engineering”, McGraw Hill
3. Edminister J.A, Electromagnetics, Tata McGraw-Hill.

4. R.K Shevgaonkar, Electromagnetic waves,Tata McGraw-Hill.
5. S Salivahanan& S Karthie, “electromagnetic Field Theory” Vikas Publishing House Ltd.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - ANALOG COMMUNICATION

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial:00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 5

Course Pre-requisites:

	Signals and Linear Systems.

Course Objectives:

1.	To introduce essential components of communication system.
2.	To teach the students DSB-FC modulation and demodulation and its mathematical background
3.	To teach the students DSB-SC & SSB modulation and demodulation and its mathematical background
4.	To teach the students frequency modulation and demodulation and its mathematical background
5.	To introduce the students working of radio receivers.
6.	To introduce the studentsanalog to digital conversion technique in communication system

Course Outcomes: **After learning this course students will be able to**

1	Identify the basic components and effect of noise on communication system
2	Demonstrate the knowledge of DSB-FC modulation and demodulation and its mathematical background

3	Demonstrate the knowledge of DSB-SC & SSB modulation and demodulation and its mathematical background		
4	Demonstrate the knowledge of frequency modulation and demodulation and its mathematical background		
5	Identify components of communication receiver system.		
6	Demonstrate the knowledge of Pulse Modulation technique		
UNIT – I	**Principles of Communication Systems**		**(08 Hours)**
	Review of signals and systems, Frequency domain of signals, Block schematic of communication system, base band signals, RF bands, Necessity of modulation, Types ofchannels, Noise types - Internal & External, Noise Calculations, Signal to Noise ratio, Noise figure, Noise Temperature		
UNIT – II	**Amplitude Modulation-I**		**(08 Hours)**
	Amplitude Modulation principles, Representation of AM, Frequency spectrum & BW, Modulation index, % modulation, Power relations in AM, Trapezoidal patterns-, high- and low-level AM transmitters, DSB-FC Generation-linear and non-linear modulator, Linear modulators-low- and high-level linear modulators, Non-linear modulators- square law modulator and switching modulator, DSB-FC Demodulation- square law detector and envelope/diode detector.		
UNIT - III	**Amplitude Modulation-II**		**(08 Hours)**
	DSB-SC Principles, DSB-SC Generation Methods: Multiplier modulator, linear modulator, non-linear modulator and switching modulator, DSB-SC Demodulation-synchronous and coherent detection, SSB Principles, SSB Generation Methods: Filter method, phase shift method &the		

	third method,SSB Demodulation, Comparison of AM,DSB-SC and SSB, Independent sideband system (ISB), Vestigial sideband (VSB).	
UNIT -IV	**Frequency Modulation**	**(08 Hours)**
	Angle Modulation, Principles, mathematical analysis of FM, frequency deviation and percentage modulation, modulation index, deviation ratio, Bessel function,BW requirements, Narrow band & wide band FM, Pre-emphasis and de-emphasis, FM modulators - Direct & Indirect modulator, Direct modulator- varactor diode modulator, reactance modulator-frequency stabilized reactance modulator, Indirect modulator- Armstrong method, FM demodulators - Direct & Indirect detector, Types of direct detectors, Indirect detector-phase locked loop.	
UNIT -V	**Radio Receivers**	**(08 Hours)**
	Block diagram of AM receiver- TRF and Super heterodyne receiver,FM receiver, receiverperformance and measurement parameters: Sensitivity, Selectivity, fidelity, Image Frequency Rejection, Automatic Gain Control (AGC)- simple and delayed AGC, IF Amplifiers, Tracking- Two point and three-point tracking, Mixers-separately excited mixers and self-excited mixers.	
UNIT -VI	**Pulse Modulation**	**(08 Hours)**
	Sampling process, Sampling Theorem,Nyquist criteria, Sampling types: Natural & flat top sampling, aliasing error and aperture effect, Pulse Modulation-PAM modulator & demodulator, PWM modulator& demodulator, PPM modulator& demodulator, Comparison of PAM,PWM and	

	PPM, Multiplexing, TDM- transmitter and receiver, FDM- transmitter and receiver.	
<u>List of experiments:</u>		
1. Write a MATLAB program for generation of AM signal		
2. Write a MATLAB program for generation of DSB-SC signal		
3. Write a MATLAB program for generation of FM signal		
4. To perform Amplitude Modulation and Demodulation.		
5. To performDSB-SC Modulation & Demodulation.		
6. To performFrequency Modulation and Demodulation		
7. To perform sampling and Reconstruction of a signal.		
8. To performPulse Amplitude Modulation (PAM.)		
9. To performPulse Width Modulation (PWM)		
10. To performPulse Position Modulation (PPM)		
Topics for projets based learning*		
1. Survey report on types of noise and its impact on communication system		
2. Survey report on types of AM modulators and demodulators		
3. Build simple AM transmitter system using linear modulator		
4. Build simple AM transmitter system using non-linear modulator		
5. Build simple AM receiver system		
6. Survey report on types of FM modulators and demodulators		

7. Build simple FM transmitter system using direct modulator
8. Build simple FM transmitter system using indirect modulator
9. Build simple FM receiver system using direct demodulator
10. Build simple FM receiver system using indirect demodulator
11. Build a circuit for sampling and seconstruction of a signal.
12. Build the Pulse Amplitude Modulation circuit
13. Build the Pulse Width Modulation circuit
14. Build the Pulse Position Modulation circuit
15. Build the Pulse Position demodulation circuit
*Students in a group of 3 to 4 shall complete any one project from the above list
Text Books:
1. Electronics Communication System, George Kennedy, 4th Edition, Tata McGraw HillPublication.
2. Modern Digital and analog Communication System, B.P.Lathi, Oxford University press.
Reference Books:
1. Principles of Communication Systems,Taub&Schilling,Tata McGraw-Hill Publication.
2. Communication Systems, Simon Haykin, 4th Edition, John Wiley & Sons.
3. Electronics Communications, Dennis Roddy, John Coolen, 4th Edition- PearsonEducation.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - DATA SCIENCE

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 50 Marks	Credits: 01
		Total Credits: 05

Course Pre-requisites:

Python Programming and DBMS.

Course Objectives:

- To acquire in-depth understanding of the fundamental concepts in data modeling, data analysis, statistics, machine learning techniques.
- To strengthen the analytical and problem-solving skill through developing real time Use cases.
- To gain practical experience in programming tools for data sciences, database systems, machine learning and Visualization tools.
- To empower students with tools and techniques for handling, managing, analyzing and interpreting data.

Course Outcomes: After learning this course students will be able to

1	Develop a schema design, perform ETL operations with normalized techniques.
2	Visualize the data and detect anomalies with the help of statistical methods.
3	Implement ANOVA test, Regression & Dimensionality Reduction Techniques.

4	Model different machine learning algorithms and draw predictive outcomes.	
5	Develop an interactive and functional Dashboard using Power BI.	
6	Visualize the data using Power BI	
UNIT – I	**Fundamentals of Data Analysis using MySQL**	**(08 Hours)**
	Introduction to Data Science, DBMS approach to analytics, ER Diagram and Schema design, Normalization techniques, data cleaning and transforming – Extract, Transform & Load.	
UNIT – II	**Data Analysis and Visualization with Excel, Python**	**(08 Hours)**
	with Excel: Descriptive statistics, Outlier detection, Visualization: Box plot, Line chart, Pie chart, Bar charts, Histogram. **With Python:** Pandas and Numpy, Data modelling and transforming, dealing with null values, different data types, preparing data for the model, Visualization with Matplotlib, Seaborn.	
UNIT - III	**Advanced Statistics**	**(08 Hours)**
	Analysis of Variance (ANOVA), Regression Analysis: linear regression, multiple linear, and non-linear regression, Dimension Reduction Techniques.	
UNIT -IV	**Machine Learning-I**	**(08 Hours)**
	Introduction to Supervised and Unsupervised Learning, Clustering, Decision Trees, Random Forest, Multiple Linear Regression, Logistic Regression, Linear Discriminant Analysis	

UNIT -V	**Machine Learning-II**	**(08 Hours)**
	Time Series Forecasting: Introduction to Time Series, Correlation, Forecasting, Autoregressive models; Model Validation, Handling Unstructured Data.	
UNIT -VI	**Data visualization using Power BI**	**(08 Hours)**
	Introduction to Power BI, Basic charts and dashboard, Descriptive Statistics, Dimensions and Measures, Visual analytics: Storytelling through data, Dashboard design & principles.	

Term Work: Any 8 of below given list

1. SQL - Northwind Trader Database: Schema Design, Normalization & Cleaning.
2. Northwind Trader Database: Querying.
3. Statistics & Visualization with Excel.
4. Handling data using Python Pandas – Load (Multiple sources such as – Excel, SQL, CSV, URL), Transform.
5. Exploratory Data Analysis & Visualization using Python.
6. Machine Learning [Supervised] – Regression (Linear, Logistic & Multi-Linear.
7. Machine Learning [Supervised] – Classification (Logistic Regression, Decision Tree & Random Forest, KNN, K Mean Clustering, SVM).
8. Machine Learning [Time series] – ECG Analysis.
9. Machine Learning – Titanic Dataset Analysis (EDA)-1 .
10. Machine Learning – Titanic Dataset Analysis (Visualization & Prediction)-2.

11. Power BI – Input & Transforming Data.
12. Power BI – Creating Visuals & Reports.
13. Power BI – Dashboard.

Topics for projets based learning*

1. Design/Model a database without normalizing from scratch and create an E-R diagram as schema. Apply normalization techniques to previous created tables and perform Data Wrangling & Data Cleaning.
2. Implement an Email automation system using SQL & Python.
3. Create a Spotify Music Analysis visualization using Python pandas.
4. Create a Crypto currency Analysis visualization using Python pandas.
5. Build a Netflix like Movie recommendation model using Machine Learning.
6. Build a Song recommendation model using Machine Learning.
7. Build a Book recommendation model using Machine Learning.
8. Create a Credit Card Fraud Detection system using Machine Learning Algorithms.
9. Create a cheque clearance model using Machine Learning Algorithm.
10. Twitter Sentiment Analysis.
11. Uber Dataset Time Series Analysis.
12. Build a dynamic functional ChatBot using reddit conversations as dataset.
13. Build a Machine Learning Model with Health Care Data.
14. Create an interactive Super Store Dataset using PowerBI.
15. Create a Dashboard on Covid Vaccine Tracker using PowerBI.

*Students in a group of 3 to 4 shall complete any one project from the above list

Text Books:

1. Introduction to Machine Learning with Python: A Guide for Data Scientists by Andreas C. Mueller, Sarah Guido, O′Reilly Publication.

2. Practical Statistics for Data Scientists by Peter Bruce, Andrew Bruce, O′Reilly Publication.
3. Microsoft Power BI Quick Start Guide: Build dashboards and visualizations to make your data come to life, by Devin Knight , Brian Knight, Packt Publishing.
Reference Books:
1. Python Machine Learning By Example: The easiest way to get into machine learning, by Yuxi (Hayden) Liu, Packt Publishing.
2.Mastering Microsoft Power BI: Expert techniques for effective data analytics and business intelligence, by Brett Powell, Packt Publishing.

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<table>
<tr><td colspan="3">B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - ADVANCED COMPUTER PROGRAMMING</td></tr>
<tr><td><u>TEACHING SCHEME:</u></td><td><u>EXAMINATION SCHEME:</u></td><td><u>CREDITS ALLOTTED:</u></td></tr>
<tr><td>Theory: 00</td><td>End Semester Examination: 00</td><td>Credits: 00</td></tr>
<tr><td>Practical: 02</td><td>Internal Assessment: 00</td><td></td></tr>
<tr><td>Tutorial: 00</td><td>TW & OR: 50 Marks</td><td>Credit: 01</td></tr>
<tr><td></td><td></td><td>Total Credit: 01</td></tr>
</table>

Course Pre-requisites:	
1.	C programming.
Course Objectives:	
	1. To introduce the basic building blocks for JAVA programming 2. To teach the concept of multithreading and exception handling. 3. To teach the lambda functions. 4. To train the student to use java script. 5. To train the student to use HTML.
Course Outcomes:	**After learning this course students will be able to**
1	Demonstrate the knowledge of basic programming in JAVA.
2	Implement the concept of multithreading and exception handling.
3	Use the lambda functions.

4	Implement the concept of JavaScript.
5	Implement the concept ofHTML.
6	Design webpage using JavaScript and HTML.

Term Work: Any 16 of below given list

1. Introduction to basics of JAVA and JAVA installation.
2. WAP to implement static and non-static members and their execution control flow.
3. WAP to implement wrapper class.
4. WAP to implement flow control statements, looping statements and arrays.
5. WAP to implement:
   a. Inheritance
   b. Abstraction
6. WAP to implement:
   a. Polymorphism
   b. Encapsulation
7. WAP to implement exception handling and assertions.
8. WAP to implement multithreading.
9. WAP to implement callable and future.
10. WAP to implement string handling.
11. WAP to implement IO streams.

12. WAP to implement collection Array List.
13. WAP to implement collection LinkedList.
14. WAP to implement lambda functions with predicates.
15. WAP to implement lambda functions with streams.
16. WAP to implement annotations.
17. WAP to implement the basics of HTML
18. WAP to implement the basics of java script
19. WAP to implement handling of events and errors, debugging with java scripts.
20. A mini-project to create Web Pages using HTML and JavaScript.
Text Books:
1. Programming with Java: A Primer, 3E by E Balagurusamy, Tata McGraw Hill Publishing Company.
Reference Books:
1. Java Complete Reference, Herbert Schildt, McGraw Hill Publishing Company
2. Java: How to Program by Deitel and Deitel
3. Ivan Bayross, “Web Enabled Commercial Applications Development Using HTML, DHTML, JavaScript, Perl – CGI”, BPB Publication.

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B. Tech. Sem. IV: Electronics & Telecommunication Engineering
SUBJECT: - SENSOR MODELLING AND SIMULATION LABORATORY

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW & OR: 50 Marks	Credit: 01
		Total Credit: 1

Course Pre-requisites:

	signals and systems and control systems.

Course Objectives:

1.	To introduce the transducers and sensors which will help direct measurement of electronic, electrical, and communication parameters.

Course Outcomes: After learning this course students will be able to

1	Characterize the temperature sensors.
2	Simulate the performance of a bio-sensor.
3	Measurement of level in a tank using capacitive type level probe.
4	Characterize the LVDT
5	Design an orifice plate for a typical application.

6	Simulate the performance of a chemical sensor.
7	Characterize the strain gauge sensor.

List of Practicals to be performed in the laboratory

1. To learn the various static and dynamic characteristics of measurement systems.
2. Characterize the temperature sensor (RTD) on virtual lab
3. Measurement of level in a tank using capacitive type level probe on virtual lab
4. Characterize and analyze the working of the LVDT.
5. Characterize the strain gauge sensor.
6. To measure and study of Pressure indicator With Pressure Output in percentage
7. To measure and study of Flow Indicator with Flow rate, Totalizer
8. To measure and study of Level Indicator with MM, CM and percentage
9. To study Inductive rotor position sensor with four inductive coils using MATLAB
10. To study Electrothermal converter using MATLAB.
11. To study Rotary transformer for measurement of angle of rotation using MATLAB
12. To study Exponential light-emitting diode with optical power output port using MATLAB

Text Books&Reference Books:

1. H. S. Kalsi, “Digital Instrumentation”, Tata McGraw Hill
2. Clyde F. Coombs “Electronic Instrumentation Handbook” McGraw Hill
3. Cooper Helfric, “Electronic Instrumentation & Measurement Techniques”, Prentice Hall Publication

SEMESTER:- V
SYLLABUS

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B. Tech. Sem. V: Electronics & Telecommunication Engineering SUBJECT: - EMBEDDED SYSTEMS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR- 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites: Digital Electronics

Course Objectives:

1.	To teach the need and application of ARM processors in embedded system.
2.	To teach the architecture of ARM series processor.
3.	To teach architecture and features of typical ARM7 & ARM CORTEX-M3.
4.	To teach interfacing of real world input and output devices with ARM7 & ARM CORTEX-M3.

Course Outcomes: After learning this course students will be able to

1	Use IDE for firmware development.
2	Describe features of ARM7.
3	Interface LPC2148 with peripherals such as LED, LCD, EEPROM, SDCARD.
4	Describe features of CORTEX-M3.
5	Interface LPC1768 with peripherals such as RGB LED, TFT display, seven segment display.
6	Specify services offered by a typical RTOS.

UNIT – I	**Introduction to Embedded Systems**	**(06 Hours)**
	Definition of Embedded System, Embedded Systems Vs General Computing Systems, Classification, Major Application Areas, Characteristics of Embedded Systems, Hardware and Software components of an Embedded System, Introduction to IDEs.	

UNIT – II	**ARM7 Processor**	**(08 Hours)**
	Introduction to ARM processors and its versions: ARM7, ARM9 & ARM11 features, ARM7 data flow model, programmer's model, modes of Operations, Overview of Instruction set. ARM7 Based Microcontroller LPC2148: Features, Architecture (Block Diagram and ItsDescription), System Control Block (PLL and VPB divider) , Memory Map, GPIO, PinConnect Block, timers.	
UNIT - III	**Interfacing with ARM7**	**(09 Hours)**
	Interfacing the peripherals with LPC2148: LED, LCD, GLCD, KEYPAD, GSM and GPS using UART, on-chip ADC using interrupt (VIC), EEPROM using I2C, SDCARD using SPI, on-chip DAC for waveform generation. Programming in Embedded C.	
UNIT - IV	**ARM CORTEX Processors**	**(08 Hours)**
	Introduction to ARM CORTEX series, improvement over classical series. CORTEX A, CORTEX M, CORTEX R processors series, versions, features and applications. ARM-CM3 Based Microcontroller LPC1768: Features, Architecture (Block Diagram & Its Description), System Control, Clock & Power Control, GPIO and Pin Connect Block.	
UNIT -V	**Interfacing with ARM CORTEX M3**	**(09 Hours)**
	Interfacing peripherals with LPC1768: RGB LED, Seven Segment, TFT Display, MOTOR control using PWM. Concept of USB, CAN, and Ethernet based communication using	

	microcontrollers. CAN, USB, ETHERNET applications in embedded c.	
UNIT - VI	**Real Time Operating System**	**(08 Hours)**
	Need of operating system in developing complex applications in embedded system, desired features of operating system & hardware support from processor. Architecture of kernel, types of scheduler algorithms. µcos II RTOS services **:** Task management, ISR, Timer, Semaphores, mailbox, message queues, pipes, events, signals, memory management. Applications based on µcos II RTOS.	

List of Experiments (Minimum 8 to be performed)
1. Interfacing LPC2148 with LED.
2. Interfacing LPC2148 with Buzzer.
3. Interfacing LPC2148 with LCD/GLCD.
4. Interfacing LPC2148 for internal ADC on interrupt basis
5. UART Interfacing LPC2148 in embedded system (GSM/GPS)
6. Interfacing SD card with LPC2148.
7. Interfacing EEPROM with LPC2148 using I2C protocol.
8. Interfacing LPC1768 to Seven Segment / RGB LED
9. Generation of PWM signal for motor control using LPC1768
10. Interfacing TFT display to LPC1768
11. Implementing CAN protocol using LPC1768
12. Implementing ETHERNET protocol using LPC1768.
13. Semaphore as signaling and synchronizing in ARM
14. Mailbox implementation for message passing in ARM
Textbooks/Reference Books
1. Andrew Sloss, Dominic Symes, Chris Wright, “ARM System Developer‟s Guide – Designing and Optimizing System Software”, ELSEVIER
2. Joseph Yiu, “The Definitive Guide to the ARM Cortex-M”, Newness, ELSEVIER
3. Rajkamal, “Embedded system-Architecture, Programming and Design”, TMH Publications, Edition 2003

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B. Tech. Sem. V: Electronics & Telecommunication Engineering **SUBJECT: - DIGITAL COMMUNICATION SYSTEM**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR- 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites: Analog Communication

Course Objectives:

1.	To learn the building blocks of digital communication system.
2.	To prepare mathematical background for communication signal analysis.
3.	To introduce fundamental concepts of information theory
4.	To analyze error performance of digital communication system
5.	To understand concept of spread spectrum communication system.
6.	To learn and analyze the signal flow in a digital communication system.

Course Outcomes: After learning this course students will be able to

1	Classify analog to digital conversion techniques in communication system.
2	Compare various baseband transmission methods for digital signals.
3	Apply Information source codes to find code efficiency
4	Analyze different error detection and correction codes.
5	Design basic building blocks of digital communication system.
6	Analyze performance of spread spectrum communication system

UNIT – I	**Digital Transmission of Analog Signal**	**(08 Hours)**
	Introduction to Digital Communication System: Block Diagram and transformations, Basic Digital Communication Nomenclature. Digital Versus Analog Performance Criteria, Sampling Process, PCM Generation and Reconstruction, Quantization Noise, Non-uniform Quantization and Companding, PCM with noise: Decoding noise,	

	Error threshold, Delta Modulation, Adaptive Delta Modulation, Delta Sigma Modulation, Differential Pulse Code Modulation, LPC speech synthesis.	
UNIT – II	**Baseband Transmission & Reception**	**(08 Hours)**
	Block diagram of baseband transmitter-receiver system, Line Coding & its properties. NRZ & RZ types, signaling format for unipolar, Polar, bipolar (AMI) & Manchester coding and their power spectra. Inter Symbol Interference (ISI), Inter Channel Interference (ICI). Baseband Receivers-Matched Filters, Correlation receivers, Optimum filter	
UNIT - III	**Information Theory**	**(08 Hours)**
	Information: Definition and Properties, Information Source, Discrete Memoryless Source, Binary Source, Entropy, Properties of Entropy, Some Source Coding Algorithms: Huffman Coding, Shannon-Fano Coding, Average Code length, Efficiency, Channel Coding Theorem, Channel Capacity Theorem.	
UNIT - IV	**Error Correction and Error Detection**	**(08 Hours)**
	Error detection codes: Cyclic Redundancy Check (CRC) code and Checksum code. Error Correction codes: Linear block code: Generator and parity check matrices, error detection, syndrome. Cyclic code: Code generation, error detection, error correction, syndrome.	
UNIT -V	**Digital Carrier Modulation & Demodulation Techniques**	**(08 Hours)**
	Generation, Detection and applications of the following modulations: Binary ASK, Binary PSK, Quadrature PSK, Off-Set QPSK, M-ary PSK, Binary FSK, M-ary FSK, 16-ary QASK and MSK.	

UNIT - VI	**Spread Spectrum Modulation**	**(08 Hours)**
	Pseudo-Noise Sequences, A Notion of spread Spectrum, Direct-Sequence Spread Spectrum with Coherent Binary Phase-shift Keying, Signal-Space Dimensionality and processing Gain,Probability of Error, Frequency Hop Spread Spectrum, Maximum length and Gold codes,TDMA,FDMA,CDMA,OFDM	

List of Experiments
1. To perform Sampling and reconstruction of signal.
2. To perform Pulse Code Modulation (PCM).
3. To observe Delta modulated signal with staircase approximation.
4. To compare Delta Modulation (DM) System and Adaptive Delta Modulation (ADM) system
5. To perform Differential Pulse Code Modulation (DPCM).
6. To draw and observe practically Different Data Formats
7. To perform Amplitude Shift Keying (ASK) modulation and demodulation.
8. To perform Binary Phase Shift Keying (BPSK) modulation and demodulation.
9. To perform Binary frequency Shift Keying (BFSK) modulation and demodulation
10. To perform Quadrature Phase Shift Keying (QPSK) modulation and demodulation.
11. MATLAB simulation of digital modulation techniques and Information Theory
Textbooks/Reference Books
1.Simon Haykins, “Communication Systems” John Wiley, 4th Edition, 2001
2.Taub& Schilling, “Principles of Digital Communication “Tata McGraw-Hill” 28th reprint, 2003
3.John G. Proakis, “Digital Communication”, McGraw Hill Inc 2001.
4.Simon Haykin, “Digital Communication Systems”, John Wiley & Sons, Fourth Edition.
5. A.B Carlson, P B Crully, J C Rutledge, “Communication Systems”, Fourth Edition, McGraw Hill Publication.
6.Ranjan Bose,”Information Theory Coding and Cryptography” Tata McGraw-Hill.

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B. Tech. Sem. V: Electronics & Telecommunication Engineering SUBJECT: - POWER ELECTRONICS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR - 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites: Elementary electronics, Electrical technology.

Course Objectives:

1.	To teach students the construction, operation and applications of controlled and uncontrolled power devices
2.	To teach fundamentals of different types of motors
3.	To explain industrial applications of power electronics

Course Outcomes: After learning this course students will be able to

1	Describe constructions, switching characteristics and selection of power devices and thyristors.
2	Design and analyzecontrolled rectifiers(AC-DC) and voltage controllers(AC-AC)
3	Design and analyzedifferent types of inverters (DC-AC)
4	Identify and differentiate between different types of Choppers(DC-DC)
5	Explain construction and working of different types of motors
6	Demonstrate applications of power electronics devices in industry.

UNIT – I	**Introduction to Power Devices**	**(08 Hours)**
	Introduction to Power Electronics: Importance, Applications, Merits and Demerits, Task of Power Electronics Introduction to Uncontrolled Device: Power diode, Power Transistor, Power MOSFET, IGBT. Introduction to Controlled Device:SCR: Construction, Operation, VI characteristics, Two transistor analogy, Turn on methods, Gate	

	Characteristics, Ratings. TRIAC: Construction, Operation, triggering modes. GTO: Construction, Operation, Turn off mechanism, Applications.	
UNIT – II	**Rectifiers and AC voltage controller**	**(08 Hours)**
	Controlled Rectifiers: line, load & forced commutation, Single phase (half and full) with R &RL and Three phase (half and full) Controlled rectifiers. Voltage Controller: Single phase AC voltage controller for R & R-L loads, three phase AC voltage controller for R load.	
UNIT - III	**Inverters**	**(08 Hours)**
	Classification, Series Inverter, Parallel Inverter, Bridge Inverter, Three phase bridge inverter, PWM Techniques, Harmonic reduction	
UNIT - IV	**Choppers**	**(08 Hours)**
	Introduction, Classification, step-down Chopper, Step-up Chopper, Types of Choppers(class A, B, C, D, E), Thyristor chopper Circuits (Voltage commutated, current commutated &Load commutated)	
UNIT -V	**Introduction to Motors**	**(08 Hours)**
	DC motors, AC Motors, Special Purpose Motors, Induction Motor, Universal Motor, Stepper Motor, Servomotors, BLDC Motors etc. (Qualitative analysis only)	
UNIT - VI	**Industrial applications**	**(08 Hours)**

	Introduction, Electric Heating, Electric welding, Ultrasonic, High voltage DC transmission systems, DC Motor control, Industrial Circuits, stepper motor controller, UPS, CNC Machines, Electric Vehicle.	
List of Experiments		
To study the SCR V-I characteristics and find latching current, holding current		
To study the characteristics of IGBT.		
To study the characteristics of MOSFET.		
To draw V-I characteristics of TRIAC for different values of gate current.		
To Study of triggering circuits.		
To study single phase AC voltage regulator		
To study Single Phase Half controlled bridge converter with R and RL and active (RLE) load.		
To study Single Phase full controlled bridge converter with R and RL and active (RLE) load.		
To study the chopper using MOSFET		
To Study Series, Parallel and Bedford inverter		
Simulation of Converter / Chopper using MATLAB/ Lab View/ Multisim.		
Simulation of PWM Inverter using MATLAB/ Lab View/ Multisim.		
Textbooks/ Reference Books		
M. H. Rashid, “Power Electronics circuits devices and applications”, PHI 3rd edition, 2004 edition, New Delhi.		
M. D. Singh & K B Khanchandani, “Power Electronics”, TMH, New Delhi.		
DeodattaShingare “Industrial and Power Electronics”, EP Publication, Maharashtra.		
P.C. Sen, “Modern Power Electronics”, S Chand & Co New Delhi.		
Ned Mohan, T. Undeland& W. Robbins, “Power Electronics Converters applications and design” 2nd edition, John Willey & sons		
B. L. Thareja& A. K. Tahreja, “Electrical Technology” Volume 1 & 2, S.Chand Publications		
H. Cotton, “Electrical Technology”, CBS.		
Nagrath Kothari, “Electrical Machines”, TMH.		

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B. Tech. Sem. V: Electronics & Telecommunication Engineering SUBJECT: - MICROWAVE AND ANTENNA		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR – 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites:

- Electromagnetics and Transmission Lines
- Linear Algebra and Calculus
- Differential Equations and Complex Analysis
- Advanced Mathematics-for Electronics
- Physics for Electronics Engineering

Course Objectives:

1.	To enhance students' knowledge in the field of Microwave and Antenna systems.
2.	To teach students to identify and select microwave components as per requirements of the system.
3.	To teach students to design different types of antennas as per given specifications.

Course Outcomes:

After learning this course students will be able to

1	**Investigate** different types of modes through Waveguide.
2	**Recognize and select** Passive Devices as per requirement of Microwave system.
3	**Identify and explain** operations of Microwave sources and Semiconductor Devices.
4	**Classify** antennas and **calculate** fundamental parameters of antenna.
5	**Design** Wire Antennas and **Analyse** linear arrays.
6	**Identify and Design** different types of antennas for Microwave application.

UNIT I	**MICROWAVE WAVEGUIDES**	**(08 Hrs)**
	Concept of Modes in Waveguide(TE,TM &TEM), Analysis of TE and TM Modes in Rectangular Waveguide, Analysis of TEM Modes in Co-axial cable, Excitation of modes in Rectangular Waveguide, Power Transmission and losses in Waveguide, Microwave cavity resonator: Rectangular,circular and semicircular Cavity Resonators.	
UNIT II	**MICROWAVE PASSIVE DEVICES**	**(08 Hrs)**
	Structure, S-matrix and Working of Microwave Passive Devices: Waveguide Tees:E-Plane tee and H-plane tee, Magic Tees (Hybrid Tees), Hybrid Rings (Rat-Race Circuits),Waveguide Corners, Bends, and Twists,Two-Hole Directional Couplers, Circulators and Isolators.	
UNIT III	**MICROWAVE SOURCES AND ACTIVE DEVICES**	**(08 Hrs)**
	Construction and operation of Microwave Tubes: Two cavity Klystron, Reflex Klystron, Travelling Wave Tube (TWT), Magnetron. **Construction and Operation of Active Microwave Devices:** Gunn Diode and RWH Theory, Tunnel Diodes, Schottky Diode, PIN Diode,Microwave Transistors.	
UNIT IV	**ANTENNA FUNDAMENTALS**	**(08 Hrs)**
	Definition and need of Antenna, General classification of antennas, **Definition and significance of antenna parameters:** Radiation Pattern ,Radiation Power Density, Radiation Intensity, Beam width, Directivity, Antenna Efficiency, Gain, Beam Efficiency, Bandwidth, Polarization ,Input Impedance , Antenna Radiation Efficiency ,Antenna Vector Effective Length and Equivalent Areas, Antenna Temperature , Near field & Far-Field.	

	Specific Absorption Rate (SAR) **Friss's Transmission Equation and Radar Range Equation**.	
UNIT -V	**WIRE ANTENNAS AND ARRAYS**	**(08 Hrs.)**
	Design and Radiation pattern of : Half wave Dipole Antenna, Short Dipole, Monopole, Loop Antenna, Helical Antenna, Slot Antenna, Yagi-Uda Antenna Analysis of fields generated by Two element Array and n-element Array (Uniform amplitude and Spacing), Principle of Pattern Multiplication	
UNIT VI	**MODERN ANTENNAS**	**(08 Hrs.)**
	Construction/Design , working and Types of : Horn Antenna, Parabolic reflector/Dish Antenna. **Design and parametric analysis of** Rectangular and Circular Microstrip patch antenna, Feeding Techniques, Microwave radiation Hazards, **Advanced Antennas :** Fractal Antenna, Smart Antenna System.	

List of Experiments: (*Any 8 from the list below)

1. Study of the characteristics of Klystron Tube and to determine its electronic tuning range.
2. To study V-I characteristics of Gunn Diode
3. To determine the frequency & wavelength in a rectangular wave-guide working on TE10 mode
4. To determine the Standing Wave-Ratio and Reflection Coefficient
5. To measure an unknown Impedance with Smith chart
6. To measure the polar pattern and the gain of a wave-guide horn Antenna.
7. Study the function of multi-hole directional coupler .
8. Study of Magic Tee
9. Study of Circulator/Isolator
10. Study of Attenuator (Fixed and Variable type)

11. Phase shift measurement
12. Measurement of Dielectric Constant
13. Design of Simple Dipole and Monopole Antenna using HFSS
14. Design of Rectangular Patch Antenna Using HFSS
15. Design of Circular Patch Antenna Using HFSS
16. Plot Radiation Pattern of simple Antenna structures.
Textbooks/Reference Books
1. Samuel Y Liao, "Microwave Devices & Circuits", Prentice Hall of India,3rd Edition, 2006. 2. D.M.Pozar, "Microwave Engineering", John Wiley & sons, Inc, 3rd Edition, 2006. 3. Robert. E.Collin, "Foundation of Microwave Engg", Willey India. 2nd Edition 4. Annapurna Das and Sisir K Das, "Microwave Engineering", Tata Mc Graw3. Hill Inc., 1st Edition ,2004. 5. C.A Balanis , “Antenna theory and Design”, John willy & sons. 6. K.D.Prasad, “Antenna and Wave Propagation”, Satya Prakashan, New Delhi. 7. R. E. Collin, "Antennas and Radio Wave Propagation", McGraw-Hill., 8. F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill., 2005 9. W. L. Stutzman, and G. A. Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons. 1998.

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B. Tech. Sem. V: Electronics & Telecommunication Engineering
SUBJECT: - DATA COMMUNICATION & NETWORKING

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits: 01
		Total Credit: 04

Course Pre-requisites:

- Analog Communications

Course Objectives:

4.	To teach various topologies and types of networks.
5.	To introduce networking architecture and protocols.
6.	To introduce the concepts of network architecture & network design
7.	To teach Networking Protocols & Layers
8.	To teach different addressing and routing schemes.

Course Outcomes: After learning this course students will be able to

1	Analyse network topologies, hardware devices, addressing schemes and the protocol stacks
2	Compare various transmission media and broadband technologies
3	Analyse the flow control, error control and the medium access control techniques
4	Identify network layer addressing and routing schemes
5	Analyze connection oriented and connectionless services
6	Apply the knowledge of application layer protocols in networking.

UNIT – I	**Introduction to Network Architectures, Protocol Layers, and Service models**	**(06 Hours)**
	Applications of computer networks. Network types: LAN, MAN, and WAN, Network topologies. Protocols and standards, need of layered protocol architecture, OSI reference model. TCP/IP architecture: protocol suite, comparison of OSI and TCP/IP Addressing: physical / logical /port addressing/socket addressing.	

UNIT – II	**Physical Layer**	**(06 Hours)**
	Guided transmission media: comparison among coaxial, optical fibre and twisted pair cables. Unguided transmission media, Broadband standards: Cable modem, DSL, and HFC Ethernet Cables Networking Hardware	
UNIT - III	**Data Link Layer**	**(06 Hours)**
	Data link services: Framing, Flow control, Error control ARQ methods: transmission efficiency, Piggybacking High Level Data Link Control (HDLC): HDLC configurations, Frame formats, HDLC bit stuffing and de-stuffing, Typical frame exchanges Medium Access Control Protocols: ALOHA, Slotted ALOHA, CSMA, CSMA/CD.	
UNIT - IV	**Network Layer**	**(06Hours)**
	Network layer services and functions. Internet Protocol: Principles of Internetworking, requirements, IPv4 packet, IPv4 addressing (classful and classless (CIDR)) Routing in Packet Switching Networks: Characteristics, Routing strategies Routing protocols: RIP, OSPF, BGP and EIGRP. Subnetting, super netting, VLSM, and NAT Introduction to ICMP, ARP, RARP IPv6 (IPv6 Datagram format, comparison with IPv4, and transition from IPv4 toIPv6).	
UNIT -V	**Transport Layer**	**(06**
	Connectionless and Connection–oriented services at transport layer, Transmission Control Protocol (TCP): TCP Services, TCP Segment, TCP three-way handshake User datagram Protocol (UDP), UDP Services, UDP Datagram TCP and UDP checksum calculation Flow control, error control and congestion control	
UNIT - VI	**Application Layer**	**(06 Hours)**
	Introduction to Application layer Protocols: HTTP, FTP, DNS, SMTP, TELNET, SSH, DHCP.(specific)	

Textbooks/Reference Books
1. Data Communications and Networking – Behrouz A. Forouzan, Fifth Edition TMH.
2. Computer Networks -- Andrew S Tanenbaum, 5th Edition, Pearson Education, 2013.
3. J J. F. Kurose and K. W. Ross,” Computer Networking: A Top-Down Approach”, Addison Wesley, 5th Edition, 2010
4. Alberto Leon Garcia, “Communication Networks”, McGraw Hill Education, Second Edition, Fourth Edition, 2008.
5. An Engineering Approach to Computer Networks-S.Keshav, 2nd Edition, Pearson Education, 2015.
6. Understanding communications and Networks, 3rd Edition, W.A.Shay, Cengage Learning

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B. Tech. Sem. V: Electronics & Telecommunication Engineering
SUBJECT: - Microcontroller Programming

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 0	Credits:00
Practical: 02	Internal Assessment: 0	
Tutorial: 00	TW & PR : 50 Marks	Credits:01
		Total Credit: 01

Course Pr-requisites: Digital Electronics, Basic Electronics

Course Objectives:

9.	To introduce an Assembly Language/embedded C programming of Micro controller.
10.	To teach interfacing simple peripheral devices to a Micro controller.
11.	To equip student groups to design and implement simple embedded systems.

Course Outcomes: After learning this course students will be able to

1	Students will Understand the basics of microcontroller
2	Students will be able to understand fundamental programming concepts of microcontrollers.
3	Students will be able to have an in-depth knowledge on interfacing the external devices to the controllers.
4	Students will be able to design a microcontroller-based system with the help of the interfacing devices
5	Students will be able to have an in-depth knowledge of applying the concepts on real- time applications.
6	students will be able to use peripherals of microcontroller for different applications

	Programming / interfacing experiments with IDE for 8051/PIC/MSP/Arduino/Raspberry Pi based interfacing boards/sensor modules	
	Assembly Language Programming experiments GROUP A(All compulsory)	
1)	Study architecture and programmer's model of 8051 micro controller	
2)	Identify and study various blocks of 8051 micro controller development board.	
3)	Study of Addressing modes and Instruction set of 8051 micro controller	
4)	Study Instruction set of 8051 for Arithmetic and Logical operations a. Write an Assembly language program for Addition Subtraction Multiplication and Division of 2 – 8 bit and16 bit numbers	
5)	Study Instruction set of 8051 for Arithmetic /Logical and Program and branching instructions a. Write an Assembly language program for Addition and Subtraction of N - 8 bit numbers	
6)	Study Instruction set of 8051 for Data transfer instructions a . Write an Assembly language program for Block of Data transfer between specified memory locations.	
7)	Write an Assembly language program to find the largest number from a Series	
Interfacing experiments using 8051 Trainer kit and interfacing modules or simulation. **Implementation in Embedded C /Assembly (Any 5 between 09 to 14)**		
8)	Introduction to embedded C programming to study following aspects. a. Programming b. Execution c. Debugging	
9)	Study port structure and interfacing concepts of 8051 a. Write an Assembly language program to Interface 7-segment display to show the decimal number from 0 to 9.	
10)	Write an Assembly language program to interface LCD and LEDs with port and display information.	

11)	Write an Assembly language program to interface 4*4 Keyboard with microcontroller	
12)	Study DAC interfacing concepts of 8051 a. Write an Assembly language program for generation of following waveform with DAC /Simulation 1.Triangular 2. staircase 3. sine	
13)	Study Timers/counters in 8051 microcontroller. a. Write an Assembly language program to generate pulse and square wave by using on chip timer.	
14)	Write an Assembly language program to Interface relay with micro controller and turn it ON and OFF.	
15)	Simple project work including multiple interfaces (ANY ONE) 1. Distance measurement. 2. Temperature measurement / Digital Thermometer 3. object counter/visitor counter using 8051	

Textbooks
1.The 8051 Microcontroller and Embedded Systems: Using Assembly and C by M.A. MAZIDI 2nd edition.
2 The 8051 Micro controller 3rd Edition By Kenneth Ayala
3 Embedded C Programming by Mark Siegesmund Publisher(s): Newnes ISBN: 9780128014707
4.Practical Electronics (Volume I): 8085 Microprocessor & 8051 Micro controller Laboratory Manual by Balamurugan A , Veeramanikandasamy T
Reference Books
1)Embedding system building blocks, Labrosse, via CMP publishers.
3) Embedded Systems, Raj Kamal, TMH. 4) Micro Controllers, Ajay V Deshmukh, TMH.
4) Micro Controllers, Ajay V Deshmukh, TMH.

5) Embedded System Design, Frank Vahid, Tony Givargis, John Wiley.
6) Micro controllers, Raj Kamal, Pearson Edition.
7) An Embedded Software Primer, David E. Simon, Pearson Edition.
8) _Embedded/Real-Time Systems‘, KVKKF Prasad, Dreamtech, Press
Web References: 1) 8051Microcontollers.com 2) http://en.wikipedia.org/wiki/Embedded_system

SEMESTER:- VI
SYLLABUS

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B. Tech. Sem. VI: Electronics & Telecommunication Engineering
SUBJECT: - PHOTONICS

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60	Credits: 4
Practical: 02	Internal Assessment: 40	
Tutorial: 00	TW: 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites: Differential Equations and Complex Analysis, Electromagnetics and Transmission Lines, Analog Communication

Course Objectives:

1.	To introduce optical fibre modes and signal degradations associated with optical fibre.
2.	To introduce optical sources, optical detectors, and their use in the optical communication system.
3.	To expose the student to digital transmission and its associated parameters on system performance.

Course Outcomes: After learning this course students will be able to

1	Analyse the basic elements of optical fibre, fibre modes configurations and structures.
2	Analyse the various optical sources and receivers along with signal degradation
3	Analyse the transmission characteristics of optical fibre along with receivers and different kinds of losses.
4	Analyse digital transmission and optical measurement.
5	Analyse the operational principles of analog systems, WDM and optical amplifiers.
6	Analyse the optical networks.

Contents:

UNIT I

Introduction to Ray Theory **[8 Hrs]**

Introduction to Ray theory transmission: Total internal reflection; Acceptance angle; Numerical aperture, Types of Fibre, modes in planar guide, phase and group velocity, mode theory in cylindrical waveguides: Modal concepts and equation, Maxwell’s Equation, Wave equation and modes for step-index fibres.

UNIT-II

Signal Degradation, Optical Sources and Detectors [8 Hrs]

Attenuation, Signal distortion in optical waveguides, pulse broadening in graded index waveguide,

Optical sources: Light Emitting Diodes; LED structures ; internal quantum efficiency; injection laser diode structures,

Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise –Noise sources , Signal to Noise ratio , Detector response time.

UNIT-III

Transmission Characteristics and Receiver of Optical Fibre [8 Hrs]

Source to fiber power launching, coupling improvement, LED coupling to single mode fiber, Optical fiber connectors and couplers, Fiber alignment and Joint Losses, Fiber Splices.

Fundamental receiver operation, Digital Receiver performance, eye diagrams, coherent detection, digital point to point links, power penalties, error control

UNIT-IV

Digital transmission and Measurement [8 Hrs]

Digital transmission system: point -to-point links, Line coding, error correction, noise effects

Fiber Attenuation measurements, Dispersion measurements, Fiber Refractive index profile measurements , Fiber cut- off Wave length Measurements, Fiber numerical Aperture Measurements, Fiber diameter measurements, OTDR

UNIT-V

Analog systems, WDM concept and amplifiers [8 Hrs]

Analog links, carrier-to-noise ratio, multichannel transmission techniques, principle of WDM, passive optical couplers, isolators and circulators, tunable laser and filters, types of optical amplifiers, semiconductor optical amplifier, EDFA, amplifier noise, Raman Amplifiers

UNIT-VI

Optical Networks [8 Hrs]

Basic Networks, SONET / SDH, Broadcast and select WDM Networks, Wavelength Routed Networks, Non-linear effects on Network performance. Performance of WDM with EDFA system, Optical CDMA, Ultra High Capacity Networks.

List of Experiments:

1. Study the characteristics of optical source LED, Laser Diode.
2. Determination of Numerical Aperture of optical fiber.
3. Determination propagation loss and bending loss in optical fiber.
4. Design the analog/digital link using fiber optic cable.
5. Simulation of power budget presentation for basic optical network using opti system software.
6. Simulation of 16 channel WDM system design.
7. Design and Simulation the channel switching based on MEMS.
8. Design and Simulation a ring switch using optispice software.
9. Setting of Fiber optic voice link using AM, FM& PWM.
10. Characteristics of photodetector.

Text Books:

1. Optical Fiber Communication – John M. Senior – Pearson Education – Second Edition. 2007

2. Optical Fiber Communication – Gerd Keiser – Mc Graw Hill – Third Edition. 2000

Reference books:

1. R.P. Khare, “Fiber Optics and Optoelectronics”, Oxford University Press, 2007.

2. J.Gower, “Optical Communication System”, Prentice Hall of India, 2001

3. Rajiv Ramaswami, “Optical Networks “, Second Edition, Elsevier, 2004.

4. Govind P. Agrawal, “Fiber-optic communication systems”, third edition, John Wiley & sons, 2004

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B. Tech. Sem. VI: Electronics & Telecommunication Engineering SUBJECT: - DIGITAL SIGNAL PROCESSING		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR: 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites:

Advanced Mathematics-for Electronics
Signals and Linear Systems
Digital Communication System

Course Objectives:

12.	To introduce the student to a very broad and advanced topic of Digital SignalProcessing (DSP)
13.	To teach the student the basic concepts and tools in the field of DSP
14.	To teach different method of solving FIR filters.
15.	To teach different method of solving IIR filters.
16.	To study applications of Digital Signal Processing in different fields.
17.	To introduce DSP Processor and Applications.

Course Outcomes: After learning this course students will be able to

1	To enumerate the advantages of DSP over processing in analog domain.
2	To be able to find Discrete Fourier Transform of a digital signal.
3	Design a Finite Impulse Response (FIR) Filter given the specifications.
4	Design a Infinite Impulse Response (IIR) Filter given the specifications.
5	Illustrate the role of DSP in different areas
6	To enumerate the features of a DSP Processor.

UNIT – I	**Introduction to DSP**	**(08 Hours)**
	Basic elements of DSP and its requirement, Advantages of digital over analog signal processing, Introduction to DSP system, DTFT, Relation between DFT and other-Transform.	
UNIT – II	**Discrete Fourier Transform**	**(08Hours)**
	Overview of Frequency Analysis of signals, DFT, IDFT, Properties of DFT- Circular convolution, Overlap save & overlap-add algorithm, correlation. DIT FFT & DIF FFT algorithm and implementation	
UNIT - III	**FIR Filter Design**	**(08Hours)**
	Overview of filters, Introduction of FIR filter, Characteristics of FIR filter, properties of FIR filter, digital network for FIR filter, frequency sampling, Fourier series & windowing method, filter design using Kaiser window, Realization of FIR by direct form structures, cascade, parallel form.	
UNIT - IV	**IIR Filter Design**	**(08Hours)**
	Introduction of IIR filter, Impulse invariant technique, Bilinear transformation, Derivative approximation methods, analog filter approximation, quantization and rounding problems, Realization of IIR by direct form structures, cascade & parallel form.	
UNIT -V	**Adaptive Filter**	**(08Hours)**
	Introduction to adaptive signal processing, Adaptive direct form FIR filters, Least Mean Square (LMS) algorithm, PSO algorithm, Hybrid algorithm.	

UNIT - VI	**DSP Processors And Applications of DSP**	**(08Hours)**
	Need for special purpose DSP Processors, Features of DSP Processors: Harvard and Modified Harvard Architectures, Bus structure, Addressing Modes, Processing Units, Address Generators, Single Cycle Execution. Case study of TMS320C67x DSP processor. Major applications of DSP: DTMF, Spectral Analysis, Musical Sound Processing.	

List of Experiments
1) Study of Matlab.
2) Study of Discrete signals
3) Study of Linear Convolution and Circular Convolution
4) To plot magnitude and phase Spectra of DFT of a given sequence.
5) To plot magnitude and phase Spectra of IDFT of a given sequence.
6) To verify properties of DFT
7) To implement filter using overlap add and overlap save method
8) To design FIR Filter for given specifications.
9) Design of FIR filter using Kaiser Window method
10) To design IIR Filter for given specifications.
11) To do Spectral Analysis of a real signal
12) To implement an FIR Filter on a DSP Processor
Textbooks/Reference Books
1. John G Prokis , “Digital Signal Processing ,Principles, Algorithms andApplication”, PHI
2. S. K. Mitra, "Digital Signal Processing", TMH
3. E. C. Ifleachor and B. W. Jervis, “Digital Signal Processing- A PracticalApproach”, Second Edition, Pearson education.
4. A.V.Oppenheins and R.W. Schalfer , “Discrete Time Signal Processing”, PHI

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B. Tech. Sem. VI: Electronics & Telecommunication Engineering SUBJECT: - CMOS Design		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR- 50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites: Elementary Electronics, Digital Electronics, Semiconductor Devices and Circuits-1

Course Objectives:

18.	To teach MOS transistor fundamentals.
19.	To explain static characteristics of an Inverter.
20.	To present Switching Characteristics and Interconnect Effects of an Inverter.
21.	To introduce concepts of Combinational MOS logic circuit.
22.	To introduce concepts of Sequential MOS logic circuit.
23.	To introduce students to Low Power CMOS logic circuits

Course Outcomes: After learning this course students will be able to

1	Apply MOS transistor fundamentals for CMOS Design.
2	Use static characteristics for Inverter design.
3	Design Inverter with delay constraints.
4	Explain CMOS Combinational Logic Circuits
5	Explain CMOS Sequential Logic Circuits
6	Apply knowledge of low power techniques for CMOS design.

UNIT – I	**MOS Transistor**	**(08 Hours)**
	MOS Structure, MOS System under External bias, Operation of MOSFET, MOSFET C-V Characteristics, MOSFET Scaling and Small geometry effects, MOSFET Capacitance	

UNIT – II	**MOS INVERTERS: STATIC CHARACTERISTICS**	**(08 Hours)**
	Introduction, Voltage Transfer Characteristic (VTC), Noise Immunity and Noise margins, Power and Area Considerations, Resistive-Load Inverter, Inverters with n-Type MOSFET Load, CMOS Inverter, DC Calculation of VIL, VIH, VOL, VOH and Vth, Design of CMOS Inverters	
UNIT - III	**MOS INVERTERS: Switching Characteristics and Interconnect Effects**	**(08 Hours)**
	Introduction, Delay-Time Definitions Calculation of Delay times, Inverter design with delay constraints, Estimation of Interconnect parasitics, Calculation of Interconnect Delay	
UNIT - IV	**Combinational MOS Logic Circuits**	**(08 Hours)**
	Introduction, MOS Logic Circuits with depletion nMOS load, CMOS Logic Circuits, Complex Logic Circuits	
UNIT-V	**Sequential MOS Logic Circuit**	**(08 Hours)**
	Behaviour of Bistable Elements, The SR Latch Circuit, Clocked Latch and Flip-Flop Circuits, CMOS D-Latch and Edge-Triggered Flip-Flop.	
UNIT - VI	**Low Power CMOS Logic Circuits**	**(08 Hours)**
	Overview of Power Consumption, Low-Power Design Through Voltage Scaling, Estimation and Optimization of Switching Activity, Reduction of Switched Capacitance	

List of Experiments

1. To Study about Microwind tool and λ (Lambda) Rules for Layout Generation
2. To generate layout for CMOS Inverter and simulate it.
3. To generate layout for CMOS NAND and simulate it.
4. To generate layout for CMOS NOR and simulate it.
5. To generate layout for CMOS TG and simulate it.
6. To implement layout for Boolean function F= (A.B +C.D)’
7. Design and implementation of half adder
8. Design and implementation of D latch
9. Design and implementation of SRAM Cell
10. Design and implementation of Counter
11. Design and implementation of Ring Oscillator

Textbooks/Reference Books

1. Sung-Mo Kang & Yusuf Leblebici, “CMOS Digital Integrated Circuits – Analysis and Design”, 3rd Edition, Tata McGraw-Hill, New Delhi, 2003.
2. Neil Weste and David Harris, “CMOS VLSI Design: A Circuits and Systems Perspective”, 4th Edition, Addison-Wesley, 2010
3. John P.Uyemura, “CMOS Logic Circuit Design”, Springer International Edition.2005.Logic Circuit Design”, Springer International Edition.2005
4. W.Wolf, Modern VLSI Design: System on Chip, Third Edition, Pearson, 2002
5. J. P. Uyemura, “Introduction to VLSI circuits and Systems,” John Wiley, New Delhi, 2002.

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B. Tech. Sem. VI: Electronics & Telecommunication Engineering

SUBJECT: - Quantitative techniques, Communication and Values

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 00		
		Total Credit: 04

Course Pre-requisites: The students should have knowledge of

1	Basic math's and reasoning, and comprehensive ability
2	Basic knowledge of communication process, soft skills
3	Basic knowledge and idea about leaders and leadership qualities, ethics, etiquettes and values

Course Objective:

The **Quantitative Techniques, Communication and Values**aims to augment students to face the campus recruitment test and train them on applying short techniques/ tricks to solve questions of Maths, reasoning and English in very less amount of time. The communication and values section focuses on the aspects of communication and soft skills such as grooming personality for leading team, presentation, business communication which would enable graduates to project themselves as a professionals in the corporate sector and/or otherwise.

Course Outcomes: The student will be able to

1	Solve the aptitude test in the recruitment and competitive exam by applying short techniques and solve the question in less amount of time
2	Apply the short mnemonics and techniques to solve the questions of logical reasoning in the placement and competitive exam in lesser time.
3	Develop the verbal ability to communicate effectively using suitable vocabulary and proper sentence pattern
4	Understand the concept of soft skills and its implication at workplace
5	Build up the ability to study employment business correspondences and its proper implications
6	Understand business ethics, etiquettes and values and apply them in the professional ventures.

Course Content:

Unit-I	**QUANTITATIVE APTITUDE** :Number system, Percentage, profit and loss,	**(8 Hrs)**

	Simple Interest and Compound Interest, Ratio, Proportion and Average, Mixture and Allegation, Time, Speed & Distance, Time & Work , Permutation & Combination, Probability, Pipes and Cisterns	
Unit-II	**NON-VERBAL REASONING :** Coding, Decoding, Number series, Blood relation Directions, cubes & dices , Data Interpretation, Data Sufficiency, Set Theory & Syllogisms, Matching, Selection & Arrangement, Clocks & Calendars, Visual Reasoning, Input, Output & Flow Chart.	**(8 Hrs)**
Unit-III	**VERBAL REASONING:** Sentence Patterns, Sentence correction and spotting errors, Vocabulary, antonyms and synonyms and analogy, Phrasal Verbs, idiomatic expressions, reading comprehension, closest, sentence rearrangement and theme detection	**(8 Hrs)**
Unit-IV	**SELF AWARENESS AND SOFT SKILLS DEVELOPMENT:** Concept of SWOT, Importance of SWOT, Individual & Organizational SWOT Analysis, Soft skills, meaning, need and importance, difference between soft skills and hard skills, life skills and personal skills, Leadership skills,-Importance ,Types, Attributes of good leader Motivational theories and leadership ,Emotional intelligence in personal and professional lives its importance need and application, Team Building and conflict resolution Skills ,Problem solving skills, Time Management and Stress Management Skills Pareto Principle(80/20) Rule in time management, Time management matrix, creativity and result orientation, working under pressure, stress management	**(8 Hrs)**
Unit-V	**COMMUNICATION AND HONING EMPLOYMENT SKILLS:** Communication process, Non-verbal codes in communication, importance of LSRW in communication, Barriers to communication, Principles of effective Technical writing, Email writing and Netiquettes, **Letter writing** – formal letters, job application letter, cover letter, structure of technical report writing, Building Resume and CV, Tips to build an effective Resume Group discussion, Skills required for Group Discussion Interview skills, Ways of handling telephonic interviews, Importance of body language, grooming &etiquettes for getting right impression in PI&GD , Extempore, Introduction to PowerPoint presentation, ,Structure & flow of presentation,	**(8 Hrs)**
Unit-VI	**BUSINESS ETHICS ,ETIQUETTES AND VALUES:** The Importance of Ethics and Values in Business World, Respect for Individuality and diversity at workplace values of a good manager Key features of corporate etiquette, Corporate grooming & dressing, etiquettes in social & office Setting-Understand the importanceof professional behaviour at the work place, Corporate social responsibility (CSR) its importance and need.	**(8 Hrs)**
Internal Assessment:		

	Unit Test -1	UNIT – I, II, III	

	Unit Test -2	UNIT – IV, V, VI	
Reference Books:			
1	Quantitative Aptitude by R. S. Agarwal published by S. Chand		
2	The Book of Numbers by Shakuntala Devi		
3	A Modern Approach To Logical Reasoning by R. S. Agarwal published by S. Chand		
4	A New Approach to Reasoning Verbal & Non-Verbal by Indu Sijwali		
5	Business Communication by Meenakshi Raman, Prakash Singh published by Oxford University press, second edition		
6	Communication Skills by Sanjay Kumar, Pushp Lata, published by Oxford University press, second edition		
7	Technical Communication by Meenakshi Raman, Sangeeta Sharma published by Oxford University press		
8	Developing Communication Skills by Krishna Mohan, Meera Banerji published by Macmillan India Pvt Ltd		
9	Soft Skills by Meenkashi Raman, published by Cengage publishers		
10	Soft Skills by Dr. K Alex published by Oxford University press		
11	Soft skills for Managers by Dr. T. Kalyana Chakravarthi and Dr. T. Latha Chakravarthi published by biztantra		
Project Based Learning Topics:			
1	Prepare mock Tests on Unit –I and solve it in given time(use of PSD lab manual)		
2	Prepare mock Tests on Unit –I and solve it in given time(use of PSD lab manual)		
3	Prepare online model test based on Unit-II and solve it in specific time(use of PSD lab manual)		
4	Prepare online model test based on Unit-II and solve it in specific time(use of PSD lab manual)		
5	Form a model for spoken and written communication skills which avoid grammar mistakes and common errors		
6	Develop various activity models for enriching and developing vocabulary		
7	Preparing strategies by using SWOT and TWOS analysis		
8	Analysing differences between Soft Skills, Hard skills, and Personal skills		
9	Develop Bruce Tuchman’s Team Building Models with classmates/Teammates		

10	To study different personalities of Leaders from various sectors and find out their attributes and success stories
11	Preparing a model for Time Management Skills and Stress Management and conduct activities for effective implementation of it.
12	Form a model to develop LSRW and communication Skills
13	Conduct mock interview and practice GD activities to build competencies for actual selection process
14	Preparing a model for evaluating Values and Ethics of Good Managers
15	Preparing a model of dress codes and attire for different professional situations Corporate etiquettes and its implications
16	Develop some good activities to understand the importance and need of Corporate social responsibility (CSR)

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B. Tech. Sem. VI: Electronics & Telecommunication Engineering SUBJECT: - INTERNET OF THINGS		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 01		Credits: 01
		Total Credit: 04

Course Pre-requisites: Control System and Applications, Embedded systems

Course Objectives:

1.	To introduce the IoT paradigm
2.	To teach the types for sensors and actuators for IoT applications
3.	To introduce the communication and networking principles for IoT
4.	To introduce the concepts of Interoperability, Discoverability for IoT
5.	To teach the design of simple IoT systems using SOC/SBC
6.	To introduce the concept of Cloud and Fog computing

Course Outcomes: After learning this course students will be able to

1	Identify a given IoT architecture
2	Select appropriate sensor and/or actuator for given IoT application
3	Identify and use communication and networking protocols
4	Apply the knowledge of interoperability and discoverability for IoT applications
5	Design simple IoT applications using microcontrollers/SOC/SBC
6	Apply the knowledge of Cloud and Fog computing for IoT applications

UNIT – I	**Introduction to Internet of Things**	**(06 Hours)**
	Evolution of IoT Concept, IoT Vision, IoT Definition, IoT Basic Characteristics IoT Distinction, IoT Architectures, Three-layer IoT Architecture, Five-Layer IoT Architecture, Seven-layer	

	Architecture	
UNIT – II	**Sensors & Actuators**	**(06 Hours)**
	Sensor Fundamentals, Sensor Classification, Simple (Direct) Sensor Versus Complex Sensor, Active Sensors Versus Passive Sensors, Contact Sensors Versus Noncontact Sensors, Absolute Sensors and Relative Sensors, Digital Sensors Versus Analog Sensors (Based on Output, Scalar Sensor Versus Vector Sensors (Based on Data Types Anatomy of Sensors, Physical Principles of Sensing, Actuators, Examples of analog and digital sensors (Temperature, Pressure, Level, Accelerometer, Humidity)	
UNIT - III	**IoT Communication**	**(06 Hours)**
	IoT Communication "Traditional" Internet Review, Physical/Link Layer, IEEE 802.3 (Ethernet) , IEEE 802.11 , Network Layer , IPv6 and IPv4 ,Transport Layer , TCP and UDP , Application Layer , HTTP ,AMQP , SIP, Designing the Architecture of an IP-based Internet of Things , Physical/Link Layer , IEEE 802.15.4 and ZigBee , Low-power Wi-Fi , Bluetooth and BLE , Powerline Communications , Network Layer , The 6LoWPAN Adaptation Layer , Transport Layer , Application Layer , CoAP , CoSIP Protocol Specification ,The Industrial IoT,NBIOT	
UNIT -IV	**Interoperability, Discoverability in IOT**	**(06 Hours)**
	REST Architectures: The Web of Things, The Web of Things , Messaging Queues and Publish/Subscribe Communications, Session Initiation for the IoT, Optimized Communications: the Dual-network Management Protocol, Service and Resource	

	Discovery, Local and Large-scale Service Discovery, Scalable and Self-configuring Architecture for Service Discovery in the IoT, Lightweight Service Discovery in Low-power IoT Networks	
UNIT -V	**Microcontrollers and SBC for IoT**	**(06**
	Introduction to ESP8266, ESP8266 Architecture, Features, Examples of programming (sensor interfacing, MQTT, HTTP) using Arduino IDE Introduction to ESP32, ESP32 Architecture, Features, Examples of programming (sensor interfacing, MQTT, HTTP) using Arduino IDE Introduction to Single Board Computers (Raspberry Pi, Orange Pi, Intel Galileo)	
UNIT -VI	**IoT Cloud and Fog Computing**	**(06 Hours)**
	Cloud Computing for IoT, IoT Cloud Architecture, Virtual Resource Pool , Application Server, Database Servers, Load-balancing Servers, Application Domains of IoT Cloud Platforms, Fog Computing for IoT, Difference from Related Computing Paradigms, Edge Computing, Mobile Edge Computing (MEC), Architecture of Fog Computing, Physical and Virtualization Layer, Monitoring Layer, Pre-processing Layer, Temporary Storage Layer, Security Layer, Transport Layer, Fog Deployment Models, Fog Service Models	

Textbooks/Reference Books

1.	Enabling the Internet of Things: Fundamentals, Design, and Applications, Muhammad Azhar Iqbal et al., IEEE Press Wiley 2021
2.	Sensors, Actuators, and Their Interfaces: A multidisciplinary introduction, Nathan Ida ,2nd Edition, The Institution of Engineering and Technology, London, United Kingdom, 2013

3.	Internet of Things, Architectures, Protocols and Standards, Simone Cirani, Wiley 2019
4.	Internet of Things with ESP8266, Marco Schwartz, Packt Publishing, 2016

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College of Engineering, Pune

B. Tech. Sem. VI: Electronics & Telecommunication Engineering SUBJECT: - VHDL		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00	Credits: 00
Practical: 02	Internal Assessment: 00	
Tutorial: 00	TW & PR: 50 Marks	Credits: 01
		Total Credit: 01

Course Pre-requisites: Digital Electronics

Course Objectives:

24.	To teach the student to understand the various features of VHDL to realize the complex digital logic systems.
25.	To explain predefined attributes and configurations of VHDL
26.	To design and simulate combinational logic circuit techniques in VHDL.
27.	To design and simulate sequential and logic circuit techniques in VHDL.
28.	To teach various modeling styles of digital logic systems using VHDL.

Course Outcomes: At the end of this course students will be able to

1.	Understand the VHDL flow for Design and Implementation of Complex Digital Logic Circuit.
2.	Demonstrate use of Concurrent Assignment and Sequential Assignment Statement.
3.	Design Combinational logic circuits in different styles of modelling.
4.	Design Sequential logic circuits in different styles of modelling.
5.	Use computer-aided design tools for design of complex digital logic circuits.

List of Experiments

1.	Introduction to Xilinx tools and design of various Gates.
2.	Write a VHDL program for Half adder, Full adder, Half subtractor, Full subtractor using Behavioral, Dataflow and Structure modeling style.
3.	Write a VHDL program for Serial adder and Ripple Carry Adder using Component Instantiation statement (Structure modeling style).
4.	Write a VHDL program for n-bit Comparator using Dataflow and Behavioral modeling style.
5.	Write a VHDL program for Parity Generator and Checker using Dataflow and Behavioral modeling style
6.	Write a VHDL program for 4:1 mux and 1:4 Demux using Select statement and Process-If Statement.

7.	Write a VHDL program to construct 16:1 mux using five 4:1 mux in Structure modeling style using Generate Statement.
8.	Write a VHDL program for 3:8 Decoder and 8: 3 Encoder using Process-Case Statement.
9.	Write a VHDL program for D-flip flop with RESET input in Behavioral modeling Style using Process and Wait Statement.
10.	Write a VHDL program for Circular Shift Register in Behavioral modeling Style using Process Statement.
11.	Write a VHDL program for SISO Shift Register in Behavioral modeling Style using Process Statement.
12.	Write a VHDL program for 8-Bit Barrel Shifter in Behavioral modeling Style using Process Statement.
13.	Write a VHDL program for ALU in Behavioral modeling Style using Case Statement.
14.	Write a VHDL program for Traffic Light Controller in Behavioral modeling Style using Process Statement.
15.	Design and Implementation of Half and Full adder using Xilinx FPGA

Textbooks/Reference Books
1. VHDL Design, Synthesis and Simulation, Debaprasad Das, Oxford University Press.
2. Fundamentals of VHDL Design by Stephen Brown and Zovenkeo Vrasesic, TMH
3. VHDL Programming by Example 4/e, Douglas L. Perry, TMH
4. “A VHDL Primer,” Bhasker, J. Pearson India.
5. V. Pedroni , “Circuit Design and Simulation with VHDL”, MIT Press, 2/e, 2010
6.Navabi, “VHDL: Analysis and Modeling of Digital Systems”, McGraw-Hill
7.Charles Roth, “Digital System Design Using VHDL”, PWS Publishing.

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B. Tech. Sem. VI: Electronics & Telecommunication Engineering SUBJECT: - Web App Development		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00 Marks	Credits: 00
Practical: 02	TW & OR – 50 Marks	
Tutorial: 00		Credits: 01
		Total Credit: 01

Course Pre-requisites: Basics of Data base Management System & Java

Course Objectives:

1	To develop an ability to design and implement static and dynamic website
2	Choose best technologies for solving web client/server problems
3	Create conforming web pages
4	Use JavaScript for dynamic effects
5	Handling Cookies and Sessions using PHP, SERVLETS and JSP

Course Outcomes: After learning this course students will be able to

1.	Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's
2.	Create dynamic web pages using JavaScript
3.	Understand, analyse, and apply the role of languages like HTML, CSS, XML, JavaScript, PHP, SERVLETS, JSP and protocols in the workings of the web and web applications
4.	Develop JSP applications implementing Session management and Data base Connectivity.
5.	Use request and response objects provided to a servlet to read parameters and to produce an HTML response
6.	Build web applications using PHP

	List of practical	
I	Design the following static web pages required for an online book store web site. 1) HOME PAGE: The static home page must contain three frames. 2) LOGIN PAGE	

	3) CATOLOGUE PAGE: The catalogue page should contain the details of all the books available in the web site in a table. 4) REGISTRATION PAGE	
II	Develop and demonstrate the usage of inline, internal, and external style sheet using CSS.	
III	Write JavaScript to validate the following fields of the Registration page. 1. First Name (Name should contains alphabets and the length should not be less than 6 characters). 2. Password (Password should not be less than 6 characters length). 3. E-mail id (should not contain any invalid and must follow the standard pattern name@domain.com) 4. Mobile Number (Phone number should contain 10 digits only). Last Name and Address (should not be Empty).	
IV	Develop and demonstrate JavaScript with POP-UP boxes and functions for the following problems: a) Input: Click on Display Date button using onclick( ) function Output: Display date in the textbox b) Input: A number n obtained using prompt Output: Factorial of n number using alert	
V	c) Input: A number n obtained using prompt Output: A multiplication table of numbers from 1 to 10 of n using alert d) Input: A number n obtained using prompt and add another number using confirm Output: Sum of the entire n numbers using alert	
VI	Write an HTML page that contains a selection box with a list of 5 countries. When the user selects a country, its capital should be printed next in the list. Add CSS to customize the properties of the font of the capital (color,bold and font size).	
VII	Write an XML file which will display the Book information which includes the following: 1) Title of the book 2) Author Name	

	3) ISBN number 4) Publisher name 5) Edition 6) Price	
VIII	Create an XML document that contains 10 users information. Write a Java Program, which takes User Id as input and returns the user details by taking the user information from XML document using DOM parser or SAX parser.	
IX	Implement the following web applications using (a) PHP (b) Servlets (c) JSP I A web application that takes a name as input and on submit it shows a hello <name> page where name is taken from the request. It shows the start time at the right top corner of the page and provides a logout button. On clicking this button, it should show a logout page with Thank You <name > message with the duration of usage (hint: Use session to store name and time). II Write a PHP Program to display current Date, Time and Day. III A web application that takes name and age from an HTML page. If the age is less than 18, it should send a page with "Hello <name>, you are not authorized to visit the site" message, where <name> should be replaced with the entered name. Otherwise it should send "Welcome <name> to this site" message. IV A web application that lists all cookies stored in the browser on clicking "List Cookies" button. Add cookies if necessary. . V write a program for deploying Java Beans in a jsp page	
X	Write a program to design a simple calculator using (a) JavaScript (b) PHP (c) Servlet and (d) JSP.	

Textbooks

1. Learning Web Application Development , Sammy Purewal , O'Reilly Publication

2. Learning Web Design , A Beginner's Guide to HTML, CSS, JavaScript, and Web Graphics, Jennifer Niederst Robbins, O'Reilly Publication

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Faculty of Engineering & Technology

Programme :B.Tech (E &Tc) Sem – VII (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
40	Soft Computing	04	02	00	60	40	25	00	25	150	04	01	00	05
41	Radio Frequency Engineering	04	00	00	60	40	00	00	00	100	04	00	00	04
42	Elective- I	03	02	00	60	40	25	25	00	150	03	01	00	04
43	Industrial Wireless Sensor Network*	04	02	00	60	40	50	00	00	150	04	01	00	05
44	Electronic Product Design	00	02	00	00	00	50	00	00	50	00	01	00	01
45	Project Stage I	00	02	00	00	00	50	50	00	100	00	03	00	03
46	Internship#	00	00	00	00	00	25	25	00	50	00	03	00	03
	Total	15	10	00	240	160	225	100	25	750	15	10	00	25

Elective-I

Sr No	**Subject Name**
1	Telecom Network Management
2	Advanced Embedded System Design
3	Image processing

*Industry Taught Course – VII

Period- 60 days

BharatiVidyapeeth (Deemed to be) University, Pune
Faculty of Engineering & Technology

	Programme:B.Tech (E &Tc) Sem – VIII (2021 Course)														
Sr. No.	**Name of the course**	**Teaching Scheme Hrs. / Week**			**Examination Scheme (Marks)**					**Total Marks**	**Credits**			
		L	**P**	**T**	**ESE**	**IA**	**TW**	**OR**	**PR**	**Total**	**L**	**P**	**T**	**Total**
47	Mobile Communication	04	02	00	60	40	25	00	00	125	04	01	00	05
48	Satellite Communication & Radar	04	02	00	60	40	25	00	25	150	04	01	00	05
49	Elective II	03	02	00	60	40	25	00	00	125	03	01	00	04
50	Cyber security*	03	00	01	60	40	00	00	00	100	03	00	01	04
51	Cloud Computing	00	02	00	00	00	25	25	00	50	00	01	00	01
52	Project Stage-II	00	04	00	00	00	100	100	00	200	00	06	00	06
	Total	**14**	**12**	01	240	160	200	125	25	750	**14**	10	**01**	**25**
	Research Paper Publication**	-	-	-	-	-	-	-	-	-	-	-	-	2

Elective-II

Sr No	Subject Name
1	Software Defined Radio
2	Automotive Electronics
3	Computer Vision

*Industry Taught Course – VIII
** Add on course

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering **SUBJECT: - SOFT COMPUTING**		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & PR:50 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites: Linear Algebra & Calculus, MATLAB Fundamentals, Control Systems & Applications

Course Objectives:

1.	Introduce a relatively new computing paradigm for creating intelligent machines useful for solving complex real -world problems.
2.	Insight into the tools that make up the soft computing technique: fuzzy logic, artificial neural networks genetic algorithms and deep learning paradigms.
3.	To create awareness of the application areas of soft computing technique
4.	Provide alternative solutions to the conventional problem solving techniques in pattern recognition/classification and control systems.

Course Outcomes: On successful completion of this course, students will be able to:

1	Classify and use the various building blocks of artificial neural networks
2	Design and implement neural network systems to solve real world problems
3	Describe and use deep learning concepts
4	Solve optimization problems using genetic algorithms
5	Use the concept of fuzzy logic to translate the real-world problems in to fuzzy domain and perform fuzzy operations
6	Design a fuzzy control system for simple processes

UNIT – I	**ARTIFICIAL NEURAL NETWORKS-I**	**(08 Hours)**
	Biological neuron , Artificial neuron model, concept of bias and threshold, Mc Culloch-Pits Neuron Model , implementation of logical AND, OR, XOR functions ,Topologies of neural networks, learning paradigms: supervised, unsupervised, reinforcement, Linear neuron model : concept of error energy , gradient descent algorithm and application of linear neuron for	

	linear regression, Activation functions : binary , bipolar (linear, signum, log sigmoid, tan-sigmoid) ,Learning mechanisms: Hebbian, Delta Rule, Perceptron and its limitations, Multilayer perceptron (MLP) and backpropagation algorithm, Application of MLP for classification and regression	
UNIT –II	**ARTIFICIAL NEURAL NETWORKS-II**	**(08 Hours)**
	Self-organizing Feature Maps, k-means clustering ,Learning vector quantization , Radial Basis Function networks: Cover's theorem, mapping functions(Gaussian, Multi-quadrics, Inverse multi-quadrics, Application of RBFN for classification and regression, Hopfield network, associative memories	
UNIT - III	**DEEP LEARNING**	**(08 Hours)**
	Concept of deep neural networks, Convolutional Neural Networks (CNNs),Long Short Term Memory Networks (LSTMs),Recurrent Neural Networks (RNNs), Generative Adversarial Networks (GANs)	
UNIT -IV	**GENETIC ALGORITHMS**	**(08 Hours)**
	Concept of genetic evolution, parent, child, chromosome, mutation from biological perspective, Comparison of Biological and GA Terminology , Robustness ,Non-integer Unknowns, Multi-parameter Problems, Mutation, Selection, Elitism ,Crossover, Initialization, Advanced Operators: Combinatorial Optimization, Locating Alternative Solutions using Niches and Species Constraints ,Multi-criteria Optimization Hybrid Algorithms, Alternative Selection Methods, Alternative Crossover Methods ,Considerations of Speed.	
UNIT -V	**FUZZY LOGIC**	**(08 Hours)**
	Concept of Fuzzy number, fuzzy set theory(continuous, discrete), Operations on fuzzy sets, Fuzzy member-ship functions , primary and composite linguistic terms, Concept of fuzzy relation, composition operation, Concept of fuzzy inference, Fuzzification and de-fuzzification, Mamdani inference rule, Sugeno inference rule	
UNIT -VI	**FUZZY CONTROL SYSTEMS**	**(08 Hours)**

	Simple example of fuzzy control in contrast with traditional PID control, control system design problem, Control (Decision) Surface, Assumptions in a Fuzzy Control System Design, Fuzzy Logic Controllers ,Comparison with traditional PID control, advantages of FLC , Architecture of a FLC: Mamdani Type , Example Aircraft landing control problem	

Experiments: (Using MATLAB or Equivalent software)

1. Implement logic gates using Culloch-Pits Neuron Model
2. Implement perceptron network for emulating the behaviour of AND , OR logic gates
3. Implement backpropagation algorithm for emulating XOR gate
4. Implement MLP for two class classification
5. Implement MLP for regression
6. Implement k-means clustering algorithm
7. Implement RBFN for two class classification
8. Implement RBFN for regression
9. Implement a two input -one output FIS
10. Mini-project based on genetic algorithm
11. Mini-project based on deep learning networks
12. Mini-project based on fuzzy control system

Reference Books

1. Fundamentals of Neural Networks: Architectures, Algorithms And Applications, Laurene Fausett, Pearson Education, Inc, 2008
2. Neural Networks-A comprehensive foundation, Simon Haykin, Prentice Hall International Inc.,1999
3. Fuzzy Logic With Engineering Applications, Third Edition, Timothy Ross, John Wiley & Sons,2010
4. Genetic Algorithms in Search, Optimization, and Machine Learning, David Goldberg, Addison Wesley, 1989

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B. Tech. Sem. I: Electronics & Telecommunication Engineering
SUBJECT: - RADIO FREQUENCY ENGINEERING

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 00	Internal Assessment: 40 Marks	
Tutorial: 00		Credits: 00
		Total Credit: 04

Course Pre-requisites: Microwave and Antenna, Electromagnetics and Transmission Lines

Course Objectives:

1.	To study RF issues related Communication Systems components.
2.	To learn Biological Effects of Microwave Radiation.
3.	To study circuit design aspects at RF.
4.	To teach different types of filter.
5.	To introduce different types of Oscillators.
6.	To introduce different types of mixer.

Course Outcomes:

1.	The students will be able to identify biological effects and transformation
2.	The students will be able to discuss behaviour of passive components at high frequency
3.	The students will be able to Learn active & passive components
4.	The students will be able to design HF amplifiers with gain bandwidth parameters.
5.	The students will be able to analyze the performance Oscillators characteristics.
6.	The students will be able to analyze the performance Mixer types.

UNIT – I	**Biological Effects of Microwave & RF Radiation**	**(08Hours)**
	RF Sources, Microwave Heating Principle, Radiation Pattern of Antenna, EMF Exposure Safety Norms, Radiation	

	Measurements, Review Biological Effects and Solutions.	
UNIT – II	**RF AND MICROWAVE DEVICES**	**(08Hours)**
	Microwave Communication Systems, Electromagnetic Spectrum, Microwave Components and Systems, Network Analyzer, Spectrum Analyzer and RF Generator, VNA, Various types of Antenna.	
UNIT - III	**RF DEVICES**	**(08 Hours)**
	Introduction RF devices, HF Resistors, HF Capacitors, HF Inductors, Chip Resistors, Chip Capacitors, diodes, microwave transistors, Heterojunction bipolar transistor- microwave FET and BJT.	
UNIT -IV	**RF FILTERS DESIGN**	**(08 Hours)**
	Introduction, Low-pass prototype filter design, Impedance and Frequency Scaling, Transmission line filters, Comparison of Amplitude and Phase Responses of LPF.	
UNIT -V	**RF OSCILLATOR DESIGN**	**(08 Hours)**
	Introduction, Oscillators Using a Common Emitter BJT, Oscillators Using a Common Gate FET, Crystal Oscillators. Colpitts Oscillator: Describing Function Model and Start-up Model of Colpitts Oscillator and oscillator Applications.	
UNIT -VI	**RF MIXER DESIGN**	**(08 Hours)**
	Introduction, diode mixer theory, Mixer fundamentals, Significant Characteristics of Mixer: Single-Ended Diode Mixer, Single-Ended FET Mixer, Balanced Mixer, Image Reject Mixer and mixer Applications.	

Reference Books
1. George d. Vendelin, anthony m. Pavio & ulrich l. Rohde “microwave circuit design using linear and nonlinear techniques” second edition a john wiley & sons, inc. publication Copyright ` 2005 by John Wiley & Sons, Inc. All rights reserved.
2. Reinhold Ludwig, Pavel Bretchko, “RF Circuit Design Theory and Applications”, Pearson Education-2011.
3. Thomas H. Lee, “The Design of CMOS Radio-Frequency Integrated Circuits”, Second Edition, Copyright ` 2009 Cambridge Publications.
4. David M. Pozar, “Microwave Engineering”, Fourth Edition, University of Massachusetts at Amherst, 2013, John Wiley & Sons, Inc.
5. T. Yettrdal, Yunhg Cheng, “Devices modeling for analog and RF COMS circuits design”,2011. John Wiley publication.

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering SUBJECT: ELECTIVE-I: ADVANCED EMBEDDED SYSTEM DESIGN		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 25 & OR:25	Credits: 01
		Total Credit: 04

Course Pre-requisites: Embedded Systems, Data Science

Course Objectives:

1.	To teach the knowledge of design and development of embedded system through case studies.
2.	To teach design aspects, implementation of real time system using Embedded OS.
3.	To teach Multicore architecture in microcontroller.
4.	To introduce Embedded machine learning.

Course Outcomes: After learning this course students will be able to

1	Identify embedded system design components for various domains.
2	Select software and hardware for development of an embedded application.
3	Demonstrate the use of FreeRTOS for embedded applications.
4	Describe features of Multicore Microcontrollers.
5	Develop an embedded application with ESP32.
6	Apply the use of TinyML in embedded system design through case studies.

UNIT – I	**Modern Embedded Systems**	**(06 Hours)**
	Characteristics of Embedded Systems, challenges faced in modern Embedded Systems with respect to application areas, Guidelines for selecting hardware and software for advanced embedded system	

	design. Case studies on advanced embedded systems with control, compute and communicate functionality.	
UNIT – II	**Software and Hardware Support for Embedded Systems**	**(06 Hours)**
	Introduction of embedded software, need, features. Role of OS in Embedded systems, Embedded OS Vs General OS. Fundamentals of Embedded OS, Case study using Embedded OS: AUTOSAR with protocols. Case study for selection of processor based on requirements of applications areas.	
UNIT - III	**RTOS**	**(06 Hours)**
	Real time system, types, design approaches and considerations, Concept of RTOS, Types of RTOS, survey of RTOS. Applications using FreeRTOS: Memory management, Task management, Queue management, Software timer, Interrupts, Resource management.	
UNIT - IV	**Multicore Architecture**	**(06 Hours)**
	Need for multicore architecture, different types of multicore, Parallelism, symmetric and Asymmetric multiprocessing, multi threading. Multicore based architecture ESP32.	
UNIT -V	**Application Design for Multicore architecture**	**(06 Hours**

	ESP32 based applications case studies in various fields: Automotive, communications equipment, Asset tracking, remote controller, IOT.	
UNIT - VI	**Introduction to Embedded Machine learning**	**(06 Hours)**
	Introduction to TinyML, TinyML challenges, resources needed. AI Lifecycle and ML workflow, Introduction to TensorFlowLite, TFLite models. TinyML application case studies.	

List of Experiments (Minimum 8 to be performed)
1. Implement multitasking services of FreeRTOS on ESP32.
2. Implement queue management services of FreeRTOS on ESP32.
3. Implement interrupt services of FreeRTOS on ESP32.
4. Implement resource management services of FreeRTOS on ESP32.
5. Implement software timer services of FreeRTOS on ESP32.
6. Industrial application LED lighting design and development using ESP32
7.Energy distribution application design and development using ESP32
8.IoT application design and development using ESP32
9.Build a Computer Vision Model using TinyML
Textbooks/Reference Books
1 Rajkamal, "Embedded system-Architecture, Programming and Design", TMH Publications, Edition 2003
2 RISC-V Assembly Language Programming using ESP32-C3 and QEMU
3 Embedded Multicore: An Introduction, Freescale semiconductors, Rev. 0 07/2009
4 https://github.com/tinyMLx/courseware/tree/master/edX
5 https://www.freertos.org/features.html
6 https://www.espressif.com/ sites/default/files/documentation /esp32_technical_reference_manual_en.pdf

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering SUBJECT: - IMAGE PROCESSING		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR:50 Marks	Credits: 01
		Total Credit: 04

Course Pre-requisites: MATLAB Fundamentals, Signals and Linear Systems.

Course Objectives:

1	To introduce the image fundamentals and mathematical transforms for image processing.
2	To introduce the image enhancement and segmentation techniques
3	To introduce measurement operations on extracted features of image.

Course Outcomes: After learning this course students will be able to

1	Identify and use the basic concepts of digital image processing and colour transformation.
2	Implement image enhancement techniques using filters.
3	Analyse an image using morphological operations.
4	Analyse Image resolution techniques and compression methods for image.
5	Analyse features of various images by using segmentation methods.
6	Design different applications and gain experience in applying image processing algorithms to real problems.

UNIT – I	**Digital Image Fundamentals.**	**(06 Hours)**
	Elements Of Visual Perception, Fundamentals steps in DIP, A simple image formation model, Representation of binary, Graylevel and colour image, colour models (RGB,HSI and YCbCr)	
UNIT –II	**Image Enhancement**	**(06 Hours)**
	Spatial domain- Intensity Transformation Functions, Histogram equalization, Basics of spatial filtering, Low pass and High pass filtering in spatial domain, Frequency domain-Introduction to Fourier Transform, Low pass and High pass filtering in frequency domain.	
UNIT - III	**Image compression**	**(06 Hours)**
	Basics of Image compression, Image compression Model, Elements of Information Theory, Lossless Compression, Lossy Compression, Compression Methods – Huffman Coding, Arithmetic Coding, Run length Coding, Bit-plan coding and predictive coding.	
UNIT -IV	**Morphological image processing**	**(06 Hours)**
	Dilation & erosion, opening and closing operation, Hit- or –miss transformation. Basic morphological operations: Boundary extraction, region filling, thinning and thickening, skeletonization.	
UNIT -V	**Image Segmentation**	**(06 Hours)**
	Detection of discontinuities: Point detection, line detection, edge detection, Sobel, Prewitt, Laplacian mask for edge detection, Thresholding -global and variable thresholding , Region based segmentation : region growing, region splitting	

	and merging.	
UNIT -VI	**Feature Extraction & Applications of Digital Image Processing**	**(06 Hours)**
	Boundary and Regional descriptors, feature extraction-chain codes, fourier descriptors, Application: Biometric Authentication, Character Recognition, Content based Image Retrieval, Remote Sensing.	

List of Experiments
1. To perform image conversion between colour spaces.
2. To perform image negative, contrast stretching and grey level slicing of an image.
3. To perform Histogram Equalization on an image.
4. To perform image smoothing using median and averaging filter.
5. To perform image sharpening using high pass filter.
6. To apply basic morphological operators (opening and closing) on an image.
7. To perform Segmentation using Point detection, line detection and edge detection techniques.
8. To perform Segmentation using Thresholding.
9. To perform Huffman coding algorithm for image compression.
Text Books / Reference Books
1. Digital Image Processing, Rafael C Gonzalez and Richard E. Woods, Fourth Edition, Pearson Publication.
2. Digital Image Processing, William K. Pratt, Third Edition, Wiley Publication.

3. Fundamentals of Digital Image Processing, Anil K. Jain, Prentice Hall Publication.
4. 2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications, Arthur Ardeshir Goshtasby, Wiley Publication.
5. Digital image processing using MATLAB, Rafael C Gonzalez, Richard E. Woods and Steven Eddins, Second Edition, McGraw Hill Publication.

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering SUBJECT: - Elective-1 TELECOM NETWORK MANAGEMENT		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW & OR:50 Marks	Credits: 01
		Total Credit: 04

Course Pre-requisites: Data Communication and Networking

Course Objectives:

1.	To introduce the Telecomm Network and its switching technology
2.	To introduce Cables modems and broadband telecom network
3.	To introduce Telecom Network Management and QoS and Reliability Issues Of Telecom Networks

Course Outcomes: After learning this course students will be able

1	Analyze design issues of various Types of Telecom Networks
2	Design different mechanisms like ISDN, ATM, SONET for broad brand communication
3	Select proper access tools for Broad Band Telecom Networks
4	Choose various routing methods for different Application
5	Optimize reliability Issues of Telecom Networks.
6	Apply the role of different management protocols in Telecom Network Management.

UNIT – I	**Introduction to Telecom Networks**	**(06 Hours)**
	Type of networks, Network design issue, Data support, Design tools, Switching Technologies: circuit switching, packet switching	
UNIT –II	**Broadband Telecom Networks**	**(06 Hours)**
	ISDN: Structure, interfacing, protocol architecture, narrowband and broadband ISDN, Frame Relay: introduction, protocol	

	architecture frame, Asynchronous Transfer Mode, Synchronous Optical Networking/Synchronous Digital Hierarchy	
UNIT - III	**Broadband Access Technologies**	**(06 Hours)**
	DSL, Cables modems, WLL, Optical wireless, Leased lines, Dynamics routing.	
UNIT - IV	**Routing**	**(06 Hours)**
	Routing Algorithm for shortest path, Centralized routing, Distributed routing, Static routing.	
UNIT -V	**QoS and Reliability Issues Of Telecom Networks**	**(06 Hours)**
	Delay Jitter, Throughput, Bandwidth, Crosstalk/Interface Issue, Network Reliability and survivability issues, Network protection mechanisms	
UNIT - VI	**Telecom Network Management**	**(06 Hours)**
	Telecom Network operation and maintenance, Traffic management, Management of transport network, Configuration management, Fault management, Security network planning support, Network Management using SNMP: Object management, management information base, Traps.	

List of Experiments
1. To study of Switching Technologies.
2. To study of ISDN.
3.To study of ATM
4. To study of WLL.
5. To study of Distributed routing.
6. To study Fault detection & correction on Linux platform.
7. To study Resource Initialization in TNM

8.To study of Security network planning support
9. To study Implementation of SNMP.
10. To study of Network protection mechanisms.
Reference Books
1. Aaron Kershenbaumj, “Telecommunication Network Design Algorithms”, MGH
2. Mischa Schwatriz, “Telecommunication Network Protocols, Modeling and Analysis”, Pearson Education.
3. Cole, “Introduction to Telecommunications: Voice, Data and The Internet”, Pearson Education.
4. Flood, “Telecommunication Switching, Traffic and Networks”, Pearson Education.
5. Kundan Mishra, “OSS for Telecomm Network”, Springer.
6. Lakshimi Raman, “Fundamentals of Telecommunications Network Management”,

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering SUBJECT: - Industrial Wireless Sensor Network		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	Credits: 01
Tutorial: 00	TW : 50 Marks	
	Total marks : 150	Total Credit: 05

Course Pre-requisites: Data Communication and Networking ,Internet of things

Course Objectives:

1.	To introduce the concept of Industrial Wireless sensor Networks
2.	To teach different types of Network architectures
3.	To introduce the concepts of wireless network protocols
4.	To introduce the concepts of network routing techniques
5.	To introduce the concepts of time synchronization and localization
6.	To teach simulation of wireless Sensor networks

Course Outcomes: After learning this course students will be able to

1	Identify the challenges and technologies for industrial wireless networks
2	Identify and apply given IWSN architecture
3	Identify and apply network protocols for IWSN
4	Apply the knowledge of Routing techniques for IWSN application
5	Apply time synchronization concepts
6	Configure and Simulate Wireless sensor Network.

UNIT – I	**OVERVIEW OF INDUSTRIAL WIRELESS SENSOR NETWORKS**	**(06 Hours)**
	Single-Node Architecture - Hardware Components- Network Characteristics- unique constraints and challenges, Enabling Technologies for Industrial wireless sensor networks,- Types of Industrial wireless sensor networks.	

UNIT – II	**ARCHITECTURES**	**(06 Hours)**
	Network Architecture- Sensor Networks-Scenarios- Design Principle, Physical Layer and Transceiver Design Considerations, Optimization Goals and Figures of Merit, Gateway Concepts, Operating Systems and Execution Environments- Introduction to TinyOS and nesC- Internet to WSN Communication	
UNIT - III	**PROTOCOLS FOR INDUSTRIALWIRELESS SENSOR NETWORKS**	**(06 Hours)**
	MAC Protocols for Wireless Sensor Networks, Low Duty Cycle Protocols And Wakeup Concepts - SMAC, - B-MAC Protocol, IEEE 802.15.4 standard and ZigBee, LAURA,the Mediation Device Protocol, Wireless HART – Highway Wi-Fi – Low power, ISA100-11	
UNIT -IV	**NETWORK ROUTING TECHNIQUES**	**(06 Hours)**
	Wakeup Radio Concepts, Address and Name Management, Assignment of MAC Addresses, Routing Protocols Energy-Efficient Routing, Geographic Routing. EARQ , InRout route Selection algorithm, Particle Swarm Optimization Algorithm	
UNIT -V	**TIME SYNCHRONIZATION AND LOCALIZATION**	**(06**
	Topology Control, Clustering, Time Synchronization, Localization and Positioning, Sensor Tasking and Control Energy-efficient reference node selection (EERS) ,	
UNIT -VI	**SENSOR NETWORK PLATFORMS AND TOOLS**	**(06 Hours)**
	Sensor Node Hardware – Berkeley Motes, Programming Challenges, Node-level software platforms, Node level Simulators, State-centric programming	

List of Experiments:

1. Implement geographic routing for the application of human body health parameters using MATLAB.

2. To transmit and receive Weather parameters using energy aware routing in MATLAB.

3. To transmit and receive Raining water data using Rumor routing.

4. Write programme for automate Home or Industrial day to day needs using collaborative processing.

5. To direct power source controller using wireless sensor network in MATLAB establish its evaluation metric.

6. To control movement of unmanned vehicle using attribute routing in MATLAB.

7. To localize stationary spot using wireless sensor network.

8. To track and do time synchronization of high alert areas using wireless sensor network.

9. To monitor and control traffic on high intensity city-road.

10. To track and control greenhouse using wireless sensor network.

11. To control movement of unmanned vehicle using wireless sensor network in NS2 OR NS3.

12. To direct power controller using wireless sensor network in NS2 OR NS3.

Textbooks/Reference Books	
1.	Soumya Ranjan Nayak, Biswa Mohan Sahoo, Muthukumaran Malarvel, Jibitesh Mishra "Smart Sensor Networks Using AI for Industry 4.0: Applications and New Opportunities." CRC Press 2021
	Holger Karl & Andreas Willig, "Protocols and Architectures for Wireless Sensor Networks", John Wiley, 3rd Edition 2005.
2.	Feng Zhao & Leonidas J.Guibas, "Wireless Sensor Networks-An Information Processing Approach", Elsevier , 4th Edition 2007
3.	Waltenegus Dargie , Christian Poellabauer, "Fundamentals Of Wireless Sensor Networks - Theory And Practice", By John Wiley & Sons Publications , 6th Edition 2019
4.	KazemSohraby, Daniel Minoli, & TaiebZnati, "Wireless Sensor Networks-Technology, Protocols, and Applications", John Wiley,3rd Edition 2007.
5.	Anna Hac, "Wireless Sensor Network Designs", John Wiley, 2nd Edition 2020

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering
SUBJECT: Electronic Product Design

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: --	End Semester Examination: --	Credits: --
Practical: 02	Continuous Assessment: --	Credit: --
Tutorial: --	TW: 50 Marks	Credit: 01
	Oral: --	
	Practical: --	Total Credit: 01

Course Pre-requisites:

	EDA Tool Practices, PCB Design and Soldering, Internet of Things.

Course Objectives:

1	The students will be able to design from basic to advance level of IoT Based System where a Microcontroller, Internet & Communication Protocols, Sensors & Actuators are convergent on common platform to Monitor, Control and Process the information.
2	To understand the stages of product design and PCB development.
3	To familiarize the fundamentals those are essential for product design with EMC/EMI compliance
4	To understand Cooling Techniques and Front Panel Design
5	To understand the importance of testing in product design cycle.
6	To understand the processes and importance of documentation.

Course Outcomes: After learning this course students will be able to

1	Apply product development process for realization of the product.
2	Design and develop a standalone Embedded System using Microcontrollers through conceptual design, PCB Design, Testing and Integration.
3	Apply concept of EMI / EMC for product design.
4	Identify appropriate Cooling Techniques and Design Front Panel.
5	Analyze test specifications for product.
6	Write technical user manual.

List of Experiments:

1. Study of IP (Ingress Protection) Standards
2. Design of Double Sided PCB
3. Study EMC/EMI Standards
4. Study of Cooling Techniques
5. Enclosure and Front Panel Design
6. Power Supply subsystem Design
7. Complete System Design of any Portable Device
8. Creating Testing and Quality Assurance manual for a product
9. Write a Technical manual for a product

Reference Books:
1. 'Electronic product design', Authors: A. E. Ward, J. A. S. Angus, 1999, ISBN:9780748751709, 074875170X , Stanley Thornes, Cheltenham, U.K.
2. 'Learning the Art of Electronics', Authors: Thomas C. Hayes, Paul Horowitz, 2016, ISBN: 9780521177238, 0521177235, Cambridge University Press.
3. 'Effective Tech Communication', Author: M. Ashraf Rizvi, 2005, ISBN:9780070599529, 0070599521, Publisher: McGraw-Hill Education (India) Pvt Limited
4. 'Electronic Instrument Design', Author: Fowler, 2006, ISBN:9780195685657, 0195685652, Publisher: Oxford University Press
5. 'Printed Circuit Board Design Techniques for EMC Compliance' Author: Mark I. Montrose · 2000, ISBN: 9780780353763, 0780353765 Contributor: IEEE Electromagnetic Compatibility Society, Publisher: Wiley.

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering
SUBJECT: - Project stage –I

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00 Marks	Credits: 00
Practical: 02	Internal Assessment: 00 Marks	Credits: 00
Tutorial: 00	TW : 50 Marks & Oral : 50 Marks	Credits: 03
	Total marks : 100	Total Credit: 03

Course Pre-requisites:

Course Objectives:

1.	To familiarize the students with the product development cycle
2.	To impart the importance of working as a team.
3.	To introduce the student to literature survey and documentation process
4.	To encourage the students to visualize and formulate a viable solution to practical engineering problems.

Course Outcomes: After learning this course students will be able to

1	Identify the problem for practical Engineering application
2	Identify the problem for practical Engineering application
3	Write specifications and identify constraints
4	Work as an effective team member
5	Work as an effective team member

Project Stage –I includes various steps such as

1. Problem Identification
2. Information gathering
3. Feasibility study
4. Synopsis
5. System analysis
6. Requirement analysis

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering SUBJECT: - Internship		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00 Marks	Credits: 00
Practical: 00	Internal Assessment: 00 Marks	Credits: 00
Tutorial: 00	TW : 25 Marks & Oral : 25 Marks	Credits: 03
	Total marks : 50	Total Credit: 03

Course Pre-requisites:

Course Objectives:

1.	To familiarize the students to industrial work processes.
2.	To work as an effective team member.
3.	To develop the communication and presentation skills
4.	To introduce the student to work ethics in industry.

Course Outcomes: After learning this course students will be able to

1	Work effectively in an industrial environment.
2	Effectively communicate and present himself/herself.
3	Identify the various sections in the industry.
4	Work in a team.

In-plant Training:
Every student must undergo training on site or in office of some company in June & July for one and half month to get the exposure and practical experience. He must submit the detailed report of training, based on which the term work and oral marks should be awarded.
Note: Student should complete in-plant industrial training after semester-VI for a period of Eight weeks. Evaluation will be done in semester-VII.

Description: Assessment based on a report on the industrial training carried out and Presentation of the same

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B. Tech. Sem. VIII: Electronics & Telecommunication Engineering SUBJECT: - Mobile Communication		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	Credits: 01
Tutorial: 00	TW:25 Marks	
	Total marks:125	Total Credit: 05

Course Pre-requisites:

Analog Communication Systems, Digital Communication Systems, Information Theory & Coding

Course Objectives:

1.	To make students familiar with the fundamentals of mobile communication systems
2.	To choose a system according to the complexity, installation cost, speed of transmission, channel properties etc.
3.	To identify the requirements of mobile communication as compared to static communication
4.	To understand Cellular communication systems.
5.	To identify the security issues in mobile communication

Course Outcomes: After learning this course students will be able to

1	To Differentiate various generations of mobile communications
2	To know the concept of cellular communication
3	To know the basics of wireless communication
4	To review the various file systems which support mobile communication
5	To discriminate the security issues in mobile communication

UNIT – I	**Introduction to Mobile Communication**	**(08 Hours)**
	Mobile and Personal Communication, mobile and wireless devices, Specialized packet and mobile radio networks, circuit-switched data services on cellular networks, packet-switched data services on cellular networks, the evolution of Mobile Communication from 1G to 5G and	

	LTE.	
UNIT – II	**Wireless LAN**	**(08 Hours)**
	Introduction, Infrared radio transmission infrastructure and ad-hoc networks, Detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM	
UNIT - III	**Mobile Network Layer**	**(08 Hours)**
	Mobile IP, DHCP (Dynamic Host Control Protocol), Mobile ad-hoc networks	
UNIT - IV	**Mobile Transport Layer**	**(08 Hours)**
	Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selective retransmission and recovery, Transaction oriented TCP, and TCP over 2.5/3G wireless networks.	
UNIT - V	**Support for Mobility**	**(08 Hours)**
	File systems, WWW, Wireless application protocol, i-mode, SyncML, WAP 2.0.	
UNIT - VI	**Security issues in wireless systems**	**(08 Hours)**
	Need for wireless security, Attacks on wireless networks, security services, WEP, VPN	

List of Experiments:

1) To understand and carry out fault finding of Pulse & Tone DTMF Telephone Trainer.
2) To carry out AT commands mobile communication using a GSM trainer
3) To Study direct sequence spread spectrum modulation & demodulation
4) To study the hardware section and carryout fault findings of the Mobile handset trainer
5) To understand two-user CDMA trainers using DSSS technology.

6) To carry out internet data transfer using CDMA trainer.	
7) To send and receive DTMF signal using DTMF encoder and decoder circuit.	
8) To carry out Voice Packet signal switching system using IP Protocol Trainer	
9) To carry out a Data Packet signal switching system using IP Protocol Trainer	
10) To carry out a Video Packet signal switching system using IP Protocol Trainer	
11) To carry out GPRS Internet data transfer using a GPRS trainer.	
Textbooks/Reference Books	
1.	Mobile Communications: Jochen Schiller (AddisonWesty)
	Wireless Networks by P. Nicopolitidis, M. S. Obaidat, G. I. Papadimitriou, A. S. Pomportsis ; Wiley Pub
2.	Advanced Wireless Networks 4G Technologies Savo G. Glisic University of Oulu, Finland, John Wiley & Sons Ltd
3.	Broadband Telecommunications Handbook, Second Edition Regis J. (Bud) Bates
	COGNITIVE RADIO NETWORKS Architectures, Protocols, and Standards

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B. Tech. Sem. VIII: Electronics & Telecommunication Engineering SUBJECT: - Satellite Communication & Radar		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 04	End Semester Examination: 60 Marks	Credits: 04
Practical: 02	Internal Assessment: 40 Marks	
Tutorial: 00	TW:25 Marks	
	PR: 25 Marks	Credits: 01
		Total Credit: 05

Course Pre-requisites:
- Radio Frequency Engineering
- Telecom Network Management

Course Objectives:

1.	To recognize and describe fundamental concept in the field of satellite communication
2.	To describe the concept of space subsystem.
3.	To introduce design, analysis & evaluation of satellite communication subsystem
4.	To enable the student to understand different band used in Satellite Television
5.	To Recognize and describe both the theoretical and practical aspects for integration of radar pulses

Course Outcomes:

After learning this course students will be able to

1	Understand Orbital aspects involved in satellite communication.
2	Calculate Power budget
3	Identify Satellite system and services provided
4	Analyze the performance of satellite communication system
5	Derive the radar range equation and to solve some analytical problems.
6	Distinguish the different methods used for tracking targets

UNIT I	**Introduction of Satellite Communication and Subsystem**	**(08Hrs)**

	Introduction, basic concept of satellite communication, Orbital Mechanics, Look angle determination, Orbital perturbation, Orbital determination, Launchers and Launch vehicles, Orbital effects in communication system performance. Satellite Subsystem, Attitude and control system(AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystem, Satellite antennas	
UNIT II	**Satellite Link Design**	**(08Hrs)**
	Introduction, Basic transmission Theory, System Noise Temperature and G/T Ration, Design of Downlinks, Satellite System using Small Earth Stations, Uplink Design, Design of specified C/N : Combining C/N and C/I values in Satellite Links	
UNIT III	**Low Earth Orbit and Non Geo-Stationary satellite system**	**(08Hrs)**
	Introduction, Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput Consideration, Operational NGSO constellation design: Iridium, Teledesic.	
UNIT IV	**Satellite Radio and GPS**	
	C-Band and Ku- Band Home satellite TV, Digital DBS TV, Satellite Radio Broadcasting, Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and codes.	**(08Hrs)**
UNIT -V	**Introduction of Radar**	
	Introduction to RADAR systems: RADAR Block diagram, RADAR Range equation, Probability of detection of false alarm, Integration of RADAR pulses, RADAR cross section of targets, MTI RADAR, CW RADAR.	**(08Hrs)**
UNIT VI	**Tracking Radar & Radar receivers**	**(08 Hrs.)**
	Tracking Radar: Tracking with Radar, Sequential Lobing, Conical Scan, Mono pulse Tracking Radar – Amplitude Comparison Mono	

	pulse (one- and two- coordinates) Radar Receivers –Displays – types. Duplexers – Branch type and Balanced type, Circulators as Duplexers.	

List of Experiments: (*Any 8 from the list below)

1. To set up a satellite communication link and study of change in uplink and downlink frequency
2. To establish an Audio-Video satellite link between Transmitter and Receiver
3. To Study Frequency Hopping Spread Spectrum (FHSS) Modulation and Demodulation Technique
4. To study generation(spreading) & demodulation(Despreading) of DSSS modulated signal.
5. To study radiation pattern &calculate beam width for Yagi uda & folded dipole antenna
6. To study radiation pattern & calculate beam width for circular & triangular patch. antenna
7. To study of Data and PN Sequence Generation
8. To study GPS data like longitude, latitude using GPS receiver
9. To study of Minimum Shift Keying (MSK) Modulation Process
10. To study of Minimum Shift Keying (MSK) Demodulation Process

Textbooks/Reference Books

1. Satellite Communications-Timothy Pratt, Charles Bostian, Jeremy Allnut John Wiley & Sons (II Edition)
2. Satellite Communications, by Dennis Roddy(Fourth edition),McGraw Hill.
3. Satellite Communication Systems Engineering, by Wilbur L. Pritchard, Henri G. Suyderhoud, Robert A. Nelson (Second Edition), Pearson
4. Satellite Technology, Principles and Applications, by Anil K. Maini, Varsha Agarwal (Second Edition), Wiley.
5. Introduction to Radar Systems – Merrill I. Skolnik, TMH Special Indian Edition, 2nd Edition, 2007.

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<table>
<tr><td colspan="3" align="center">B. Tech. Sem. VIII: Electronics & Telecommunication Engineering
Subject: - Automotive Electronics
Elective II</td></tr>
<tr><td><u>TEACHING SCHEME:</u></td><td><u>EXAMINATION SCHEME:</u></td><td><u>CREDITS ALLOTTED:</u></td></tr>
<tr><td>Theory: 03</td><td>End Semester Examination: 60</td><td>Credits:03</td></tr>
<tr><td>Practical: 02</td><td>Internal Assessment: 40</td><td></td></tr>
<tr><td>Tutorial:</td><td>TW 25 Marks</td><td>Credits:01</td></tr>
<tr><td></td><td></td><td>Total Credit: 04</td></tr>
<tr><td colspan="3">Course Pre requisites: Embedded systems, sensor modeling and simulation, Electrical technology.</td></tr>
</table>

Course Objectives:

1.	Demonstrate different electrical and electronic systems in a vehicle
2.	To describe Automotive systems & subsystems.
3.	To introduce concept of Interfacing automotive sensors and sensors monitoring mechanisms along with different actuator mechanisms.
4.	To teach automotive battery, starting, charging and ignition systems
5.	To teach various communication systems, wired and wireless protocols used in vehicle networking.

Course Outcomes: After successfully completing the course students will be able to:

1	Identify the fundamentals of vehicle systems.
2	Analyze and design various sensor and actuator systems
3	Analyse the concepts involve in automotive microcomputer system
4	Analyse and design the operational Automotive Communication Systems
5	Demonstrate practical competence in automotive electronics in designing prototypes of modern systems.
6	Demonstrate the knowledge of the battery technologies and charging methods

Unit 1	**Fundamentals Of Automotive**	**(06 H)**
	Introduction to Different Automobile Components: Engine, Transmission, (Powertrain System); Fuel Storage and Delivery System, Emission and Emission Treatment Systems. Braking and Steering System, Safety System, Suspension System, Comfort System, Lighting System. Different Fuel Types: Fossil Fuel, Battery, Fuel Cell, Hydrogen. Introduction to ECU and AUTOSAR Architecture for Automotive Systems	
Unit 2	**Automotive Sensors and Actuators**	**(06 H)**
	Basic measurement systems, Analog and digital signal processing, Sensor characteristics, electronic engine control system, Variables to be Measured. Speed measurement (engine and vehicle speed), pressure Measurements, Engine Crankshaft Angular Position Sensor, Hall-Effect Position Sensor Throttle Angle Sensor, Exhaust Gas Oxygen Sensor. PID controller, Feedback and closed-loop mechanism used to control the output of the system. Electric Motors: Brushless DC Motors, Stepper Motors, servo motors	
Unit 3	**Microcontrollers/Microprocessors in Automotive**	**(06 H)**
	The automotive context of microprocessors, microcontrollers, and digital signal processors. Criteria to choose the right microcontroller/processor for various automotive applications. Architectural attributes relevant to automotive applications. Automotive grade processors viz. Renesas, Infineon. ECU and its components, Cruise control system and its functional elements, performance expectations, microcontroller requirement, input,	

	and output.	
Unit 4	**Automotive Communication Networks and Protocols:**	**(06 H)**
	Automotive Ethernet, In-vehicle Networking Technologies Compared - Automotive Ethernet (100BASE-T1, 1000BASE-T1, 10BASE-T1s), Automotive Communication Systems: Characteristics and Constraints, Different Networks for Different Requirements, Event-Triggered versus Time-Triggered. In-Car Embedded Networks, priority Buses: CAN and J1850, TT Networks: Flex Ray Protocol, Low-Cost Automotive LIN Network, Multimedia Networks: MOST Network, Vehicle area network (VAN). Infotainment Systems: Application of telematics in automotive domain. Global positioning systems (GPS) and General packet radio service (GPRS).	
Unit 5	**Electric vehicle technology**	**(06 H)**
	Comparison of ICE and EV (Electric Vehicle). Necessity of HEV, Electric vehicle (EV) layouts, EV components, Hybrid vehicles: classifications, operating modes, hybrid power system. Vehicle navigation systems, block diagram of electric propulsion system	
Unit 6	**battery technologies and charging methods**	**(06 H)**
	Battery Technologies: Lead–Acid Battery, Ni-MH Batteries, Lithium-Based Batteries, Ultra capacitors. Flywheels: Basic working principle and power capacity. Charging Standards, Charging methods AC /DC/ Concept of wireless power transfer, Battery Swapping Technology	
Reference Books		

1. “**Understanding Automotive Electronics**,” Williams. B. Ribbens 7th Edition, Elsevier Publication, 2012.

2. “**Automotive Electronics Handbook**”, Robert Bosch John Wiley and Sons, 2004.

3. **Automotive Embedded Systems Handbook**: Nicolas Navet CRC Press (2009)

4. **Automotive electronics handbook** by Ronald Jurgen McGraw Hill publication (1997)

5.**Modern electric, hybrid electric and fuel cell vehicles** by Mehrdad Ehsani, Texas USA CRC Press, (2018)

6. **Electric and Hybrid Vehicles** by Tom Denton 2016

Lab Assignments: lab work can be accomplished with Mat lab, Simulink and Simscape or any relevant simulator (any 8)

1. Study Simscape simulator through simscape on ramp.
2. Study Simulink through Simulink on ramp.
3. Design and simulate 3 phase BLDC Motor and investigate its back EMF profile.
4. Design and simulate Speed control of BLDC motor with PWM
5. Interface the sensors for Speed and Pressure measurement with ADC and observe output
6. Interface the sensors for temperature and displacement measurement with ADC and observe output
7. Design and simulate Battery operation with Simulink and use equivalent circuits to represent the dynamic behaviour of the battery cell
8. Design and simulate Safety simulation on car seat belt working
9. Simulating Longitudinal and Lateral Vehicle Dynamics

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B. Tech. Sem. VIII: Electronics & Telecommunication Engineering SUBJECT: - COMPUTER VISION (Elective-II)		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 01	Internal Assessment: 40 Marks	
Tutorial: 00	TW: 25 Marks	Credits: 01
		Total Credit: 04

Course Pre-requisites:
- ❖ Basics concepts in linear algebra
- ❖ Image Processing

Course Objectives:

1.	To introduce students to camera Models, Projection and Camera Calibration used for image formation. fundamentals of computer Vision, applications, and challenges in computer vision
2.	To introduce students to stereo imaging techniques, 3D reconstruction algorithms and multi-view geometry method.
3.	To study the computer vision techniques and its algorithms used for object tracking in videos scene.
4.	To introduce computer vision techniques for object recognition.
5.	To develop and validate the various basic computer vision algorithms using programming environment: Python/TensorFlow /Kera's.

Course Outcomes:

After learning this course students will be able to

1	Develop understanding working of camera and camera calibration for image formation.
2	Demonstrates different feature detection techniques
3	Identify application and challenges in stereo imaging concept.
4	Apply computer vision algorithms for motion tracking
5	Develop different real time computer vision applications using supervised learning methods

UNIT I	**Introduction to Computer Vision**	**(06 Hrs)**

	Objective, Applications, Challenges in computer vision, CCD image sensors, Projective Geometry, Camera parameters, Camera model and Camera calibration, Perspective, Digital camera, Bayers pattern. Smart Camera and its applications.	
UNIT II	**Feature Detection**	**(06Hrs)**
	Points and patches, Edges, Lines, Segmentation: Active contours, Level set representations, Fourier and wavelet descriptors, Graph-Cut and energy-based methods, Texture Descriptors, Colour Features, Corner Point Detectors, Scale Invariant Feature Transform	
UNIT III	**Stereo Imaging**	**(06 Hrs)**
	Binocular imaging systems, Concept, triangulation, Correspondence, Epipolar geometry, rectification, dynamic programming. 3D reconstruction, Multi-view stereo: Volumetric and 3D surface reconstruction. Shape from silhouettes, Image registration, techniques, panorama creation	
UNIT IV	**Objective tracking and Motion:**	
	Object Tracking, condensation, Spatio-Temporal Analysis, Dynamic Stereo; Basics of motion, corner detector, and optical flow by Lucas Kanade mean shift tracking, Kalman filter, Motion parameter estimation, Structure from motion, Motion Tracking in Video	**(06 Hrs)**
UNIT -V	**Pattern recognition in Computer Vision**	
	Artificial Neural Network for Pattern Classification, Convolutional Neural Networks, Autoencoder, Machine Learning Algorithms and their Applications in Image Segmentation. Image fusion	
UNIT VI	**Applications of Computer Vision**	**(06 Hrs.)**

	Thermal and Infrared Imaging. Range Imaging, In Vehicles: Lane Detection, Stereo Obstacle Detection, Laser Obstacle Detection, Vehicle Detection. Biometrics, document processing, Face and Facial Expression Recognition, Gesture Recognition	

List of Experiments: (Using Python / OpenCV/ MATLAB)

1. Perform the detection of edges, points, and lines from the given images.
2. Perform the detection of corners from the given images.
3. Performa the camera calibration for your mobile camera and determine its intrinsic and extrinsic parameters.
4. Determination of depth estimation using stereo vision.
5. Plotting the optical flow for the given video sequence.
6. Fusion of two images of different modalities (CT/MRI, SAR/Multispectral) using PCA/ Min-Max/Wavelet based fusion techniques
7. Document image processing for English / Devanagari character recognition.
8. Any one application in field of computer vision and machine learning.

Textbooks/Reference Books

1. Forsyth D and Ponce J, Computer Vision A Modern Approach, Prentice Hall (2002).
2. Milman Sonka,Vaclav Halvac, Rogger Boyle-Image Processing, Analysis and Machine Vision, 4th ed., 2015.
3. R Szeliski, Computer vision: algorithms and applications, Springer (2010)
4. Hornberg, Alexander, ed. Handbook of machine and computer vision: The guide for developers and users. John Wiley & Sons, 2017

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B. Tech. Sem. VII: Electronics & Telecommunication Engineering SUBJECT: - SOFTWARE DEFINED RADIO		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 02	Internal Assessment: 40 Marks	Credits: 01
Tutorial: 00	TW: 25 Marks	
	Total marks: 125	Total Credit: 04

Course Pre-requisites:

Analog and Digital Communication, Digital Signal Processing, Wireless Communication

Course Objectives:

1	Know about the Software Communications Architecture and other relevant standards
2	Know different types of processing elements that are being used on platforms for software-defined radio
3	Understand receiver, sensor, and transmitter architectures
4	Understand analogue-to-digital and digital-to-analogue conversion, as well as sample-rate conversion
5	Can synthesize communications- and sensor functionality on a platform

Course Outcomes: After learning this course students will be able to

1	To able to analyse the Need for Software Radios and their characteristics
2	To able to access the various communication profiles of receivers and transmitters
3	To know Resource Management of the different networks
4	To able to analyse the Reconfiguration of the network elements and various systems
5	To understand cognitive radio networks

UNIT – I	**Introduction**	**(06 Hours)**
	The Need for Software Radios, what is Software Radio, Characteristics and benefits of software radio, Design Principles of Software Radio, RF Implementation issues, The Purpose of RF Front-End, Dynamic Range, The Principal Challenge of Receiver Design, RF Receiver Front-End Topologies.	
UNIT – II	**Profile and Radio Resource Management**	**(06 Hours)**
	Introduction, Communication Profiles, Terminal Profile, Service Profile, Network Profile, User Profile, Communication Profile Architecture, Profile Data Structure, XML Structure, Distribution of Profile Data, Access to Profile Data, Management of Communication Profiles.	
UNIT - III	**Radio Resource Management in Heterogeneous Networks**	**(06 Hours)**
	Introduction, Definition of Radio Resource Management, Radio Resource Units over RRM Phases, RRM Challenges and Approaches, RRM Modelling and Investigation Approaches, Investigations of JRRM in Heterogeneous Networks, Measuring Gain in the Upper Bound Due to JRRM, Functions and Principles of JRRM, General Architecture of JRRM,	
UNIT - IV	**Reconfiguration of the Network Elements**	**(06 Hours)**
	Introduction, Reconfiguration of Base Stations and Mobile Terminals, Abstract Modelling of Reconfigurable Devices, the Role of Local Intelligence in Reconfiguration, Performance Issues, Classification and Rating of Reconfigurable Hardware, Processing Elements, Connection Elements, Global Interconnect Networks, Hierarchical Interconnect Networks.	
UNIT - V	**Software Defined Radio Architectures for Cognitive Radios**	**(06 Hours)**
	Introduction, SDR and Cognitive Radio Relationship, SDR Architectures, Software Tuneable Analog Radio Components, Antenna Systems. Reconfigurable Digital Radio Technologies, Basic Digital Radio Components	

UNIT - VI	**Application & Smart antennas**	**(06 Hours)**
	Software Defined Radio Examples Frameworks and Platforms,3G SDR Testbeds, Applying Software Radio Principles to Smart Antenna Systems, Smart Antenna Architectures Switched Beam Array, A Software Radio Smart Antenna Architecture, Smart Antenna Performance	

List of Experiments:

1) Implement SDR transmission/Modulation using MATLAB.
2) Implement SDR reception/Demodulation using MATLAB.
3) Parameter estimation for adaptation of wireless communication systems (learning environment and other factors)
4) Incorporate cognitive features in the upcoming standards (like 802.16m, LTE advanced, 802.11n, adaptive frequency hopping in Bluetooth) and in the 3G (2.5G) standards.
5) List down the Challenges and issues regarding the implementation of SDR?
6) Implement SDR in LabVIEW.
7) Implementing Software-Defined Radio: 4-QAM Modem in LabVIEW
8) Develop a model of a Software Defined Radio using the SIMULINK tool to implement the IEEE 802.11 and Bluetooth standards.
9) Implementing Single tone in Ni-USRP using LabVIEW.
10) Implementing audio file modulation in NI-USRP using LabVIEW

Textbooks/Reference Books

1	Markus Dillinger, Kambiz Madani, “Software Defined Radio Architecture System and Functions”, WILEY 2003
2	Walter Tuttle Bee, “Software Defined Radio: Enabling Technologies”, 2002, WileyPublications
3	Jeffrey H. Reed, “Software Radio: A Modern Approach to Radio Engineering”, 2002, PEA Publication
4	Markus Dillinger, Kambiz Madani, Nancy Alonistioti, “Software Defined Radio: Architectures, Systems and Functions”, 2003, Wiley
5	Software Defined Radio the Software Communications Architecture John Bard, Space Coast Communication Systems Inc., USA Vincent J. Kovarik Jr., Harris Corporation, USA, John Wiley & Sons Ltd,

6	Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems, HÜSEYIN ARSLAN, University of South Florida, Tampa, FL, USA, 2007 Springer

Bharati Vidyapeeth
(Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. VIII: Electronics & Telecommunication Engineering
SUBJECT: - CYBER SECURITY*

TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 03	End Semester Examination: 60 Marks	Credits: 03
Practical: 00	Continuous Assessment: 40 Marks	
Tutorial: 01	TW: --	Credits: 01
	Oral: --	
	Practical: --	Total Credits: 04

Course Pre-requisites:

Data Communication and Networking.

Course Objectives:

- To learn fundamental concepts of Computer and Network
- To learn different types of threats and cyber-crimes.
- To examine secure software development practice
- To incorporate approaches for incident analysis and response
- To understand key concepts in I.T. ACT and cyber-crime basics.
- To enhance awareness cyber forensics.

Course Outcomes: After learning this course students will be able to

1	Identify various types of cyber-attacks and cyber-crimes
2	Identify Learn threats and risks within context of the cyber security.
3	Differentiate Techniques Hackers use in Hacking
4	Implement Various Computer Security methods
5	Evaluate the effectiveness of cyber-security, cyber-laws and other countermeasures against
6	Identify digital forensics and implement countermeasures

UNIT – I	**Introduction to Cyber Security**	**(06 Hours)**
	Basic Cyber Security Concepts, layers of security, Vulnerability, threat, Harmful acts, Internet Governance – Challenges and Constraints, Computer Criminals, CIA Triad, Assets and Threat, motive of attackers, active attacks, passive attacks, Software attacks, hardware attacks, Cyber Threats-Cyber Warfare, Cyber Crime, Cyber terrorism, Cyber Espionage, etc., Comprehensive Cyber Security Policy.	
UNIT – II	**Cyber Frauds, DoS, Viruses**	**(06 Hours)**
	Cyber Stalking, Fraud, and Abuse: Introduction, How Internet Fraud Works, Identity Theft, Cyber Stalking, Protecting Yourself Against Cyber Crime. Denial of Service Attacks: Introduction, DoS, Illustrating an Attack, Malware: Introduction, Viruses, Trojan Horses, The Buffer-Overflow Attack.	
UNIT - III	**Techniques Used by Hackers**	**(06 Hours)**

	Introduction, Basic Terminology, The Reconnaissance Phase, Actual Attacks, Malware Creation, Penetration Testing.	
UNIT -IV	**Computer Security Technology**	**(06 Hours)**
	Introduction, Virus Scanners, Firewalls, Antispyware, IDS, Digital Certificates, SSL/TLS, Virtual Private Networks, Wi-Fi Security.	
UNIT -V	**CYBER ETHICS AND LAWS**	**(06 Hours)**
	Introduction to Cyber Laws, E-Commerce and E-Governance, Certifying Authority and Controller, Offences under IT Act, Computer Offences and its penalty under ISO 27001, IT Act 2000, Positive Aspects and weak areas of ITA 2000, Digital signatures and the Indian ITA act, ITA 2008, and International Standards maintained for Cyber Security, Security Audit, Investigation by Investing Agency, Intellectual Property Rights in Cyberspace.	
UNIT -VI	**Introduction to Forensics**	**(06 Hours)**
	Introduction, General Guidelines, Finding Evidence on the PC, Finding Evidence in System Logs , Getting Back Deleted Files, Operating System Utilities, Operating System Utilities, Mobile Forensics: Cell Phone Concepts	

Text Books:

1. Computer Security Fundamentals - Chuck Easttom, Pearson, third edition
2. John R. Vacca, ―Computer Forensics‖, Computer Crime Investigation Firewall Media, New Delhi
3. Nelson, Phillips Enfinger, Steuart, ―Computer Forensics and Investigations‖, CENGAGE Learning
4. Cyber Security: Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Nina Godbole and Sunil Belapure, Wiley INDIA. ISBN 978-81-265-2179-1
5. Practical Cyber Forensics an Incident-Based Approach to Forensic Investigations, Niranjan Reddy, Apress, ISBN-13: 978-1-4842-4459-3
6. Practical Digital forensics – Richard Boddingtion, PACKT Publishing ISBN 978-1-78588-710-9

Reference Books:

1. William Stallings, Computer Security: Principles and Practices, Pearson 6th Ed, ISBN: 978-0- 13-335469-0
2. Bernard Menezes, Network Security and Cryptography, Cengage Learning, ISBN-978-81- 315-1349- 1
3. Dr. V.K. Pachghare, Cryptography and Information security, PHI, Second edition, ISBN- 978- 81- 203-5082-3
4. Ethical Hacking, Thomas Mathew, OSB Publisher, 2003
5. Jason Luttgens, Matthew Pepe, Kevin Mandia, Incident Response & Computer Forensics, McGraw-Hill Osborne Media, 3 rd edition , 2014
6. Hacking Exposed: Network Security Secrets & Solutions, Stuart McClure, Joel Scambray and George.Kurtz, McGraw-Hill, 2005
7. BRAGG, Network Security: The Complete Reference, McGraw Hill Professional, 2012
8. Christopher L.T. Brown, ―Computer Evidence Collection & Presentation‖, Firewall

Bharati Vidyapeeth (Deemed to be University)
College of Engineering, Pune

B. Tech. Sem. VIII: Electronics & Telecommunication Engineering
SUBJECT: - CLOUD COMPUTING

Course Pre-requisites: - Database Management Systems**,** Data Communication and Networking

TEACHING SCHEME:	EXAMINATION SCHEME:	CREDITS ALLOTTED:
Theory: 00 Hours / Week	End Semester Examination: 00 Marks	Credits: 00
Practical: 02 Hours / Week	Continuous Assessment: 00 Marks	Practical: 01
	Term Work + Oral: 50Marks	Total Credit: 01

Course Objectives:

1.	To introduce the fundamentals of Cloud computing, its technologies, Challenges and Applications
2.	To give Insights into the virtualization technologies and Architecture.
3.	To know the relationship between Cloud and SOA.
4.	To classify and evaluate Cloud Security Issues.
5.	To appreciate the emergence of cloud as the next generation computing paradigm.
6.	To appreciate the evolution of cloud from the existing technologies.

Course Outcomes:

	On successful completion of this course, students will be able to:
1.	Adapt different types of virtualizations and increase resource utilization.
2.	Describe and demonstrate the underlying principles of different Cloud Service Models.
3.	Build a private cloud using open-source technologies.
4.	Examine and explain the core issues of cloud computing such as resource management and security.
5.	Develop applications on Cloud Platforms.
6.	Develop real world web applications and deploy on commercial cloud

List of Practical to be performed in the laboratory:	
1	To Install and run GATE.
2	To launch the web applications Using Gate launcher
3.	To Simulate a cloud scenario using CloudSim and run a scheduling algorithm that is not present in CloudSim
4.	To Implement IaaS using your resources
5.	Design and deploy a PaaS environment.
6.	To transfer the files from one virtual machine to another virtual machine.
7.	To Simulate identity management in one's private cloud.
8.	Design and develop custom Application using Cloud (like Salesforce/GCP/AWS.)
9.	Design an Assignment to retrieve, verify, and store user credentials using Firebase Authentication, the Google App Engine standard environment, and Google Cloud Data store
10.	To Deploy web applications on commercial cloud. Technology: Google appEngine/ Windows Azure
11.	To launch virtual machine using try stack (Online Openstack Demo Version)
12.	To Create Storage as a Service for remote file access using web interface.
13.	To Implement security of web server and data directory. technology: ownCloud
14.	To create and access VM instances and demonstrate various components such as EC2, S3, Simple DB, DynamoDB. Technology: AWS
Note: The term work shall be the record of minimum eight experiments performed from the above list.	
Reference Books:	
1.	Enterprise Cloud Computing by Gautam Shroff, Cambridge,2010
2.	Cloud Security by Ronald Krutz and Russell Dean Vines, Wiley - India, 2010 ,
3	Getting Started with OwnCloud by Aditya Patawar , Packt Publishing Ltd, 2013.

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B. Tech. Sem. VIII: Electronics & Telecommunication Engineering SUBJECT: - Project stage –II		
TEACHING SCHEME:	**EXAMINATION SCHEME:**	**CREDITS ALLOTTED:**
Theory: 00	End Semester Examination: 00 Marks	Credits: 00
Practical: 04	Internal Assessment: 00 Marks	Credits: 00
Tutorial: 00	TW : 100 Marks & Oral : 100 Marks	Credits: 06
	Total marks : 200	Total Credit: 06

Course Pre-requisites: Project Stage -I

Course Objectives:

1	To familiarize the students with the product development cycle
2.	To impart the importance of working as a team.
3.	To introduce the student to literature survey and documentation process
4.	To encourage the students to visualize and formulate a viable solution to practical engineering problems.

Course Outcomes: After learning this course students will be able to

1	Identify the problem for practical Engineering application
2	Identify the problem for practical Engineering application
3	Write specifications and identify constraints
4	Work as an effective team member

Project Stage –II includes various steps such as

1. System Design
2. Testing
3. System documentation
4. Project report

BHARATI VIDYAPEETH
(DEEMED TO BE UNIVERSITY), PUNE

Faculty of Engineering & Technology
B. Tech. - Electronics & Telecommunication Engineering
Old Syllabus

College Information

Bharati Vidyapeeth University college of Engineering, Pune continued to take new strides towards evolving directions to further the growth and dissemination of scientific and technological knowledge.

The college established in 1983, is one of the oldest and largest Engineering Colleges in the state of Maharashtra. The college has well defined goals which are intensely practised and followed.

Their implementation encompass multi-faceted activities in the form of recruiting experienced faculty, organizing faculty development program, Identifying socio-economically relevant areas and emerging technologies. Constant review and upgradation of curricula, Upgradation of Laboratories, library and communication facilities, Collaboration with industries and research and development organizations, Sharing of knowledge, infrastructure and resources, training extension, testing and consultancy services and Promoting Interdisciplinary research.

The college has been ranked as 'A' grade Engineering college by the Government of Maharashtra. Meeting quality standards in education such as is been a motto of this institute. As a pedagogical effect, out of ten under graduate programmes being conducted, seven programmes eligible for accreditation are accredited by National Board of Accreditation(NBA).

The DATAQUEST - CMR conducts an annual survey of technical schools of India and publishes the list of best 100 technical schools in India. In the surveys, for the past seven years, the college has been consistently ranked among top 50 technical schools.

Another feather in Institute's cap is its selection for the grant of Rs. 4.0 Crore under Technical Education Quality Improvement Programme - II(TEQIP-II) by Ministry of Human Resource Development (MHRD) of Government of India supported by World Bank.

This Institute has been ranked to 45th position at all India level and 5th at the Western Region of AICTE in 2012.The Institute has been very sensitive to the human resource development and continues initiating new academic programmes. Presently it offers 09 undergraduate programmes in the field of Civil Engineering, Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Electronics and Telecommunication Engineering, Mechanical Engineering and Production Engineering.

The college offers 08 postgraduate programmes in the field of Civil Engineering,Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Mechanical Engineering and NanoTechnology.

Salient Features

Major Groups/ Areas
Image Processing
Digital Signal Processing
Very Large Scale Integration
Fiber Optic Communication

Laboratories
Mobile Communication
Digital Electronics
Embedded Systems
Electronic Circuit Design and Project
Microprocessor and Microcontroller
Computer Network
DSP and Image Processing
Electronic Instrumentation and Measurement
Power Electronics
Instrumentation Control System Lab
Network Analysis

Research Publication from Academic Year 2010-11 to 2014-15

Type of Publication	No of Publication
International Journals & Conference	30
National Journal & Conference	26
Total	56

Mission

To empower students with state of the art knowledge & latest trends in Electronics and allied engineering to meet real world challenges.

Vision

To create technical manpower to suit global needs in Electronics and allied Engineering.

Program Educational Objectives

PEO1 To make students competent for professional career in Electronics & allied fields.

PEO2 To equip students with effective communication & teamwork skills to acquire professional excellence in national & multinational organizations.

PEO3 To nurture students to be sensitive to ethical, societal & environmental issues while conducting their professional work.

PEO4 To build strong fundamental knowledge amongst student to pursue higher education and continue professional development in Electronics & other fields.

Programme Outcomes

The Graduates Engineers will have the ability to

1. Apply basic knowledge of mathematics, science and engineering.
2. Identify, formulate and solve engineering problems.
3. Build, analyze & interpret Electronics Systems.
4. Solve Engineering problems in Electronics & allied fields.
5. Use modern software tools in Electronics Engineering practice.
6. Understand effect of engineering solutions in global, economic, health, safety & societal context.
7. Understand the impact of engineering solutions on society & to be aware of contemporary issues.
8. Shoulder professional and ethical responsibilities for societal development.
9. Work as effective and efficient member of the team or leader.
10. Communicate effectively.
11. Manage projects in Electronics and multidisciplinary environment.
12. Engage in lifelong learning.

Sr. no.	Subject	Teaching Scheme (Hrs/Week)			Examination Scheme (Marks)					Total	Credits		
		L	P	T	End Semester Exam	Continuous Assessment			TW		TH	TW	Total
						Unit Test	Atten-dance	Assign-ments					
1.	Engineering Mathematics - I	3	-	1	60	20	10	10	-	100	3	1	4
2.	Fundamentals of Civil Engineering	3	2	-	60	20	10	10	25	125	3	1	4
3.	Engineering Graphics *	4	2	-	60	20	10	10	25	125	4	1	5
4.	Engineering Chemistry	4	2	-	60	20	10	10	25	125	4	1	5
5.	Elements of Electronics Engineering	3	2	-	60	20	10	10	25	125	3	1	4
6.	Professional Skill Development - I	2	-	-	50	-	-	-	-	50	2	-	2
7.	Workshop Technology	-	2	-	-	-	-	-	50	50	-	1	1
	Total	19	10	1	350	100	50	50	150	700	19	6	25

*End Semester Exam of duration 4 hours

Note

1. Sem-I & Sem-II are common to the branches (Electronics, Biomedical & E & T/C)
2. * indicates subjects common to the branches (Electronics, Biomedical & E & T/C)
3. ** indicates subjects common to the branches (Electronics & E & T/C)
4. Engineering Mathematics –I, II, III are common to the branches (Electronics, Biomedical & E & T/C)

   Internal assessment of 40 marks comprises of 20 marks average of two Unit tests,10 marks tutorials/assignments and 10 marks attendanc

Sr. no.	Subject	Teaching Scheme (Hrs/Week)			Examination Scheme (Marks)					Total	Credits		
		L	P	T	End Semester Exam	Continuous Assessment			TW		TH	TW	Total
						Unit Test	Atten-dance	Assign-ments					
1.	Engineering Mathematics - II	3	-	1	60	20	10	10	-	100	3	1	4
2.	Fundamentals of Mechanical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
3.	Engineering Mechanics	4	2	-	60	20	10	10	25	125	4	1	5
4.	Engineering Physics	4	2	-	60	20	10	10	25	125	4	1	5
5.	Fundamentals of Electrical Engineering	3	2	-	60	20	10	10	25	125	3	1	4
6.	Professional Skill Development - II	2	-	-	50	-	-	-	-	50	2	-	2
7.	Fundamentals Of Computing	-	2	-	-	-	-	-	50	50	-	1	1
	Total	19	10	1	350	100	50	50	150	700	19	6	25

Total Credits

Sem - I = 25

Sem - II = 25

Grand Total = 50

ENGINEERING MATHEMATICS – I

TEACHING SCHEME

Lectures	:3 Hrs/week
Tutorial	:1 Hrs/week
Total	:4 Hrs/week

CREDIT

Theory	:3
Tutorial	:1
Total	:4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Total	: 100 Marks

Course Prerequisite

Students should have knowledge about

1. Matrix
2. Complex Numbers
3. Derivatives

Course Objectives

To develop an ability to use the mathematical techniques, skills and tools necessary for engineering practice.

Course Outcomes

At the end of this course, a student will be able to

1. solve the consistency of any type of system.
2. find the roots of equation, using DeMoivre's Theorem and to locate imaginary points using Argand Diagram.
3. apply Leibnitz rule to find n^{th} Derivative.
4. test Convergence and Divergence of infinite series.
5. compute a total derivative.
6. compute Maxima and Mininma of any functiion of two variables

Unit-I (8 Hours)

Matrices

Rank, Normal form, System of Linear Equations, Linear Dependence and Independence, Linear and Orthogonal Transformations, Eigen values, Eigen Vectors, Cayley – Hamilton Theorem, Application to problems in Engineering .

Unit-II (8 Hours)

Complex Numbers and Applications

Definition, Cartesian, Polar and Exponential Forms ,Argand's Diagram, De'Moivre's theorem and its application to find roots of algebraic equations, Hyperbolic Functions, Logarithm of Complex Numbers, Separation into Real and Imaginary parts, Application to problems in Engineering.

Unit-III (8 Hours)

Expansion of Functions and Differential Calculus

Differential Calculus : Successive Differentiation, n^{th} Derivatives of Standard Functions, Leibnitz's Theorem.

Expansion of Functions : Taylor's Series and Maclaurin's Series.

Unit-IV (8 Hours)

Differential Calculus

Indeterminate Forms, L' Hospital's Rule, Evaluation of Limits.

Infinite Series

Infinite Sequences, Infinite Series, Alternating Series, Tests for Convergence, Absolute and Conditional Convergence, Power series, Range of Convergence.

Unit-V (8 Hours)

Partial Differentiation and Applications

Partial Derivatives, Euler's Theorem on Homogeneous Functions, Implicit functions, Total Derivatives, Change of Independent Variables.

Errors and Approximations.

Unit-VI

(8 Hours)

Jacobian

Jacobians and their applications, Chain Rule, Functional Dependence.

Maxima and Minima

Maxima and Minima of Functions of two variables, Lagrange's method of undetermined multipliers.

Text Books

Applied Mathematics (Volumes I and II) by P.N. Wartikar and J.N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune 7th edition(1988).

Assignments

1. Rank , System of linear equations.
2. Complex Numbers.
3. Differential calculus and expansion of functions.
4. Indeterminate forms and infinite series.
5. Partial Derivatives, Euler's theorem on homogeneous functions.
6. Jacobians, Maxima and Minima of functions of two variables.

Reference Books

Advanced Engineering Mathematics by Peter V. O'Neil ,(Thomson Learning) 6th Edition (2007).

Advanced Engineering Mathematics, by M. D. Greenberg, (Pearson Education) 2nd Edition (2002).

Advanced Engineering Mathematics, by Erwin Kreyszig ,Wiley Eastern Ltd. 8th Edition (1999).

Higher Engineering Mathematics ,by B. S. Grewal ,(Khanna Publication, Delhi) 42nd Edition(2012).

Higher Engineering Mathematics , by B. V. Ramana, Tata McGraw- Hill, Edition(2012).

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

FUNDAMENTALS OF CIVIL ENGINEERING

TEACHING SCHEME

Lectures	: 3 Hrs/week
Practicals	: 2 Hrs/week
Total	: 5 Hrs/week

CREDITS

Theory	: 3
Term Work	: 1
Total	: 4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Term work	: 25 Marks
Total	:125 Marks

Course Prerequisite

The Students should have the knowledge of

1.Concepts of units and conversions of units.
2.Basic knowledge of Chemistry
3.Basic knowledge of geography, concept of latitude and longitude.

Course Objective

To make student understand the scope and application of Civil Engineering

Course Outcomes

Students will be able to

1. Describe the scope of Civil Engineering and role of Civil Engineer in Construction project.
2. Explain use of surveying instruments for land survey .
3. Explain principles of building planning and bye laws.
4. Describe types of foundations and their stability.
5. Explain methods of irrigation, types of dams, canals, and water and sewage treatment process.
6. Describe the components of infrastructure like roads, railways, bridges and airports.

Unit-I

(6 Hours)

Civil Engineering scope and applications

Civil Engineering scope, importance and applications to other disciplines of Engineering; Civil Engineering construction process and role of Civil engineer; Government authorities related to Civil Engineering; Types of structures based on loading , material and configuration; Building components and their functions; Civil Engineering materials: concrete, construction steel, bricks, flooring material and tiles, paints, plywood , glass and aluminum.

Unit-II

(6 Hours)

Surveying

Objectives , Principles and Classification of Surveying; Linear ,angular ,Vertical and area Measurements and related instruments.

Unit-III

(6 Hours)

Building planning and Bye laws

Site selection for residential building; Principles of building planning; Building bye laws- necessity, Floor Space Index, Heights , open space requirements, set back distance , ventilation and lighting, concept of carpet and built up area, minimum areas and sizes for residential buildings, Concept of Eco friendly structures and Intelligent buildings.

Unit-IV

(6 Hours)

Foundations and Earthquakes

Function of foundation, concept of bearing capacity and its estimation, types of foundation and its suitability, causes of failure of foundation.

Earthquakes causes, effects and guidelines for earthquake resistant design, earthquake zones .

Unit-V

(6 Hours)

Irrigation and Water Supply

Rainfall measurement and its use in design of dams; Types of dams, canals, methods of irrigation and their merits and demerits; hydropower structures ;Water supply, drinking water requirements and its quality, water and sewage treatment flow chart.

Unit-VI

(6 Hours)

Jacobian

Roads- types of roads and their suitability, cross section of roads, meaning of terms ; width of roads, super elevation, camber, gradient ,sight distance, materials used for construction of roads.

Railways- Types of gauges, section of railway track, components of railway track, advantages.

Bridges : Components - Foundation , Piers, Bearings, Deck.

Airways- Components -Runway , Taxiway and Hangers.

Waterways: components- port, jetty, breakwater.

Text Books

(Following Exercises should be carried out.)

1. Study and use of prismatic compass and measurement of bearings.
2. Study and use of Dumpy level and reduction of levels by collimation plane method.
3. Area measurement by Digital Planimeter.
4. Drawing- plan and elevation of a residential bungalow.
5. Study of features of topographical maps.
6. Assignment on collection of information on Civil Engineering materials.
7. Assignment on types of foundations.
8. Assignment on unit 6.

Reference Books

1. Surveying Vol I - S.K. Duggal , Tata Mc Graw Hill Publication.
2. Built Environment – Shah , Kale, Patki, , Tata Mc Graw Hill Publication
3. Building Construction – Dr. B.C. punmia , Laxmi Publication
4. Irrigation and water Power Engineering , Dr. P.N. modi
5. Text book of transportation Engineering- Arora, Charotar Publishers.
6. Water supply and sanitary engineering-Rangawala, Charotar Publishers.
7. Assignment on types of foundations.
8. Assignment on unit 6.

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING GRAPHICS

TEACHING SCHEME

Lectures	: 4 Hrs/week
Practicals	: 2 Hrs/week
Total	: 6 Hrs/week

CREDIT

Theory	: 4
Practical	: 1
Total	: 5

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Prerequisites

Students should have basic knowledge of fundamentals of drawing.

Course Objectives

To apply fundamental principles of Engineering Graphics.

Course Outcomes

At the end of this course, a student will be able to understand

1. Different engineering curves and dimensions.
2. Differentiate first angle and third angle projection method in orthographic.
3. To interpret views of object and to draw by using Isometric Projection Method.
4. Projection of lines and its traces.
5. Projection of different planes
6. Projection of solids and its sections.

Unit-I (6 Hours)

Lines and Dimensioning in Engineering Drawing

Different types of lines used in drawing practice, Dimensioning – linear, angular, aligned system, unidirectional system, parallel dimensioning, chain dimensioning, location dimension and size dimension.

Unit-II (6 Hours)

Curves used in Engineering Practice

Ellipse by Directrix-Focus method, Arcs of Circle method, Concentric circle method and Oblong method. Involute of a circle, Cycloid, Archimedean Spiral, Helix on cone, Loci of points- Slider Crank mechanisms.

Projections of Points and Lines and planes

Projections of points, projections of lines, lines inclined to one reference plane, Lines inclined to both reference planes. (Lines in First Quadrant Only) Traces of lines, Projections of Planes, Angle between two planes, Distance of a point from a given plane, Inclination of the plane with HP, VP

Unit-III (6 Hours)

Projection of Solids

Projection of prism, pyramid, cone and cylinder by rotation method.

Unit-IV (6 Hours)

Section of Solids

Types of section planes, projections of solids cut by different sections of prism, pyramid, cone and cylinder.

Unit-V (6 Hours)

Orthographic Projection

Basic principles of orthographic projection (First and Third angle method) . Orthographic projection of objects by first angle projection method only. Procedure for preparing scaled drawing, sectional views and types of cutting planes and their representation, hatching of sections.

Unit-VI (6 Hours)

Isometric Projections

Isometric view, Isometric scale to draw Isometric projection, Non-Isometric lines, and construction of Isometric view from given orthographic views and to construct Isometric view of a Pyramid, Cone, Sphere.

Term work

- Term work shall consist of Seven half-imperial size or A2 size (594 mm x 420 mm) sheets.
- Assignment 05 Problems on each unit in A3 size Drawing Book

Sheets

- Types of lines, Dimensioning practice, Free hand lettering, 1nd and 3rd angle methods symbol.
- Curves and loci of points
- Projections of Points and Lines and planes
- Projection of Solids
- Section of solids
- Orthographic Projections
- Isometric views

Text Books

1. "Elementary Engineering Drawing", N.D. Bhatt, Charotar Publishing house, Anand India.
2. "Text Book on Engineering Drawing", K.L.Narayana&P.Kannaiah, Scitech Publications, Chennai.
3. "Fundamentals of Engineering Drawing", Warren J. Luzzader, Prentice Hall of India, New Delhi .
4. "Engineering Drawing and Graphics", Venugopal K., New Age International Publishers.
5. M. B. Shah and B. C. Rana, "Engineering Drawing", 1st Ed, Pearson Education, 2005
6. P. S. Gill, "Engineering Drawing (Geometrical Drawing)", 10 Edition, S. K. Kataria and Sons, 2005.
7. P. J. Shah, "Engineering Drawing", C. Jamnadas and Co., 1 Edition, 1988.

Syllabus For Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING CHEMISTRY

TEACHING SCHEME

Theory	: 4 Hrs/week
Practicals	: 2 Hrs/week
Total	: 6 Hrs/week

CREDITS

Theory	: 4
Practical	: 1
Total	: 5

EXAMINATION SCHEME

Theory	: 60 Marks
Term Work	: 25 Marks
Unit Test	: 20 Marks
Assignments	: 10 Marks
Attendance	: 10 Marks
Total	: 125Marks

Course Prerequisites

Students should have basic knowledge of

Industrial use of water, crystal structure, fuels, corrosion, electrochemical cell and structure of organic molecules at Higher Secondary level of schooling.

Course Objectives

After completing this course the students will able to apply knowledge of Engineering Chemistry to different branches of engineering for better conceptual clarity and exploring emerging fields of technology and research.

Course Outcomes

At the end of this course, a student will be able to

1. Analyze the methods involved in improving quality of water for domestic and industrial purposes.
2. Express the crystal structure through X-ray diffraction technique to examine the internal structure of crystal.
3. Demonstrate the properties and applications of fossil fuels and derived fuels.
4. Define the fundamental principles of corrosion and methods used for minimizing corrosion.
5. Interpret the basic concepts of electrochemical techniques and its applications in society.
6. Develop the skills for correct stereo chemical assignment and interpretation in complex organic molecules.

Unit-I (8 Hours)

Water

Introduction, Hardness of water, Effect of hard water on boilers and heat exchangers: a) boiler corrosion b) caustic embrittlement c) scales and sludges d) priming and foaming Water softening methods for industrial purposes :a) Zeolite process b) Phosphate conditioning , Numerical based on the zeolite process.

Unit-II (8 Hours)

Material Chemistry

Crystallography

Unit cell, Laws of crystallography, Weiss indices and Miller indices, Crystal defects (point and line defects), X-ray diffraction – Bragg's Law and numericals.

Cement

Introduction of cement, Hydraulic/ Non-hydraulic cementing materials, classification of cement, chemistry of portland cement, chemical composition and compound constituents of portland cement, properties of cement and its applications.

Unit-III (8 Hours)

Fuels

Introduction, classification of fuels, calorific value of fuels, NCV and GCV, Determination of calorific values using Bomb calorimeter and Boys' gas calorimeter.
Theoretical calculation of calorific value of a fuel, Analysis of coal a) Proximate b) Ultimate analysis of coal, Numericals based on NCV, GCV.

Unit-IV (8 Hours)

Corrosion and its Prevention

Corrosion : Definition, atmospheric corrosion-mechanism, Wet corrosion-mechanism, Electrochemical and galvanic series, Factors affecting corrosion-nature of metal, nature of environment.
Methods of prevention of corrosion : Cathodic and Anodic protection, Metallic coatings, Electroplating, Hot dipping.

Unit-V
(8 Hours)

Electrochemistry

Introduction, Arrhenius Ionic theory, Kohlrausch's law of independent migration of ions Laws of electrolysis: Faradays Laws, Ostwald's dilution law, Acids and Bases, concept of pH and pOH, Buffer solutions, Solubility Product, Redox Reactions.

Electrode Potential, electrochemical cell, concentration cell, reference Electrodes, Overvoltage, Conductometric Titrations, Fuel cells, Lead Acid Storage Cell and numericals based on the above articles.

Unit-VI
(8 Hours)

Stereochemistry

Introduction, chirality, optical activity, Enantiomers, Diastereomers, projection formula of tetrahedral carbon- Newman projection, Wedge projection, Fischer projection,

Geometrical isomerism : cis and trans isomerism, E and Z isomers

Optical isomerism : Mesoform, the number of optical isomers for chiral molecules,

Conformations : conformations of ethane, conformations of n-butane

Term work

Practicals

Any Eight experiments from the following

1. Estimation of hardness of water by EDTA method.
2. Estimation of chlorine by Mohr's method.
3. Determination of percentage of Ca in given cement sample
4. Determination of coefficient of viscosity by Ostwald's viscometer.
5. Study of Bomb calorimeter for determination of calorific value.
6. Determination of calorific value of gas fuel by using Boy's gas calorimeter.
7. Determination of dissolved oxygen in a water sample.
8. To determine the Molecular Weight of polymer.
9. Estimation of Copper from brass sample solution by Iodometrically.
10. Estimation of percentage of Iron in Plain Carbon Steel by Volumetric Method.
11. To standardize NaOH solution and hence find out the strength of given hydrochloric Acid solution .
12. To determine Surface Tension of given liquid by Stalagmometer.
13. Study of corrosion of metals in medium of different pH.
14. To set up Daniel cell.
15. To determine pH of soil .
16. To determine Acidity of soil.

Assignments

1. Effect of hard water on boilers and heat exchangers
2. Hydraulic/ Non-hydraulic cementing materials
3. Analysis of coal a) Proximate b) ultimate analysis of coal
4. Wet corrosion-mechanism, Electroplating, Hot dipping
5. Geometrical isomerism :- cis and trans isomerism, E and Z isomers
6. Fuel cells

References / Text Books

1. Engineering Chemistry by Jain and Jain, Dhanpat Rai Company (P) Ltd, New Delhi.
2. Chemistry of Engineering Materials, Agarwal C.V, Rata Publication Varanasi, 6th edition (1979)
3. Chemistry in Engineering and Technology, Volume W, Tata McGraw Hill Publishing Company Ltd, New Delhi (1988)
4. Applied Chemistry, O. P. Vidyankar, J. Publications, Madurai, (1955)
5. Engineering Chemistry, S. N. Chand and Co., Jalandhar, 31st Edition (1990)
6. Engineering Chemistry by Dara S. S. Chand Publications
7. Fundamentals of Electrochemistry, V. S. Bagotsky (Ed) Wiley NY (2006)

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ELEMENTS OF ELECTRONICS ENGINEERING

TEACHING SCHEME

Lectures	:3 Hrs/week
Practicals	:2 Hrs/week
Total	:5 Hrs/week

CREDITS

Theory	:3
Term work	:1
Total	:4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignments	: 10 Marks
Term work	: 25 Marks
Total	:125 Marks

Course Prerequisite

Students have completed a course in Physics and have the knowledge of laws of

Course Objective

This course will introduce the concepts of electronic engineering . By the end of the course, student will be familiar with electronic components, semiconductor devices and their applications. The course emphasizes on Electronic devices, ICs and Digital

Course Outcomes

At the end of the course, a student will be able to

1 understand the basic semiconductor physics and semiconductor devices.
2 understand transport phenomenon of semiconductor devices through energy band diagrams.
3. to identify electronic components like, resistors, capacitors, inductors and to study characteristics of semiconductor devices.
4. apply the knowledge of diodes to the rectifier and filter circuits.
5. to represent numerical values in various number systems and perform number conversions between different number system and study applications of logic

Unit-I (6Hours)

Electron Dynamics

Motion of electron in electric , magnetic and combined electric and magnetic fields. Detection and focusing system of Oscilloscope tube-Television picture tube- LCD and Flat panel displays .

Unit-II (6 Hours)

Transport phenomenon in semiconductor

Mobility and conductivity - Drift and Diffusion currents – Continuity Equation – Minority carrier injection and recombination in Homogeneous semiconductor – Thermistors – Piezo Resistors – Hall Effect – Thermoelectric effect.

Unit-III (6 Hours)

Electronic components

Resistors -Inductors and Capacitors and their types – Construction and Characteristics of PN junction diode – Zener Diode – Tunnel diode - Bipolar junction transistors – CB,CC,CE circuits , Field Effect transistors .

Unit-IV (6 Hours)

Electronic Devices and Linear ICs

Rectifiers : Half wave , Full wave and Bridge rectifiers - capacitor filter-wave forms-ripple factor regulation characteristics .Special semiconductor devices : FET - SCR - LED - VI characteristics – applications. Introduction to Op-Amp and Timers .

Unit-V (6 Hours)

Digital system

Number system : Binary system , Decimal to Binary , Octal system, Hexadecimal system , binary –addition, subtraction ,multiplication and division .

Logic gates : OR, AND,NOT , Exclusive-OR, NOR, NAND gates, Logic networks, Gate Standardization, Introduction to Logic Circuits –Combinational and Sequential Circuits Introduction to Microprocessor.

Unit-VI

(6 Hours)

Consumer Electronics

Basic study of various products such as radio receivers , television sets , MP3 players, video recorders , DVD players , digital cameras , microwaves , personal computers , video game consoles , telephones and mobile phones , laptops and palmtops and fax machines

List of Practicals

1. To study various electronics components: Resistors, Inductors, Capacitors, diodes and transistors.
2. To plot V-I characteristics of PN junction diode.
3. To plot V-I characteristics of Zener diode.
4. To plot input-output characteristics of CE configuration of BJT.
5. To plot input-output characteristics of FET.
6. To study basic logic gates: AND, OR, NOT.
7. To study derived logic gates: NAND, NOR, Ex-OR, Ex-NOR.
8. To fabricate at least 5 electronic components on a PCB

Textbooks

1. Mottershed Allen, Electronic Devices & Circuits, PHI
2. R. P. Jain, Modern Digital Electronics, Mc Graw Hill

References

1. Thomas L. Floyd, Electronic Devices, Pearson Education (Sixth edition)
2. Millman & Halkis, Electronic Devices & Circuits, PHI
4. Malvino Leach, Digital Principles & Applications, Mc Graw Hill
3. Millman & Halkis, Integrated Electronics, MGH

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

PROFESSIONAL SKILL DEVELOPMENT - I

ENGLISH COMMUNICATION

TEACHING SCHEME

Lectures	: 2 Hrs/week
Total	: 2 Hrs/week

CREDITS

Theory	: 2
Total	: 2

EXAMINATION SCHEME

Theory	: 50 Marks
Total	: 50 Marks

Unit I: (5 hours)

Essential Grammar

Tenses: Basic forms and use, sentence formation (general & Technical), Common errors, Parts of speech through context, Direct and reported speech structures and voices.

Unit II: (2 hours)

Vocabulary Enrichment

Exposure to words from General Service List (GSL) by West, Academic word list (AWL) specific technical terms related to the field of technology. Phrases, idioms, significant abbreviations, formal (business) vocabulary.

Unit III: (3 hours)

Written Communication I

Letter Writing – Formal and Informal letter writing, Application letters, Report Writing-Academic and Business reports, Job application letter.

Unit IV: (2 hours)

Phonetics

Pronunciation, Reduction of MTI in spoken English, Question formation with emphasis on common errors made during conversation.

SOFT SKILLS

Unit I: (3 hours)

Communication Skill

a) Importance of effective communication, types of communication- verbal and non verbal, barriers of communication, effective communication

b) Listening Skills: Law of nature- Importance of listening skills, difference between listening and hearing, Types of listening.

Unit II: (3 hours)

Self Awareness & Self Development

a) Self Assessment, Self Appraisal, SWOT, Goal setting - Personal & career - Self-Assessment, Self-Awareness, Perceptions and Attitudes, Positive Attitude, Values and Belief Systems, Self-Esteem, Self appraisal, Personal Goal setting,

b) Career Planning, Personal success factors, Handling failure, Depression and Habit, relating SWOT analysis & goal setting, prioritization.

Unit III: (4 hours)

Interpersonal Relationship

Team work, Team effectiveness, Group discussion, Decision making - Team Communication. Team, Conflict Resolution, Team Goal Setting, Team Motivation Understanding Team Development, Team Problem Solving, Building the team dynamics. Multicultural team activity

Unit IV: (2 hours)

Time Management

The Time management matrix, apply the Pareto Principle (80/20 Rule) to time management issues, to prioritize using decision matrices, to beat the most common time wasters, how to plan ahead, how to handle interruptions , to maximize your personal effectiveness, how to say "no" to Time wasters.

WORKSHOP TECHNOLOGY

TEACHING SCHEME

Practicals	: 2 Hrs/week
Total	: 2 Hrs/week

CREDITS

Practical	: 1
Total	: 1

EXAMINATION SCHEME

Term Work	: 50 Marks
Total	: 50 Marks

Course Objectives

Introduction to different materials in engineering practices with respect to their workability, formability & machinability with hand tools & power tools and to develop skills through hands on experience. Special; emphasis shall be given to Safety in Workshop - Fire hazards, electric short circuit –causes and remedies, Machine protection, Human protection, Accident prevention methods, developing ability to observe safe working habits.

Term work shall consist of any three jobs, demonstrations on rest of the trades and journal consisting of six assignments one on each of the following topics.

Course Outcomes

At the end of this course, students should be able to understand

1. Basic Manufacturing Processes used in the industry,
2. Importance of safety
3. Electrical circuit making.

Carpentry

Introduction to wood working, kinds of woods, hand tools & machines, Types of joints, wood turning. Pattern making, types of patterns, contraction, draft & machining allowances Term work includes one job involving joint and woodturning.

Fitting

Types of Fits, concepts of interchangeability, datum selection, location layout, marking, cutting, shearing, chipping, sizing of metals, drilling and tapping. Term work to include one job involving fitting to size, male-female fitting with drilling and tapping.

Sheet Metal Practice

Introduction to primary technology processes involving bending, punching and drawing various sheet metal joints, development of joints.

Joining

Includes making temporary and permanent joints between similar and dissimilar material by processes of chemical bonding, mechanical fasteners and fusion technologies. Term work includes one job involving various joining processes like riveting, joining of plastics, welding, brazing, etc.

Forging

Hot working, cold working processes, forging materials, hand tools & appliances, Hand forging, Power Forging.

Moulding

Principles of moulding, methods, core & core boxes, preparation of foundry sand, casting, Plastic moulding.

Electrical Board Wiring
(Demonstration Common for Electrical & Non electrical Group)

Electric power utilization, energy audit, Types of wiring - House wiring, stair case wiring, two-way switch wiring, Types of fuses and their uses, circuit breaker, Three phase wiring for electrical motors, earthing, minor fault finding.

Plumbing (Demonstration Common for Electrical & Non electrical Group)

Types of pipe joints, threading dies, Pipe fittings.

ENGINEERING MATHEMATICS – II

TEACHING SCHEME

Lectures	:3 Hrs/week
Tutorial	:1 Hrs/week
Total	:4 Hrs/week

CREDIT

Theory	:3
Tutorial	:1
Total	:4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Total	: 100 Marks

Course Prerequisite

Students should have basic knowledge about

1. Derivatives
2. Integration

Course Objectives

To develop an ability to use the mathematical techniques, skills and tools necessary for engineering practice.

Course Outcomes

At the end of this course, a student will be able to

1. solve the differential equations of first order and first degree.
2. form mathemtical model of rectilinear motion , electric circuit , fourier heat conduction, newton's law of cooling.
3. represent periodic function as fourier series.
4. evaluate definite Integral by DUIS Rule and to trace cartesian and polar curves.
5. transform the cartesian coordinates into spherical polar and cylindrical coordinate systems.
6. apply methods to find area and volume by double and triple integration.

Unit-I (8 Hours)

Differential Equations (DE)

Definition, Order and Degree of DE, Formation of DE, Solutions of Variable Separable DE, Exact DE, Linear DE and reducible to these types

Unit-II (8 Hours)

Application of Differential Equations

Applications of DE to Orthogonal Trajectories, Newton's Law of Cooling, Kirchoff's Law of Electrical Circuits, Motion under Gravity, Rectilinear Motion, Simple Harmonic Motion, One–Dimensional Conduction of Heat, Chemical engineering problems

Unit-III (8 Hours)

Fourier Series

Definition, Dirichlet's conditions, Fourier Series and Half Range Fourier Series, Harmonic Analysis.

Integral Calculus

Reduction formulae, Beta and Gamma functions.

Unit-IV (8 Hours)

Integral Calculus

Differentiation Under the Integral Sign, Error functions

Curve Tracing

Tracing of Curves, Cartesian, Polar and Parametric Curves. Rectification of Curves.

Unit-V (8 Hours)

Solid Geometry

Cartesian, Spherical Polar and Cylindrical Coordinate Systems. Sphere, Cone and

Unit-VI (8 Hours)

Multiple Integrals and their Applications

Double and Triple integrations, Applications to Area, Volume, Mean and Root Mean Square Values.

Assignments

1.Differential equations.
2.Aplication of differential equations.
3.Fourier series and Integral calculus.
4.DUIS and curve tracing.
5.Solid geometry.
6.Double and triple integrations, area and volume.

Text Books

Applied Mathematics (Volumes I and II) by P.N. Wartikar and J.N. Wartikar, Pune Vidhyarthi Griha Prakashan, Pune 7th edition(1988).

Reference Books

Higher Engineering Mathematics ,by B. S. Grewal ,(Khanna Publication, Delhi) 42nd Edition(2012).
Higher Engineering Mathematics , by B. V. Ramana, Tata McGraw- Hill, Edition(2012).
Advanced Engineering Mathematics by Peter V. O'Neil ,(Thomson Learning) 6th Edition (2007).
Advanced Engineering Mathematics, by M. D. Greenberg, (Pearson Education) 2nd Edition (2002).
Advanced Engineering Mathematics, by Erwin Kreyszig ,Wiley Eastern Ltd. 8th Edition (1999).

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

FUNDAMENTALS OF MECHANICAL ENGINEERING

TEACHING SCHEME

Lectures	: 3 Hrs/week
Practicals	: 2Hrs/week
Total	: 5Hrs/week

CREDIT

Theory	: 3
Practical	: 1
Total	: 4

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Prerequisites

Students should have the basic knowledge of Thermal Science.

Course Objectives

Students will get the basic knowledge of Mechanical Engineering systems.

Course Outcomes

At the end of this course, a student will be able to understand

1. the fundamentals of thermal engineering.
2. working of power producing and absorbing devices.
3. different energy sources and fundamental laws of heat transfer.
4. the basic properties of fluids and materials.
5. the different mechanical devices and mechanisms.
6. machine tools and manufacturing processes.

Unit-I

(8 Hours)

Thermodynamics

Heat, work and Internal Energy, Thermodynamic State, Process, Cycle, Thermodynamic System, First Law of Thermodynamics, Application of First Law to steady Flow and Non Flow processes, Limitations of First Law, PMM of first kind (Numerical Treatment), Second Law of Thermodynamics – Statements, Carnot Engine and Carnot Refrigerator, PMM of Second Kind (Elementary treatment only)

Unit-II

(8 Hours)

Introduction to I.C. Engines and turbines

Two stroke, Four Stroke Cycles, Construction and Working of C.I. and S.I. Engines, Hydraulic turbines, steam turbines, gas turbines.(Theoretical study using schematic diagrams)

Introduction to refrigeration, compressors & pumps

Vapor compression and vapor absorption system, house hold refrigerator, window air conditioner. Reciprocating and rotary compressor, Reciprocating and centrifugal pump. (Theoretical study using schematic diagrams)

Unit-III

(8 Hours)

Energy Sources

Renewable and nonrenewable, solar flat plate collector, Wind, Geothermal, Wave, Tidal, Hydro power, Bio-gas, Bio-Diesel, Nuclear power.

Heat transfer

Statement and explanation of Fourier's law of heat conduction, Newton's law of cooling, Stefan Boltzmann's law. Conducting and insulating materials and their properties, types of heat exchangers and their applications.

Unit-IV (8 Hours)

Properties of fluids

Introduction, Units of measurements, mass density, specific weight, specific volume and relative density, viscosity, pressure, compressibility and elasticity, gas laws, vapor pressure, surface tension and capillarity, regimes in fluid mechanics, fluid properties and analysis of fluid flow.

Properties of Materials and their Applications

Metals – Ferrous and Non-Ferrous, Nonmetallic materials, smart materials, Material selection criteria.

Unit-V (8 Hours)

Mechanical devices

Types of Belts and belt drives, Chain drive, Types of gears, Types of Couplings, friction clutch (cone and plate), brakes, Power transmission shafts, axles, keys, bush and ball bearings.

Mechanisms

Slider crank mechanism, Four bar chain mechanism, List of various inversions of Four bar chain mechanism, Geneva mechanism, Ratchet and Paul mechanism

Unit-VI (8 Hours)

Machine Tools

Lathe Machine – Centre Lathe, Drilling Machine – Study of Pillar drilling machine, Introduction to NC and CNC machines, Grinding machine, Power saw, Milling Machine.

Introduction to manufacturing processes and Their Applications

Casting, Sheet metal forming, Sheet metal cutting, Forging, Fabrication, Metal joining processes

List of experiments:

The Term Work shall consist of any Eight experiments of following list

1. Measurement of viscosity using Redwood viscometer.
2. Assembly and working of 4-bar, 6-bar, 8-bar planer mechanisms
3. Finding relation between input angle and output angle for various link lengths.
4. Study of domestic refrigerator & window air-conditioner
5. Demonstration of operations of centre lathe
6. Demonstration of operations on drilling machines
7. Demonstration of Two stroke and four stroke engine
8. Study of power transmitting elements: Coupling, Gears and bearings
9. Demonstration of pumps and compressor
10. Study and demonstration of different types of clutches.

References

1. Thermodynamics An Engineering Approach: Yunus A. Cengel and Michael A. Boles,McGraw-Hill, Inc,2005,6th edition.
2. Applied Thermodynamics for Engineering Technologists: T. D. Eastop and A. McConkey, 5th Edition, Prentice Hall.
3. I.C. Engines Fundamentals: J. B. Heywood, McGraw Hill, 3rd Edition, MacMillian
4. I.C.Engine : V.Ganeshan,Tata McGraw-Hill, 3rd edition.
5. Strength of Materials: H. Ryder, Macmillians, London, 1969, 3rd edition.
6. Mechanics of Materials: Johston and Beer TMH, 5th edition
7. Mechanisms and Machine Theory: Ambekar A.G., Prentice-Hall of India, 2007.
8. Theory of Machines: S S Rattan, Tata McGraw- Hill, 2nd edition.
9. A Textbook of production engineering: P.C. Sharma, S. Chand Publication, New Delhi, 2nd edition.
10. Fluid Mechanics & Fluid Power: D.S. Kumar, Katson Publishing Engineering House, Ludhiana. 8th edition

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING MECHANICS

TEACHING SCHEME

Lectures	: 4 Hrs/week
Practicals	: 2 Hrs/week
Total	: 6 Hrs/week

CREDIT

Theory	: 4
Practical	: 1
Total	: 5

EXAMINATION SCHEME

Theory	: 60 Marks
Unit Test	: 20 Marks
Attendance	: 10 Marks
Assignment	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Prerequisites

The Students should have knowledge of

1. Scalar and Vector
2. Newton's law of motion
3. Law of friction
4. Concept of physical quantities, their units and conversion of units
5. Concept of differentiation and integration

Course Objectives

To develop and apply the concept of resultant and equilibrium for various static and dynamic engineering problems.

Course Outcomes

At the end of this course, a student will be able to understand

1. calculate resultant and apply conditions of equilibrium.
2. analyze the truss and calculate friction force.
3. calculate centroid and moment of inertia.
4. solve problem on rectilinear motion.
5. solve problems on curvilinear motion.
6. Use D'Alembert's principle, Work Energy principle and Impulse Momentum principle for particle.

Unit-I (8 Hours)

Resultant and Equilibrium

Types and Resolution of forces, Moment and Couple, Free Body Diagram, Types of Supports, Classification and Resultant of a force system in a Plane - Analytical and Graphical approach..

Unit-II (8 Hours)

Truss and Friction

Coefficient of Static Friction, Impending motion of Blocks, Ladders and Belts.
Analysis of Perfect Trusses - Method of Joint, Method of Section and Graphical Method.

Unit-III (8 Hours)

Centroid and Moment of Inertia

Centroid of line and plane areas, Moment of Inertia of plane areas, parallel and perpendicular axis theorem, radius of gyration, least moment of inertia.

Unit-IV (8 Hours)

Kinematics of Rectilinear motion of a Particle

Equations of motion, Constant and variable acceleration, Motion Curves, Relative motion, Dependent motion.

Unit-V (8 Hours)

Kinematics of Curvilinear motion of a Particle

Motion of a Projectile, Cartesian components, Normal and Tangential components of a curvilinear motion.

Unit-VI (8 Hours)

Kinetics of a Particle

D'Alemberts Principle, Work-Energy Principle and Impulse-Momentum Principle, Coefficient of Restitution, Direct Central Impact.

Practicals

A) The term-work shall consist of minimum Five experiments from list below.

1. Determination of reactions of Simple and Compound beam.
2. Study of equilibrium of concurrent force system in a plane.
3. Determination of coefficient of friction for Flat Belt.
4. Determination of coefficient of friction for Rope.
5. Study of Curvilinear motion.
6. Determination of Coefficient of Restitution.

B)The term-work shall also consist of minimum Five graphical solutions of the problems on different topics.

Reference Books

1. Beer F.P. and Johnston E.R., "Vector Mechanics for Engineers-Vol.-I and Vol.-II (Statics and Dynamics)", Tata McGraw Hill Publication.
2. Hibbeler R.C., "Engineering Mechanics (Statics and Dynamics)", McMillan Publication.
3. Shames I.H., "Engineering Mechanics (Statics and Dynamics)", Prentice Hall of India (P) Ltd.
4. Singer F.L., "Engineering Mechanics (Statics and Dynamics)", Harper and Row Publication.
5. Meriam J.L. and Kraige L.G., "Engineering Mechanics (Statics and Dynamics)", John Wiley and Sons Publication.
6. Timoshenko S.P. and Young D.H., "Engineering Mechanics (Statics and Dynamics)", McGraw Hill Publication.
7. Bhavikatti S.S. and Rajashekarappa K.G., "Engineering Mechanics", New Age International (P) Ltd.
8. Tayal A.K., "Engineering Mechanics (Statics and Dynamics)", Umesh Publication.
9. Mokashi V.S., "Engineering Mechanics-I and II (Statics and Dynamics)", Tata McGraw Hill Publication.

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

ENGINEERING PHYSICS

TEACHING SCHEME		EXAMINATION SCHEME	
Lectures	: 4 Hrs/week	Paper	: 60 Marks
Practicals	: 2 Hrs/week	Unit Test	: 20 Marks
Total	: 6 Hrs/week	Assignment	: 10 Marks
CREDITS		Attendance	: 10 Marks
Theory	: 4	Term Work	: 25 Marks
Practicals	: 1	Total	:125 Marks
Total	: 5		

Course Prerequisite

The Student should have basic knowledge of kinematics, electrostatic, wave mechanics and dimensions along with good knowledge of calculus of Higher Secondary level of schooling.

Course Objective

After completing this course the students will able to apply knowledge of Engineering Physics to different branches of engineering for better conceptual clarity and exploring emerging fields of technology and research.

Course Outcomes

1. To use the properties of charged particles to develop modern instruments and explain the mechanism of fusion and fission.
2. To understand the basics of semiconductor and its uses to develop devices such as diode.
3. Students will be capable of applying knowledge of nanoscience to develop new electronic devices.
4. Students will be able to associate the wave nature of light and apply it to measure stress, pressure and dimension etc..
5. To discuss the concept of transverse waves.
6. To judge the problems associated with architectural acoustics and give their remedies and use ultrasonic as a tool in industry for Non Destructive Testing.
7. To understand the behavior of quantum particles in different types of potentials.

Unit-I (8 Hours)

Modern Physics

Motion of a charged particle in electric and magnetic fields, Electrostatic and Magnetostatic focussing, Wavelength and resolution, Specimen limitation, Depth of field and focus, Electron microscope, Positive rays, Separation of isotopes by Bainbridge mass spectrograph.

Nuclear Physics

Nuclear fission, Liquid drop model of nucleus, Nuclear fission in natural uranium, Fission energy, Critical mass and size, Reproduction factor, Chain reaction and four factor formula, Nuclear fuel and power reactor, Nuclear fusion and thermonuclear reactions, Merits and demerits of nuclear energy, Particle accelerators, Cyclotron, Betatron

Unit-II (8 Hours)

Solid State Physics

Band theory of solids, Free electron theory, Fermi-Dirac probability function and position of Fermi level in intrinsic semi-conductors and in extrinsic semi-conductors (with derivation), Band structure of p-n junction diode under forward and reverse biasing, Conductivity in conductor and semi-conductor, Hall effect and Hall coefficient, Photovoltaic effect, Solar cell and its characteristics.

Superconductivity

Introduction, Properties of a super conductor, Meissner's effect, Critical field, Types of superconductors, BCS theory, High temperature superconductors, Application of superconductors.

Unit-III (8 Hours)

Thermodynamics

Zeroth law of thermodynamics, first law of thermodynamics, determination of j by Joule's method, Applications of first law, heat engines, Carnot's cycle and Carnot's engine, second law of thermodynamics, entropy, change in entropy in reversible and irreversible processes, third law of thermodynamics.

Nanoscience

Introductions of nanoparticals, properties of nanoparticals (Optical, electrical, Magnetic, structural, mechanical), synthesis of nanoparticals(Physical and chemical), synthesis of colloids, growth of nanoparticals, synthesis of nanoparticals by colloidal route, applications.

Unit-IV (8 Hours)

Optics - I

Interference

Interference of waves, Visibility of fringes, interference due to thin film of uniform and non-uniform thickness, Newton’s rings, Engineering applications of interference (optical flatness, non-reflecting coatings, multi-layer ARC).

Diffraction

Classes of diffraction, Diffraction at a single slit (Geometrical method), Conditions for maximum and minimum, Diffraction at a circular aperture (Result only), Plane diffraction grating, Conditions for principal maxima and minima, Rayleigh's criterion for resolution, Resolving power of grating and telescope.

Unit-V (8 Hours)

Polarisation

Introduction, Double refraction and Huygen's theory, Positive and negative crystals, Nicol prism, Dichroism, Polaroids, Elliptical and circular polarisation, Quarter and half wave plates, Production of polarised light, Analysis of polarised light, half shade polarimeter, LCD.

Lasers

Spontaneous and stimulated emission, Population inversion, Ruby laser, Helium-Neon laser, Semiconductor laser, Properties of lasers, Applications of lasers (Engineering/ industry, medicine, communication, Computers), Holography.

Unit-VI (8 Hours)

Architectural Acoustics

Elementary acoustics, Limits of audibility, Reverberation and reverberation time, Sabine's formula, Intensity level, Sound intensity level, Sound absorption, Sound absorption coefficient, different types of noise and their remedies, basic requirement for acoustically good hall, factors affecting the architectural acoustics and their remedies.

Quantum Mechanics

Wave nature of matter, De-Broglie waves, Wavelength of matter waves, Electron diffraction, Davisson and Germer's experiment, Physical significance of wave function, Schrodinger's time dependant and time independent wave equation, Application of Schrodinger's time independent wave equation to the problems of Particle in a rigid box and non rigid box.

Term-work :

Experiments

Any eight experiments from the following

1. Determination of band gap of semi-conductor.
2. Solar cell characteristics.
3. e/m by Thomson's method.
4. Uses of CRO for measurement of phase difference and Lissajous figures.
5. Hall effect and Hall coefficient.
6. Conductivity by four probe method.
7. Diode characteristics (Zener diode, Photo diode, LED, Ge/Si diode).
8. Plank's constant by photodiode.
9. Wavelength by diffraction grating.
10. Newton's rings.
11. Ultrasonic interferometer.
12. Sound intensity level measurement.
13. Wavelength of laser by diffraction.
14. Determination of refractive index for O-ray and E-ray.
15. Brewester's law.

Assignments

1. Recent advances in Nanotechnology
2. Nuclear radiation detectors.
3. Atomic force microscope (AFM).
4. Advanced opto-electronic devices.
5. Laser in Industry.
6. Different spectroscopic methods – a comparison (Raman, IR, UVR, etc.).

Text Books

1. Engineering Physics –Gaur and Gupta, Dhanpat Rai Publication
2. A text Book of Engineering Physics- M.N. Avadhanulu, P.G. Kshirsagar, S. Chand Technical

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

FUNDAMENTALS OF ELECTRICAL ENGINEERING

TEACHING SCHEME

Lectures	: 3 Hrs/week
Practicals	: 2 Hrs/week
Total	: 5 Hrs/week

CREDITS

Theory	: 3
Term work	: 1
Total	: 4

EXAMINATION SCHEME

Theory	: 60 Marks
Umit Test	: 20 Marks
Attendance	: 10 Marks
Assignments	: 10 Marks
Term Work	: 25 Marks
Total	: 125 Marks

Course Pre-requisites :

The Students should have basic knowledge about

1. Mathematics
2. Physics

Course Objectives :

The course introduces fundamental concepts of DC and AC circuits, electromagnetism, transformer and measuring instruments to all first year Engineering students.

Course Outcomes:

1. Understand and apply knowledge of basic concepts of work, power, energy for electrical, mechanical and thermal systems.
2. Understand and apply knowledge of Kirchoff's laws and network theorems to solve electrical networks.
3. Describe construction, principle of operation, specifications and applications of capacitors and batteries.
4. Describe and apply fundamental concepts of magnetic and electromagnetic circuits for operation of single phase transformer.
5. Define basic terms of single phase and three phase ac circuits and supply systems.
6. Know and use electrical safety rules.

Unit-I

(6 Hours)

Basic concepts

Concept of EMF, Potential Difference, current, resistance, Ohms law, resistance temperature coefficient, SI units of Work, power, energy. Conversion of energy from one form to another in electrical, mechanical and thermal systems

Unit-II

(6 Hours)

Network Theorem

Voltage source and current sources, ideal and practical, Kirchoff's laws and applications to network solutions using mesh analysis, Simplifications of networks using series-parallel, Star/Delta transformation. Superposition theorem, Thevenin's theorem, Max Power Transfer theorem.

Unit-III

(6 Hours)

Electrostatics

Electrostatic field, electric field intensity, electric field strength, absolute permittivity, relative permittivity, capacitor composite, dielectric capacitors, capacitors in series& parallel, energy stored in capacitors, charging and discharging of capacitors, Batteries-Types, Construction& working.

Unit-IV

(6 Hours)

Magnetic Circuit & Transformer

Magnetic effect of electric current, cross and dot convention, right hand thumb rule, concept of flux, flux linkages, Flux Density, Magnetic field, magnetic field strength, magnetic field intensity, absolute permeability, relative permeability, B-H curve, hysteresis loop, series-parallel magnetic circuit, composite magnetic circuit, Comparison of electrical and magnetic circuit

Farady's law of electromagnetic induction, statically and dynamically induced emf, self inductance, mutual inductance, coefficient of coupling,

Single phase transformer construction, principle of operation, EMF equation, voltage ratio, current ratio, kVA rating, losses in transformer, Determination of Efficiency & Regulation by direct load test.

Unit-V

(6 Hours)

AC Fundamentals & AC Circuits

AC waveform definitions , form factor, peak factor, study of R-L, R-C, RLC series circuit, R-L-C parallel circuit, phasor representation in polar & rectangular form, concept of impedance, admittance, active, reactive, apparent and complex power, power factor, 3-ph AC Circuits.

(6 Hours)

Unit-VI

Electrical Wiring and Illumination system

Basic layout of distribution system, Types of Wiring System & Wiring Accessories, Necessity of earthing, Types of earthing, Different types of lamps (Incandescent, Fluorescent, Sodium Vapour, Mercury Vapour, Metal Halide, CFL, LED) , Study of Electricity bill.

Term-work :

The term work shall consist of record of minimum eight exercises / experiments.

List of Experiments

1. Determination of resistance temperature coefficient
2. Verification of Superposition Theorem
3. Verification of Thevenin's Theorem
4. Verification of Kirchoff's Laws
5. Verification of Maximum power transfer Theorem
6. Time response of RC circuit
7. Study of R-L-C series circuits for XL> XC , XL< XC & XL= XC
8. Verification of current relations in three phase balanced star and delta connected loads.
9. Direct loading test on Single phase transformer
   a)Voltage and current ratios.
   b) Efficiency and regulations .
10. Study of a Residential (L.T.) Bill

Text Books :

1. A Textbook of Electrical Technology Volume- I – B.L.Theraja, S.Chand and Company Ltd., New Delhi.
2. . Basic Electrical Engineering, V. K. Mehta, S. Chand and Company Ltd., New Delhi.
3. Electrical Engineering- G. K. Mittal
4. Theory and problems of Basic Electrical Engineering- I. J. Nagrath and Kothari, Prentice Hall of India Pvt. Ltd.

Reference Books

1. Electrical Technology- Edward Hughes, Seventh Edition, Pearson Education
2. Elements of Electrical Technology- H. Cotton, C.B.S. Publications
3. Basic circuits analysis by John Omalley Shawn Mc Graw Hill.
4. Principles of Electrical Engineering by Del. Toro, PHI

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

PROFESSIONAL SKILL DEVELOPMENT - II

ENGLISH COMMUNICATION

TEACHING SCHEME

Lectures	: 2 Hrs/week
Total	: 2 Hrs/week

EXAMINATION SCHEME

Theory	: 50 Marks
Total	: 50 Marks

CREDITS

Theory	: 2
Total	: 2

Unit I: (4 hours)

Essential Grammar II

Application of tenses, Auxiliaries- correct usage and importance in formal communication, Business Vocabulary - Vocabulary exercises through web-based applications

Unit II: (4 hours)

Written Communication II

Email writing- Formal and Informal email writing structure, Inquiry letters, Instruction letters, complaint letters, Routine business letters, Sales Letters etc. Technical writing, Essay writing, Paragraph writing.

Unit III: (2 hours)

Vocabulary Application

Vocabulary exercises through web-based applications, Usage and application through

Unit IV: (2 hours)

Situational Conversation

Application of grammar and correct spoken English according to context/ situation and application in business scenario.

SOFT SKILLS

Unit I: (3 hours)

Fundamentals Of Effective Communication

Public Speaking: fundamentals of effective public speaking, types- Extempore speech, manuscript speech, and ways to enhance public speaking skills, storytelling, oral review

Unit II: (3 hours)

Presentation Skills

PowerPoint presentations, Effective ways to structure the presentation, importance of body language.

Unit III: (3 hours)

Leadership Skills, Leader's Role, Responsibilities And Skill Required

Understanding good Leadership behaviors, Learning the difference between Leadership and Management, Gaining insight into your Patterns, Beliefs and Rules, Defining Qualities and Strengths of leadership, Determining how well you perceive what's going on around you, interpersonal Skills and Communication Skills, Learning about Commitment and How to Move Things Forward, Making Key Decisions, Handling Your and Other People's Stress, Empowering, Motivating and Inspiring Others, Leading by example, effective feedback.

Unit VI: (2 hours)

Problem Solving Skill

Problem solving skill, Confidence building

Unit V: (4 hours)

Corporate / Business Etiquettes

Corporate grooming & dressing, etiquettes in social & office setting-Understand the importance of professional behavior at the work place, Understand and Implement etiquettes in workplace, presenting oneself with finesse and making others comfortable in a business setting. Importance of first impression, Grooming, Wardrobe, Introduction to Ethics in engineering and ethical reasoning, rights and responsibilities

FUNDAMENTALS OF COMPUTING

TEACHING SCHEME

Practical : 2 Hours/week
Total : 2 Hours/week

EXAMINATION SCHEME

TW : 50 Marks

CREDITS
Term work : 1
Total : 1

Course Prerequisite

Students must possess knowledge about basic fundamentals of computer and professional microsoft office development tools.

Course Objective

This course will introduce the concepts of C language software development and compiling tool. By the end of the course, student will be familiar with various fundamentals of C- language, software file system, computer graphics and its various multimedia applications.

Course Outcomes

At the end of the course, a student will be able to

1. Write C programs using conditional statements and loops.
2. Execute the logic using Arrays and strings and perform matrix operation using them.
3. Perform logic operations using Structures &Unions and use them with pointers.
4. Write C program for File manipulations and Dynamic memory allocation

Unit-I

(8 Hours)

Introduction

Computer systems, Hardware & software concepts.
Algorithm / pseudo code, flowchart, program development steps, Computer Languages: machine, symbolic, and high-level languages, Creating and running programs: Writing, editing, compiling, linking, and executing.

Basics Of C

Structure of a C program, identifiers, basic data types and sizes. Constants, variables, arithmetic, relational and logical operators, increment and decrement operators, conditional operator, assignment operators, bit-wise Operators expressions, type conversions, conditional expressions, precedence and order of evaluation, Managing input and output operations, Sample programs.

Conditional Statements and Loops

Decision making within a program, conditions, if statement, if-else statement, loops: while loop, do while, for loop. Nested loops, infinite loops, switch statement, sample programs

Unit-II

(8 Hours)

Arrays & Strings

Arrays - concepts, declaration, definition, accessing elements, storing elements, Strings and string manipulations, 1-D arrays, 2-D arrays and character arrays, string manipulations, Multidimensional arrays , Array applications: Matrix Operations

Unit-III

(8 Hours)

Functions

Basics, parameter passing, storage classes- extern, auto, register, static, scope rules, user defined functions, standard library functions, recursive functions, Recursive solutions for Fibonacci series, Towers of Hanoi, header files, example c programs. Passing arrays & strings to functions.

Pointers

Concepts, initialization of pointer variables, pointers and function arguments, passing by address, address arithmetic, Character pointers and functions, pointers to pointers, pointers and multidimensional arrays.

Unit-IV

(8 Hours)

Structures & Unions

Derived types- structures- declaration, definition and initialization of structures, accessing structures, nested structures, arrays of structures, structures and functions, pointers to structures, self referential structures, unions, typedef, bit-fields, program

Unit-V

(8 Hours)

Files and Dynamic Memory Allocation

Input and output : Concept of a file, text files and binary files, Formatted I/o, file I/o operations, example programs.
Dynamic memory allocation, malloc, calloc, realloc ,free. Concepts of linked lists, Sample programs

Unit-VI

(8 Hours)

Graphics & Multimedia

Introduction to Computer Graphics

Overview of Computer Graphics, Computer Graphics Application, Description of graphics devices, Input Devices for Operator Interaction

Introduction to Multimedia

History, elements of multimedia – text, audio, video, image, animation, Multimedia applications different areas

Text Books

1. Programming in ANSI C – E Balagurusamy (5th Edition-TMH)
2. Computer Graphics: Principles and Practices in C – Andrea Von Dam, Steven K Fiener, F Hughes John [2nd Edition- Pearson]

Reference Books

1. Let Us C- YashwantKanitkar
2. D. Hearn, M. Baker, "Computer Graphics - C Version", 2nd Edition, Pearson Education, 2002, ISBN 81 - 7808 - 794 – 4
3. Ralf Steinmetz, KlaraNahrstedt, “Multimedia: Computing, Communication and Applications”
4. Judith Jeffcoate, “ Multimedia Technique”

Term work will consist of ten assignments based on C programming language.

List of Practicals

1. a. Write a C program to take user Input and print it on the screen.
   b. Write a C program to perform addition or subtraction of two numbers.
   c. Write a C program to find whether the number is Odd or Even.
2. a. Write a C program to find out Prime numbers.
   b. Write a C program to find out Fibonacci series.
3. Write C programs to print different patterns
4. a. Write a C program to do factorial using recursion.
   b. Write a C program to find out Armstrong number.
5. Write a C program to sort the array in Ascending & Descending order.
6. Write C programs to perform operations on 2-D arrays
7. Write a C program to perform different operations on strings.
8. Use of Pointers
   a. Write a C program to swap numbers using pointers
   b. Write a C program to show the use of pointers in arrays.
   c. Write a C program to use functions using pointers.
9. a. Write a C program to create student mark sheet using structures
   b. Write a C program to show the use of structure using pointers
10. Write a C program to perform different operations on Files.
11. Write a C program to create single Linked List.
12. Application of Graphics and Multimedia

Syllabus for Unit Tests

Unit Test I	Unit I ,II & III
Unit Test II	Unit IV, V &VI

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standards of Passing and ATKT Rules:

1. For all courses, both UE(University Evaluation) and IA(Internal Assesment) constitue separate heads-of-passing (HoP). In order to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0(40 % marks) at UE and also a minimum grade point of 5.0 (40 % marks) at IA.

   OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50 % of aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fails at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT:

1. A student is allowed to carry backlog of courses prescribed for B. Tech. Sem - I, III , V , VII to B.Tech. Sem-II, IV , VI , VIII respectively.
2. A student is allowed to keep term of Sem-III , if he/she is failing in any number of subjects of Sem - I & II.
3. A student is allowed to keep term of Sem-V , if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem- I & II.
4. A student is allowed to keep term of Sem-VII , if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem-III & IV.

Award of Class for the Degree Considering CGPA:

Award of Honours:

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks(%)
$9.50 \leq$ CGPA ≤ 10.00	O	Outstanding	$80 \leq$ Marks ≤ 100
$9.00 \leq$ CGPA ≤ 9.49	A+	Excellent	$70 \leq$ Marks ≤ 80
$8.00 \leq$ CGPA ≤ 8.99	A	Very Good	$60 \leq$ Marks ≤ 70
$7.00 \leq$ CGPA ≤ 7.99	B+	Good	$55 \leq$ Marks ≤ 60
$6.00 \leq$ CGPA ≤ 6.99	B	Average	$50 \leq$ Marks ≤ 55
$5.00 \leq$ CGPA ≤ 5.99	C	Satisfactory	$40 \leq$ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40

College Information

Bharati Vidyapeth University college of Engineering, Pune continued to take new strides towards evolving directions to further the growth and dissemination of scientific and technological knowledge.

The college established in 1983, is one of the oldest and largest Engineering Colleges in the state of Maharashtra. The college has well defined goals which are intensely practised and followed.

Their implementation encompass multi-faceted activities in the form of recruiting experienced faculty, organizing faculty development program, identifying socio- economically relevant areas emerging technologies. Constant review and upgradation of curricula, Upgradation of Laboratories, Library and communication facilities, Collaboration with industries and research and development organizations, Sharing of knowledge, infrastructure and resources, training extension, testing and consultancy services and promoting interdisciplinary research.

The college has been ranked as 'A' grade Engineering college by the Government of Maharashtra. Meeting quality standards in education such as is been a motto of this institute. As a pedagogical effect, out of ten under graduate programmes being conducted, seven programmes eligible for accreditation are accredited by National Board of Accreditation (NBA).

The DATAQUEST – CMR conducts and annual survey of technical schools of India and publishes the list of best 100 technical schools in India. In the surveys, for the past seven years, the college has been consistently ranked among top 50 technical schools.

Another feather in Institute's cap is its selection for the grant of Rs. 4.0 Crore under Technical Education Quality Improvement Programme – II (TEQIP-II) by Ministry of Human Resource Development (MHRD) of Government of India supported by World Bank.

This Institute has been ranked to 45th position at all India level and 5th at the Western Region of AICTE in 2012. The Institute has been very sensitive to the human resource development and continues initiating new academic programmes. Presently it offers 09 undergraduate programmes in the field of Civil Engineering, Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Electronics and Telecommunication Engineering, Mechanical Engineering and Production Engineering.

The college offers 08 postgraduate programmes in the field of Civil Engineering, Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Mechanical Engineering and NanoTechnology.

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – III

Sr. No.	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
					End Semester Exam	Continuous Assessment			TW& PR	TW & OR				
		L	P	T		Unit Test	Assign ment	Attend ance				Theory	TW	Total Credits
15	Engineering Mathematics-III	3	0	1	60	20	10	10	-	-	100	4	0	4
16	Electronic Devices and Applications	4	2	0	60	20	10	10	50	-	150	4	1	5
17	Signals & Systems	3	0	1	60	20	10	10	-	50	150	3	1	4
18	Digital Circuits & Applications	3	2	0	60	20	10	10	50	-	150	3	1	4
19	Network Theory	3	2	0	60	20	10	10	50	-	150	3	1	4
20	Professional Skill Development- III	4	0	0	100	--	--	--	--	-	100	4	0	4
	Total	**20**	**6**	**2**	**400**	**100**	**50**	**50**	**150**	**50**	**800**	**21**	**04**	**25**

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – IV

Sr. No	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
					End Semester Exam	Continuous Assessment			TW& PR	TW& OR				
		L	P	T		Unit test	Assign ment	Attend ance				Theor y	TW	Total Credits
21	Linear Integrated circuits	3	2	0	60	20	10	10	50	-	150	3	1	4
22	Applied Electronic circuits	4	2	0	60	20	10	10	50	-	150	4	1	5
23	Control System Engineering	3	2	1	60	20	10	10	-	25	125	4	1	5
24	Analog Communication System	3	2	0	60	20	10	10	-	50	150	3	1	4
25	Data Structures and Files	2	2	0	60	20	10	10	-	25	125	2	1	3
26	Professional Skill Development- IV	4	0	0	100	-	-	-	-	-	100	4	0	4
	Total	**19**	**10**	**01**	**400**	**100**	**50**	**50**	**100**	**100**	**800**	**20**	**05**	**25**

Total Credits Sem – III	:	25
Total Credits Sem – IV	:	25
Grant total	:	50

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – III

SUBJECT: - ENGINEERING MATHEMATICS-III

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	End Semester Exam	: 60 Marks
Tutorial: 1 Hour/week	Continuous Assessment	: 40 Marks
	Credits	: 04

Course prerequisites

Students should have basic knowledge of:

- Differential calculus
- Integral calculus
- Complex numbers
- Vector algebra

Course objective

To develop ability to use the mathematical techniques, skills, and tools necessary for engineering practice.

Course Outcomes

On successful completion of this course, students will be able to

1. Form mathematical modeling of systems using differential equations and ability to solve linear differential equations with constant coefficient.
2. Apply basics of analytic functions and the basics in complex integration which is used to evaluate complicated real integrals.
3. Apply theorems to compute the Laplace transform, inverse Laplace transforms.
4. Solve difference equation by Z-transform.
5. Calculate the gradients and directional derivatives of functions of several variables.
6. Use Green’s theorem to evaluate line integrals along simple closed contours on the plane.

Contents

Unit-I (06 Hours)

Linear Differential Equations (LDE)

Solution of nth order LDE with Constant Coefficients, Method of Variation of Parameters, Cauchy's &Legendre's DE, Solution of Simultaneous & Symmetric Simultaneous DE, Modeling of Electrical Circuits.

Unit-II (06 Hours)

Complex Variables

Functions of Complex Variables, Analytic Functions, C-R Equations, Conformal Mapping, Bilinear Transformation, Cauchy's Theorem, Cauchy's Integral Formula, Laurent's Series, Residue Theorem

Unit-III (06 Hours)

Transforms

Fourier Transform (FT): Complex Exponential Form of Fourier series, Fourier Integral Theorem, Sine & Cosine Integrals, Fourier Transform, Fourier Sine and Cosine Transform and their Inverses. Introductory Z-Transform (ZT): Definition, Standard Properties, ZT of Standard Sequences and their Inverses. Solution of Simple Difference Equations.

Unit-IV (06 Hours)

Laplace Transform (LT)

Definition of LT, Inverse LT. Properties & theorems. LT of standard functions. LT of some special functions viz., Periodic, Unit Step, Unit Impulse, ramp, jump, . Problems on finding LT & inverse LT. Applications of LT and Inverse LT for solving ordinary differential equations.

Unit -V (06 Hours)

Vector Differential Calculus

Physical Interpretation of Vector Differentiation, Vector Differential Operator, Gradient, Divergence and Curl, Directional Derivative, Solenoidal, Irrotational and Conservative Fields, Scalar Potential, Vector Identities.

Unit-VI (06 Hours)

Vector Integral Calculus

Line, Surface and Volume integrals, Work-done, Green's Lemma, Gauss's Divergence Theorem, Stoke's Theorem, Applications to Problems in Electro-Magnetic Fields.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Assignments

1. Linear Differential Equations
2. Complex Variables
3. Transforms
4. Laplace Transform
5. Vector Differential Calculus
6. Vector Integral Calculus

Text Books

1. Advanced Engineering Mathematics by Peter V. O'Neil (Cengage Learning).
2. Advanced Engineering Mathematics by Erwin Kreyszig (Wiley Eastern Ltd.).

Reference Books

1. Engineering Mathematics by B.V. Raman (Tata McGraw-Hill).
2. Advanced Engineering Mathematics, 2e, by M. D. Greenberg (Pearson Education).
3. Advanced Engineering Mathematics, Wylie C.R. & Barrett L.C. (McGraw-Hill, Inc.)
4. Higher Engineering Mathematics by B. S. Grewal (Khanna Publication, Delhi).
5. Applied Mathematics (Volumes I and II) by P. N. Wartikar & J. N. Wartikar (Pune Vidyarthi Griha Prakashan, Pune).

SUBJECT: - ELECTRONIC DEVICES AND APPLICATIONS

Teaching Scheme	**Examination Scheme**
Lecture: 4 Hours/week	**End Semester Exam : 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment : 40 Marks**
	TW & PR. : 50 Marks
	Credits : 05

Course prerequisites

- Knowledge of EEE.

Course objective

1. To make student understand working of bipolar junction transistor and field effect transistor with different biasing techniques
2. To make student understand a practical approach of design and analysis of waveshaping circuits using diode and multivibrator using transistors
3. To make student understand working of FET and MOSFET and its applications
4. To make student understand working of optoelectronic devices and its applications.
5. To make student understand the fabrication process of PCB

Course Outcomes

On successful completion of this course, students will be able to

1. Demonstrate knowledge of working and applications of diode.
2. Demonstrate knowledge of working of BJT with different biasing techniques.
3. Analyze applications of BJT as an amplifier and multivibrator.
4. Explain working of FET and MOSFET and its applications.
5. Demonstrate knowledge of working of optoelectronic devices.
6. Design, built and test any small electronic circuit on PCB.

Contents

Unit-I (08 Hours)

Transistor Biasing

Need of biasing, DC load line analysis, operating point, Thermal runaway. Different biasing circuits: fixed bias, collector to base bias & voltage divider bias. Stability factor, General expression for stability factor, stability factor for all biasing circuits, Design of biasing circuits, Compensation techniques: Thermistor and diode compensation, Thermal Resistance

Unit-II (08 Hours)

BJT Amplifiers

Two port device and Hybrid model , transistor Hybrid model, h- parameters, Simplified CE Hybrid Model, Analysis of amplifiers using Approximate Model(CE, CC, CB), BJT Single Stage Amplifiers, Small Signal Analysis of Single Stage BJT Amplifiers, Distortion in Amplifiers, Application of Transistor as a Switch

Unit-III (08 Hours)

Field Effect Transistor (FET)

Types of FET viz. JFET,MOSFET, JFET -construction, VI characteristics, transfer characteristics, Characteristics Parameters of JFET, FET Biasing(Self Bias, Fixed Bias, Current Source Bias), JFET amplifiers-CS,CD and CG amplifiers, Application of FET.

Unit-IV (08 Hours)

MOSFETs

(08Hours)

Types of MOSFET viz. DMOSFET,EMOSFET, n-MOS, p-MOS and CMOS devices, DMOSFET and EMOSFET characteristics and parameters, non-ideal V-I characteristics viz. finite output resistance, body effect, subthreshold conduction ,breakdown effects and temperature effects, MOSFET biasing, MOSFET as VLSI device

Unit -V (08 Hours)

Wave shaping and Multivibrator Circuits

Diode as clipper- series and parallel forms of clipper circuits, biased clipper, their operations and transfer characteristics, Diode as a clamper, voltage multiplier circuits-voltage doubler, Tripler and quadruple configuration ,Multi-vibrator circuits-astable and monostable multivibrator circuits using BJT

Unit-VI (08 Hours)

Optoelectronics devices and PCB design

Construction, V-I characteristics and applications of LED, LDR, Photodiode, Phototransistor, Photoconductive cell, Photovoltaic cell, opto-coupler

PCB: types of PCB, PCB design rules, layout design, artwork design, fabrication process of single sided PCB, different copper clad laminates, composition of solder metal

List of Experiments

1. Biasing techniques of BJT- to find stability factor of self bias, collector to base bias, fixed bias
2. To plot frequency response of single stage CE amplifier and find its bandwidth
3. To plot frequency response of single stage FET amplifier (CS/CD configuration)and find its bandwidth
4. To study different types of Clipper circuits
5. To study different types Clamper circuits
6. To study Astable mulitivibrator using BJT
7. To study monostable mulitivibrator using BJT
8. To plot transfer characteristics of Optocoupler
9. To plot V-I and optical characteristics of LED and LDR
10. To plot V-I and optical characteristics of Photodiode and phototransistor
11. To design, built and test any electronic circuit based on above syllabus.

Assignments

1. Distinguish Biasing techniques of BJT- self bias, collector to base bias, fixed bias
2. Derive the equations for , , , , , for CE, CB and CC configurations of n-p-n transistor.
3. Draw the construction of JFET and explain operation of JFET in Fixed bias, Self bias and voltage divider bias.
4. Draw the construction of D-MOSFET, E-MOSFET and explain input, Output, transfer Characteristics
5. Draw the circuits for clipper, clamper, and voltage multiplier and explain their operations.
6. Design and test BJT amplifier/FET amplifier/Voltage multiplier/Multivibrators circuit on PCB
7. Visit to local Electronics Market

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

3. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
4. End term Examination

Text Books

1. "Electronic Devices and Circuits" by S. salivahanan,Suresh kumar- Mc Graw Hill Publication
2. "Integrated Electronics", by Millman J and Halkias .C., TMH publication
3. "Electronic Devices and Circuits " by Millman ,Halkies,TMH publication

Reference Books

4. "Electronic Devices and Circuits" by Allen Mottershed- PHI Publication
5. "Electronic Devices and Circuits" by J.B. Gupta-Katson educational series
6. "Microelectronics "by Jacob Millman, Arvin Garbel- Mc Graw Hill Publication
7. "Printed Circuits Handbook " by Clyde F. Coombs - McGraw Hill Handbooks
8. "Microelectronic Circuits Theory and applications "by Adel S. Sedra , Kenneth C. Smith- Oxford

SUBJECT: - SIGNALS AND SYSTEMS

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	End Semester Exam	: 60 Marks
Tutorial: 1 Hour/week	Continuous Assessment	: 40 Marks
	TW & OR.	: 50 Marks
	Credits	: 04

Course prerequisites

Knowledge of Engineering Mathematics-I, Engineering Mathematics-II and Engineering Mathematics-III course.

Course objective

The course aims to introduce the basic concepts of signals and systems analysis and their tools in the time and frequency domain. It also provides knowledge of correlation function and sampling.

Course Outcomes

On successful completion of this course, students will be able to

1. Characterize and analyze the properties of signals.
2. Classify the systems and analyze in time domain using convolution.
3. Apply Fourier transform, Laplace transform and Z-Transform for analysis of LTI systems.
4. Conceptualize the effects of sampling on signal and describe the auto correlation and cross correlation between signals.

Contents

Unit-I (06 Hours)

Introduction to signals

Definition of signals, classification of signals: continuous time signals & discrete time signals, even & odd signals, periodic & non-periodic, deterministic & non-deterministic, energy & power, elementary signals: unit impulse, unit step, unit ramp, exponential & sinusoidal, basic operations on signals.

Unit-II (06 Hours)

Classification of Discrete time systems

Definition ,Classification of System, System Interconnections, state space analysis, Linear & non -linear ,Time-Invariant & Time variant, causal & non-causal, static & dynamic, stable & unstable systems, stability & impulse response of systems to standard signals.

LTI system Analysis: Introduction to LTI systems. Block Diagram, Linear Convolution-Convolution Integral, Impulse response, Methods of Convolution. Properties of convolution

Unit-III (06 Hours)

Continuous Time system Analysis

Response of LTI Systems to exponential signals, periodic signals. Fourier series, Fourier Transforms, properties, application of Fourier series & Fourier transforms to the system analysis.

Unit-IV (06 Hours)

Laplace Transform and Applications

Laplace Transform: Definition and its properties, ROC and pole zero concept. Application of Laplace transforms to the LTI system analysis. Inversion using duality, numerical based on properties.

Unit-V (06 Hours)

Z-Transform and Applications

Z-Transform: Definition and its properties, The Region of Convergence for the Z-Transform, the Inverse z-Transform, Application of Z-Transform to the LTI system analysis

Unit VI (06 Hours)

Correlation and Spectral Density

Definition of Correlation and Spectral Density, correlogram, analogy between correlation, covariance and convolution, conceptual basis, auto-correlation, cross correlation, energy/power spectral density, properties of correlation and spectral density, inter relation between correlation and spectral density, Sampling theorem & its proof, aliasing, reconstruction of sampled signals, interpolation.

Assignments

1. Classify and explain any 5 signals that occur physical world.
2. Explain LTI system by giving a real world example.
3. Find the Fourier Transform using MATLAB.
4. Find the Laplace Transform using MATLAB.
5. Find the Z-Transform using MATLAB.
6. Find the autocorrelation of sine sequence x[n] with frequency 50Hz and sampling frequency 200Hz, using MATLAB. If the given signal x[n] is affected by noise signal z[n], such that y[n] = x[n] + z[n], find the cross correlation between x[n] and y[n], using MATLAB.

Content Delivery Methods

Chalk & talk, Power point presentation, MATLAB

Assessment Methods

1. Continuous Assessment (Attendance, Assignments/Tutorials, Unit Test)
2. End term Examination

Text Books

1. Roberts M. J., Signals & Systems, TMH
2. Oppenheim, Wilsely & Nawab, Signals & Systems, MGH

Reference Books

1. B.P.Lathi, Signal Processing & Linear Systems, Berkeley Cambridge, 1998 Edition

SUBJECT: - DIGITAL CIRCUITS AND APPLICATIONS

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam : 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment : 40 Marks**
	TW & PR : 50 Marks
	Credits : 04

Course Prerequisite

1. Fundamentals of Number Systems.

Course Objective

1. To understand principles, characteristics & operations of combinational & sequential logic circuits.
2. To design combinational circuits by using logic gates, MSI circuits, PLDs.
3. To design, implement analyze, asynchronous & synchronous sequential circuits using flip flops.

Course Outcomes

On successful completion of this course, students will be able to

1. Demonstrate the knowledge of Boolean algebra including simplification techniques.
2. Describe the characteristics of Logic families TTL, CMOS, ECL & explain the fundamentals of semiconductor memories.
3. Analyze & design digital combinational circuits such as of multiplexers, demultiplexers, encoder, decoder and arithmetic circuits.
4. Demonstrate the knowledge of operations of basic types of flip-flops, registers, counters & the design of FSM.
5. Describe the characteristics of PLDs, Semiconductor memories and their applications.

Contents

<u>Unit –I</u> (06 Hours)

Binary Number Systems & Coding

Review of Binary number system: Binary addition and subtraction using 1's, 2'scomplement method, sign magnitude representation. BCD codes, 8421, Excess –3, Grey code, codes with more than four bits, ASCII code.

Principles of combinational logic

Fundamental theorems of Boolean algebra, Canonical and standard forms (SOP and POS), minimization of logic functions, Karnaugh maps up to 4 variables, Don't care conditions, Quine Mc-Cluskey method.

<u>Unit-II</u> (06 Hours)

Arithmetic modules

Adder, subtractor, carry look ahead adder, BCD adder, magnitude comparator, Excess-3 Adder, series and parallel adder, ALU.

Combinational Logic modules

Code conversion, Multiplexer, Demultiplexer, Encoder, Decoder and their applications. Parity generator and checker.

<u>Unit-III</u> (06 Hours)

Logic Families

Parameter definitions - Noise margin, power dissipation, voltage and current parameters, propagation delay. Typical values for TTL, CMOS & ECL. Two input TTL NAND gate, TTL logic families standard, Totem – pole, open collector, tri-state (concept & application). TTL-CMOS/CMOS-TTL interfacing, comparison of TTL & CMOS ECL.

<u>Unit-IV</u> (07 Hours)

Sequential Logic systems

Basic sequential circuits-latches and flip-flops: SR-latch, D-latch, D flip-flop, JK flip-flop, MS J-K flip flop, T flip-flop.

Definition of state machines, Moore and Mealy machine, state machine as a sequential controller. Design of state machines: state table, state assignment, transition/excitation table, excitation maps and equations, logic realization. Designing state machine using ASM charts, using state diagram, sequence detector and design examples.

Unit-V (5 Hours)

Application of Flip flops

Registers, Shift registers, Counters (ring counters, twisted ring counters), Sequence Generators, ripple counters, up/down counters, synchronous counters, lock out, Clock Skew, Clock jitter.

Unit-VI (6 Hours)

PLDs & Semiconductor Memories: Programmable logic devices

Study of PROM, PAL, PLAs. Designing combinational circuits using PLDs.

Semiconductor memories

Classification and characteristics of memory, different types of RAMs, ROMs and their applications, Double Data Rate RAMs.

List of Experiments

Hardware Experiments

1. Implementation of Boolean functions using logic gates
2. Study of characteristics of typical 74 TTL / 74 CMOS family like: fan in, fan out standard load , noise margin & interfacing with other families
3. Half, Full Adder and subtractor using gates and IC's
4. Code conversion using digital IC's
5. Function implementation using Multiplxer and Demultiplexer
6. Sequence generator using MSJK flip flop IC's
7. Study of counters : Ripple , Synchronous , Ring , Johnson , Up-down counter and its application

8. Study of shift registers : Shift left , Shift right , parallel loading and Pulse Train generator
9. BCD Adder/Subtractor with Decoder driver and 7 segment display

Software Experiments

Perform following experiments using Xilinx ISE simulator

1. Full Adder using half adder
2. 2 bit comparator

Assignments

1. Solve four examples of Boolean expressions using K-maps, Quine-McClusky method using both minterms and maxterms.
2. Design carry look Ahead adder for adding two 4-bit numbers.
3. Design sequence detector using FSM and implement using suitable flip flops.
4. Design 4-bit/ 5-bit ripple counters, synchronous counters for positive edge/ negative edge triggered flip flops.
5. Study any CPLD/ FPGA board and make a report on the features of the board.
6. Study ISE of any platform(Xilinx, Quartus, Libero etc.) and make a report on working of the platform.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Attendance, Assignments/Tutorials, Unit Test)
2. End term Examination

Text Books

1. R.P. Jain , “Modern digital electronics” , 3rdedition , 12th reprint TMH Publication, 2007.
2. Anand Kumar ‘Fundamentals of Digital Circuits’--. PHI

Reference Books

1. J.F.Wakerly “Digital Design: Principles and Practices”, 3rd edition, 4th reprint, Pearson Education, 2004.
2. A.P. Malvino, D.P. Leach ‘Digital Principles & Applications’’ –Vith Edition-Tata Mc Graw Hill, Publication.
3. Morris Mano ‘Digital Design’-- (Third Edition),.PHI

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – III

SUBJECT: - NETWORK THEORY

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	**End Semester Exam**	**: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment**	**: 40 Marks**
	TW & PR	**: 50 Marks**
	Credits	**: 04**

Course prerequisites

- Knowledge of KCL and KVL Laws from Basic Electrical Engineering
- Knowledge of Linear Differential Equations and Systems of Linear Equations from Engineering Mathematics - I and II.

Course objective

The objective of the course is to enable the student to perform any of the network analysis task required in the subsequent courses. The student is exposed to some concepts in graph theory for providing a good foundation for the methods of Mesh Analysis and Node Analysis. The transient analysis using Laplace Transforms is also included. The series and parallel resonance circuits which occur quite frequently in electronics are analyzed. The topic of constant K filter is included as it finds many applications in electronic design. The two port network parameters which are of fundamental importance in many courses on electronic devices are included in the last unit.

Course Outcomes

On successful completion of this course, students will be able to:

1. To find voltages and currents in a given network using Mesh Analysis or Node Analysis or Network Theorems.
2. To find voltages and currents in a given network by formulating network equilibrium equations from graph theory.
3. To find the transient response in a given network consisting of series or a parallel combination of resistance, capacitance and inductance.

4. To find all the parameters relating to a given series or a parallel resonant circuit.
5. To design a constant K prototype low pass, high pass, band pass or a band stop passive filter
6. To find any of the two port parameters of a given two port network.

Contents

Unit I (06 Hours)

Basic Circuit Analysis and Simplification Techniques

KCL, KVL, Source Transformation, Source Shifting, Mesh Analysis, Node Analysis, Super Mesh, Super Node, Mesh and Node Analysis in Sinusoidal Steady State

Network Theorems:

Superposition Theorem, Thevenin's Theorem, Norton's Theorem, Maximum Power Transfer Theorem, Reciprocity Theorem.

Unit II (06 Hours)

Graph Theory

Network Graph, tree, cotree & loops, Incidence Matrix, tie set matrix, cut-set matrix, Formulation of equilibrium equations in matrix form, Solution of resistive and non resistive networks, Principle of Duality

Unit III (06 Hours)

Transient Analysis of Basic RC, RL, & RLC Circuits

Initial Conditions in networks. A procedure for evaluating initial conditions. Solution of step response in RC, RL, RLC circuits using classical method and using Laplace Transform.

Unit IV (06 Hours)

Resonance

Resonant condition, Definition of Quality factor. Finding resonant frequency, impedance at resonance, voltage and current variation with frequency, bandwidth, selectivity, magnification factor for series and parallel resonant circuits. General case of resistance present in both branches of parallel resonant circuit. Comparison of series and parallel resonant circuits, Applications of resonant circuits, Analysis of some circuits in communication electronics.

Unit V (06 Hours)

Passive Filters

Filter Fundamentals, Image impedance, Characteristic impedance, Propagation constant. Constant K prototype for LPF, HPF, BPF and BSF, m-derived LPF, HPF, Terminating half sections, Composite filters, Applications of passive filters.

Unit VI (06 Hours)

Two Port Networks

Network Functions, Two port network parameters, Z, Y, H, ABCD and other parameters, Relationships between two-port network parameters, Interconnections of two-ports, Reciprocity and Symmetry conditions, Analysis of some circuits using two port network parameter theory.

Assignments

1. Determine the currents, voltages and power absorbed in the given branches in any given network by applying mesh and node analysis.
2. Determine the currents, voltages and power absorbed in the given branches in any given network using the concepts of graph theory.
3. Carry out transient analysis and determine the voltage and current expressions for a given network containing R, L and C with non zero initial conditions.
4. Search for circuits which involve series and parallel resonant circuits in the literature on communication electronics and perform resonant circuit analysis.
5. Design a passive LC filter circuit for use in a DC power supply.

6. Search for circuits involving electronic devices where theory of two port network parameters can be applied and carry out the analysis.

List of Experiments

1. To verify Thevenin's and Norton's Theorem.
2. To verify Superposition and Reciprocity Theorem.
3. To find resonant frequencies of series and parallel circuit.
4. To plot frequency response of frequency selective network (Twin T or Wein Bridge).
5. To plot frequency response & cut-off frequency of constant-k LPF and HPF.
6. To plot frequency response & cut-off frequency of constant-k BPF and BSF.
7. To find Z and Y parameters of given two port network.
8. To find H and ABCD parameters of given two port network.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books

1. D. Roy Choudhury, 'Network and Systems', New Age International Publishers, Second Edition.
2. Franklin F. Kuo, 'Network Analysis and Synthesis', John Wiley & Sons (Second Edition)

References Books

1. M. E. Van Valkenburg, 'Network Analysis', PHI (3rd Edition)
2. John D. Ryder, 'Networks, Lines and Fields', PHI Learning Pvt. Ltd., Second Edition

SUBJECT: PROFESSIONAL SKILLS DEVELOPMENT

TEACHING SCHEME	:	**Theory : 4 Hours / Week**
EXAMINATION SCHEME	:	**End Semester Examination: 50 Marks**
CREDITS ALLOTED	:	**2**

Course Pre-requisites

The Students should have knowledge of

1. Basic math's and reasoning, the rules of English and comprehensive ability
2. Basic awareness of phrasal verbs used in spoken communication and knowledge of verbs and other words used in professional life.
3. Basic writing techniques taught to them in the first semester.
4. The strengths and achievements analyzed during self awareness session taught in the second semester. They should also be able to identify their long term and short term goals.
5. Basic knowledge and idea about leaders and leadership qualities.
6. Basic awareness of PowerPoint presentation and paper presentation and also should be fluent in English.

Course Objectives

The Professional Skills Development course which is a combination of aptitude and soft skills aims to augment students to face the campus recruitment test and train them on applying short techniques/ tricks to solve questions of Maths, reasoning and English in very less amount of time. The English and soft skills section focuses on the higher aspects of soft skills such as grooming them on leadership, presentation, business communication which would enable them to project themselves as professionals in the corporate sector and/or otherwise.

Course Outcomes

The student should be able to

1. Solve the aptitude test in the recruitment exam and competitive exam by applying short techniques and solve the question in less

amount of time. They would be able to handle around 15-20 topics of math's and reasoning and 50 rules of parts of speech.

2. Present themselves with finesse by using around 25-20 idioms and phrases relevant to corporate communication as well as spoken English. They will also learn 50-60 words and other words that are specifically used in meetings, group discussions, presentation and other corporate events.

3. Process their ideas and thoughts (verbal communication) into written communication in an effective, coherent and logical manner within a stipulated time and specific word limit of 500-750 words for essay writing along with limited words for technical writing and report writing.

4. Identify themselves in terms of their strengths. Weaknesses and opportunities available to them for the career growth. They would also learn to overcome their weakness and convert into strengths and also make utilization of the opportunity vis-à-vis their strength. They would also learn to set realistic short/long term goals relevant to them through the SMART goal mnemonic.

5. Differentiate between the different types of leaders and groom themselves to be potential leaders. Based on their qualities and strengths they would learn 5 types of leadership styles and mould themselves according to that. They would also learn 10-15 leadership traits.

6. Prepare PowerPoint presentation and paper presentation effectively by focusing on body language, tone of communication and audiences' needs. They would also learn to handle the questions in an effective and smart way.

Unit I (18 Hours)

Aptitude (Maths, Logical Reasoning, English)

- **Maths**

  i) Enjoy maths + Number system

ii) Number system

iii) Percentage, profit and loss

- **Logical Reasoning**

  i) Coding, Decoding, Number series,

  ii) Blood relation Directions, cubes & dices

- **English**

  i) Vocabulary-1

  ii) Confusing words-1(Homonyms)

Unit II (6 Hours)

Essential Grammar - III

- Idioms and phrases
- Usage of Idioms & phrases in daily conversation
- Activities
- Academic word list- Words to be used in business communication

Unit III (4 Hours)

Written Communication- II

- Essay writing
- Mnemonics to develop ideas and write essays
- Structure of essays
- Technical writing
- Report writing

Unit IV (6 Hours)

SWOT Analysis

- Introduction to SWOT
- Importance to SWOT

- Individual & Organizational SWOT Analysis
- Identifying strengths, weaknesses, threats & opportunities
- Short term goals& Long term goals, Career planning

Unit V (4 Hours)

Interpersonal Skills - III

- Introduction to leadership skills
- Importance of leadership skills
- Types of leadership skills
- Are leaders born or made?

Unit VI (4 Hours)

Presentation Skills

- Introduction to PowerPoint presentation
- Structure & flow of presentation
- Importance of body language
- Presentation by students-evaluation& feedback by trainers

Text Books

1. APAART: Verbal Ability
2. APAART: Logical Reasoning
3. APAART: Quantitative Aptitude
4. APAART: Speak Well 1 (English Language and Communication)
5. APAART: Speak Well 2 (Soft Skills)

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – IV

SUBJECT: - LINEAR INTEGRATED CIRCUITS

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	End Semester Exam	: 60 Marks
Practical: 2 Hours/week	Continuous Assessment	: 40 Marks
	TW & PR	: 50 Marks
	Credits	: 04

Course prerequisites

- Knowledge of KCL and KVL Law
- Basic knowledge of Op-Amp and its configurations

Course objective

This course provides in depth knowledge on the Op-Amp. Also it introduces the design of PLL, Waveform generators, Timer IC's and Converters.

Course Outcomes

On successful completion of this course, students will be able to

1. Design linear and nonlinear applications of Op-Amp.
2. Design of first and second order active filters.
3. Analyze and design Waveform Generators.
4. Demonstrate knowledge of Phase Locked Loop IC 565 and Converters.
5. Design of multivibrators using Timer IC 555

Contents

Unit-I (06 hours)

Introduction to op–amp

Block diagram representation of a typical op-amp, Schematic symbol for op-amp ,Definition of integrated circuits ,Types of Integrated Circuits ,Manufacturers ,Designation for IC ,IC package types ,PIN identification &

temp ranges , Ordering information, Characteristics of an op-amp, Internal &external offset voltage compensation, Frequency Response of an op-amp.

Unit-II (06 hours)

Linear applications of op-amp

Inverting amplifier, Non-inverting amplifier, Voltage Follower, Adder, Subtractor, Scaling averaging amplifier, Integrator, Differentiator, Instrumentation amplifier using 1, 2 and 3 op-amps, Instrumentation amplifier using transducer bridge, Peaking amplifier

Unit-III (06 hours)

Non-linear applications of op-amp

Precision half wave rectifier & full wave rectifier, comparator, Schmitt trigger, window detector, log-antilog amplifier and its temperature compensation techniques, log ratio, sample and hold circuit.

Unit-IV (06 hours)

Active filters and waveform generators

First and second order low pass Butterworth filters, first and second order high pass Butterworth filter, Band pass filter, Band reject filter, All-pass filter, notch filter, Square wave, Triangular wave, Sawtooth wave generator and study of function general or IC 8038. Design and analysis of RF filters.

Unit-V (06 hours)

Timer IC 555 and PLL IC 565

IC 555- as Monostable and Astable Multivibrators and its applications.

IC 565- operating principle of Phase Locked Loop IC 565, Applications like Frequency multiplier, FSK and FM detector

Communication applications of PLL: Locking and tracking of frequency, Co-channel and adjacent channel rejection.

Unit-VI (06 hours)

Converters

V to I & I to V converter, D to A converter- Binary weighted resistors and R & 2R resistors, A to D Converter- Counter-ramp type , Successive approximation and Dual Slope.

List of Experiments

1. To design and build Integrator and draw frequency response
2. To design and build Differentiator and draw frequency response
3. To design and build precision rectifier
4. To design and build schmitt trigger and find threshold levels
5. To design and build first order Butterworth low pass filter
6. To design and build first order Butterworth high pass filter
7. To design and build triangular waveform generator using IC 741
8. To design and build Function generator using IC 8038
9. To design and build Astable multivibrator using timer IC 555.

Assignments

1. Design of integrator for given frequency and its practical implementation using IC741.
2. Design of Differentiator for given frequency and its practical implementation using IC741.
3. Design of Schmitt Trigger for given frequency and its practical implementation using IC741.
4. Design of LPF and HPF for given cutoff frequency and its practical implementation using IC741.
5. Design of Astable Multivibrator for given frequency and its practical implementation using IC555.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books: References Books

1. Ramakant Gayakwad, Op Amp & IC's, PHI
2. D. Roy Choudhari, Liner Integrated Circuits, PHI

References Books

1. K. R. Botkar, Integrated Circuits, khanna Publishers.
2. Clayton, Integrated Circuits, MGH

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – IV

SUBJECT: - APPLIED ELECTRONIC CIRCUITS

Teaching Scheme	Examination Scheme	
Lecture: 4 Hours/week	End Semester Exam	: 60 Marks
Practical: 2 Hours/week	Continuous Assessment	: 40 Marks
	TW & PR	: 50 Marks
	Credits	: 05

Course prerequisites

- Knowledge of linear circuit theory
- Basic concept of BJT

Course objective

- To make student understand analysis of multistage transistor amplifier.
- To make student understand a practical approach of design and analysis of feedback amplifiers ,power amplifiers and oscillators
- To make student understand analysis and design of voltage regulators.
- To make student understand the behavior of high frequency BJT amplifiers

Course Outcomes

On successful completion of this course, students will be able to

1. Analyze multistage amplifier.
2. Analyze and design feedback amplifier and power amplifier and oscillators
3. Analyze and design voltage regulators.
4. Characterize behavior of high frequency BJT amplifiers.

Contents

Unit-I (08 hours)

Cascade amplifiers

Need of Multistage amplifiers, Parameter evaluation such as Ri, Ro, Av, Ai & Bandwidth for general multi stage amplifier, Analysis & design at low frequency & mid frequency of direct coupled, RC coupled, transformer coupled (Two stage) amplifier, Darlington amplifier, cascade amplifier

Unit-II (08 hours)

Negative Feedback amplifiers

Concept of feedback, classification of amplifiers, Negative feedback topologies with their block diagram representation, Effect of negative feedback on Input impedance, Output impedance, Gain and Bandwidth with derivation, method of analysis of feedback amplifier, analysis of all feedback topologies.

Unit-III (08 hours)

Power amplifiers

classification of power amplifiers - Class A, Class B, Class C, and Class AB. Operation of - Class A with resistive load; Transformer coupled class A Amplifier; Class B Push – pull amplifier ; Class B Complementary symmetry amplifier. Efficiency analysis for Class A transformer coupled amplifier and Class B push – pull amplifier, cross over distortion in power amplifiers, harmonic analysis

Unit-IV (08 hours)

Oscillators

Positive feedback, Barkhausen criterion, Classification of oscillators, derivation and analysis of RC oscillators, Wien bridge Oscillators, LC Oscillators for frequency of oscillation, Tuned collector oscillator, Piezo-electric effect in crystals and Crystal Oscillator

Unit-V (08 hours)

Regulators

Block schematic of linear regulators, Performance parameters – Load and Line regulations, Ripple rejection, Output resistance Emitter follower regulator, Transistor series regulator, shunt regulator Study and design of regulators using IC's :78XX,79XX,723,LM317, Method of boosting output current using external series pass transistor. Protection circuits – Reverse polarity protection, over circuit, fold back current limiting, over voltage protection.

Unit-VI (08 hours)

High frequency amplifiers

High frequency T model. Common base short circuit current frequency response ,alpha cut-off frequency ,CE short circuit current frequency response, high frequency hybrid π CE model, Amplifier response taking into account source and load resistances.

List of Experiments

1. CE two-stage amplifier with capacitive coupling
2. Voltage series and current series feedback amplifiers
3. Voltage shunt and current shunt feedback amplifiers
4. Class A,B,C power amplifiers.
5. Class B/AB push – pull/ Complementary Symmetry power amplifier.
6. Class A transformer coupled amplifier
7. RC Oscillators - phase shift and wien bridge
8. LC oscillators – Hartley, Colpitt
9. Linear voltage regulators – series regulator using series pass transistor, shunt regulator using zener diode
10. Fix voltage regulators using IC 78XX &79XX, Adjustable voltage regulators using IC LM317

Assignments

1. Artwork & layout preparation for any one circuit from above mentioned experiment list.
2. Simulation of the same circuit using Multisim.
3. Design & assemble simulated circuit on the Cu clad PCB.
4. Physical verification of the performance parameters for the designed PCB.
5. Presentation based on comparative analysis of the simulated results and physically verified results for the same circuit.
6. Report submission on the same kit with special components datasheets.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books

1. "Electronic devices and circuits" by S. Salivahanan, Suresh Kumar Vallavaraj, Mc Graw Hill Publication
2. "Electronic devices and circuits "by MillamanHalkies ,TMH publication
3. "Integrated Electronics", by Millman J and Halkias .C., TMH publication

Reference Books

1. "Electronic Devices and Circuits "by Allen Mottershed- PHI Publication
2. "Electronic Devices and Circuits "by J.B. Gupta-KATSON educational series books
3. Microelectronic Circuits Theory and applications "by Adel S. Sedra, Kenneth C. Smith- Oxford
4. "Microelectronics "by Jacob Millman, Arvin Garbel- Mc Graw Hill Publication
5. Electronic Principles by Albert Malvino and David J Bates, 7 edition, Tata McGraw Hill
6. Basic Electronics by Zbar, Malvino and Miller, 7 edition, Tata McGraw Hill

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – IV

SUBJECT: - CONTROL SYSTEM ENGINEERING

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	End Semester Exam	: 60 Marks
Practical: 2 Hours/week	Continuous Assessment	: 40 Marks
Tutorial: 1 Hour/week	TW & OR	: 25 Marks
	Credits	: 05

Course prerequisites

- Basic knowledge of signals.
- Basic mathematical tools like Laplace transform.
- Basic knowledge of software like MATLAB.

Course objective

This course provides in depth knowledge of the various control systems. Also it introduces the stability of system, transducers, controllers etc.

Course Outcomes

On successful completion of this course, students will be able to

1. Identify various control systems and determine the 'Transfer Function' of a system using block diagram reduction technique and signal flow graph.
2. Measure various Non-electric quantities such as displacement, temperature, angular speed, acceleration etc using suitable transducer.
3. Determine the error in various control systems.
4. Evaluate the stability of a system using Routh's Stability Criterion, root locus anddifferent graphical methods like Bode plot and polar plot.
5. Compare various control actions such as Proportional (P), Integral (I), Derivative (D), PI, PID.

Unit I (06 Hours)

Introduction to Control System

Classification of Control System, control problem, Feedback and Non-feedback Systems, Transfer Function, Block diagram and signal flow graph analysis, Mathematical models of physical system- Electrical & Mechanical System.

Unit II (06 Hours)

Transducers

Characteristics, types of transducers, RTD, Thermocouple, Thermister, capacitive transducer, LVDT, strain gauge, flow-meters and level measuring instruments.

Unit III (06 Hours)

Time Domain Analysis

Time response of first order & second order system using standard test signal, steady state errors and error constants, Root locus techniques- Basic concept, rules of root locus, application of root locus techniques for control system

Unit IV (06 Hours)

Stability

Concept of stability, necessary conditions for stability, Hurwitz and Routh stability criteria, and stability of system modeled in state variable form, root locus techniques Effect of Poles and Zeros on the System Stability.

Unit V (06 Hours)

Frequency Domain Analysis

Relationship between time & frequency response, Polar plots, Bode plot, stability in frequency domain, Nyquist stability criterion.

Unit VI (06 Hours)

Controllers and Compensators

Control actions – On/Off, P, PI, PD, PID. PLC Architecture, Introduction to Ladder Diagram, Types of Compensators, Lead, Lag, Lead-Lag Compensators

List of Experiments

1. Unit Step and Impulse response of the Transfer function using MATLAB.
2. Transient response of second order system
3. To draw Root Locus theoretically and verify it using MATLAB.
4. To draw Bode plot theoretically and verify it using MATLAB.
5. Magnitude and phase plot of Lead network.
6. Magnitude and phase plot of Lag network.
7. To Study characteristics of temperature transducer.
8. To Study characteristics of LVDT for displacement measurement.
9. Study of Strain gauge.
10. To study architecture of PLC.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books

1. I.J. Nagrath, M.Gopal "Control Systems Engineering", 5th Edition, New Age International Publication
2. Schaum's Series book "Feed back Control Systems".
3. Les Fenical "Control Systems", 1st Edition, Cengage Learning India.
4. R. Anandanatarajan, P. Ramesh Babu , "Control Systems Engineering", Scitech Publications

Reference Books

1. Norman S. Nise "Control Systems Engineering", 4th edition, Wiley edition.
2. Samarjeet Ghosh, "Control Systems Theory & Applications", 1st edition, Pearson education.
3. S.K. Bhattacharya, "Control Systems Engineering", 1st edition, Pearson education.
4. Hackworth, "Programmable Logic Controller", 1st edition, Pearson education.

Assignments

- Collaboration and discussion is encouraged on home works.
- The submitted MATLAB projects and all take-home quizzes must be individual work.
- Late take-home quizzes/assignments will be accepted, but will be penalized. Some homework problems for each chapter will be assigned but not graded.
- Take-home quizzes, when assigned, will generally be handed out on given date.
- Questions can be directed to the instructor during the tutorial or during office hours.
- In total, some take-home quizzes and a few MATLAB assignments will be assigned.

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – IV

SUBJECT: - ANALOG COMMUNICATION SYSTEM

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam : 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment : 40 Marks**
	TW & OR : 50 Marks
	Credits : 04

<u>Course prerequisites</u>

- Basic knowledge of signals and systems.
- Basic mathematical tools like fourier series & transform

<u>Course objective</u>

- To introduce to student essential components of communication system and emphasize need of modulation.
- To make student recognize concept of noise and its effects.
- To make student understand amplitude & frequency modulation and demodulation and its mathematical background.
- To make student understand working of radio receivers.

<u>Course Outcomes</u>

On successful completion of this course, students will be able to

1. Describes basic components of communication system and explains need of modulation.
2. Describes concept of noise and also recognizes its effects.
3. Describes amplitude and frequency modulation and demodulation and can do analysis in Time and frequency domain.
4. Describes components of communication receiver system.

Contents

<u>Unit-I</u> (4 Hours)

Introduction to Communication Systems

Review of signals and systems, Frequency domain of signals, Block schematic of communication system, types of communication channels, base band signals, RF bands, Necessity of modulation.

Unit-II (6 Hours)

Noise

Types of noise, External noise, Internal Noise, Noise calculations, signal to noise ratio, noise figure, and noise temperature.

Unit-III (8 Hours)

Amplitude Modulation

Amplitude Modulation, low level and high level transmitters, Frequency spectrum of AM wave, Representation of AM, power relations in AM, Generation of AM,DSB suppressed carrier (DSBSC)-modulator, Single Side Band (SSB):-Principle, Filter method, phase shift method and third method, Independent sideband (ISB) and Vestigial Side Band (VSB) principles and transmitters, Diode detector, practical diode detector, and square law detector. Demodulation of DSBSC, Demodulation of SSBSC.

Unit-IV (6 Hours)

Angle Modulation

Basic concept, mathematical analysis, frequency spectrum of FM wave, sensitivity, phase deviation and modulation index, frequency deviation and percent modulated waves, bandwidth requirement, deviation ratio, Narrow Band FM, and Wide Band FM. Varactor diode modulator, FET reactance modulator, stabilized reactance modulator- AFC, Direct FM transmitter, indirect FM Transmitter, pre-emphasis and de-emphasis. Amplitude limiting, FM demodulators.

Unit-V (6 Hours)

TRF and Super Heterodyne Radio Receiver

Block diagram of AM and FM Receivers, TRF receiver, Super heterodyne Receiver, Performance characteristics: Sensitivity, Selectivity, Fidelity, Image Frequency Rejection. IF Amplifiers. Tracking, AGC, Mixers.

Unit -VI (6 Hours)

Pulse Analog Modulation

Pulse modulation. Sampling process, Sampling Theorem for low pass and band pass signals, Nyquist criteria, Sampling techniques, aliasing error, and aperture effect. PAM, PWM, PPM generation and detection. TDM and FDM.

List of Experiments (Minimum 08)

1. Study of Amplitude Modulation and Demodulation.
2. Study of Frequency Modulation and Demodulation
3. Study of SSB Modulation & Demodulation.
4. Analysis of standard signals (square and triangular)and Modulated signals(all types of AM, FM) using spectrum analyzer.
5. Sampling And Reconstruction.
6. Study of Pulse Amplitude Modulation (PAM.)
7. Study of Pulse Width Modulation.(PWM)
8. Study of Pulse Position Modulation.(PPM)
9. Study of PAM-TDM.
10. Study of Super heterodyne (AM) Receiver.

Assignments

1. Discussion is encouraged on home works of Analog Signal Transmission.
2. Design PCB of Modulation and Detection KIT.
3. SSB, DSBSC &VSB Modulation and Detection using Hardware.
4. AM, FM & Superhetrodyne Receivers.
5. PAM, PWM, PPM Modulation and Detection.
6. Visit to Radio station.

   (Late take-home quizzes/assignments will be accepted, but will be penalized.)

Content Delivery Methods

Chalk & talk, Power point presentation.

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books

1. George Kennedy ‘Electronics Communication System’- IVth Edition-Tata McGraw Hill Publication.
2. B.P.Lathi ‘Modern Digital and analog Communication System’ Oxford University press.

Reference Books

1. Taub & Schilling: Principles of Communication Systems, Tata McGraw-Hill.
2. Dennis Roddy, John Coolen.‘Electronics Communications ‘IVth Edition-Pearson Education

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – IV

SUBJECT: - DATA STRUCTURES AND FILES

Teaching Scheme

Lecture: 2 Hours/week

Practical: 2 Hours/week

Examination Scheme

End Semester Exam	**: 60 Marks**
Continuous Assessment	**: 40 Marks**
TW & OR	**: 25 Marks**
Credits	**: 03**

Course prerequisites

- Basic Knowledge in C programming.

Course objective

This course provides in depth knowledge of the various types of data structures and various algorithms. Also it introduces the concept of linked list, stack, queues, graph and tree.

Course Outcomes

On successful completion of this course, students will be able to

1. Write a program involving pointers and structures.
3. Write a program involving search and sorting techniques.
4. Write a program using linked and double linked lists.
5. Implement stacks and queues involving linked list.
6. Perform operations on a tree using linked lists.
7. Find the shortest path in a given graph.

Contents

Unit-I (5 Hours)

C Programming Revision

Pointers, Arrays, Single and Multi-Dimensional arrays, Row major and Column Major, Arrays and polynomials, Structures ,Unions, Call by Value ,Call by Reference , Passing arrays ,Passing a function to function, Pointer to function ,Pointers and Structures.

Unit-II (4 Hours)

Data Structure and Analysis of algorithms.

Introduction to data structure, Data representation, Abstract Data types, Primitive data types, Data structure and data types, Differences between data types. Program design. Algorithms and different approaches to designing an algorithm, Complexity, Big O notation, algorithm analysis .Recursion. Sorting Bubble sort, Selection sort, Quick sort, Merge sort, Insertion sort.

Unit-III (4 Hours)

Linked Lists

Definition, operations on linked list, Reversing the links, Merging of linked lists, Sorting the linked list, Circular Linked list, Recursive operation on linked list, Doubly linked list, Linked list and Polynomials,

Unit-IV (3 Hours)

Stack and Queues

Operation on stacks, Stack as an array, Stack as a linked list, Application of stack, Infix to prefix conversion, Infix to postfix conversion, Postfix to prefix conversion, Postfix to infix conversion.

Representation of Queue as an array, Queue as an linked list, Circular Queue, Priority queue

Unit-V (3 Hours)

Tree

Binary tree, Linked and array representation of Binary tree, Binary search tree, Operation: Searching of a Node in a Binary tree, Insertion of a node in binary tree, deletion from a binary tree. Threaded binary tree, Forest. AVL trees

Unit-VI (3 Hours)

Graphs

Definition ,Adjacent vertices and Incident edges, graph representation, adjacency list, depth first search ,breadth first search, Spanning tree, Kruskal.s Algorithm, Shortest path algorithm, Dijkstra.s algorithm.

List of Experiments

1. Program to create & manipulate database using structure.
2. Program to add two polynomial using array of structure.
3. Program to implement primitive operation on Sequential file.
4. Program to search for record from a given list of records stored in array using
    - i) Linear search
    - ii) Binary search
5. Program to sort an array of names using
    - i) Bubble sort
    - ii) Insertion sort
    - iii) Quick sort
6. (a) Program to implement following operation on singly linked list:
    - i) Create
    - ii) Delete
    - iii) Insert
    - iv) Display
    - v) Search

   (b) Program to add two polynomials using linked list.
7. (a) Program to implement stack using:
    - i) Array
    - ii) Linked list

   (b) Program to convert an infix expression to postfix expression & evaluate the resultant expression.
8. Program to Implement Queue using: (i) Array (ii) linked list
9. Program to create a Binary search tree & Perform following primitive operation on it:
    - i) Search
    - ii) Delete
    - iii) Traversals (inorder, pre-order, post-order -recursive)
    - iv) Non-recursive in order traversal

10. Program to create a graph using adjacency list & traverse it using BFS & DPS methods

Assignments

1. Write a c program to print a 100 year calendar.
2. Write a c program to find color code of a resistor.
3. Case study of following topics
   a>Chatting Applications (WhatsApp and true Caller)
   b>Origin of programming languages
4. Library assignments: Comparison of Object oriented programming.
5. Any of the lab experiments.
6. PPT presentation by students.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. Continuous Assessment (Unit Test, Tutorials/ Assignments, Attendance)
2. End term Examination

Text Books

1. "Data structure using C" ISRD group,TMH.
2. "Data Structure through C" ,Yashwant kanetkar,BPB Puplication.

Reference Books

1. "Data structure using C" AM Tanenbaum, Y Langsam and MJ Augustein, Prentice Hall India.
2. "Data structure and Algorithm Analysis in C" Weiss, Mark Allen Addison Wesley.
3. "Data structure – A Pseudocode Approach with C", Richard F Gilberg Behrouz A. Forouzan, Thomson
4. "Let us C" ,Yashwant Kanetkar,BPB Publication.

SUBJECT: PROFESSIONAL SKILLS DEVELOPMENT

TEACHING SCHEME	:	**Theory : 4 Hours / Week**
EXAMINATION SCHEME	:	**End Semester Examination: 100 Marks**
CREDITS ALLOTED	:	**4**

Course Pre-requisites

The Students should have knowledge of

1. Basic concepts of Maths, Logical reasoning and English Grammar taught in the last semester.
2. An overall idea about the difference in personal and professional communication in terms of vocabulary used.
3. Knowledge of writing skills, importance of professionalism in emails and letters.
4. They should be aware of concepts of self esteem, self-assessment and its importance in setting long term and short term goals.
5. Awareness of the interpersonal skills like team work and introduction to Leadership taught during the last semester.
6. Body language and importance of non verbal communication to maintain professionalism.

Course Objectives

The Professional Skills Development 4 is an extension of PSD- 3 with focus on the remaining topics of Maths and Logical reasoning. The further complex concepts of Aptitude and Grammat aims to acquaint them with the level of complexity presented in recruitment tests and also provide them techniques to solve such question with tricks/methods in a very short period. The English communication and soft skills section of PSD-4 focuses on the higher aspects of soft skills such as grooming them on corporate etiquettes and various formats of email/ letter writing so that can present themselves as professionals further both in oral and written communication.

<u>Course Outcomes</u>

The student should be able to

1. Learn further concepts of Maths, Logical reasoning and English grammar and apply short cuts/ tricks to solve questions in less time. Learn remaining 25-30 rules of grammar relevant from the recruitment point of view.
2. Use appropriate words in the right context both academically and professionally. Students would have approximately around 80-100 words from the academic word list prescribed in the syllabus.
3. Understand the importance of email etiquettes and distinguish between the format of formal and informal emails/letters. They would be able to draft professional mails and letters like job application letters, cover letters, and apology emails with proper structure and words which are necessary in the corporate life.
4. Apply various strategies of conflict resolution through amicable way to settle team conflicts/disputes. They would learn to handle criticism and feedback in a positive way as an individual as well as a team.
5. Understand the major concepts of leadership like coaching, mentoring. They would learn effective time management strategies- Pareto principle (the 80-20 rule of time management) and apply them in the corporate life.
6. Understand the importance of grooming, body language and etiquettes in the corporate sector. They would be able to conduct themselves in a professional and impressive way by conducting themselves according to situations in the professional sector. They would also learn various strategies and conversational techniques to handle telephonic interviews confidently.

<u>Unit I</u> (18 Hours)

Aptitude (Maths, Logical Reasoning, English)

- **Maths**
  - i) Simple Interest and Compound Interest
  - ii) Ratio, Proportion and Average

iii) Mixture and Allegation

- **Logical Reasoning**

  i) Data Interpretation

  ii) Data Sufficiency

- **English**

  i) Grammar I

  ii) Vocabulary - Analogies

Unit II (4 Hours)

Essential Grammar - IV

- Vocabulary – Academic word List

Unit III (6 Hours)

Written Communication- III

- Email writing and etiquettes – formal and informal email writing, format of various types of email, do's and don'ts of email writing
- Letter writing – formal letters, job application letter, cover letter.
- Essay writing – mnemonics top develop ideas and write essays, structure of essays

Unit IV (4 Hours)

Self Awareness and Conflict Resolution

- Self-assessment & Perception & attitudes.
- Analyzing skills & weaknesses and habits.
- Developing positive attitude & handling criticism positively
- Handling conflicts in the personal and corporate sector
- Causes of conflicts in work scenario.
- Ways and methods for conflict resolution

Unit V (6 Hours)

Interpersonal Skills - III

- Mentoring, Difference between Leadership and Management
- Leading with examples
- Time management -The Time Management Matrix, Pareto Principle

Unit VI (4 Hours)

Corporate Etiquettes and Grooming

- Introduction to grooming & etiquettes
- Ways of handling telephonic interviews

Text Books

1. APAART: Verbal Ability
2. APAART: Logical Reasoning
3. APAART: Quantitative Aptitude
4. APAART: Speak Well 1 (English Language and Communication)
5. APAART: Speak Well 2 (Soft Skills)

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standars of Passing and ATKT Rules

1. For all courses, both UE (Universtiy Evaluation) and IA (Internal Assessment) constitue separate heads - of - passing (HoP). In ordar to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0 (40 % Marks) at UE and also a minimum grade point of 5.0 (40 % Marks) at IA.

   OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50 % Aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fail at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

1. A student is allowed to carry backlog of courses prescribed for B.Tech Sem - I, III, V, VII to B.Tech Sem - II, IV, VI, VIII respectively.
2. A student is allowed to keep term of Sem - III, if he/she is failing in any number of subjects of Sem I & II.
3. A student is allowed to keep term of Sem - V, if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem - I & II.
4. A student is allowed to keep term of Sem - VII, if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem - III & IV.

Award of Class for the Degree Considering CGPA

Award of Honours

A student who has completed the minimum credits specified for the programme shall be decleared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
9.50 ≤ CGPA ≤ 10.00	0	Outstanding	80 ≤ Marks ≤ 100
9.00 ≤ CGPA ≤ 9.49	A+	Excellent	70 ≤ Marks ≤ 80
8.00 ≤ CGPA ≤ 8.99	A	Very Good	60 ≤ Marks ≤ 70
7.00 ≤ CGPA ≤ 7.99	B+	Good	55 ≤ Marks ≤ 60
6.00 ≤ CGPA ≤ 6.99	B	Average	50 ≤ Marks ≤ 55
5.00 ≤ CGPA ≤ 5.99	C	Satisfactory	40 ≤ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40

College Information

Bharati Vidyapeth University college of Engineering, Pune continued to take new strides towards evolving directions to further the growth and dissemination of scientific and technological knowledge.

The college established in 1983, is one of the oldest and largest Engineering Colleges in the state of Maharashtra. The college has well defined goals which are intensely practised and followed.

Their implementation encompass multi-faceted activities in the form of recruiting experienced faculty, organizing faculty development program, identifying socio- economically relevant areas emerging technologies. Constant review and upgradation of curricula, Upgradation of Laboratories, Library and communication facilities, Collaboration with industries and research and development organizations, Sharing of knowledge, infrastructure and resources, training extension, testing and consultancy services and promoting interdisciplinary research.

The college has been ranked as 'A' grade Engineering college by the Government of Maharashtra. Meeting quality standards in education such as is been a motto of this institute. As a pedagogical effect, out of ten under graduate programmes being conducted, seven programmes eligible for accreditation are accredited by National Board of Accreditation (NBA).

The DATAQUEST – CMR conducts and annual survey of technical schools of India and publishes the list of best 100 technical schools in India. In the surveys, for the past seven years, the college has been consistently ranked among top 50 technical schools.

Another feather in Institute's cap is its selection for the grant of Rs. 4.0 Crore under Technical Education Quality Improvement Programme – II (TEQIP-II) by Ministry of Human Resource Development (MHRD) of Government of India supported by World Bank.

This Institute has been ranked to 45th position at all India level and 5th at the Western Region of AICTE in 2012. The Institute has been very sensitive to the human resource development and continues initiating new academic programmes. Presently it offers 09 undergraduate programmes in the field of Civil Engineering, Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Electronics and Telecommunication Engineering, Mechanical Engineering and Production Engineering.

The college offers 08 postgraduate programmes in the field of Civil Engineering, Chemical Engineering, Computer Engineering, Information Technology, Electrical Engineering, Electronics Engineering, Mechanical Engineering and NanoTechnology.

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – V

Sr. No	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
		L	P	T	End Semester Exam	Continuous Assessment			TW& PR	TW& OR		Theory	TW	Total Credits
						Unit test	Assignment	Attendance						
27	Microprocessors and Microcontrollers	4	2	0	60	20	10	10	50	-	150	4	1	5
28	Electronic Instruments & Measurement System	3	2	0	60	20	10	10	-	50	150	3	1	4
29	Digital Communication	3	2	0	60	20	10	10	-	50	150	3	1	4
30	Power Devices & Machines	3	2	0	60	20	10	10	-	50	150	3	1	4
31	Electromagnetic Engineering	3	0	1	60	20	10	10	-	-	100	4	0	4
32	Professional Skill Development- V	4	0	0	100	-	-	-		-	100	4	0	4
	Total	**20**	**8**	**1**	**400**	**100**	**50**	**50**	**50**	**150**	**800**	**21**	**04**	**25**

Optional Subject

Sr. No.	Name of Course	Teaching Scheme			Examination Scheme							Credits		
		L	P	T	ESE	Continuous Assessment			Practical		Total	Theory	TW	Total
						Unit Test	Attendance	Assignment	TW PR	TW OR				
	Engineering Mathematics IV	4	--	--	60	20	10	10	--	--	100	4	--	4

Sr. No	Name of the course	Teaching Scheme Hrs. / Week			Examination Scheme (Marks)						Total Marks	Credits		
					End Semester Exam	Continuous Assessment			TW& PR	TW& OR				
		L	P	T		Unit test	Assign ment	Attend ance				Theory	TW	Total Credits
33	Digital Signal Processing	4	2	0	60	20	10	10	-	50	150	4	1	5
34	Embedded Systems	3	2	0	60	20	10	10	-	50	150	3	1	4
35	VLSI Design	3	2	0	60	20	10	10	50	-	150	3	1	4
36	Microwave theory and Antennas	3	2	0	60	20	10	10	-	25	125	3	1	4
37	Information Theory and Coding	3	0	0	60	20	10	10	-	-	100	3	0	3
38	Electronic Circuit Design& Practices	0	2	0	-	-	-	-	-	25	25	0	1	1
39	Professional Skill Development- VI	4	0	0	100	-	-	-		-	100	4	0	4
	Total	**20**	**09**	**0**	**400**	**100**	**50**	**50**	**50**	**150**	**800**	**20**	**05**	**25**

Credits of Sem- V : 25
Credits of Sem- VI : 25
Total Credits : 50

SUBJECT: - ELECTRONIC INSTRUMENTS AND MEASUREMENT SYSTEM

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/Week	**End Semester Exam : 60 Marks**
Practical: 2 Hours/ Week	**Continuous Assessment : 40 Marks**
	TW & OR : 50 Marks
	Credits : 04

Course Prerequisites

- Fundamentals of instrumentation
- Signal conditioning units such amplifier, attenuator.

Course Objectives

- Electronic Instruments and measurements include all type of instruments which will help direct measurement of electronic, electrical, and communication parameters.
- It is also useful for virtual implementation of electronic, electrical, and communication parameters using LABVIEW software. So the subject is useful for test and measurement industries to verify quality of product.

Course Outcomes

On successful completion of this course, students will be able to

1. Describe fundamentals of instrumentation and measurements.
2. Classify different electronic instruments according to its usage.
3. Analyze Universal Counter for the measurement of time, frequency, ratio and period with high frequency measurement techniques.
4. Describe various types of Oscilloscope & their functions.
5. Specify and perform communication measurements using various analyzers.

6. Specify functioning, specifications, and applications of different signal analyzing instruments.
7. Describe the operations involved in computer controlled test measurement techniques.

UNIT I (6 Hours)

Fundamentals Of Instrumentation And Measurements

Necessity of Electronic Measurements, Block diagram of Electronic Measurement system, Concept of static and dynamic properties of measurements, Types of errors, Voltage, current, resistance measurement using DMM, Units and Standards, Calibration, Auto zeroing, Auto ranging.

UNIT II (6 Hours)

Basic Instruments

Working principle, types, methods & applications of following Instruments: True RMS Meter, Vector voltmeter, Vector impedance meter, LCR-Q meter with important specifications.

UNIT III (6 Hours)

Frequency Generation And Measurements

Standard frequency generators, Types of frequency generators, Frequency, Ratio, Time interval, Period & Multiple Period Averaging using digital universal frequency counter, High frequency measurements and its techniques.

UNIT IV (6 Hours)

Oscilloscope

Overview of analog CRO, Dual/Multi-trace CRO, Various CRO probes & its applications; Digital Storage Oscilloscope, DSO Design considerations and specifications, DSO functionalities / Measurements such as FFT; Math Functions; Automatic Measurements, Curve Tracer.

UNIT V (6 Hours)

Communication Measurements

Basics of Communication measurements at transmitter – receiver, sensitivity, selectivity, phase jitter, S/N ratio, co-channel interference, SINAD test etc; Network analyzer- system element, measurement accuracy, Types of network analyzers, S-parameter measurement using network analyzer, EMI measurements and suppression techniques.

UNIT VI (6 Hours)

Signal Analyzers And Computer Controlled Test Measurements

Harmonic and wave analyzer, Distortion factor meter, Spectrum analyzer - FFT analyzer, Logic analyzer, Protocol analyzer, Computer controlled test measurements, Virtual measurements and its applications, IEEE 488, PCI/PCI express, buses, Introduction of Lab view software.

List of Experiments

(Any 8 experiments should be conducted from following list.)

1. Voltage /current Measurements using CRO and DMM.
2. Voltage /current measurement of rectifier circuit using True RMS meter.
3. Measurement of resistance, inductance, capacitance and quality factor for any RLC circuit using LCR-Q Meter
4. Frequency, Period and frequency Ratio measurements using Digital Universal Frequency Counter.
5. Measurement and analysis of digital signals using Logic Analyzer.
6. Basic usage of Spectrum Analyzer for RF spectrum generation of sin, square and triangular wave.
7. Measurement of total harmonic distortion using Distortion Factor Meter.
8. Verification of diode and transistor characteristic using Curve Tracer.
9. Digital Storage Oscilloscope Measurements for FFT analysis, capturing transients, storing and retrieving different signals, and various operations like add, subtract and math functions.
10. Measurement of S parameters of transmitter and receiver using Network analyzers.

List of Assignments

1. Preparation of basic block schematic of any instrument with design considerations and their justification. (Paper design)
2. Select any sensor or transducer. Find its important specifications. Select instrument for the measurement of those important specifications. (Case Study)
3. How quality or standard of any instrument is specified? Which are the important global parameters that can affect quality of measurement? (Presentation)
4. Search and enlist various testing methodologies, instruments and their important aspects. (Case Study)
5. Design any measurement system on Multisim, LABVIEW Software. (Report with design and result)
6. Design a code in C or C++ for any kind of electronic system. (Program with outcome)

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. Cooper Helfric, "Electronic Instrumentation & Measurement Techniques", Prentice Hall Publication
2. H. S. Kalsi, "Digital Instrumentation", Tata McGraw Hill

Reference Books

1. Oliver Cage, "Electronic Measurements and Instrumentation", Tata McGraw Hill
2. Clyde F. Coombs "Electronic Instrumentation Handbook" McGraw Hill

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – V

SUBJECT: - DIGITAL COMMUNICATION

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	End Semester Exam	: 60 Marks
Practical: 2 Hours/week	Continuous Assessment	: 40 Marks
	TW & OR	: 50 Marks
	Credits	: 04

Course Prerequisites

- Basic knowledge of signals and systems.
- Basic mathematical tools like fourier series, fourier transform probability theory

Course Objectives

- To understand the building blocks of digital communication system.
- To prepare mathematical background for communication signal analysis.
- To understand and analyze the signal flow in a digital communication system.
- To analyze error performance of a digital communication system in presence of noise and other interferences.
- To understand concept of spread spectrum communication system.

Course Outcomes

On successful completion of this course, students will be able to

1. Classify analog to digital conversion techniques in communication system.
2. Apply mathematics knowledge to solve problems based on probability theory for Random Signals.
3. Understand bandwidth utilization schemes in digital communication systems.

4. study performance of communication system in presence of noise
5. Understand different multiplexing techniques.
6. understand detection and performance analysis of digital signals

UNIT-I (6 Hours)

Analog To Digital Conversion

Pulse Modulation-Sampling process, Quantization, Pulse Code Modulation (PCM), Companding, Noise considerations in PCM Systems-Delta modulation, linear prediction, differential pulse code modulation, Adaptive Delta Modulation, LPC Speech synthesis.

UNIT-II (6 Hours)

Random Processes

Introduction to Random Variables, Mathematical definition of a random process, Stationary processes, Mean, Correlation &Covariance function, Ergodic processes, Transmission of a random process through a LTI filter, Power spectral density, Gaussian process, noise, Narrow band noise, Representation of narrowband noise in terms of in phase & quadrature components

UNIT-III (6 Hours)

Line Coding And Digital Multiplexing

Line Coding & its properties. NRZ & RZ types, signaling format for unipolar, Polar, bipolar (AMI) & Manchester coding and their power spectra. Digital Multiplexing: Multiplexers and hierarchies, Data Multiplexers, synchronization: Bit Synchronization, Scramblers, Frame Synchronization .Inter-symbol interference, Eye Patterns, Equalization.

UNIT-IV (6 Hours)

Digital Carrier Modulation & Demodulation Techniques

Introduction, Amplitude Shift Keying (ASK), ASK Spectrum, ASK Modulator, Coherent ASK Detector, Noncoherent ASK Detector, Frequency Shift Keying

(FSK), Frequency Spectrum of FSK, FSK Transmitter, Non-coherent FSK Detector, Coherent FSK Detector, Binary Phase Shift Keying, Binary PSK Spectrum, BPSK Transmitter, Coherent PSK Detection, Quadrature Phase Shift Keying (QPSK), QPSK Demodulator, M-Ary PSK, Quadrature Amplitude Modulation (QAM); MQAM transmitters and receivers, Band Width efficiency, Carrier Recovery; Differential PSK, DPSK transmitter and receiver, Minimum Shift Keying (MSK)

UNIT-V (6 Hours)

Data Transmission

Base band signal receiver, probability of error, the optimum filter, and white noise-the matched filter, probability of error of the matched filter, coherent reception: correlation, application of coherent reception in PSK and FSK. Correlation receiver for QPSK.

UNIT-VI (6 Hours)

Spread Spectrum System

Spread Spectrum Modulation- Pseudo- noise sequences, a notion of spread spectrum, Direct sequence spread spectrum with coherent binary phase shift keying, Signal space Dimensionality and processing gain , Probability of error , Frequency –hop spread spectrum ,Maximum length and Gold codes,TDMA,FDMA,CDMA.

List of experiments

(Any 8 experiments should be conducted from following list.)

1. To perform Sampling and reconstruction of signal.
2. To perform Pulse Code Modulation (PCM).
3. To observe Delta modulated signal with staircase approximation.
4. To compare Delta Modulation (DM) System and Adaptive Delta Modulation (ADM) system
5. To perform Differential Pulse Code Modulation (DPCM).
6. To draw and observe practically Different Data Formats
7. To perform Amplitude Shift Keying (ASK) modulation and demodulation.

8. To perform Binary Phase Shift Keying (BPSK) modulation and demodulation.
9. To perform Binary frequency Shift Keying (BFSK) modulation and demodulation
10. To perform Quadrature Phase Shift Keying (QPSK) modulation and demodulation.
11. MATLAB simulation of digital modulation techniques.

List of Assignments

1. To solve problems on statistical parameters of random variables
2. To study Pulse digital modulation techniques
3. To draw different Line coding formats for given data
4. To study Digital carrier modulation
5. Derive Probability of error
6. To study Spread spectrum techniques

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. Simon Haykins, "Communication Systems" John Wiley, 4th Edition, 2001
2. Taub& Schilling, "Principles of Digital Communication "Tata McGraw-Hill" 28th reprint, 2003

Reference books

1. John G. Proakis, "Digital Communication", McGraw Hill Inc 2001.
2. Simon Haykin, "Digital Communication Systems", John Wiley & Sons, Fourth Edition.
3. A.B Carlson, P B Crully, J C Rutledge, "Communication Systems", Fourth Edition, McGraw Hill Publication.

SUBJECT: MICROPROCESSORS AND MICROCONTROLLERS

Teaching Scheme		**Examination Scheme**	
Lecture: 4 Hours/week		**End Semester Exam**	**: 60 Marks**
Practical: 2 Hours/week		**Continuous Assessment**	**: 40 Marks**
		TW & PR	**: 50 Marks**
		Credits	**: 05**

Course Prerequisites

- Students should have basic knowledge of 'Digital Electronics'.

Course Objectives

- To make students familiar with the basic blocks of microprocessor and microcontroller devices in general.
- To familiarize students with architecture and features of typical Microcontrollers.
- To learn interfacing of real world input and output devices and use assembly and high level languages to interface the microcontrollers to various applications

Course Outcomes

On successful completion of this course, students will be able to

1. Differentiate features of microprocessors and microcontrollers.
2. Use Hardware and software tools for microcontrollers.
3. Develop interfacing of microcontrollers with real world devices.

UNIT 1 (8 Hours)

Introduction To Microprocessors

Evolution of Microprocessors, comparison of Microprocessor & Micro controller. Difference between RISC & CISC microcontrollers, Harvard & Von Neumann architectures. Internal architecture of 8 bit Microprocessor 8085, Overview of instruction set, Addressing modes, instruction cycle, Stack and Subroutines, interrupts.

UNIT 2 (8 Hours)

8051 Microcontroller

MCS-51 architecture, family devices & its derivatives. Ports, registers, memory organization, Overview of Instruction set, Addressing modes, Machine cycles and bus timings, timers and its modes, Interrupt structure.

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UNIT 3 (8 Hours)

Peripheral Interfacing With 8051

Serial Communication with RS232, 8051 based system design – Address decoding data memory space Interfacing & Applications –LED, LCD, Stepper motor, DAC/ADC, Sensors, Keyboard. Programming in Embedded C.

UNIT 4 (7 Hours)

Pic Microcontroller

Comparison of Features of different PIC series, PIC 18F architecture, registers, memory Organization, oscillator options, BOD, power down modes and configuration bit settings, Overview of instruction set, Addressing modes.

UNIT 5 (8 Hours)

Peripheral Interfacing With Pic-I

Port structure, interrupts & timers of PIC18F. Interfacing of PIC18F with LED, Seven segment display, LCD and Keypad. Use of timers with interrupts, PWM generation. All programs in embedded C.

UNIT 6 (9 Hours)

Peripheral Interfacing With Pic-Ii

MSSP structure, CCP and ECCP, Study of UART, SPI, I2C, ADC. Interfacing serial port, ADC, RTC with I2C and EEPROM with SPI. Motor Control using PIC. All programs in embedded C.

List of experiments

Any 8 of below given list.

1. Find Largest/ Smallest number in an array in 8085.
2. Multiplication/ Division of 8-bit numbers in 8085.
3. Generate BCD up/ down counter in 8051.
4. Square wave generation using timers in 8051.
5. Serial Communication using 8051.
6. LCD interfacing with 8051.
7. Stepper motor interfacing with 8051.
8. Keyboard interfacing with 8051.
9. ADC/DAC interfacing with 8051.
10. Serial Communication using PIC.
11. LCD interfacing with PIC.
12. Stepper motor interfacing with PIC.
13. Keyboard interfacing with PIC.
14. Seven segment display interfacing with PIC.

List of Assignments

1. Case study of any one of the latest processors.
2. Mini project using 8051/PIC microcontroller on topics such as design of Digital Multimeter, design of DAS system, DC Motor control using PWM, Frequency counter etc.(Simulation only)

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. Mazidi, “8051 microcontroller & embedded system” 3rd Edition ,Pearson
2. Mazidi, “PIC microcontroller & embedded system” 3rd Edition ,Pearson

Reference Books

1. Ajay V. Deshmukh, “Micro-controllers - Theory and Applications”, Tata McGraw Hill.
2. Kenneth J. Ayala, “The 8051 Micro-controller – Architecture, Programming & Applications”, Penram International & Thomson Asia, Second Edition.
3. John B. Peatman, “Design with PIC Micro-controllers”, Pearson Education Asia, Low Price Edition.
4. 18F xxx reference manual

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – V

SUBJECT: - ELECTROMAGNETIC ENGINEERING

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/Week	**End Semester Exam**	**: 60 Marks**
Tutorials: 1 Hour/Week	**Continuous Assessment**	**: 40 Marks**
	Credits	**: 04**

Course Objectives

- To provide the basic skills required to understand, develop, and design various engineering applications involving electromagnetic fields.
- To lay the foundations of electromagnetism and its practice in modern communications such as wireless, guided wave principles such as fiber optics and electronic electromagnetic structures.

Course Outcomes

After the successful completion of the course student should be able to:

1. Apply vector calculus to static electric-magnetic fields in different engineering situations.
2. Analyze Maxwell's equation in different forms (differential and integral) and apply them to diverse engineering problems.
3. Examine the phenomena of wave propagation in different media and its interfaces and in applications of microwave engineering.
4. Analyze the nature of electromagnetic wave propagation in guided medium which are used in microwave applications.

UNIT 1 (06 Hours)

Vector Analysis

Introduction and significance of electromagnetic fields, introductory vector analysis and coordinate systems, concepts of gradient, divergence, curl,

UNIT 2 (06 Hours)

Electrostatic Field

coulomb's law & electric field, field due to distributed charges, flux density, gauss's law , divergence theorem, electrostatic potential, potential gradient, electric dipole, electrostatic energy density, boundary conditions for electrostatic field.

UNIT 3 (06 Hours)

Steady Magnetic Field

Biot-Savart's law, Ampere's circuital law, Stroke's Theorem, Magnetic flux density & Vector magnetic potential, Current carrying conductors in magnetic fields, Torque on loop, Energy stored in magnetic field, Boundary conditions for magneto static field.

UNIT 4 (06 Hours)

Time Varying Fields and Maxwell's Equations

Continuity equations for static conditions, displacement current, Faraday's law, Inconsistency of Ampere's law, Maxwell's equations, Comparison of field & circuit theory. Energy stored in Electric and magnetic field time varying fields.

UNIT 5 (06 Hours)

Propagation of Electromagnetic Waves

Wave propagation in dielectric & conducting media, wave equations for sinusoidal time variations, Characteristics of plane wave in pure dielectric media and conducting media. Reflection of electromagnetic wave for normal incidence, Polarization, Pointing theorem, Skin depth, phase velocity and group velocity, Boundary conditions

UNIT 6 (06 Hours)

Transmission Lines and waves theory

Types of Transmission lines, Transmission line equation, Transmission line parameters, the terminated uniform transmission line, Reflection coefficient, VSWR, group velocity, phase velocity. Smith chart and impedance matching Technique, attenuation of waves, EMI- EMC.

List of Assignments

1. Coordinate Systems.
2. Case Study of Electromagnetic fields.
3. Application note on- Electrostatic Discharge
4. Application note on- Electromagnetic interference and Compatibility
5. Analysis of transmission lines using Smith Chart.

List of Tutorials

1. Vectors & coordinate systems
2. Application of Stoke's theorem.
3. Application of Gauss's law.
4. Energy stored in capacitor.
5. Application of Poission's and Laplace's equations.
6. Applications of Ampere's law
7. Boundary conditions for electrostatic fields.
8. Boundary conditions for magnetic fields.
9. Poynting theorem and their applications.
10. Applications of Smith Chart.

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1.	Unit Test	2.	Assignments
3.	Continuous Assessment	4.	End term Examination

Text Books

1. Matthew N. O. Sadiku, "Principles of Electromagnetics", 4th Edition, Oxford University Press.
2. John D. Kraus "Electromagnetic", McGraw Hill.

Reference Books

1. William Hyte "Electromagnetic Engineering", McGraw Hill.
2. Edminister J.A, Electromagnetics, Tata McGraw-Hill.
3. R.K Shevgaonkar, Electromagnetic waves,Tata McGraw-Hill.
4. S Salivahanan& S Karthie, "electromagnetic Field Theory" Vikas Publishing House Ltd.

SUBJECT: - POWER DEVICES AND MACHINES

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam : 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment : 40 Marks**
	TW & OR : 50 Marks
	Credits : 04

Course Prerequisites

- Basic knowledge of electronic devices, electrical technology.
- Basic mathematical tools like Integration and Derivatives, Partial Derivatives Fourier series.

Course Objectives

- To introduce to students the theory and applications of power electronics systems for high efficiency, renewable and energy saving conversion systems,
- To prepare students to know the characteristics of different power electronics switches and selection of components for different applications.
- To develop students with an understanding of the switching behavior and design of power electronics circuits such as AC-DC, AC-AC and DC-DC converters.

Course Outcomes

After successfully completing the course students will be able to:

1. Explain construction, switching characteristics and justify the selection of power devices and thyristors.
2. Explain operating principle and suggest protection circuit for power devices and thyristors.
3. Explain construction and operating principle of DC machines and AC machines (1φ and 3φ).

4. Learn the role of Power Electronics in utility-related applications which are becoming extremely important.
5. Understand, simulate and design single-phase and three-phase thyristors converters.

UNIT I (06 Hours)

Power Diodes And Transistors

Power Diodes: Construction, Switching characteristics, Line frequency diodes.

Power BJT: Construction, Operation, Steady state characteristics, switching characteristics. Switching limits, Break down voltages, Second breakdown, Thermal runaway.

Power MOSFET: Construction, Operation, Static characteristics, Switching characteristics, Forward and reverse bias Safe Operating Area, Parallel operation.

IGBT: Construction, Operation, Steady state characteristics, Switching characteristics, Safe operating area.

Gate drive circuits for Power BJT, MOSFET & IGBT.

UNIT II (06 Hours)

Thyristors

SCR: Construction, Operation, Transistor analogy, Static characteristics, Switching characteristics. SCR ratings, Gate Characteristics, Triggering requirements, Triggering techniques, Isolation techniques.

TRIAC: Construction, Operation, Steady state characteristics, triggering modes.

GTO: Construction, Operation, Turn off mechanism, Applications.

UNIT III (06 Hours)

Power Converters – I

Controlled Rectifiers (AC – DC converters): Concept of line & forced commutation Single phase Semi & Full converters for R & R-L loads, Effect of free-wheeling diode,

Three phase Semi & Full converters for R load. AC – AC converters: Single phase AC voltage controller for R & R-L loads, three phase AC voltage controller for R load. (Qualitative analysis only)

UNIT IV (06 Hours)

Power Converters – II

DC - DC converters: DC Chopper: - Working principle of step down chopper, control strategies, step down chopper for R-L load, step up chopper; SMPS.

DC- AC converters: Inverter: - Working principle of single phase, Bridge inverter for R & R-L load, three phase bridge inverter for R load, Harmonic reduction using PWM technique. (Qualitative analysis only)

UNIT V (06 Hours)

Introduction to Motors

DC motors, AC Motors, Special Purpose Motors, Induction Motor, Universal Motor, Stepper Motor, Servomotors etc. (Qualitative analysis only)

UNIT VI (06 Hours)

Industrial Applications

Introduction to drives, sped control techniques, illumination and lighting control protocol, Electric Heating, Electric Welding, High Voltage DC transmission, UPS- On line and off line, LED drives, Solar PV.

List of Experiments

Minimum 6 experiments to be performed from the following List.

1. SCR/TRIAC/ MOSFET/IGBT Characteristics.
2. Triggering circuits and phase control circuits for SCRs/MOSFET Driver Circuits
3. Single phase FW bridge converter feeding DC motor.

4. Three Phase Converter (HW and FW Bridge)
5. Single phase AC Voltage Regulator
6. Chopper (Step up and Step down)
7. Single phase / three phase Inverter with Resistive/Induction Motor load.
8. Simulation of Converter / Chopper using MATLAB/ Lab View/ Multisim.
9. Simulation of PWM Inverter using MATLAB/ Lab View/ Multisim.

List of Assignments

1. Study of 1- phase AC to DC controlled converter (half controlled and full controlled).
2. Study of 3- phase AC to DC full controlled converter.
3. Study of Thyristor based dc to dc converter (dc chopper).
4. Study of a 3- phase PWM inverter with fixed (50Hz) output frequency and study of a non-PWM type inverter with 120-degree conduction of switches.
5. MOSFET based dc to dc converter (buck, boost and buck-boost types with non-isolated output voltage.)
6. Study of an industrial type fly-back dc to dc converter with isolated and regulated output voltage.
7. Case study of the real time application of electrical systems.

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. M. H. Rashid, “Power Electronics circuits devices and applications”, PHI 3rd edition, 2004 edition, New Delhi.
2. M. D. Singh & K B Khanchandani, “Power Electronics”, TMH, New Delhi.

Reference Books

1. P.C. Sen, “Modern Power Electronics”, S Chand & Co New Delhi.
2. Ned Mohan, T. Undeland& W. Robbins, “Power Electronics Converters applications and design” 2nd edition, John Willey & sons.
3. B. L. Thareja& A. K. Tahreja, “Electrical Technology” Volume 1 & 2, S.Chand Publications.
4. H. Cotton, “Electrical Technology”, CBS.
5. Nagrath Kothari, “Electrical Machines”, TMH.

SUBJECT: PROFESSIONAL SKILLS DEVELOPMENT

TEACHING SCHEME	:	**Theory : 4 Hours / Week**
EXAMINATION SCHEME	:	**End Semester Examination: 50 Marks**
CREDITS ALLOTED	:	**2**

Course Pre-requisites

The Students should have knowledge of

1. Basic math's and reasoning, the rules of English and comprehensive ability
2. Basic awareness of phrasal verbs used in spoken communication and knowledge of verbs and other words used in professional life.
3. Basic writing techniques taught to them in the first semester.
4. The strengths and achievements analyzed during self awareness session taught in the second semester. They should also be able to identify their long term and short term goals.
5. Basic knowledge and idea about leaders and leadership qualities.
6. Basic awareness of PowerPoint presentation and paper presentation and also should be fluent in English.

Course Objectives

The Professional Skills Development course which is a combination of aptitude and soft skills aims to augment students to face the campus recruitment test and train them on applying short techniques/ tricks to solve questions of Maths, reasoning and English in very less amount of time. The English and soft skills section focuses on the higher aspects of soft skills such as grooming them on leadership, presentation, business communication which would enable them to project themselves as professionals in the corporate sector and/or otherwise.

Course Outcomes

The student should be able to

1. Solve the aptitude test in the recruitment exam and competitive

exam by applying short techniques and solve the question in less amount of time. They would be able to handle around 15-20 topics of math's and reasoning and 50 rules of parts of speech.

2. Present themselves with finesse by using around 25-20 idioms and phrases relevant to corporate communication as well as spoken English. They will also learn 50-60 words and other words that are specifically used in meetings, group discussions, presentation and other corporate events.
3. Process their ideas and thoughts (verbal communication) into written communication in an effective, coherent and logical manner within a stipulated time and specific word limit of 500-750 words for essay writing along with limited words for technical writing and report writing.
4. Identify themselves in terms of their strengths. Weaknesses and opportunities available to them for the career growth. They would also learn to overcome their weakness and convert into strengths and also make utilization of the opportunity vis-à-vis their strength. They would also learn to set realistic short/long term goals relevant to them through the SMART goal mnemonic.
5. Differentiate between the different types of leaders and groom themselves to be potential leaders. Based on their qualities and strengths they would learn 5 types of leadership styles and mould themselves according to that. They would also learn 10-15 leadership traits.
6. Prepare PowerPoint presentation and paper presentation effectively by focusing on body language, tone of communication and audiences' needs. They would also learn to handle the questions in an effective and smart way.

Unit I (18 Hours)

Aptitude (Maths, Logical Reasoning, English)

- **Maths**
  - i) Enjoy maths + Number system

ii) Number system

iii) Percentage, profit and loss

- **Logical Reasoning**

  i) Coding, Decoding, Number series,

  ii) Blood relation Directions, cubes & dices

- **English**

  i) Vocabulary-1

  ii) Confusing words-1(Homonyms)

<u>Unit II</u> (6 Hours)

Essential Grammar - III

- Idioms and phrases
- Usage of Idioms & phrases in daily conversation
- Activities
- Academic word list- Words to be used in business communication

<u>Unit III</u> (4 Hours)

Written Communication- II

- Essay writing
- Mnemonics to develop ideas and write essays
- Structure of essays
- Technical writing
- Report writing

<u>Unit IV</u> (6 Hours)

SWOT Analysis

- Introduction to SWOT
- Importance to SWOT

- Individual & Organizational SWOT Analysis
- Identifying strengths, weaknesses, threats & opportunities
- Short term goals& Long term goals, Career planning

Unit V (4 Hours)

Interpersonal Skills - III

- Introduction to leadership skills
- Importance of leadership skills
- Types of leadership skills
- Are leaders born or made?

Unit VI (4 Hours)

Presentation Skills

- Introduction to PowerPoint presentation
- Structure & flow of presentation
- Importance of body language
- Presentation by students-evaluation& feedback by trainers

Text Books

1. APAART: Verbal Ability
2. APAART: Logical Reasoning
3. APAART: Quantitative Aptitude
4. APAART: Speak Well 1 (English Language and Communication)
5. APAART: Speak Well 2 (Soft Skills)

SUBJECT: - DIGITAL SIGNAL PROCESSING

Teaching Scheme	**Examination Scheme**	
Lecture: 4 Hours/week	**End Semester Exam**	**: 60 Marks**
Practical: 2 Hours/week	**Continuous Assessment**	**: 40 Marks**
	TW & OR	**: 50 Marks**
	Credits	**: 05**

Course Prerequisite

- Signals and System

Course Objective

- To introduce the student to a very broad and advanced topic of Digital Signal Processing (DSP) which is one of the core subjects in the curriculum.
- To teach the student the basic concepts and tools in the field of DSP
- To enable the student to apply knowledge of Digital Signal Processing (DSP) in the fields of Signal Processing, Communication, Speech Processing, Instrumentation, Medical Electronics and research

Course Outcomes

After the successful completion of the course the student will be able to

1. To enumerate the advantages of DSP over processing in analog domain.
2. To be able to find Discrete Fourier Transform of a digital signal.
3. To design a Finite Impulse Response (FIR) Filter given the specifications.
4. To design a Infinite Impulse Response (IIR) Filter given the specifications.
5. To quantify the finite word length effects in the field of DSP.
6. To enumerate the features of a DSP Processor.

<u>UNIT 1</u> (7 Hours)

Introduction

Basic elements of DSP and its requirement, Advantages of digital over analog signal processing, z-Transform and its application to the analysis of LTI systems, Discrete Complex exponentials and their properties, Frequency domain analysis of LTI systems, Frequency response of LTI systems, LTI systems as Frequency selective filters

<u>UNIT 2</u> (9 Hours)

Discrete Fourier Transform

Overview of Frequency Analysis of signals, Discrete Time Fourier Transform(DTFT), Discrete Fourier Transform as Sampled DTFT, Properties of DFT, Linear filtering methods based on DFT and IDFT, Goertzel Algorithm, Frequency analysis using DFT. FFT algorithms, Saving in computation achieved by FFT algorithm, Decimation in time and decimation in frequency FFT algorithms, Butterfly computation.

<u>UNIT 3</u> (9 Hours)

FIR Filter Design

Advantages and overview of FIR filters, Symmetric & Anti-symmetric FIR filters, Design of FIR filters using windows, Frequency sampling method, Equiripple optimum Chebyshev FIR filter design, Alternation theorem, Design of some special FIR filters: FIR differentiators, Hilbert Transformers and Raised Cosine Filters. FIR filter structures - Direct form, Cascade form and Frequency-Sampling structures.

<u>UNIT 4</u> (9 Hours)

IIR Filter Design

Advantages and overview of IIR Filters, IIR Filter design methods - Approximation of derivatives, Impulse invariance, Bilinear transformation. Limitations of the design methods, Designing of Butterworth and Chebyshev Filters, Frequency transformations in analog and digital domain, IIR filter structures - Direct form, Cascade Form, Parallel form structures and Lattice & Lattice-ladder structures

UNIT 5 (7 Hours)

Finite Word Length Effects

Overview of Finite Word Length Effects, Quantization process and errors, Coefficient quantization effects, Arithmetic round-off errors, Dynamic range scaling, Limit cycles in IIR digital filters, Round-off errors in FFT algorithms, Minimizing the Finite Word Length Effects

UNIT 6 (7 Hours)

DSP Processors And Applications Of DSP

Need for special purpose DSP Processors, Features of DSP Processors: Harvard and Modified Harvard Architectures, Bus structure, Addressing Modes, Processing Units, Address Generators, Single Cycle Execution. Case study of TMS320C67x DSP processor. Major applications of DSP: DTMF, Spectral Analysis, Musical Sound Processing, Transmultiplexers, Oversampling A/D and D/A converters

List of Experiments

Assignments to be carried out using software such as MATLAB

1) To plot magnitude and phase Spectra of DFT of a given sequence.
2) To verify properties of DFT
3) To implement filter using overlap add and overlap save method
4) To design FIR Filter for given specifications.
5) To design IIR Filter for given specifications.
6) To observe Finite Word Length Effect in any one application in DSP
7) To do Spectral Analysis of a real signal
8) To implement Dual Tone Multi Frequency signal generation and detection.
9) To implement an FIR Filter on a DSP Processor

List of Assignments

1) Write down what changes were brought due to the transition from analog processing to digital processing in any one field such as telephone system or a audio playback system.
2) Write down the significance of the contribution by Cooley and Tookey to the field of DSP.
3) Justify the need of window function in the design of FIR filter by windowing method.
4) What are the limitations of each of the IIR Filter design method?
5) Compare the structures used to implement digital filters with respect to Finite word length effects.
6) Write down the features of any one commercially available DSP Processor.

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. J. G. Proakis, D. G. Manolakis, "Digital Signal Processing ", PHI
2. S. K. Mitra, "Digital Signal Processing", TMH

Reference Books

1. D. G. Monolakis, V. K. Ingle, 'Applied Digital Signal Processing', Cambridge University Press
2. A. V. Oppenheim, R. W. Schaffer, "Discrete Time Signal Processing ", PHI
3. B. Venkataramani, M. Bhaskar, 'Digital Signal Processors', TMH

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – VI

SUBJECT: - EMBEDDED SYSTEMS

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/week	End Semester Exam	: 60 Marks
Practical: 2 Hours/week	Continuous Assessment	: 40 Marks
	TW & OR	: 50 Marks
	Credits	: 04

CoursePrerequisites

Fundamentals of Computer, Digital Logic Circuits, Computer Organization and Architecture.

Course Objectives

- To understand need and application of ARM Microcontroller in embedded system.
- To study the architecture of ARM series microcontroller
- To understand architecture and features of typical ARM7& ARM CORTEX-M3 Microcontroller.
- To learn interfacing of real world input and output devices

Course Outcomes

On successful completion of this course, students will be able to

1. Develop Firmware Embedded Systems.
2. Interface the advanced peripherals to microcontrollers.
3. Design embedded system with available resources.

UNIT 1 (4 Hours)

Introduction to Embedded Systems

Definition of Embedded System, Embedded Systems Vs General Computing Systems, Classification, Characteristics of Embedded Systems, Hardware and Software components of an Embedded System, Introduction to IDEs. Major Application Areas.

UNIT 2 (8 Hours)

Introduction to embedded programming & RTOS

Introduction to embedded data types in embedded C, addressing memory & I/O, I/O functions of embedded C. Examples on Embedded C.

RTOS: Architecture of kernel, Task and Task scheduler, Interrupt service routines, Semaphores, Mutex, Mailboxes, Message queues, Event registers, Pipes, Signals, Timers, Memory management, Priority inversion problem.

UNIT 3 (8 Hours)

ARM7 Based Microcontroller

Introduction to ARM processors and its versions: ARM7, ARM9 & ARM11 features, ARM7 data flow model, programmer's model, modes of Operations, Overview of Instruction set.

ARM7 Based Microcontroller LPC2148: Features, Architecture (Block Diagram and Its Description), System Control Block (PLL and VPB divider) , Memory Map, GPIO, Pin Connect Block, timer.

UNIT 4 (6 Hours)

Interfacing with ARM7

Interfacing the peripherals with LPC2148: LED, LCD, GLCD, KEYPAD, GSM and GPS using UART, on-chip ADC using interrupt (VIC), EEPROM using I2C, SDCARD using SPI, on-chip DAC for waveform generation.

UNIT 5 (6 Hours)

ARM CORTEX Processors

Introduction to ARM CORTEX series, improvement over classical series. CORTEX A, CORTEX M, CORTEX R processors series, versions, features and applications.

ARM-CM3 Based Microcontroller LPC1768: Features, Architecture (Block Diagram & Its Description), System Control, Clock & Power Control, GPIO and Pin Connect Block.

UNIT 6 (4 Hours)

Interfacing with ARM CORTEX M3

Interfacing peripherals with LPC1768: RGB LED, Seven Segment, TFT Display, MOTOR control using PWM.

List of experiments

Any 8 of below given experiments.

1. Interfacing LPC2148 with LCD/GLCD
2. UART Interfacing LPC2148 in embedded system (GSM/GPS)
3. Interfacing LPC2148 for internal ADC on interrupt basis
4. Interfacing SD card with LPC2148
5. Interfacing EEPROM with LPC2148 using SPI protocol
6. SRAM interfacing with LPC2148/LPC1768.
7. Interfacing LPC1768 to Seven Segment / RGB LED
8. Generation of PWM signal for motor control using LPC1768
9. Interfacing TFT display to LPC1768
10. Implementing CAN protocol using LPC1768
11. Implementing ETHERNET protocol using LPC1768.
12. Semaphore as signaling and synchronizing in ARM7.
13. Mailbox implementation for message passing in ARM7

List of Assignments

1. Case study of any one of the latest ARM processors and Power point presentation of the same in class.
2. Survey of CORTEX M3 based controllers, its features and comparison.
3. Design of Firmware Embedded system using LPC 2148 (Simulation only).
4. Design of Firmware Embedded system using LLPC1768 (Simulation only).
5. Case study of any one of the RTOS with examples.

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. Rajkaml, "Embedded system-Architecture, Programming and Design", TMH Publications, Edition 2003
2. Andrew Sloss, Dominic Symes, Chris Wright, "ARM System Developer's Guide –Designing and Optimizing System Software", ELSEVIER
3. Joseph Yiu, "The Definitive Guide to the ARM Cortex-M", Newness, ELSEVIER

Reference Books

1. LPC 214x User manual (UM10139):- www.nxp.
2. LPC 17xx User manual (UM10360) :- www.nxp.com
3. ARM architecture reference manual : - www.arm.com
4. Trevor Martin,"AnEngineer's Introduction to the LPC2100 series", Hitex (UK) Ltd.

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – VI

SUBJECT: VLSI DESIGN

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/Week	End Semester Exam	: 60 Marks
Practical: 2 Hours/Week	Continuous Assessment	: 40 Marks
	TW& PR	: 50 Marks
	Credits	: 04

Course Prerequisite

Analog Electronics, Digital Electronics and Semiconductor Physics

Course objectives

To introduce students to VLSI Design, Fabrication and Testability techniques.

Course Outcomes

- Ability to design analog and digital VLSI circuits.
- Ability to study fabrication theory and to implement stick diagrams.
- Ability to design and simulate digital circuits using VHDL.
- Ability to learn low power CMOS VLSI design.
- Ability to understand the concepts of Design for Testability.

Unit-I (06 Hours)

Introduction to VLSI Design– Introduction to VLSI, VLSI Design Flow, Design Hierarchy, Concepts of Regularity, Modularity & Locality.

Fabrication of MOSFETs-Introduction, Fabrication Process flow: Basic steps, C-MOS n-Well Process, Layout Design rules, Stick Diagram of NAND, NOR, Inverter

UNIT-II (06 Hours)

MOS Transistor- The Metal Oxide Semiconductor (MOS) structure, The MOS System under external bias, Operation of MOS transistor, MOSFET Current-

Voltage characteristics, MOSFET scaling & small-geometry effects, MOSFET capacitances.

MOS Inverters – CMOS Inverter Characteristics, Delay – Time Definitions, Calculation of Delay Times, and Inverter Design with Delay Constraints.

UNIT-III (6 Hours)

Digital VLSI Design-1

VHDL Entity-Architecture Concepts, Introduction to various modeling styles of VHDL (Behavioral, Dataflow and Structural), VHDL Basic Elements (Data types, Data objects and Operator),Dataflow Modeling: Example based on dataflow modeling, When-Else and With Select Statement, Structural modeling: Concept of Component .

UNIT-IV (6 Hours)

Digital VLSI Design-2

Behavioral modeling for digital design, If-else, Loop, Case and Wait Statements. Moore and Mealy FSM Design using VHDL, Overview of PLDs, CPLD and FPGA architecture overview, Modes of configuration.

UNIT- V (6 Hours)

Low – Power CMOS Logic Circuits

Introduction, Overview of Power Consumption, Low Power Design through Voltage scaling, Estimation and Optimization of switching activity, Reduction of Switched Capacitance and Adiabatic Logic Circuits.

UNIT- VI (6 Hours)

Design for Testability

Introduction, Fault Types and Models, Controllability and Observability, Ad Hoc Testable design Techniques, Scan Based and BIST Techniques

List of experiments

1. Introduction to Xilinx tools and design of various Gates.
2. Dataflow Modeling -1
   - A) Design Full-adder using dataflow modeling.
   - B) Design 3x8 Decoder using dataflow modeling.
3. Dataflow Modeling-2
   - A) Design 8x3 encoder using when else statement.
   - B) Design 4x1Multiplexer using with select statement.
4. Structural Modeling-1
   - A) Design a Half adder using Structural modeling.
   - B) Design a 4bit adder using Full adder as component.
5. Sturctural Modeling-2

   Design 8-bit odd parity detector using Structural Modeling. Assume 2i/p X-OR as component.
6. Behavioral Modeling-1
   - A) Implimentation of Positive edge triggered D-FF.
   - B) Implimentation of Positive edge triggered T-FF.
7. Behavioral Modeling-2
   - A) Design a 4bit buffer register.
   - B) Design a 4bit Ring counter using wait statement.
8. FSM Design-1

   Design a BCD counter using Moore FSM
9. FSM Design-2

   Implement sequence detector 1010 using Mealy machine.
10. Layout Design-1

    Introduction to Microwind and design of Inverter.
11. Layout Design-2

    Using Mircrowind, Design NAND and NOR.

List of Assignments

1. Any one complex Digital VLSI Design Example using VHDL
2. Presentation based on any advanced topics of VLSI Design.
3. Layout design of Ring Oscillator using Microwind

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. Sung-Mo Kang &YosufLeblebici, "CMOS Digital Integrated Circuits: Analysis & Design", TMH, 3rd Edition.
2. Douglas Perry, "VHDL: Programming by Example", McGraw Hill, Fourth Edition, 2002.

Reference Books

1. Neil H.E. Weste, Davir Harris, "CMOS VLSI Design: A Circuits and system perspectives", Pearson Education 3rd Edition, 2004.
2. Charles Roth, Larry Kinney, "Fundamentals of Logic Design", Cengage Learning, Seventh edition, 2014.
3. J. Bhaskar "A VHDL Primer", PHI Learning, Third Edition, 1998.
4. V. Pedroni , "Circuit Design and Simulation with VHDL", MIT Press, Second Edition, 2010

SUBJECT: - MICROWAVE THEORY AND ANTENNAS

Teaching Scheme	Examination Scheme	
Lecture: 3 Hours/Week	End Semester Exam	: 60 Marks
Practical: 2 Hours/Week	Continuous Assessment	: 40 Marks
	TW& OR	: 25 Marks
	Credits	: 04

Course Prerequisites

Students should have basic knowledge of

- Electromagnetic engineering

Course objective

- Todevelop ability to design antenna and understanding of Microwave communication.

Course Outcomes

On successful completion of this course, students will be able

1. To perform wave propagation on a line and Use Smith chart.
2. To understand concepts of Modes and Calculate network parameters.
3. To understand Microwave devices and use them.
4. To calculate antenna parameters.
5. To design different Antenna arrays.
6. To Design Microstrip Antenna.

UNIT 1 (6 Hours)

Introduction and Transmission Line Theory

Applications of Microwave Engineering, A Short History of Microwave Engineering, Wave Propagation on a Transmission Line, The Lossless Line, Transmission Line Parameters, Propagation Constant, Group Velocity, Power Flow for the Lossless Coaxial Line, The Combined Impedance–Admittance

Smith Chart, The Quarter-Wave Transformer, Load Matched to Line, Conjugate Matching, The Terminated Lossy Line, Single-Stub Tuning, Shunt Stubs Series Stubs, Double-Stub Tuning, Smith Chart Solution

UNIT 2 (6 Hours)

Waveguides and Network Parameters

Concept of Mode, Characteristics of TEM, TE and TM Modes, Losses associated with microwave transmission Concept of Impedance in Microwave transmission, Coaxial Line.

Rectangular Waveguide, Circular waveguide, Equivalent Voltages and currents for non-TEM lines. Network parameters for microwave Circuits, Scattering Parameters

UNIT 3 (6 Hours)

Microwave Devices

Microwave Passive components: Directional Coupler, Power Divider, Microwave Passive components: Magic Tee, attenuator, resonator, Microwave Active components: Diodes, Transistors, Microwave Active components: oscillators, mixers, Microwave Semiconductor Devices: Gunn Diodes, Schottky Barrier diodes, PIN diodes, Microwave tubes: Klystron, TWT, Magnetron, klystron Amplifier

UNIT 4 (6 Hours)

Antenna parameters

Introduction ,Types of Antennas ,Radiation Mechanism ,Radiation Pattern ,Radiation Power Density ,Radiation Intensity ,Beam width , Directivity, Numerical Techniques, Antenna Efficiency ,Gain , Beam Efficiency , Bandwidth, Polarization ,Input Impedance , Antenna Radiation Efficiency ,Antenna Vector Effective Length and Equivalent Areas ,Maximum Directivity and Maximum Effective Area , Friis Transmission Equation and Radar Range Equation , Antenna Temperature , Far-Field Radiation

UNIT 5 (6 Hours)

Antennas and its array

Small Dipole, Finite Length Dipole, Half-Wavelength Dipole, Cylindrical Dipole, Folded Dipole ,Loop antennas, Circular Loop of Constant Current, Two-Element Array, N-Element Linear Array: Uniform Amplitude and Spacing, N-Element Linear Array: Uniform Spacing, Non uniform Amplitude, Circular Array , Traveling Wave Antennas, Broadband Antennas, Log-Periodic Antennas, Fractal Antennas

UNIT 6 (6 Hours)

Microstrip and Other antennas

Field Equivalence Principle: Huygens' Principle, Babinet's Principle,Microstrip Antennas , Rectangular Patch, Circular Patch, Quality Factor, Bandwidth, and Efficiency, Input Impedance, Coupling, Arrays and Feed Networks, Horn Antennas, Conical Horn, Parabolic Reflector Antennas, Smart-Antenna, Signal Propagation in Smart antennas ,Mobile Ad hoc Networks, Smart-Antenna System Design.

List of Experiments

Any of the 8 below Experiments.

1. Frequency & Wavelength measurement of Klystron tube.
2. Determination of VSWR & reflection Coefficient
3. I-V characteristics of Gunn diode.
4. Frequency & Wavelength Measurement
5. Study of Magic tree
6. Design of Microstrip antenna using Ansys HFSS
7. Design of Horn antenna using Ansys HFSS
8. Design of parabolic antenna using Ansys HFSS
9. Design of antenna with array using Ansys HFSS
10. Study of Smart antennas

List of Assignments

1. Case study of Research paper on Antenna.
2. Design and research Paper publication.
3. Advance applications in Microwave and Antenna.
4. PPT presentation on Subject Topic

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

2.	Unit Test	2.	Assignments
3.	Continuous Assessment	4.	End term Examination

Text Books

1. Microwave Engineering by David M Pozzar (John willy& sons).
2. Antenna theory and Design C.A Balanis (John willy& sons.).

Reference Books

1. R. E. Collin, "Antennas and Radio Wave Propagation", McGraw-Hill.,
2. F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill., 2005
3. W. L. Stutzman, and G. A. Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons. 1998.

SUBJECT: - INFORMATION THEORY & CODING

Teaching Scheme
Lecture: 3 Hours/week

Examination Scheme
End Semester Exam : 60 Marks
Continuous Assessment : 40 Marks
Credits : 03

Course Prerequisites

- Digital Communication
- Analog Communication
- Signals and Systems

Course Objectives

- To introduce the student to the field of Information Theory.
- To introduce the student to the fundamental concepts in information theory
- To enable the students to apply the algorithms of source coding and channel coding.

Course Outcomes

On successful completion of this course, students will be able to

1. To find a source code for a given information source and calculate its efficiency.
2. To find the mutual information for a given source and a channel.
3. To find the channel capacity for a given channel
4. To find the error correcting capacity for a given linear block code
5. To find the encoding and decoding circuit for a given cyclic code.
6. To apply Viterbi decoding algorithm for a given received sequence

UNIT - I (6 Hours)

Source Coding

Introduction, Historical Perspective of Information Theory, Information: Definition and physical significance, Properties of Information, Information Source, Discrete Memoryless Source, Binary Source, Entropy, Properties of Entropy, Some Source Coding Algorithms: Huffman Coding, Shannon-Fano Coding. Average Code length, Efficiency, Source Coding Theorem, Lempel-Ziv Coding.

UNIT – II (6 Hours)

Mutual Information And Channel Coding Theorem

Discrete Memoryless Channel, Channel Matrix, Mutual information, Conditional Entropy, Joint Entropy. Physical Significance of Mutual Information, Properties of Mutual Information, Channel Capacity, Channel Coding Theorem, Error Free Communication, Verification of Channel Coding Theorem for Binary Symmetric Channel.

UNIT - III (6 Hours)

Channal Capacity Theorem

Differential entropy and mutual information for continuous ensembles, Differential entropy for Gaussian distribution, Channel Capacity Theorem, Sphere Packing Problem, Implications of Channel Capacity Theorem, Rate Distortion Theory.

UNIT - IV (6 Hours)

Linear Block Codes

Introduction: Need of Error Control Coding, Classification of Error Correcting Codes, Error Detection and Error Correction Techniques, Systematic and nonsystematic Codes, Code rate. Linear Block Codes, Generator and Parity Check Matrices, Hamming Codes, Syndrome: definition and properties, Syndrome decoding, Hamming Bound, Perfect Code.

UNIT -V (6 Hours)

Cyclic Codes

Cyclic Codes: Properties and significance, Generator Polynomial and its properties, Parity Check Polynomial, Syndrome Polynomial and its properties, Encoding and Decoding of Cyclic Codes using shift register. Overview of BCH Codes, RS codes, Golay codes, Burst error correcting codes.

UNIT- VI (6 Hours)

Convolutional Codes

Introduction, Encoding of Convolutional Codes, Code Tree, State diagram and Trellis Diagram, Transform Domain Approach, Maximum Likelihood Decoding-Viterbi Algorithm, Sequential Decoding, Overview of Turbo Codes.

List of Assignments

1. To find Huffman code, average code length, coding efficiency for a given source.
2. To find mutual information for a given source and channel.
3. To find the channel capacity of a practical channel such as telephone line.
4. To find minimum distance for a given linear block code.
5. To find generator matrix representation for a given generator polynomial.
6. To decode a given received sequence of bits for a given convolutional code using Viterbi Algorithm

Content Delivery Methods

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes.

Assessment Methods

1. Unit Test
2. Assignments
3. Continuous Assessment
4. End term Examination

Text Books

1. Simon Haykin, ‘ Communication Systems’ 4th edition, John Wiley & Sons
2. Ranjan Bose, “Information Theory Coding and Cryptography” Tata McGraw-Hill.

Reference Books

1 K. Sam Shanmugam, “Digital and analog communication systems”, John Wiley.

2 Thomas M. Cover, Joy A. Thomas,” Elements of Information Theory, 2nd Edition”, Wiley Publication.

3 Roberto Togneri, Christopher J.S deSilva “Fundamentals of Information Theory and Coding Design”, CRC Press.

4 Steven Roman,” Introduction to Coding and Information Theory”, Springer New York.

5 N. T. Markad “Communication System”, I K International Publishing House Pvt. Ltd., New Delhi.

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – VI

SUBJECT: - ELECTRONIC CIRCUIT DESIGN & PRACTICES

Teaching Scheme	**Examination Scheme**	
Practical: 2 Hours/Week	**TW & OR**	**: 25 marks**
	Credits	**: 01**

Course prerequisites

- Knowledge of basic electronics components

Course objective

The aim is to enable the student to undertake an independent survey into a relevant area.This course is to familiarize the student with the analysis and design of Electronics circuits.

Course Outcomes

On successful completion of this course, students will be able to

- Design and implementation of small electronics systems
- Model and quantitatively analyze circuits with transistors and other nonlinear devices;
- Construct and test electronic circuits in the laboratory;
- Use software tools to simulate the behavior of electronic circuits

Contents

- Tutorial and Laboratory work should consists of design and implementation of small electronics systems based on OP-AMP,Timer 555 IC, encoders, decoders, multiplexers, demultiplexers, switching regulators, PLL etc.
- A group consists of two students, who will work on one system for entire semester.
- The work includes design, implementation, validation and report writing of the system.

Note: Microcontroller based systems are strictly not allowed.

List of Experiments

- Minimum 8 Experiments based on syllabus using simulation software.

Content Delivery Methods

Chalk & talk, Power point presentation

Assessment Methods

1. End term oral performance

Text Books

- Millman J. and Halkias .C "Integrated Electronics ", 2nd Edition, Tata McGraw-Hill, 2001.

Reference Books

4. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuit Theory”, 8th Edition. PHI, 2002.
5. S.Salivahanan, et.al, “Electronic Devices and Circuits”, TMH, 2008.
6. Floyd, Electronic Devices, Sixth edition, Pearson Education, 2003.
7. I.J. Nagrath, Electronics – Analog and Digital, PHI, 2009.

B.TECH (ELECTRONICS & TELECOMMUNICATION) SEM – VI

SUBJECT: PROFESSIONAL SKILLS DEVELOPMENT

TEACHING SCHEME	:	**Theory : 4 Hours / Week**
EXAMINATION SCHEME	:	**End Semester Examination: 100 Marks**
CREDITS ALLOTED	:	**4**

Course Pre-requisites

The Students should have knowledge of

1. Basic concepts of Maths, Logical reasoning and English Grammar taught in the last semester.
2. An overall idea about the difference in personal and professional communication in terms of vocabulary used.
3. Knowledge of writing skills, importance of professionalism in emails and letters.
4. They should be aware of concepts of self esteem, self-assessment and its importance in setting long term and short term goals.
5. Awareness of the interpersonal skills like team work and introduction to Leadership taught during the last semester.
6. Body language and importance of non verbal communication to maintain professionalism.

Course Objectives

The Professional Skills Development 4 is an extension of PSD- 3 with focus on the remaining topics of Maths and Logical reasoning. The further complex concepts of Aptitude and Grammat aims to acquaint them with the level of complexity presented in recruitment tests and also provide them techniques to solve such question with tricks/methods in a very short period. The English communication and soft skills section of PSD-4 focuses on the higher aspects of soft skills such as grooming them on corporate etiquettes and various formats of email/ letter writing so that can present themselves as professionals further both in oral and written communication.

Course Outcomes

The student should be able to

1. Learn further concepts of Maths, Logical reasoning and English grammar and apply short cuts/ tricks to solve questions in less time. Learn remaining 25-30 rules of grammar relevant from the recruitment point of view.
2. Use appropriate words in the right context both academically and professionally. Students would have approximately around 80-100 words from the academic word list prescribed in the syllabus.
3. Understand the importance of email etiquettes and distinguish between the format of formal and informal emails/letters. They would be able to draft professional mails and letters like job application letters, cover letters, and apology emails with proper structure and words which are necessary in the corporate life.
4. Apply various strategies of conflict resolution through amicable way to settle team conflicts/disputes. They would learn to handle criticism and feedback in a positive way as an individual as well as a team.
5. Understand the major concepts of leadership like coaching, mentoring. They would learn effective time management strategies- Pareto principle (the 80-20 rule of time management) and apply them in the corporate life.
6. Understand the importance of grooming, body language and etiquettes in the corporate sector. They would be able to conduct themselves in a professional and impressive way by conducting themselves according to situations in the professional sector. They would also learn various strategies and conversational techniques to handle telephonic interviews confidently.

Unit I (18 Hours)

Aptitude (Maths, Logical Reasoning, English)

- **Maths**
  - i) Simple Interest and Compound Interest
  - ii) Ratio, Proportion and Average
  - iii) Mixture and Allegation

- **Logical Reasoning**
  i) Data Interpretation
  ii) Data Sufficiency
- **English**
  i) Grammar I
  ii) Vocabulary - Analogies

Unit II (4 Hours)

Essential Grammar - IV

- Vocabulary – Academic word List

Unit III (6 Hours)

Written Communication- III

- Email writing and etiquettes – formal and informal email writing, format of various types of email, do's and don'ts of email writing
- Letter writing – formal letters, job application letter, cover letter.
- Essay writing – mnemonics top develop ideas and write essays, structure of essays

Unit IV (4 Hours)

Self Awareness and Conflict Resolution

- Self-assessment & Perception & attitudes.
- Analyzing skills & weaknesses and habits.
- Developing positive attitude & handling criticism positively
- Handling conflicts in the personal and corporate sector
- Causes of conflicts in work scenario.
- Ways and methods for conflict resolution

Unit V (6 Hours)

Interpersonal Skills - III

- Mentoring, Difference between Leadership and Management
- Leading with examples
- Time management -The Time Management Matrix, Pareto Principle

Unit VI (4 Hours)

Corporate Etiquettes and Grooming

- Introduction to grooming & etiquettes
- Ways of handling telephonic interviews

Text Books

1. APAART: Verbal Ability
2. APAART: Logical Reasoning
3. APAART: Quantitative Aptitude
4. APAART: Speak Well 1 (English Language and Communication)
5. APAART: Speak Well 2 (Soft Skills)

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standars of Passing and ATKT Rules

1. For all courses, both UE (Universtiy Evaluation) and IA (Internal Assessment) constitue separate heads - of - passing (HoP). In ordar to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0 (40 % Marks) at UE and also a minimum grade point of 5.0 (40 % Marks) at IA.

OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50 % Aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fail at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

1. A student is allowed to carry backlog of courses prescribed for B.Tech Sem - I, III, V, VII to B.Tech Sem - II, IV, VI, VIII respectively.
2. A student is allowed to keep term of Sem - III, if he/she is failing in any number of subjects of Sem I & II.
3. A student is allowed to keep term of Sem - V, if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem - I & II.
4. A student is allowed to keep term of Sem - VII, if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem - III & IV.

Award of Class for the Degree Considering CGPA

Award of Honours

A student who has completed the minimum credits specified for the programme shall be decleared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
9.50 ≤ CGPA ≤ 10.00	0	Outstanding	80 ≤ Marks ≤ 100
9.00 ≤ CGPA ≤ 9.49	A+	Excellent	70 ≤ Marks ≤ 80
8.00 ≤ CGPA ≤ 8.99	A	Very Good	60 ≤ Marks ≤ 70
7.00 ≤ CGPA ≤ 7.99	B+	Good	55 ≤ Marks ≤ 60
6.00 ≤ CGPA ≤ 6.99	B	Average	50 ≤ Marks ≤ 55
5.00 ≤ CGPA ≤ 5.99	C	Satisfactory	40 ≤ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40

BHARATI VIDYAPEETH DEEMED UNIVERSITY
Pune.

Faculty of Engineering & Technology
Programme : B. Tech. (E & TC)

COURSE STRUCTURE AND SYLLABUS
(Choice Based Credit System - 2014 Course)
(Electronics & Telecommunications) Sem:-VII & VIII

Bharati Vidyapeeth Deemed University, Pune

Bharati Vidyapeeth, the parent organization of this University is one of the largest educational organizations in the country. It has 171 educational units under its umbrella including 67 Colleges and Institutes of conventional and professional education.

The Department of Human Resource Development, Government of India on the recommendations of the University Grants Commission accorded the status of "Deemed to be University" initially to a cluster of 12 units of Bharati Vidyapeeth. Subsequently, 17 additional colleges / institutes were brought within the ambit of Bharati Vidyapeeth Deemed University wide various notifications of the Government of India. Bharati Vidyapeeth Deemed University commenced its functioning on 26th April, 1996.

Constituent Units of Bharati Vidyapeeth Deemed University

1. BVDU Medical College, Pune.
2. BVDU Dental College & Hospital, Pune
3. BVDU College of Ayurved, Pune
4. BVDU Homoeopathic Medical College, Pune
5. BVDU College of Nursing, Pune
6. BVDU Yashwantrao Mohite College of Arts, Science & Commerce, Pune.
7. BVDU New Law College, Pune
8. BVDU Social Sciences Centre (M.S.W.), Pune
9. BVDU Yashwantrao Chavan Institute of Social Science Studies & Research, Pune.
10. BVDU Centre for Research & Development in Pharmaceutical Sciences & Applied Chemistry, Pune
11. BVDU College of Physical Education, Pune.
12. BVDU Institute of Environment Education & Research, Pune
13. BVDU Institute of Management & Entrepreneurship Development, Pune
14. BVDU Poona College of Pharmacy, Pune
15. BVDU College of Engineering, Pune
16. BVDU Interactive Research School in Health Affairs (IRSHA), Pune
17. BVDU Rajiv Gandhi Institute of Information Technology & Biotechnology, Pune
18. BVDU College of Architecture, Pune
19. BVDU Abhijit Kadam Institute of Management & Social Sciences, Solapur
20. BVDU Institute of Management, Kolhapur
21. BVDU Institute of Management & Rural Development administration, Sangli
22. BVDU Institute of Management & Research, New Delhi

23. BVDU Institute of Hotel Management & Catering Technology, Pune
24. BVDU Yashwantrao Mohite Institute of Management, Malakapur-Karad
25. BVDU Medical College & Hospital, Sangli
26. BVDU Dental College & Hospital, Mumbai
27. BVDU Dental College & Hospital, Sangli
28. BVDU College of Nursing, Sangli
29. BVDU College of Nursing, Navi Mumbai

The status of University was given to a cluster of these colleges and institutes in appreciation of the high level of their academic excellence and for their potential for further growth.

During the last 20 years or so, the University has achieved higher pinnacles of academic excellence and has established its reputation to such an extent that it attracts students not only from various parts of India but also from abroad. According to a survey conducted by Association of Indian Universities, this University is one among the top ten Universities in the country preferred by the overseas students for admissions. At present, there are more than 850 overseas students from 47 countries on the rolls of constituent units of this University.

During the last 20 years, there has been tremendous academic expansion of the University. It now conducts in all 305 courses in its constituent units, of them 108 are Post Graduate, 45 are Under Graduate and 55 Diploma level courses. 12 Fellowship and 5 certificate courses. All the professional courses which the University conducts such as those of Medicine, Dentistry, Engineering etc., have approval of the respective statutory councils, viz., Medical Council of India, Dental Council of India, All India Council for Technical Education etc.

The University is a throbbing center of research activities and has launched Ph.D. programmes in 77 subjects and M.Phil in 3 subjects. It has also introduced quite few innovative academic programmes such as Masters in Clinical Optometry, M.Tech. in Nano Technology etc.

The University's performance and achievements were assessed by the "National Assessment and Accreditation Council" and it was reaccredited with a prestigious "A" grade in 2011. Some programmes of the constituent units such as College of Engineering at Pune, Management Institute in Delhi and others have also been accredited by "National Board of Accreditation". Three constituent units of Bharati Vidyapeeth Deemed University are also the recipients of ISO 9001-2001 certifications.

College Information :

Bharati Vidyapeeth University College of Engineering, Pune (BVUCOE) established in 1983, a constituent unit of BVU (University with 'A' Grade status by MHRD, accredited to Grade 'A' by NAAC in 2004 and 2011) and holds a place of pride and is amongst the most reputed institute. It has been ranked to 61st by National Institutional Ranking Framework (NIRF) with criteriawise ranking as 5th in Graduate Outcome (GO), 13th in Outreach and Inclusivity (OI), 44th in Teaching Learning Resources (TLR) and 62nd in Perception (PR). This also made institute to stand 4th in the State of Maharashtra. Further, DATAQUEST-CMR national survey also ranked this institute to 4th among private technical institutions of India, 29th by Times of India and 41st by OUTLOOK. This is the only institute selected by MHRD for its Technical Education Quality Improvement Programme (TEQIP-II – 1.1 Programme) for the grant of Rs. 4 Crores.

BVUCOE, Pune offers 09 graduate, 08 post graduates programmes and Doctoral programmes in 08 disciplines. All Programmes are accredited by National Board of Accreditation (NBA) twice and we have applied for third cycle of accreditation.

Institute has its own spacious well designed building measuring 26,286 sq. m. and it houses 101 labs, 43 class rooms, and 21 tutorial rooms. The library of the institute is a five storied building and houses periodical section, computer center, reading hall, reference section. It contents more than 60,000 books, 15,000 volumes, 80 national and 81 international journals subscription and digital library facility. Digital library of institute with 66,944 number of journals in e-form is one of the richest source of knowledge in e-form for students and faculty members. The Library, Laboratories, Equipments, Learning resources and Software constantly get upgraded and updated in tune with the changing time. An Investment of Rs.119.95 million is made in the last five years.

The structured faculty development programme has strengthened quality of Teaching - Learning Process in the institute. 35 faculty members with Ph. D. qualifications have been proved as resources for research, innovations and sound Teaching – Learning Process. As a part of quality improvement programme 04 number faculty members were deputed to International Universities, Institutions of national importance such as IIT, NIT etc. for qualification improvement. Team of 206 faculty members with average experience 11.7 years and average age 38.3 years indicates teachers with fine blend of experience and youth. Faculty members are well conversant and trained for use of latest softwares and latest equipments being purchased every year as policy of upgrading laboratories. In last five years college has invested Rs. 119.95 million in laboratory upgradation. Institute organized 138 number of continuing education programmes in last five years to keep sharpen skills of faculty members. Further, 1389 faculty members were deputed to attend various workshops and training programmes for sharing and enhancing their knowledge. Faculty members also play active role in curriculum development as Member of Board of Studies of various subjects and other statutory bodies of the University.

The research quality is indicative of the university penchant for quality. The research publications in reputed international and national refereed journals and conferences have shown a steady and significant rise over the years which is aptly reflected by 1091 Research papers publications in reputed national and international journals in last five years. Grant of Rs. 152.73 Lakhs from funding agencies such as UGC, DST, DRDO, AICTE etc. fetched by faculty members is strong indicator of research aptitude of faculty members. Seed money up to Rs. 3 lakhs under Institutionally Funded Research Programme (IFRP) nurtures research aptitude of faculty members. 575 number of publications in standard research databases such as SCOPUS, Web of Science, Google Scholar etc. in last five years throws light on quality of publications by faculty members of this institute. These publications by faculty members have received 137 number of citations in the same period. Institute has 02 patents to its credit and filed 05 patents.

The institute has collaboration with international universities such as North Carolina A & T State University, Greensboro, USA, Joint School of Nanoscience and Nanoengineering (JSNN), USA, The University of Tokushima, Japan, ARM University, USA and with industries such as TCS, SKF India Ltd. Every year one faculty member is deputed for Ph. D. programme in NCAT with scholarship. Students of M. Tech. (Nanotechnology) joins JSNN, USA to pursue their dissertation research work for six months with scholarship to the tune of $1000 per month. Further, NCAT, USA, The University of Tokushima, Japan contributes intellectually as well as financially to organize biannual international conference NANOCON. Three editions of NANOCON are conducted since 2010 with their association. In association with Eduvance & GAATsis, a " Center of Excellence in Embedded Systems" is established in the Institute with donation of Educational kits like ARM development boards from ARM University Program and PSoC kits by Cypress Semiconductors are used for developing projects in the sponsored laboratory. TCS supports students and faculty members for faculty enablement programmes and student development programme. Establishment of Lubricant Conditioning Monitoring Laboratory is outcome of collaboration with SKF India Ltd.

Being Deemed University college takes advantage of academic autonomy in making the curriculum industry oriented and enable students to make employable. In-plant training (45 days), courses such as Professional Skill Development introduced as integrated part of course structure. In-plant training enable students to interact within their associated industries for gaining practical field experience and professional exposure. Curriculum is Choice Based Credit System which makes students path of joining international universities for their higher studies smoother.

Today, qualitative soft skill development in students is more pertinent to a student's professional career. The institute regularly arranges training programme in the area of personality development, aptitude test, group discussion and personal interview. Through its Employment Enhancement Programme (EEP) designed for third year students which comprises of communication skill quantities analysis, corporate culture, IT Training and soft skills. This programme is conducted in association with professional institutes of national repute for effective execution and implementation. To enhance their professional experience and get them head start in the industry, an innovative programme is initiated on student mentoring "Saturday @ BV", wherein speakers are entrepreneurs and high ranked corporate who share their experiences, hardship and their corporate journey.

In it's long, multi-pronged, persistent and pain staking efforts for producing quality engineering professionals, institute has produced more than 1068 entrepreneurs.

PROGRAMME : E & TC ENGINEERING

Vision

Provide high quality Production Engineers to the insustry and society.

Mission

Promoting industry institute interaction.
Enhancing employability
Creating future leaders to fulfil the needs of industry.

Program Educational Objectives

1. Create innovative Production Engineers.
2. Pursue lifelong learning for professional development
3. To develop leadership qualities

Programme Outcomes

Graduate production engineer will be able to,

1. Apply knowledge of mathematics, science and engineering in Manufactuting industries.
2. Identify the need, plan and conduct experiments, analyze data for improving the manufacturing processes.
3. Design manufacturing systems that meet desired specifications and requirements.
4. Design and develop complex manufacturing system using statistical and advanced mathematical tools.
5. Use IT tools for prediction and modelling of production engineering activities with an understanding of the limitations.
6. Design Eco-friendly and sustainable safety manufacturing system.
7. Be professionally and ethically responsible to apply engineering tools to satisfy society needs.
8. Perform as a member or a leader in multidisciplinary teams.
9. Communicate in written and verbal form.
10. Manage projects in multidisciplinary environment as a member or leader of a team exhibiting his knowledge, understanding and managerial skills.
11. Engage in independent and life-long learning.

Bharati Vidyapeeth University, Pune
Faculty of Engineering & Technology
Programme: B.Tech (E&TC) Sem – VII (2014 Course)

Semester - VII											Contact Hours: 23 Hrs/week Total Credits: 25 Total Marks: 750			
Sr.no	Subject	L	T	P	Examination Scheme (Marks						Total Marks	Credits		
					Theory	Continuous Assessment			TW & PR	TW & OR		TH	TW	Total
						Unit Test	Tutorials / Assignments	Attendance						
41	Computer Networks	3	0	2	60	20	10	10	-	50	150	3	1	4
42	Project Management And Finance	3	0	0	60	20	10	10	-	-	100	3	0	3
43	Mobile and Broadband Communication	3	0	2	60	20	10	10	50	-	150	3	1	4
44	Radio Frequency Engineering	2	0	0	60	20	10	10	-	-	100	2	0	2
45	ELECTIVE-I	3	1	0	60	20	10	10	-	50	150	3	1	4
46	Project Stage-I	0	0	4	-	-	-	-	-	50	50	0	4	4
47	In-plant Training	0	0	0	-	-	-	-	-	50	50	0	4	4
	Total	**14**	**01**	**08**	**300**	**100**	**50**	**50**	**50**	**200**	**750**	**14**	**11**	**25**

Elective -I:

1) Wireless Sensor Network
2) Advanced Digital Signal Processing
3) Digital Image Processing
4) Advanced Computer Programming

Bharati Vidyapeeth University, Pune
Faculty of Engineering & Technology
Programme:B.Tech (E&TC) Sem – VIII (2014 Course)

Semester - VII I

Contact Hours: 28 Hrs/week
Total Credits: 25
Total Marks: 750

Sr.no	Subject	L	T	P	Examination Scheme (Marks						Total Marks	Credits		
					Theory	Continuous Assessment			TW & PR	TW & OR		TH	TW	Total
						Unit Test	Tutorials / Assignments	Attendance						
48	Optical Fiber Communication	3	0	2	60	20	10	10	50	-	150	3	1	4
49	Satellite Communication	3	0	2	60	20	10	10	-	50	150	3	1	4
50	Software Defined Radios	3	1	0	60	20	10	10	-	-	100	4	0	4
51	Elective -II	3	1	0	60	20	10	10	-	50	150	3	1	4
52	Project Stage -II	0	0	8	-	-	-	-	-	150	150	0	8	8
53	Seminar	0	0	2	-	-	-	-	-	50	50	0	1	1
	Total	**12**	**2**	**14**	**240**	**80**	**40**	**40**	**50**	**300**	**750**	**13**	**12**	**25**

Elective -II

1) Speech & Audio Processing
2) Artificial Intelligence and Robotics
3) System on Chip (SOC)
4) Fuzzy Logic & Neural Network

COMPUTER NETWORKS

TEACHING SCHEME

Teaching Scheme
Lecture: 03 Hours/week
Practical: 02 Hours/week

CREDITS ALLOTTED

Examination Scheme
End Semester Exam: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignment: 10 marks
TW& OR: 50 marks
Credits: 04

Course Pre-requisites

Analog and Digital Communications, Basic Embedded Systems, Probability Theory.

Course Objectives:

1. To introduce various topologies and types of networks.
2. To introduce the concepts of network architecture &network design
3. To give know how of congestion control mechanism.
4. Familiarize with Networking Protocols & Layers
5. Introduce network security aspects.

Course Outcomes: On successful completion of this course, students will be able to

1. Identify the types of computer networks and topologies.
2. Identify the functions of network connectors, Hubs, Switches, Routers, Bridges, NIC& network layers.
3. Implement various algorithms used in computer networks.
4. Use TCP/IP protocol.
5. Apply the various Network security techniques.

UNIT-I (06)

Introduction to Computer Networks and Internet

Understanding of network hardware, network software and Internet, the network edge, the network core, understanding of Delay, loss and recovery in the circuit and packet switching network, TCP/IP Protocol Suite: The OSI Model, Comparison of the OSI and TCP/IP reference model.

UNIT-II (06)

Physical Layer

Guided transmission media, wireless transmission media, EIA 232 D interface standard, Circuit, Packet and Message Switching inComputer Network, High Speed Digital Access, Multi Access Protocols – ALOHA and CSMA, Collision free protocols, Ethernet, Gigabit Ethernet, Ethernet Mac Sub layer, data link layer switching & use of bridges, learning bridges, spanning tree bridges, repeaters, API, hubs, bridges, switches, routers, modems and gateways.

UNIT-III (06)

Data Link Layer

LLC, MAC, CRC codes, Elementary Data Link Layer Protocols, sliding window protocol, HDLC, modes of operation.

Transport Layer

Multiplexing and Demultiplexing, Connection less transport (UDP), Principles of reliable data transfer, Medium access sub layer – channel allocation problem, multiple access protocols, IEEE 802 standards for LANS & WANS.

UNIT-IV (06)

Network Layer

Introduction, Virtual and Datagram networks, IP protocol and addressing in the Internet Routing algorithms Broadcast and Multicast routing Network Layer Design issues Network Layer Design issues, store and forward packet switching connection less and connection oriented networks-routing algorithms-optimality principle, shortest path, flooding, Hierarchical Routing, Congestion generation and control algorithms, policies-leaky bucket algorithm, token bucket algorithm, virtual circuit subnet and choke packets, Resource Reservation Protocol.

UNIT-V (06)

TCP/IP Protocol suit –

RPC, Real Time Transport Protocols, The Internet Transport Protocols- The TCP Service Model, The Connection Establishment and in Release in TCP, The TCP Connection Management Modeling, TCP Congestion Control and Flow control.

Application Layer-

Introduction, Applications layer paradigms, Client server model, Client-server application-HTTP, FTP, electronic mail, TELNET, DNS, SSH, Protocols - PPP, ARP / RARP, ICMP, IGMP, UDP, IP, DHCP, DNS, EMAIL, Web and HTTP, IPV.4, IPV.6.

UNIT-VI (06)

Network security –

Cryptography Algorithms and Trust Models, Ciphers vs Codes, Symmetric-key algorithms (DES, AES), Public- key algorithms – RSA, Digital signatures, IPSec, Firewall, Managements of publics keys, communications security, Authentication Protocols

Content Delivery Methods: Chalk & talk, Power point presentation.

Assignment:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Experiments: Min 8 experiments to be performed

1. Study of Networking
2. Implementation of bus topology using Network Simulator
3. Implementation of star topology using Network Simulator
4. Connecting two computers using RJ45
5. Establish a Ethernet LAN between computers

6. Telephone switching circuit using EPBX
7. Carry networking between two or more computers
8. Configuring different network topologies using MATLAB & introduction to DHCP
9. i) Character transfer using Simplex method
   ii) Character transfer using Full-Duplex method
10. Simulation and implementation of bit stuffing
11. Simulation and implementation of CRC
12. Stop-and Wait protocol using MATLAB
13. Go-Back-N protocol using MATLAB
14. Selective repeat Protocol using MATLAB
15. Distance Vector Routing Algorithm using MATLAB
16. Link State Routing algorithm using MATLAB

List of Assignments:

1. Explain different types of Networks and topologies.
2. Describe functions of OSI layers and its architecture.
3. What is TCP / IP protocol model.
4. Explain the connections of Physical Layer using different mediums
5. Explain the functionalities of Data Link Layer and error control
6. Describe techniques of encoding and decoding
7. Explain Network Layer and Data Recovery Methods
8. Describe congestion control mechanism and routing mechanism
9. Explain session layer, addressing and subnetting in OSI reference model.
10. Explain cryptography, symmetric-key algorithms.
11. Explain the concepts if IPSec, Firewall Design
12. Explain different network security mechanisms.

Text Books

1. Andrew Tanenbaum, “Computer networks”, Prentice Hall
2. L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier Morgan Kaufmann Publisher, 5thEdition.
3. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall

References

1. S. Keshav, “An Engineering Approach to Computer Networking”, Pearson Education
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition
3. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition
4. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
5. William Stallings, “Data and computer communications”, Prentice Hall

Syllabus for Unit Test:

Unit Test-I : Unit- I, II, III

Unit Test-II : Unit- IV,V, VI

PROJECT MANAGEMENT & FINANCE

TEACHING SCHEME
Lecture: 03 Hours/week

CREDITS ALLOTTED
End Semester Exam: 60 Marks
Unit Test: 20marks
Attendance: 10 marks
Assignment: 10 marks
Credits: 03

Course Pre-requisites

Mathematics, Economics, and Statistics.

Course Objectives

1. To realize basic principles/concepts of project management and finance.
2. To describe the most well-known theories and perspectives on project managements.

Course Outcomes

At the end of the course, a student will be able to

1. Define the Characteristics, Objectives, and Stages of Project management.
2. Conceptualize the importance of time and work estimation in Project management.
3. Analyze Management Concepts for Developing Project Plan.
4. Analyze and Understand Financial & Project Management.
5. Demonstrate Scope, Objectives and Importance of Financial Management.
6. Identify and understand the main responsibilities and tasks of Securities and Exchange Board of India (SEBI) in money market and capital Market.

UNIT - I (06)

Introduction to Project management:

Characteristics of projects, Definition and objectives of Project Management, Stages of Project Management, Project Planning Process, Establishing Project organization.

UNIT - II (06)

Work Definition:

Defining work content, Time Estimation Method, Project Cost Estimation and budgeting, Project Documentation Introduction to CMM, Project Risk Management, Project scheduling and Planning Tools: Work Breakdown structure, LRC, Gantt charts, ,CPM/PERT Networks

UNIT - III (06)

Management Concepts:

Developing Project Plan (Baseline) , Project cash flow analysis, Project scheduling with resource constraints: Resource Levelling and Resource Allocation. Time Cost Trade off: Crashing Heuristic.

UNIT - IV (06)

Project Implementation:

Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management

UNIT - V (06)

Financial Management:

Introduction of Finance, Types of Finance, Financial Management, Scope & Objectives of Financial Management, function of finance manager, Importance of Financial Management, Sources of finance, Security Finance.

UNIT - VI (06)

Working Capital Management:

Capital Structure, Fixed & working capital, Role of Securities and Exchange Board of India (SEBI), function of money market and capital Market, sources of finance. Introduction to capital budgeting, Techniques of capital budgeting. Break even analysis - assumptions, importance, Cost-Benefit analysis, CVP graph.

Content Delivery Methods:

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Assignments:

1. Write characteristics of projects.
2. Define objectives of project management.
3. Discuss the relationship between financial objectives, corporate objectives and corporate strategy.
4. State the differences between PERT and CPM.
5. Discuss in brief: Project scheduling.
6. Explain project monitoring & control using PERT/Cost
7. Identify the nature and role of money and capital markets, both nationally and internationally.
8. Write in brief: Concepts & Importance of organization.
9. Discuss functions of finance manager.
10. Critically evaluate various approaches to the financial management
11. Discuss sources of finance.
12. Explain the functions of a stock market and a corporate bond market.

Text Books

1. Shtub, Bard and Globerson, "Project Management: Engineering, Technology, and Implementation", Prentice Hall, India
2. C. Paramasivan and T. Subramanian, "Financial Management", New age international publishers.
3. John M Nicholas, "Project Management for Business and Technology: Principles and Practice", Prentice Hall, India, 2002.
4. Cleland and King, "VNR Project Management Handbook".
5. Wiest and Levy, "Management guide to PERT/CPM", Prentice Hall. India.

Reference Books

1. HoraldKerzner, "Project Management: A Systemic Approach to Planning, Scheduling and Controlling", CBS Publishers, 2002.
2. S. Choudhury, "Project Scheduling and Monitoring in Practice".
3. P. K. Joy, "Total Project Management: The Indian Context", Macmillan India Ltd.

Syllabus for Unit Test:

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV,V, VI

Mobile & Broadband Communication

TEACHING SCHEME
Lecture: 03 Hours/week
Practical: 02 Hours/week

CREDITS ALLOTTED
End Semester Exam: 60 Marks
Unit Test: 20marks
Attendance: 10 marks
Assignment: 10 marks
TW & PR: 50 Marks
Credits: 04

Course Pre-requisites

Analog Communication System, Digital Communication System, Information Theory & Coding

Course Objectives:

1. To make students familiar with fundamentals of mobile communication systems
2. To choose system (TDMA/FDMA/CDMA) according to the complexity, installation cost, speed of transmission, channel properties etc.
3. To identify the requirements of mobile communication as compared to static communication
4. To understand the three primary components of a fiber-optic communication system.
5. To understand the system design issues and the role of WDM components in advanced light wave systems.

Course Outcomes: On successful completion of this course, students will be able to

1. Understand with various generations of mobile communications
2. Understand the concept of cellular communication
3. Understand the basics of wireless communication
4. Carry out Link power budget and Rise Time Budget by proper selection of components and check its viability.
5. Carry out Satellite Link design for Up Link and Down Link

UNIT - I (06)

Introduction to Mobile Communication

Mobile and Personal Communication, mobile and wireless devices, Specialized packet and mobile radio networks, circuit switched data services on cellular networks, packet switched data services on cellular networks

UNIT - II (06)

Wireless LAN

Introduction, Infrared radio transmission infrastructure and adhoc networks, Detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM

UNIT - III (06)

Mobile Network Layer & Transport Layer

Mobile IP, DHCP (Dynamic Host Control Protocol), Mobile adhoc networks, Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selectiveretransmission and recovery

UNIT - IV (06)

ISDN

Switching Techniques, Principles of ISDN, Architecture, ISDN standards, I-series Recommendations, Transmission structure, User network interface, ISDN protocol architecture, ISDN connections, Addressing, Interworking,

UNIT - V (06)

B-ISDN architecture and standards, B-ISDN Services

Conversational, Messaging, Retrieval, Distribution, Business and Residential requirements.

UNIT - VI (06)

B-ISDN protocols

User plane, Control plane, Physical layer, Line coding, Transmission structure, SONET Requirement, Signal Hierarchy, System Hierarchy.

Content Delivery Methods :

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Experiments:

1. To understand and carryout fault finding of Pulse & Tone DTMF Telephone Trainer.
2. To Carryout telephone signal switching system using EPBX Trainer.
3. To install and configure PSTN switch configuration using T/S/T Switch.
4. To install and understand ISDN EPBX system.
5. To transfer voice between two computers using ISDN terminal Adaptors.
6. To transfer data between two computers using ISDN terminal adaptor modem.
7. To transfer video between two computers using ISDN system.
8. To study hardware section and carryout fault finding of Mobile handset trainer.
9. To carryout AT commands mobile communication using GSM trainer.
10. To carryout GPRS Internet data transfer using GPRS trainer.
11. To understand two user CDMA trainer using DSSS technology.
12. To carryout internet data transfer using CDMA trainer.
13. To send and receive DTMF signal using DTMF encoder and decoder circuit.
14. To carryout Voice Packet signal switching system using IP Protocol Trainer

15. To carryout Data Packet signal switching system using IP Protocol Trainer
16. To carryout Video Packet signal switching system using IP Protocol Trainer

List of Assignments:

1. How the Mobile and Personal Communication can works?
2. Distinguish Circuit Switching and Packet Switching with diagrams
3. Explain in detail of IEEE 802.11.
4. Write down the important features of HIPER LAN with its applications.
5. Write short note on DHCP (Dynamic Host Control Protocol)
6. What are prerequisites of Mobile ad hoc networks?
7. List the ISDN standards & explain any one of them.
8. What is mean by Interworking? Explain in detail.
9. List out the Business and Residential requirements. Explain in detail.
10. What are the services provided under B-ISDN?
11. Write a note on SONET.
12. List all the ISDN protocols, and explain the importance of them.

Text Books:

1. J. E. Flood , “Telecommunications Switching, Traffic and Networks”, Pearson Education
2. Krzysztof Wesolowski, “Mobile Communication Systems”, Wiley Student Edition.
3. Balaji Kumar,” A professional guide to ATM, Frame relay, SMDS, SONET,B-ISDN”, Tata McGraw-Hill Publications.
4. Robert Newman,” Broadband Communication”, PHI Publications.

Reference Books

1. Mobile Communications: Jachen Schiller (Addison Westy)
2. Wireless Networks by P. Nicopolitidis, M. S. Obaidat, G. I. Papadimitriou, A. S. Pomportsis ; Wiley Pub.
3. ISDN and Broadband ISDN with Frame Relay and ATM William Stallings, Prentice-Hall, 4th edition
4. Govind P. Agrawal, Fiber-Optic Communication Systems, Wiley, 3rd edition.
5. Dennis Roody, “Satellite Communications”, McGraw Hill

Syllabus for Unit Test:

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV,V, VI

RADIO FREQUENCY ENGINEERING

TEACHING SCHEME	CREDITS ALLOTTED
Lecture: 02 Hours/Week	End Semester Exam: 60 Marks
	Unit Test: 20 marks
	Attendance: 10 marks
	Assignment: 10 marks
	Credits: 02

Course Pre-requisites

Electromagnetic Engineering, Microwave Theory and Antennas

Course objectives:

1. To introduce RF issues related to active and passive components.
2. To introduce RF circuit design.
3. To introduce modeling of RF circuits.

Course Outcomes: On successful completion of this course, students will be able to

1. Understand behavior of passive components at high frequency and modeling of HF circuit.
2. Design HF amplifiers with gain bandwidth parameters.
3. Identify Mixer types and their characteristics.
4. Gain the knowledge of PLLs and Oscillators with respect to circuit topologies.

UNIT - I (04)

RF Behavior of Passive Components

HF Resistors, HF Capacitors, HF Inductors, Chip Components. Circuit Board Considerations: Chip Resistors, Chip Capacitors, Surface Mounted Inductors.

UNIT - II (04)

RF Measurement & Bandwidth Estimation

Network Analyzer, Spectrum Analyzer and RF Generator. Open Circuit Time Constant Method: Observations & Interpretations, Accuracy of OCτs, Considerations, Short Circuit Time Constant Method.

UNIT - III (04)

High Frequency Amplifier Design

Shunt Peaked Amplifier, Shunt Series peak Amplifier, Two port bandwidth enhancement, Design example. Bandwidth enhancement techniques. Tuned Amplifier: Common Source Amplifier with Single Tuned Load.

UNIT - IV (04)

Low Noise Amplifier Design

MOSFET two port noise parameters, LNA topologies, Power-constrained noise optimization. Design examples: Thermal Noise, Shot Noise,Signal to Noise Ratio and Noise Figure.

UNIT - V (04)

RF Oscillators

Oscillators Using a Common Emitter BJT, Oscillators Using a Common Gate FET, Crystal Oscillators. Colpitts Oscillator: Describing Function Model and Start-up Model of Colpitts Oscillator.

UNIT - VI (04)

Mixers

Mixer fundamentals, Significant Characteristics of Mixer: Single-Ended Diode Mixer, Single-Ended FET Mixer, Balanced Mixer, Image Reject Mixer.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Assignments:

1) To study of Frequency measurement of Klystron tube.
2) Design a lumped element 'LC' network for matching ZL= 10+j10 Ω to a 50Ω transmission line at 1 GHz.
3) To plot the resonant frequency behavior of parallel LC circuit, as a function of resistance.
4) To determine stability regions of the device and sketch them in the Smith Chart. Assume suitable parameters.
5) Determination of VSWR & reflection coefficientSmart antennas using HFSS.
6) With neat diagram, explain the working principle of Gunndiode.
7) Explain characteristics of Gunn diode.
8) Derive the equation for the scattering matrix of magic Tee.
9) Study of Smart antennas using HFSS.
10) Explain difference between RF circulator and isolator.
11) Design of any one type oscillator.
12) Design ofSingle-Ended Diode Mixer.

Text Books:

1. Reinhold Ludwig, PavelBretchko, "RF Circuit Design Theory and Applications", Pearson Education.
2. Thomas H. Lee, "The Design of CMOS Radio-Frequency Integrated Circuits", Second Edition, Cambridge Publications.
3. David M. Pozar, "Microwave Engineering", Fourth Edition John Wiley & Sons, Inc.

Reference Books:

1. T. Yettrdal, Yunhg Cheng, "Devices modeling for analog and RF COMS circuits design", John Wiley publication.
2. Calvin Plett, "Radio frequency Integrated Circuits Design", Artech house

Syllabus for Unit Test:

Unit Test-IUnit- I, II, III

Unit Test-II Unit- IV,V, VI

ELECTIVE-I WIRELESS SENSOR NETWORK

TEACHING SCHEME

Lecture: 03 Hours/week

Tutorial: 01 Hour/week

CREDITS ALLOTTED

End semester exam: 60 Marks

Unit Test: 20 marks

Attendance: 10 marks

Assignment: 10 marks

TW & OR: 50 Marks

Credits : 04

Course Pre-requisites

Engineering Mathematics I, Engineering Mathematics II, Engineering Mathematics III, Analog communication and digital communication

Course objectives:

1. To introduce the concept of sensor network establishment, tasking-control and analysis of sensors using wireless medium.
2. To provide knowledge of mathematical functions associated with sensor network.
3. Familiarize the student with various routing algorithms
4. Introduce the idea of Internet of Things and its future scope.

Course Outcomes:

On successful completion of this course, students will be able to

1. Define, characterize and analyze concept and need of wireless sensor network.
2. Design theoretical localization and tracking algorithms of wireless sensor network.
3. Analyze the effects of various types of routing in wireless sensor network.
4. Apply Mathematical tools to wireless sensor network establishment.
5. Define wireless sensor network tasking and controlling to fulfill the requirement of application area.
6. Categorize the databases of sensor networks and understand design challenges and handling of the huge database.

UNIT - I (03)

Introduction

Unique constraints & challenges, Advantages of sensor networks, Sensor network application, Collaborative processing, Key definitions of sensor network

UNIT - II (03)

Localization & Tracking

Introduction to Open Grid Services Architecture (OGSA) – Motivation – Functionality Requirements – Practical & Detailed view of OGSA/OGSI – Data intensive grid service models – OGSA services. Grid Monitoring Architecture.

UNIT - III (03)

Networking Sensors

Key assumption, Medium access control, General issues, Geographic & Energy-aware routing, Attribute-based routing, IDSQR, Directed diffusion, Rumor routing.

UNIT - IV (03)

Infrastructure Establishment

Topology control, Clustering, Time Synchronization, Interval Methods, Reference broadcasts, Localization services, Ranging Techniques, Range Based localization algorithms

UNIT - V (03)

Sensor Tasking and Control

Task driven sensing, Roles of sensor nodes & utilities, Information-based sensor tasking, cluster leader based, Joint routing & Information aggregation, moving center of aggregation sensor GROUP MANAGEMENT

UNIT - VI (03)

Sensor Network Databases and introduction of IOT

Sensor database challenges, Querslater forces, Cougar sensor database, Abstract data types, In-Network aggregation, Tiny DB Query Processing, data indices & range queries, Temporal data, ,IOT, Cloud computing.

Content Delivery Methods:

The course will be delivered through lectures, class room interaction, group discussion, exercises and quizzes

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Tutorials/Experiments:

1. Implement geographic routing for the application of human body health parameters using MATLAB.
2. To transmit and receive Weather parameters using energy aware routing in MATLAB.
3. To transmit and receive Raining water data using Rumor routing.
4. Write programme for automate Home or Industrial day to day needs using collaborative processing.
5. To direct power source controller using wireless sensor network in MATLAB establish its evaluation metric.
6. To control movement of unmanned vehicle using attribute routing in MATLAB.
7. To localize stationaryspot using wireless sensor network.
8. To trackand do time synchronization of high alert areas using wireless sensor network.

9. To monitor and control traffic on high intensity city-road.
10. To track and control greenhouse using wireless sensor network.
11. To control movement of unmanned vehicle using wireless sensor network in NS2 OR NS3.
12. To direct power controller using wireless sensor network in NS2 OR NS3.

List of Assignments:

1. Compare traditional telemetry and wireless sensor network.
2. Enlist and study various basic terminologies of wireless sensor network.
3. Case study of research papers on wireless sensor network for any application.
4. Write a survey paper based on assignment no.3.
5. Choose any wireless sensor application and for that enlist requirements of devices.
6. For the assignment no.5, count total number sensors and define functioning of each.
7. For the assignment no.5, decide priority of parameters such as response time, sensitivity, accuracy and cost of establishment.
8. For the assignment no.5, select best routing algorithm and do its MATLAB simulation or NS3 simulation.
9. Write programme using MATLAB to show failure detection in any wireless sensor application.
10. Enlist various control systems used with wireless sensor network.
11. Explain future applications of wireless sensor network with IOTs.
12. Enlist various disadvantages of wireless sensor network and write solutions to resolve them.

Text Books

1. "Wireless Sensor Networks: An Information Processing Approach" by Feng Zhao and Leonidas J. Guibas,2007

2. " Information Processing in Sensor Networks," by Feng Zhao, and Leonidas J. Guibas (Eds)
3. “Designing the Internet of Things” by Adrian McEwen, Hakim Cassimally
4. KazemSohraby, Daniel Minoli, &TaiebZnati, “Wireless Sensor Networks-Technology, Protocols, And Applications”, John Wiley, 2007.

Reference Books

1. “Wireless sensor networks technology, Protocols, and Application” by KazemSohraby, Daniel Minoli, TaiebZnati
2. Anna Hac, "Wireless Sensor Network Designs," John Wiley & Sons.
3. Edgar H. Callaway, Jr. and Edgar H. Callaway, "Wireless Sensor Networks: Architectures and Protocols," CRC Press.
4. Victor Lesser, Charles L. Ortiz, and MilindTambe, "Distributed Sensor Networks: A Multiagent Perspective," Kluwer.
5. “Getting Started with the Internet of Things” by CunoPfister
6. Shad Roundy, Paul Kenneth Wright, and Jan M. Rabaey, "Energy Scavenging for Wireless Sensor Networks: With Special Focus on Vibrations," Kluwer,
7. Jose A. Gutierrez, Edgar H. Callaway, Raymond Barrett, "IEEE 802.15.4 Low-Rate Wireless Personal Area Networks: Enabling Wireless Sensor Networks," .
8. Holger Karl & Andreas Willig, " Protocols And Architectures for Wireless Sensor Networks" , John Wiley, 2005.
9. Anna Hac, “Wireless Sensor Network Designs”, John Wiley, 2003.
10. BhaskarKrishnamachari, ”Networking Wireless Sensors”, Cambridge Press,2005.
11. Mohammad Ilyas And ImadMahgaob,”Handbook Of Sensor Networks: Compact Wireless And Wired Sensing Systems”, CRC Press,2005.
12. Wayne Tomasi, “Introduction To Data Communication And Networking”, Pearson Education, 2007.

Syllabus for Unit Test:

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV,V, VI

ELECTIVE I ADVANCED DIGITAL SIGNAL PROCESSING

TEACHING SCHEME

Lecture: 03 Hours/week

Tutorial: 01 Hour/week

CREDITS ALLOTTED

End Semester Exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignment: 10 marks

TW & OR: 50 Marks

Credits: 04

Course Pre-requisites

Signals & systems, Digital Signal Processing

Course Objectives:

1. To make student familiar with basic principles of spectral estimation methods.
2. To introduce the advanced concepts and techniques of digital signal processing.
3. To create awareness about the practical applications in the field of Digital Signal Processing.
4. To introduce DSP processor architecture.

Course Outcomes:

On successful completion of this course, students will be able to

1. Apply parametric and non-parametric techniques for estimating the power spectral density.
2. Design and implement multistage sampling rate converter.
3. Design appropriate adaptive filter in communication applications.
4. Perform multi-resolution analysis using wavelet transform.
5. To implement the signal processing application using DSP processor.

Unit I (6 Hours)

DSP Processor Characteristics

Features of DSP Processors, Harvard and modified Harvard Architecture, Multiply-Accumulate operation, Single Cycle Execution, Multiple on chip buses, ALU, MAC, Shifter Processing Units, Address Generation units, Modulo addressing, Bit reversed addressing, Efficient Looping Mechanisms, Examples of DSP Processors, Applications of DSP Processors.

Unit II (6 Hours)

Linear Prediction

Random Processes, Stationary Random Process, Ergodic Random Process, , AR process, MA process and ARMA process, AR lattice and ARMA lattice Ladder Filters, Forward and backward linear prediction, Solution of Normal Equations, Levinson-Durbin Algorithm, Properties of Linear Prediction Error Filters.

Unit III (4 Hours)

Power Spectrum Estimation

Estimate definition, Nonparametric methods-Periodogram, modified periodogram, Bartlett's method, Blackman-Tukey Method, Performance Comparisons of nonparametric methods, Parametric methods, Methods for estimating parameters of AR, MA and ARMA models

Unit IV (6 Hours)

Multirate DSP fundamentals

Need for Multi-rate DSP, Decimation by factor D , Interpolation by factor I, Sampling rate conversion by rational factor I/D, software implementation of sampling rate converters (Decimators and Interpolators), sample rate conversion using poly-phase filter structures

Unit V (6 Hours)

Adaptive filters

FIR adaptive filters – the MMSE criterion and LMS and RLS algorithms, Adaptive Lattice-Ladder Filters - Recursive Least Squares Lattice Ladder Algorithms, Applications of Adaptive Filters.

Unit VI (6 Hours)

Time Frequency Representation of signals

Time Frequency description of signals, Concept of Instantaneous frequency and Complex signal, Uncertainty principle, need for joint time frequency representation, tiling diagrams. Short Time Fourier Transform, Wigner Ville distribution, Continuous Wavelet Transform, Discretization of STFT & CWT, Spectrogram.

Content Delivery Methods:

Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous assessment
3. End semester Examination

List of Tutorials/Experiments:

1. Study of various addressing modes of DSP.
2. Describe the power spectrum estimation using Blackman and Tukey method.
3. Describe the role of Adaptive filters in Communication.
4. A brief survey of DSP applications in speech processing.
5. Implementation of Multi-rate application in digital audio processing.
6. Implementation of sub band coding for speech signal.

7. Discuss in detail various applications of wavelet transforms.
8. Explain the process of digital FM stereo signal generation.
9. Demonstration of Hardware and Software utilities for DSP starter kits.

List of Assignments:

1. Present a comparative study of DSP processors based on their features and applications.
2. Plot the Periodogram of a Noisy Signal and estimate PSD using Periodogram and Modified Periodogram methods.
3. Estimation of PSD of two sinusoids plus noise using Welch method
4. Find linear prediction coefficients and reflection coefficients using Levinson Durbin Algorithm.
5. Implement program to convert CD data into DVD data
6. Implement LMS algorithm using MATLAB.
7. Record a speech file in your own voice. Find pitch period for a voiced part of the segment.
8. Perform continuous and discrete wavelet analysis of a signal.
9. Implementation of Linear / Circular convolution on DSP processor.
10. Implementation of FIR filter using DSP processor
11. Design an Adaptive filter using LMS algorithm.
12. Mini-project based on the Matlab/Scilab.

Text books:

1. John G. Proakis, Manolakis, “Digital Signal Processing, Principles, Algorithms and Applications”, Pearson education, Fourth Edition, 2007.
2. B. Venkataramani, M. Bhaskar, “Digital Signal Processors”, TMH

Reference Books:

1. E. C. Ifeachor and B. W. Jervis, “Digital Signal Processing- A Practical Approach”, 2nd Edition, Pearson education. 2007.

2. Widrow, B. and Stearns, S.D., “Adaptive Signal Processing”, Pearson Education. 1985
3. Manolakis, D.G., Ingle, V.K. and Kogon, M.S., “Statistical and Adaptive Signal Processing”, Artech House. 2005.
4. Diniz, P.S.R., “Adaptive Filtering: Algorithms and Practical Implementation”, Kluwer. 1997
5. S. D. Apte, “Advanced Digital Signal Processing,” Wiley Publications, 2014.
6. Leon Cohen, “Time-Frequency Analysis”, Prentice Hall,1995.
7. K.P Soman, K.I Ramchandran, N.G.Reshmi, “Insight into Wavelets- from theory to Practice,” PHI Learning Private Limited, Third Edition, 2010.
8. Rao R M and A S Bopardikar, “Wavelet Transforms Introduction to theory and Applications”, Pearson Education, Asia, 2000.

Syllabus for Unit Test:

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV,V, VI

ELECTIVE-I DIGITAL IMAGE PROCESSING

TEACHING SCHEME

Lecture: 03 Hours/week

Tutorial: 01 Hour/week

CREDITS ALLOTTED

End Semester Exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignment: 10 marks

TW & OR: 50 Marks

Credits: 04

Course Pre-requisites

Signals and System

Course objectives:

1. To understand the image fundamentals and mathematical transforms for image processing.
2. To analyze the image enhancement techniques
3. To introduce the concepts of image registration and image fusion.
4. To identify different features of image by using segmentation.
5. To perform measurement operations on extracted features of image.
6. To analyze 3D Image Processing and Visualization

Course Outcomes:

On successful completion of this course, students will be able to

1. To introduce fundamentals of digital image processing and Color transformation.
2. Design image enhancement and filters.
3. Analyze morphological operations and its effects on image.
4. Image resolution and compression method for image.

5. Determine features of various images by using segmentation method.
6. To learn different applications and gain experience in applying image processing algorithms to real problems.

UNIT - I (06)

Fundamentals Digital Image Processing

Introduction, Fundamental steps in digital image processing and components, Elements of visual perception, Image sensing and acquisition, sampling and quantization, An Introduction to the mathematical tools used in digital image processing, Digital image representation, Color models, Noise in color images, Image conversion – RBG to Gray, RGB to Binary.

UNIT - II (06)

Image Enhancement

Spatial domain, Gray level transformations, Intensity transformation functions, Histogram processing, Basics of spatial filtering, Smoothing and sharpening spatial filtering, Frequency domain, Introduction to Fourier Transform, One-Dimensional Fourier Transform and Inverse of Fourier Transform, Smoothing and sharpening frequency domain filters, Ideal, Butterworth and Gaussian filters.

UNIT - III (06)

Multi Resolution Analysis and Compressions

Wavelet Transforms , Multi resolution analysis, Image pyramids, Multi resolution expansion, Image compression, Image compression Model, Shannon's Theorem, Elements of Information Theory, Error free Compression, Lossy Compression, Image format - TIFF, BMP,GIF, PNG, JPEG, JPEG-2000,HDV, Compression Methods – Huffman Coding, Arithmetic Coding, Run length Coding, Bit-plan coding and predictive coding.

UNIT - IV (06)

Morphological Operations in Image Processing

Dilation and erosion, Opening and Closing, Hit or Miss Transformation, Morphological algorithms, Extensions to grey scale images, Image Watermarking.

UNIT - V (06)

Image Segmentation and Feature Extraction

Thresholding, Region based segmentation, Region growing, Region splitting and Merging, Segmentation by morphological watersheds, First and second order edge detection operators, Hough transform, Types of Hough transform, shape features, Boundary descriptors, Localized feature extraction detecting image curvature.

UNIT - VI (06)

Applications of Digital Image Processing

Image Classification, Image Recognition, Image Understanding, Working principle of Video Motion Analysis (GIF), Introduction to Iris Recognition, Difference between 2D and 3D image, Sources of 3D Data sets, 3D Image Processing and Visualization, Measurements on 3D images.

Content Delivery Methods:

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Tutorials/ Experiments:

1. Displaying Image in different File Format in MATLAB.
2. Transformation of Simple Binary and Gray Level.
3. Explain Histogram effects in image.
4. Perform Histogram Equalization on Image.
5. Study of Smoothing of Image in Special Domain using Averaging.
6. Study of Smoothing of Image in Special Domain using Medium Method.
7. Analyze Edge Detection Techniques.
8. Study of Morphological Operations.
9. How to perform Segmentation using Thresholding.
10. Study operation of Hough transforms and Feature Detection.

List of Assignments:

1. Discuss Digital image representation.
2. Discuss Color Model.
3. Explain Gray level transformations and Intensity transformation functions.
4. Show working of Butterworth and Gaussian filters.
5. Explain and differentiate Image format
6. Write different Image compression Techniques.
7. Discuss in detail Image Watermarking
8. Write role of Dilation and erosion in image processing
9. What are different types of Edge detection
10. How Hough transform works for detecting varies shapes
11. What is Image Recognition
12. Explain Working principle of Video Motion Analysis (GIF).

Text Books:

1. Gonzalez, Rafel C. and Woods, Richard E., "Digital Image Processing", Second Edition, Prentice Hall, 2006.
2. Ardeshir Goshtasby, “2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications”, John Wiley and Sons, 2005.

Reference Books:

1. Rosenfield, Azriel and Kak, Avinash C., "Digital Picture Processing", Academic Press Inc, New York, 1982.
2. Salomon, David., "Data Compression: The Complete Reference", Second Edition, Springer Verlag, New York, 2001.
3. Pratt, William K., "Digital Image Processing", John Wiley & Sons, New York, 2003.
4. Jain, Anil K., "Fundamentals of Digital Image Processing", Prentice Hall of India, New Delhi.
5. Mark Nixon, Alberto Aguado, “Feature Extraction and Image Processing”, Academic Press, 2008.

Syllabus for Unit Test:

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV,V, VI

ELECTIVE-I ADVANCED COMPUTER PROGRAMMING

TEACHING SCHEME
Lecture: 03 Hours/week
Tutorial: 01Hour/week

CREDITS ALLOTTED
End Semester Exam: 60 marks
Unit Test: 20marks
Attendance: 10 marks
Assignment: 10 marks
TW & Oral: 50 marks
Credits: 04

Course Pre-requisites

Fundamentals of computing

Course objective:

1. To introduce object oriented programming concepts.
2. To develop programming ability by learning advanced coding techniques.

Course Outcomes:

On successful completion of this course, students will be able to

1. Demonstrate basic knowledge of object oriented programming concepts.
2. Write simple programs in Java.
3. Apply Java for HTML and Applet applications.
4. Use SQL for database manipulation

UNIT - I (06)

Object Oriented Programming:

Programming fundamentals, Basic Concepts, Different ProgrammingParadigms, Evolution of Different Programming Languages and theirCharacteristics, Object-Oriented Paradigm, Objects and Classes, DataAbstraction and Encapsulation, Inheritance, Polymorphism, DynamicBinding, Message Communication, Benefits of OOP, Applications of OOP,Java Language as an OOP Language.

UNIT - II (06)

Introduction to Java:

Introduction to Java, Different Characteristics of Java, C++ and Java:Feature Comparisons, Improvements, Detailed Overview, Constants,Variables and Data Types, Operators and Expressions, Decision Makingand Branching and Decision Making and Looping, Classes Objects andMethods, Arrays, Strings and Vectors, Interfaces.

UNIT - III (06)

Threads:

Packages in Java, Multithreaded Programming concepts and applications,Managing Errors and Exceptions, Managing Input/Output Files in JAVA.

UNIT - IV (06)

HTML and Java Applets:

History, W3C Standards, Standard HTML Tags for Image and TextFormatting, Tables, Lists, Frames. Introduction to dynamic HTML. JavaApplets: History, Introduction, HTML and Java Applet. Basic Applet programming, Applets on Web. Applet applications for Web.

UNIT - V (06)

SQL and Java:

Introduction to databases, Data Models, Concepts, Schema, RelationalQuery. Detailed Overview of SQL Language, Basic SELECT Query,WHERE Clause, ORDER BY Clause, Merging Data from MultipleTables: INNER JOIN, INSERT Statement, UPDATE Statement, DELETE Statement, and Installation of MySQL or PL SQL. Setting MySQL / PL SQLUser Account.

UNIT - VI (06)

Database Connectivity:

Introduction to JDBC, JDBC Architecture, Types of JDBC drivers, Result Set, Metadata, Stored Procedure, Callable Procedure, Connection Procedure.

Content Delivery Methods:

Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Tutorials/Experiments

1. Write a Java program to implement Class and Inheritance Concept.
2. Write a Java program to differentiate between method overloading and method overriding.
3. Write a Java program to understand the use of String class and string buffer class
4. Write a Java program to implement the concept of Package.
5. Write a Java program to implement concept of Exception Handling.
6. Write a program to implement Frame and different graphics objects.
7. Write a program to implement Java Applet.
8. Write a SQL Program for implementation of DDL, DML, and DCL.

List of Assignments:

1. Write a C++ or Java Program to demonstrate the use of OOP features.
2. Write a Java Program to display pattern (Triangle, Pyramid) using different loops.

3. Implementation of different string functions by using switch case.
4. Write a Java Program implement multiple inheritances by using Interface.
5. Write a Java Program to perform different file operations.
6. Write a program to implement multithreading.
7. Design a College website containing detailed information using HTML Tags.
8. Write a program to implement a Java Applet.
9. Write a Java program to demonstrate JDBC connectivity.
10. Comparison of different database
11. Justify the role of SQL for database manipulation
12. A mini project on Java and SQL.

Text Books:

1. Programming with Java: A Primer, 3E by E Balagurusamy, Tata McGraw Hill Publishing Company.
2. Database System Concepts, Sixth Edition by Henry Korth, McGraw Hill Publishing Company
3. Java Complete Reference, Herbert Schildt, McGraw Hill Publishing Company
4. Java: How to Program by Deitel and Deitel

Reference Books:

1. Ivan Bayross, “Web Enabled Commercial Applications Development Using HTML, DHTML, JavaScript, Perl – CGI”, BPB Publication.
2. Korth, “Database System Concepts”, MGH Publication.
3. Ivan Bayross, “Programming with SQL”, Sybase Publication.

Syllabus for Unit Test:

Unit Test-I	Unit- I, II, III
Unit Test-II	Unit- IV,V, VI

PROJECT STAGE –I

TEACHING SCHEME	CREDITS ALLOTTED
Lecture: 00 Hours/week	TW & Oral: 50 marks
Practical: 04 Hours/week	Total Credits: 04

Course objective:

1. To familiarize the students with the product development cycle
2. To impart the importance of working as a team.
3. To introduce the student to literature survey and documentation process.
4. To encourage the students to visualize and formulate a viable solution to practical engineering problems.

Course Outcomes:

On successful completion of this course, students will be able to

1. Identify the problem for practical Engineering application
2. Formulate and design appropriate solution
3. Write specifications and identify constraints
4. Work as an effective team member
5. Effectively plan the financial budget for the project.

Project Stage –I includes various steps such as :

1. Problem Identification
2. Information gathering
3. Feasibility study
4. Synopsis
5. System analysis
6. Requirement analysis

IN-PLANT TRAINING

TEACHING SCHEME

Lectures: 00 Hours/week

CREDITS ALLOTTED

TW& OR: 50 marks

Credits: 01

Course Objectives:

1. To familiarize the students to industrial work processes.
2. To work as an effective team member.
3. To develop the communication and presentation skills.
4. To introduce the student to work ethics in industry.

Course Outcomes:

On successful completion of this course, students will be able to

1. Work effectively in an industrial environment.
2. Effectively communicate and present himself/herself.
3. Indentify the various sections in the industry.
4. Work in a team.

In-plant Training:

Every student has to undergo training on site or in office of some company in June & July for one and half month to get the exposure and practical experience. He has to submit the detailed report of training, on the basis of which the term work and oral marks should be awarded.

Note: Student should complete in-plant industrial training after semester-VI for a period of six weeks. Evaluation will be done in semester-VII.

OPTICAL FIBER COMMUNICATION

TEACHING SCHEME

Lecture: 3 Hours/week

Practical: 2 Hours/week

CREDITS ALLOTTED

End semester exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignment: 10 marks

TW & PR: 50 Marks

Total Credits:04

Course Pre-requisites

- Electromagnetic Engineering
- Analog Communication System

Course Objectives:

1. To introduce optical fiber modes and signal degradations associated with optical fiber.
2. To introduce optical sources,optical detectors and their use in the optical communication system.
3. To expose the student to digital transmission and its associated parameters on system performance.

Course Outcomes:

On successful completion of this course, students will be able to

1. Analyze the basic elements of optical fiber, fiber modes configurations and structures.
2. Design optimization of SM fibers, RI profile and cut-off wave length.
3. Analyze the different kind of losses, signal distortion in optical wave guides and other signal degradation factors Also to analyze the fiber splicing and connectors
4. Analyze the various optical source materials, LED structures, quantum efficiency, Laserdiodes and different fiber amplifiers.To analyze about different Detectors, PIN and APD and their noise performance.

5. Design the receiver operation and configuration. noise effects on system performance
6. Analyzethe SONET,WDM optical networks
7. Analyze the operational principles WDM , solitons and optical CDMA

Contents:

UNIT-I [6 Hrs]

Introduction

Introductionto Ray theory transmission: Total internal reflection; Acceptance angle; Numerical aperture, Types of Fiber, Electromagnetic mode theory of optical propagation: modes in planar guide, phase and group velocity, modes in cylindrical fibers.

UNIT-II [6 Hrs]

Sources and Detectors

Optical sources: Light Emitting Diodes; LED structures ; internal quantum efficiency; injection laser diode structures ; comparison of LED and ILD, Optical Detectors: PIN Photo detectors, Avalanche photo diodes, construction, characteristics and properties, Comparison of performance, Photo detector noise –Noise sources , Signal to Noise ratio , Detector response time.

UNIT-III [6 Hrs]

Transmission Characteristics of Optical Fiber

Attenuation: Absorption, Scattering; Fiber Bend losses; Dispersion, Optical fiber connectors, Fiber alignment and Joint Losses, Fiber Splices, Fiber connectors and Couplers.

UNIT-IV [6 Hrs]

Fiber Optic Receiver and Measurements

Fundamental receiver operation, Pre amplifiers, Error sources, Receiver Configuration, Probability of Error, Quantum limit, Fiber Attenuation measurements, Dispersion measurements, Fiber Refractive index profile measurements , Fiber cut- off Wave length Measurements, Fiber numerical Aperture Measurements, Fiber diameter measurements, OTDR

UNIT-V [6 Hrs]

Optical Networks

Basic Networks, SONET / SDH, Broadcast and select WDM Networks, Wavelength Routed Networks, Non-linear effects on Network performance.

UNIT-VI [6 Hrs]

Advance Optical Communication

Performance of WDM with EDFA system, Solitons, Optical CDMA, Ultra High Capacity Networks.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Experiments:

1. Study the characteristics of optical source LED, Laser Diode.
2. Determination of Numerical Aperture of optical fiber.
3. Determination propagation loss and bending loss in optical fiber.
4. Design the analog/digital link using fiber optic cable.
5. Simulation of power budget presentation for basic optical network using optisystem software.
6. Simulation of 16 channel WDM system design.
7. Design and Simulation the channel switching based on MEMS.
8. Design and Simulation a ring switch using optispice software.
9. Setting of Fiber optic voice link using AM, FM& PWM.
10. Characteristics of photodetector.

List of Assignments

1. Classification of types of fibers and study of basic principle of optical fiber and its parameters.
2. Study ofElectromagnetic mode theory of optical propagation.
3. Discuss the degradation of optical fiber.

4. Classify the types of optical connectors and couplers.
5. Study of characteristics of optical source like LED,LASER.
6. Study of characteristics of optical detector like PIN,APD.
7. Measurement of different parameters of optical fiber.
8. Study of receiver configuration, probability of error, quantum limit of optical receiver.
9. Study of SONET / SDH, Broadcast and WDM networks.
10. Discuss the non-linear effects on network performance.
11. Study of performance of WDM with EDFA system, Solitons.
12. Study of Optical CDMA, Ultra High Capacity Networks.

Text Books:

1. Optical Fiber Communication – John M. Senior – Pearson Education – SecondEdition. 2007
2. Optical Fiber Communication – Gerd Keiser – Mc Graw Hill – Third Edition. 2000

Reference books:

1. R.P. Khare, "Fiber Optics and Optoelectronics", Oxford University Press, 2007.
2. J.Gower, "Optical Communication System", Prentice Hall of India, 2001
3. Rajiv Ramaswami, "Optical Networks ", Second Edition, Elsevier, 2004.
4. Govind P. Agrawal, "Fiber-optic communication systems", third edition, John Wiley & sons, 2004

SATELLITE COMMUNICATION

TEACHING SCHEME

Lecture: 3 Hours/week

Practical: 2 Hours/week

CREDITS ALLOTTED

End semester exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignment: 10 marks

TW & PR: 50 Marks

Credits: 04

Course Pre-requisites

Analog Communication, Digital Communication

Course Objectives

1 To introduce the fundamental concept in the field of satellite communication.

2 To enable the student to understand how to place satellite in orbit.

3 To teach the concept of space subsystem.

4 To introduce design, analysis & evaluation of satellite communication subsystem.

Course Outcomes:

On successful completion of this course, students will be able to

1. Understand Orbital aspects involved in satellite communication.
2. Calculate Power budget.
3. Identify Satellite system and services provided.
4. Analyze the performance of satellite communication system.

UNIT 1: [6Hrs]

Introduction of Satellite Communication

Introduction, basic concept of satellite communication, Orbital Mechanics, Look angle determination, Orbital perturbation, Orbital determination, Launchers and Launch vehicles, Orbital effects in communication system performance.

UNIT 2: [6Hrs]

Satellite subsystem

Satellite Subsystem, Attitude and control system(AOCS), Telemetry, Tracking, Command and Monitoring, Power systems, Communication subsystem, Satellite antennas, Equipment reliability and space qualification.

UNIT 3: [6Hrs]

Satellite Link Design

Introduction, Basic transmission Theory, System Noise Temperature and G/T Ration, Design of Downlinks, Satellite System using Small Earth Stations, Uplink Design, Design of specified C/N : Combining C/N and C/I values in Satellite Links.

UNIT 4: [6Hrs]

Satellite Networks

Reference architecture for satellite networks, basic characteristics of satellite networks, Onboard connectivity with transparent processing, analogue transparent switching, Frame organization, Window organization, On board connectivity with beam scanning.

UNIT 5: [6Hrs]

Low Earth Orbit and Non Geo-Stationary satellite system

Introduction, Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput Consideration, Operational NGSO constellation design: Iridium, Teledesic.

UNIT 6: [6Hrs]

Satellite Radio and GPS

C-Band and Ku- Band Home satellite TV, Digital DBS TV, Satellite Radio Broadcasting, Radio and Satellite Navigation, GPS Position Location Principles, GPS Receivers and codes.

Content Delivery Methods:

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Experiments:

1. To study Direct satellite broadcasting receiver
2. To study Low Noise Block converter
3. To study SAW filter
4. To study Ceramic filter
5. To study Satellite antenna
6. To study Microstrip patch antenna
7. To study Satellite transponder
8. To study Video IF amplifier
9. To study video power amplifier
10. To study Communication receiver

Text Books:

1. Satellite Communications-Timothy Pratt, Charles Bostian, Jeremy Allnut John Wiley & Sons (II Edition)
2. Satellite Communications-Anil k. Maine and Varsha Agaraval, Wiley Publications

Reference Books:

1. Satellite Communications, by Dennis Roddy(Fourth edition),McGraw Hill.
2. Satellite Communication Systems Engineering, by Wilbur L. Pritchard, Henri G. Suyderhoud, Robert A. Nelson (Second Edition), Pearson
3. Satellite Communication, by Timothy Pratt, Charles Bostian, Jeremy Allnutt(Second Edition), John Wiley & Sons.
4. Satellite Technology, Principles and Applications, by Anil K. Maini, Varsha Agarwal (Second Edition), Wiley.

List of Assignments

1. Explain in detail introduction to satellite communication
2. Explain Kepler's first, second and third law in detail
3. Explain in detail satellite antenna.
4. Write about radio wave propagation.
5. Explain in detail various layers existing in radio propagation
6. Explain in detail various polarisation existing in satellite antenna
7. Describe telemetry, tracking and orbital control existing in satellite communication.
8. Explain in detail multiplexer and demultiplexes existing in satellite communication
9. Explain working of satellite transponder

10 Explain working of satellite receiver

SOFTWARE DEFINED RADIOS

Teaching Scheme	**Examination Scheme**	
Lecture: 3 Hours/week	End semester exam: 60 Marks	
Tutorial: 1 Hours/week	Unit Test:	20marks
	Attendance:	10 marks
	Assignment:	10 marks
	Credits:04	

Course Prerequisites:

- Digital Communication, RF Engineering, DSP, Microwave and Antenna theory

Course objective:

1. To provide the student with solid fundamental tools used for Software defined radio.
2. To introduce the design of antenna systems to accommodate the need of a software defined radio (i.e. smart antenna algorithms)
3. To develop ability to understand and implement structure of Software defined radio.
4. To provide understanding of analog and digital technologies used for software-defined radio.

Course Outcomes:

On successful completion of this course, students will be able to

1. Understand the basic concepts of SDR.
2. To design algorithms for smart antenna.
3. Use DSP concepts for SDR.
4. Understand the architecture of SDR.
5. Understand different Applications of SDR and smart antennas.

Unit 1 [6 Hrs]

Introduction to Software Defined Radio

Introduction to Software Defined Radio, Software Radio Applications, A Traditional Hardware Radio Architecture, An Ideal Software Defined Radio Architecture, Signal Processing Hardware History, Software Defined Radio Project Complexity, Radio Architectures, Hybrid Radio Architecture, Basic Software Defined Radio Block Diagram, System-Level Functional Partitioning, Digital Frequency Conversion Partitioning

Unit 2 [7 Hrs]

RF design for SDR devices

3G RF Performance Requirements, Receiver Requirements 3G Transmitter Requirements, ,14-Bit Software Radio ADC, DACs ,DAC Noise Budget ,ADC Noise Budget , Decimation, Interpolation, and Multirate Processing, Cascading Digital Converters and Digital, Frequency Converters

Unit 3 [5 Hrs]

Signal Processing Hardware Components

SDR Requirements for Processing Power, DSPs, DSP Devices, DSP Performance Summary, DSP Compilers, Reconfigurable Processors, Chameleon Reconfigurable Communications Processor (RCP), Adaptive Computing Machine FPGAs, Symbol Rate and Chip-Rate Partitioning

Unit 4 [6 Hrs]

Software Architecture and Components

Introduction Major Software Architectural Choices, Hardware-Specific Software Architecture, Abstracted Open Software Architecture, Software Standards for Software Radio, JTRS Software Communications Architecture Specification, SDRF Distributed Object Computing

Software Radio Architecture, The OMG, Software Design Patterns, Component Choices

Unit 5 [6 Hrs]

Application & Smart antennas

Software Defined Radio Examples Frameworks and Platforms,3G SDR Testbeds,

Applying Software Radio Principles to Smart Antenna Systems, Smart Antenna Architectures Switched Beam Array, A Software Radio Smart Antenna Architecture, Smart Antenna Performance,

Unit 6 [6 Hrs]

Low-Cost Experimental Software Radio Platform

Platform Requirements, System Architecture, Analog RF Interface, TMS320C62x EVM Daughterboard Interface, PCI Interface ,Line-Level Audio Output Interface ,System Design , DSP Clock Frequency , ADC Clock Source ,Matching Sampling Rate ,Functional Design , Low-Level Implementation Details ,THS12082 Hardware,THS12082 Software ,DSP BIOS Configuration ,Potential Applications

Content Delivery Methods :

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/ Experiments.

1. Implement SDR transmission/Modulation using MATLAB.
2. Implement SDR reception/Demodulation using MATLAB.
3. Parameter estimation for adaptation of wireless communication systems (learning environment and other factors)
4. Incorporate cognitive features in the upcoming standards (like 802.16m, LTE advanced, 802.11n, adaptive frequency hopping in Bluetooth) and in the 3G (2.5G) standards.

5. List down the Challenges and issues regarding the implementation of SDR?
6. Implement SDR in LabVIEW.
7. Implementing Software-Defined Radio: 4-QAM Modem in LabVIEW
8. Develop a model of a Software Defined Radio using SIMULINK tool to implement the IEEE 802.11 standard and the Bluetooth standard.
9. Implentating Single tone in Ni-USRP using LabVIEW.
10. Implemting audio file modulation in NI-USRP using LabVIEW.

List of Assignments:

1. Draw hybrid radio architecture and explain each of its block.
2. Define Interpolation and Decimation & their Importance in digital communication?
3. List the advance applications in SDR?
4. Explain Symbol Rate and Chip-Rate Partitioning with examples?
5. Cognitive radio is related to SDR. Explain
6. List down the different FPGAs and differentiate between them.
7. List down the Software Standards for Software Radio.
8. Explain the salient features of Texas T1 DSP processors
9. Define Smart antennas and its importance.
10. Explain 3G SDR Testbeds.
11. List down the requirements of low level implementation of SDR
12. Differentiate between 3G,4G &5G

Text Books :

1. Software defined Radio for 3G by Joe Burns (Artech house).
2. Software defined radio by Walter Tuttlebee (Wiley.).

Reference Books:

1. Huseyinarslan, "Cognitive Radio, Software Defined Radio, and Adaptive Wireless Systems ", Springer 2007
2. F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill., 2005

ELECTIVE - II SPEECH & AUDIO PROCESSING

Teaching Scheme

Lecture: 3 Hours/week

Tutorial: 1 Hour/week

Examination Scheme

End Semester Exam : 60 Marks

Unit Test : 20marks

Attendance : 10 marks

Assignment : 10 marks

TW & OR : 50 Marks

Credits : 04

Course prerequisites:

Engineering Mathematics-III , Signals and Systems, Digital Signal processing

Course objective:

1. To introduce speech & audio processing theory and time domain models
2. To introduce the coding techniques for speech & audio signals.
3. To enable students to apply STFT analysis and speech synthesis
4. To introduce linear predictive coding a well as different techniques to enhance speech quality

Course Outcomes:

On successful completion of this course, students will be able to

1. Qualitatively describe the mechanisms of human speech production and how the articulation mode of different classes of speech sounds determines their acoustic characteristics.
2. Apply programming tools (such as MATLAB, Lab VIEW) to analyze speech and audio signals in time and frequency domains, and in terms of the parameters of a source-filter production model and harmonic models.

3. Critically analyze, compare, and implement methods and systems for coding of speech and audio signals, and finally engineer efficient coding solutions.
4. Analyze, compare, and implement methods and systems for enhancement of speech and audio signals in environmental noisy conditions.

Unit-I [6 Hrs]

Fundamentals of Speech

The Human Speech Production Mechanism, LTI Model for Speech Production, Nature of the Speech Signal, Linear Time-Varying Model, Phonetics, Types of Speech, Voiced and Unvoiced Decision Making, Audio File Formats: Nature of the WAV File.

Unit-II [6 Hrs]

Parameters of Speech: Pitch and Formants

Fundamental Frequency or Pitch Frequency, Parallel Processing Approach for Calculation of Pitch Frequency, Pitch Period Measurement Using Spectral Domain, Cepstral Domain, Formants and Their Relation With LPC, Evaluation of Formants Using Cepstrum, Evaluation of Formants Using Log Spectrum, Evaluation of Formants Using Power Spectral Density Estimate, Estimation of Formants: Other Methods.

Unit-III [6 Hrs]

Spectral Parameters of Speech

Homomorphic Processing, Cepstral Analysis of Speech: Cepstral Coefficients,The Auditory System as a Filter Bank, Mel Frequency Cepstral Coefficients (MFCCs), Perceptual Linear Prediction (PLP), Log Frequency Power Coefficients (LFPCs), Relative Spectral Perceptual Linear Prediction (Rasta-PLP): Strategies for Robustness, Short-Time Spectral Analysis of Speech: Short-Time Fourier Transform (STFT), Wavelet Transform Analysis of Speech

Unit-IV [6Hrs]

Linear Prediction of Speech

Lattice Structure Realization, Forward Linear Prediction, Autocorrelation Method, Covariance Method, Lattice Methods, Selection of Order of the Predictor, Line Spectral Frequencies/Line Spectral Pair Frequencies.

Unit -V [6 Hrs]

Speech Quantization and Coding

Uniform and Non-Uniform Quantizers and Coder, Companded Quantizers, Uniform Quantization of Non-Uniform Sources: Adaptive Quantizers, Waveform Coding of Speech, Comparison of Different Waveform Coding Techniques, Parametric Speech Coding Techniques, Sinusoidal Speech Coding Techniques, Mixed Excitation Linear Prediction Coder, Multi-Mode Speech Coding (Hybrid Coder), Transform Domain Coding of Speech

Unit-VI [6 Hrs]

Speech Processing Applications

Speech Recognition Systems, Architecture of a Large Vocabulary Continuous Speech Recognition System, Deterministic Sequence Recognition for ASR, Statistical Sequence Recognition for ASR, Statistical Pattern Recognition and Parameter Estimation, VQ-HMM-Based Speech Recognition, Discriminant Acoustic Probability Estimation, Word Spotting/Keyword Spotting, Speech Recognition and Understanding, Speaker Recognition, Distortion Measures: Mathematical and Perceptual, Speech Enhancement, Adaptive Echo Cancellation.

Content Delivery Methods :

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Practicals:

1. Record speech signal and find Energy and ZCR for different frame rates and comment on the result.
2. Record different vowels as /a/, /e/, /i/, /o/ etc. and extract the pitch as well as first three formant frequencies. Perform similar analysis for different types of unvoiced sounds and comment on the result.

3. Write a program to identify voiced, unvoiced and silence regions of the speech signal.
4. Record a speech signal and perform the spectrographic analysis of the signal using wideband and narrowband spectrogram. Comment on narrowband and wide band spectrogram.
5. Write a program for extracting pitch period for a voiced part of the speech signal using autocorrelation.
6. Write a program to design a Mel filter bank and using this filter bank write a program to extract MFCC features.
7. Write a program to perform the cepstral analysis of speech signal and detect the pitch from the voiced part using cepstrum analysis.
8. Write a program to find LPC coefficients using Levinson Durbin algorithm.
9. Write a program to enhance the noisy speech signal using spectral subtraction method.
10. Write a program to extract frequency domain audio features like SC, SF and Spectral roll off.

List of Assignments:

1. Provide the details of human speech production mechanism
2. Explain Types of Speech
3. Explain voiced and unvoiced signal decision making techniques
4. Describe Pitch and Formants of speech signal
5. Explain linear predictive coding (LPC).
6. Write a note on 'Autocorrelation Method for speech processing'
7. Explain Mel Frequency Cepstral Coefficients (MFCCs).
8. Study of Line Spectral Frequencies/Line Spectral Pair Frequencies.
9. Write a note on 'Speech Recognition Systems'
10. Compare VQ and HMM based Speech Recognition on various parameters
11. Study of Uniform and Non-Uniform Quantizers and Coder
12. Study of Log Frequency Power Coefficients (LFPCs)

ELECTIVE - II ARTIFICIAL INTELLIGENCE AND ROBOTICS

Teaching Scheme
Lecture: 3 Hours/week
Tutorial: 1 Hours/week

Examination Scheme
End Semester Exam: 60 Marks
Unit Test:20marks
Attendance: 10 marks
Assignment:10 marks
TW & OR: 50 Marks
Credits: 4

Course Prerequisites:

- Programming languages, Microcontrollers.

Course Objectives:

1. To introduce basic concepts of Artificial Intelligence.
2. To familiarize the students with methods of solving problems using Artificial
   Intelligence.
3. To introduce the basic configuration of Robotics and various types of Robots.

Course Outcomes:

On successful completion of this course, students will be able to

1. Identify problems that are amenable to solution by AI methods.
2. Identify appropriate AI methods to solve a given problem.
3. Formalize a given problem in the language/framework of different AI methods.
4. Implement basic AI algorithms in design of Robots

UNIT 1 [6 Hrs]

Scope of AI

Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

UNIT 2 [6 Hrs]

Problem solving

State space search; Production systems, search space control: depth-first, breadth-first search, heuristic search - Hill climbing, best-first search, branch and bound. Problem Reduction, Constraint Satisfaction End, Means-End Analysis.

UNIT 3 [6 Hrs]

Knowledge Representation

Predicate Logic: Unification, modus ponens, resolution, dependency directed backtracking. Rule based Systems: Forward reasoning, conflict resolution, backward reasoning, use of no backtrack. Structured Knowledge Representation: Semantic Nets, slots, exceptions and default frames, conceptual dependency, scripts.

UNIT 4 [6 Hrs]

Handling uncertainty and learning

Non-Monotonic Reasoning, Probablistic reasoning, use of certainty factors, fuzzy logic. Concept of learning, learning automation, genetic algorithm, learning by inductions, neural nets.

UNIT 5 [6 Hrs]

Robotics

Automation and Robotics, Definition, Basic Structure of Robots, Robot Classification, Robot Specification, notation, Present trends and future trends in robotics, Overview of robot subsystems.

UNIT 6 [6 Hrs]

Direct and Inverse Kinematics

Co-ordinates Frames, Rotations, Homogeneous Coordinates, Arm Equation of four Axis SCARA Robot, TCV, Inverse Kinematics of Four Axis SCARA Robot.

Content Delivery Methods :

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials / Experiments:

1. Program to find truth and probability in evolutionary game.
2. Program for optimal search and graph heuristics
3. Forward and backward Chaining.
4. K-nearest neighbors.
5. Implement Predicate logic
6. Write a program for face detection.
7. Implement knowledge representation
8. Constraint satisfaction problems
9. Breadth-first search
10. Hill climbing algorithm
11. Depth-first search

List of Assignments:

1. Write a note on different AI techniques.
2. Explain Optimal search and graph heuristics.
3. What are problem solving, search and control strategies?
4. Define Mean-end analysis.
5. Discuss Forward chaining and backward chaining with an example.
6. Explain modus pones with formal notation
7. Write a note on artificial neural network.
8. Explain fuzzy logic with examples.
9. Define basic structure of robot and its classification.
10. Write the Present trends and future trends in robotics
11. Discuss SCARA ROBOT with neat diagram.
12. Explain Inverse Kinematics of Four Axis SCARA Robot

Text Books:

1. E. Rich and K. Knight, "Artificial intelligence", TMH, 2nd ed., 1992.
2. Robin R Murphy, Introduction to AI Robotics PHI Publication, 2000
3. Fundamentals of Robotics: Analysis and Control – Robert J Schilling, PHI, New Delhi
4. Robotic Engineering – Klafter, Thomas, Negin, PHI, New Delhi

Reference Books:

1. D.W. Patterson, "Introduction to AI and Expert Systems", PHI, 1992.
2. R.J. Schalkoff, "Artificial Intelligence - an Engineering Approach", McGraw Hill Int. Ed., Singapore, 1992.
3. George Lugar, .Al-Structures and Strategies for and Strategies for Complex Problem solving., 4/e, 2002, Pearson Educations.
4. Robotics for Engineers – YoramKoren, McGraw Hill

ELECTIVE-II SYSTEM ON CHIP

Teaching Scheme	Examination Scheme
Lecture: 3 Hours/week	End Semester Exam: 60 Marks
Tutorial: 1 Hour/week	Unit Test: 20marks
	Attendance : 10 marks
	Assignment : 10 marks
	TW & OR : 50 Marks
	Credits : 4

Course Prerequisites :

Processor Design, Digital Electronics

Course objective:

1) To make students familiar with fundamentals of SOC design methodology.
2) To categorize requirements of SOC design.
3) To recognize essentials of SOC design.
4) To comprehend applications of SOC.

Course Outcomes:

On successful completion of this course, students will be able to

1) Conceptualize SOC design methodology
2) Understand SOC design flow
3) Design complex SOC
4) Intellectualize future trends in SOC design

Unit-1 [6 Hrs]

The Case for a New SOC Design Methodology

The age of Megagate SOCs, The fundamental trends of SOC design, An improved design methodology for SOC design.

Unit-2 [6 Hrs]

SOC Design Today

Hardware System Structure, Software trends, Current SOC Design Flow, Six Major Issues in SOC Design.

Unit-3 [6 Hrs]

A New Look at SOC Design

The basics of Processor-Centric SOC architecture, Accelerating Processors for Traditional Software Tasks, System Design with Multiple Processors, New Essentials of SOC Design Methodology

Unit-4 [6 Hrs]

System-Level Design of Complex SOCs

Complex SOC System Architecture Opportunities, Major Decisions in Processor-Centric SOC Organization, Communication Design = Software Mode + Hardware Interconnect, Hardware Interconnect Mechanisms, The SOC Design Flow

Unit -5 [6 Hrs]

Advanced Topics in SOC Design

Pipelining for Processor Performance, Inside Processor Pipeline Stalls, Optimizing Processors to Match Hardware, Multiple Processor Debug and Trace, Issues in Memory Systems

Unit-6 [6 Hrs]

The future of SOC Design

What's happening to SOC design, The designer's dilemma, The SOC design transition, Looking into future of SOC design, Future applications of complex SOC.

Content Delivery Methods :

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Experiments:

1) Study of SOC Components
2) Study of Integration Technology in SOC with standard CMOS process.
3) Study of Technology challenges in SOC design.
4) Study of SOC design requirements
5) Study of SOC architecture
6) Study of SOC test methodology
7) Application of SOC in Communication
8) Application of SOC in Computer
9) Application of SOC in Consumer
10) Case study: Complex SOC

List of Assignments:

1) What are the challenges in SOC design? Describe in brief.
2) List various design elements, tools and methodologies playing an important role in SOC Design.
3) Using diagram, explain SOC design flow.
4) Which are the important issues in SOC design? Explain in detail.
5) Discuss the basics of processor -centric SOC design.
6) Write essentials of SOC design methodology.

7) Define complex SOC system architecture opportunities.
8) Explain major decisions in processor-centric SOC organizations.
9) Discuss pipelining and exceptions.
10) Explain issues in memory system.
11) Describe designer's dilemma wrt SOC.
12) List future applications of complex SOC.

Text book:

1) Chris Rowen, Engineering the Complex SOC, Prentice Hall, 2004.

Reference books:

1) Rainer Leupers, Olivier Temam, Processor and System-on-Chip Simulation, Springer, 2010
2) Michael J. Flynn, Wayne Luk, Computer System Design System on Chip, Wiley, 2011
3) Bashir M. Al-Hashimi, System-on-Chip: Next Generation Electronics, IET, 2006
4) Steve Furber, ARM System on Chip Architecture, Pearson India, 2000
5) Wayne Wolf, Ahmed Amine Jerraya, Multiprocessor Systems-on-Chips, Elsevier, 2005.
6) Sudeep Pasricha and NikilDutt, On-Chip Communication Architectures System on Chip Interconnect, Elsevier, 2008

ELECTIVE-II FUZZY LOGIC & NEURAL NETWORK

Teaching Scheme
Lecture: 03 Hours/week
Tutorial: 01 Hour/week

Examination Scheme
End semester exam: 60 Marks
Unit Test: 20marks
Attendance: 10 marks
Assignments: 10 marks
TW & Oral: 50 Marks
Credits: 04

Course Prerequisites:

Engineering Mathematics-II, Engineering Mathematics-III, Signals & Systems.

Course Objectives:

1. Introduce a relatively new computing paradigm for creating intelligent machines useful for solving complex real world problems.
2. Insight into the tools that make up the soft computing technique: fuzzy logic, artificial neural networks and hybrid systems Techniques.
3. To create awareness of the application areas of neural network technique
4. Provide alternative solutions to the conventional problem solving techniques in image/signal processing, pattern recognition/classification, control system.

Course Outcomes :

On successful completion of this course, students will be able to

1. Design fuzzy system for Electronics applications.
2. Describe the fundamentals of Crisp sets, Fuzzy sets, Fuzzy Relations and Fuzzy Logic Controller.

3. Describe the various architectures of building an ANN and its applications.
4. Design and implement neural network systems to solve real-world problems
5. Develop models for different applications using fuzzy system.

Unit I

Fuzzy Logic -I [05 Hours]

Concept of Fuzzy number, fuzzy set theory (continuous, discrete), Operations on fuzzy sets, Fuzzy membership functions (core, boundary, support), primary and composite linguistic terms, Concept of fuzzy relation, composition operation (T-norm, T-conorm), Fuzzy if-then rules.

Unit II

Fuzzy Logic -II [07 Hours]

Fuzzification, Membership Value Assignment techniques, De-fuzzification (Max membership principle, Centroid method, Weighted average method), Concept of fuzzy inference, Implication rules- Dienes-Rescher Implication, Mamdani Implication, Zadeh Implication, Fuzzy Inference systems -Mamdani fuzzy model, Sugeno fuzzy model, Tsukamoto fuzzy model, Implementation of a simple two-input single output FIS employing Mamdani model Computing.

Unit III [06 Hours]

Fuzzy Control Systems

Assumptions in a Fuzzy Control System Design, Fuzzy Logic Controllers, Comparison with traditional PID control, advantages of FLC, Architecture of a FLC: Mamdani Type, Example Aircraft landing control problem, washing machine and vacuum cleaner.

Unit IV [05 Hours]

Artificial Neural Network -I

Biological neuron, Artificial neuron model, concept of bias and threshold , Mc Culloch-Pits Neuron Model, implementation of logical AND, OR, XOR functions Soft Topologies of neural networks, learning paradigms: supervised, unsupervised, reinforcement, Linear neuron model : concept of error energy , gradient descent algorithm and application of linear neuron for linear regression, Activation functions : binary , bipolar (linear, signup, log sigmoid, tan-sigmoid) Learning mechanisms: Hebbian, Delta Rule o Perceptron and its limitations Draft.

Unit V [07 Hours]

Artificial Neural Network -II

Multilayer perceptron (MLP) and back propagation algorithm, Application of MLP for classification and regression, Self-organizing Feature Maps, k-means clustering, Learning vector quantization Radial Basis Function networks: Cover's theorem, mapping functions (Gaussian, Multiquadrics, Inverse multi quadrics), Application of RBFN for classification and regression, Hopfield network, associative memories.

Unit VI [06 Hours]

Adaptive Neuro-Fuzzy Inference Systems (ANFIS)

ANFIS architecture, Hybrid Learning Algorithm, Advantages and Limitations of ANFIS Application of ANFIS/CANFIS for regression

Content Delivery Methods :

Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination.

List of Tutorials/Experiments:

1. Study of Fuzzy sets and operations.
2. Study of concepts of fuzzy sets core, support, alpha cuts..
3. Study of fuzzy relation, Max-min composition.
4. Analyze t-norms and t-conorms.
5. Analyze Fuzzy Inference systems -Mamdani fuzzy model, Sugeno fuzzy model, Tsukamoto fuzzy model.
6. Analyze architecture of a FLC: Mamdani Type with Example Aircraft landing control problem, washing machine and vacuum cleaner.
7. Study of learning mechanisms, approaches and activation functions in ANN.
8. Study of Multilayer perceptron (MLP) and back propagation algorithm.
9. Study of Radial Basis Function networks.
10. Study of ANFIS architecture and Hybrid Learning Algorithm.

List of Assignments:

1. Implement simple logic network using MP neuron model
2. Implement a simple linear regressor with a single neuron model.
3. Implement and test MLP trained with backpropagation algorithm
4. Implement and test RBF network.
5. Implement SOFM for character recognition.
6. Perform fuzzy sets operations.
7. Implement fuzzy membership functions (triangular, trapezoidal, gbell, PI, Gamma, Gaussian).
8. Implement defuzzyfication (Max-membership principle, Centroid method, Weighted average method)
9. Implement FIS with Mamdani inferencing mechanism.
10. Implement Simulink model for Vacuum cleaner, washing machine using Fuzzy Logic tools

11. Implement Fuzzy Logic Controller.
12. Implement perceptron learning, multilayer feed forward neural networks.

Text Books:

1. Fundamentals of Neural Networks: Architectures, Algorithms and Applications, Laurene Fausett, Pearson Education, Inc, 2008.
2. Fuzzy Logic with Engineering Applications, Third Edition Thomas, Timothy Ross, John Wiley & Sons,2010.
3. Neuro- Fuzzy and Soft Computing, J.S. Jang, C.T. Sun, E. Mizutani, PHI Learning Private Limited.
4. Principles of Soft Computing , S. N. Sivanandam, S. N. Deepa, John Wiley & Sons, 2007

Reference Books:

1. Introduction to the theory of neural computation, John Hertz, Anders Krogh, Richard Palmer, Addison –Wesley Publishing Company, 1991
2. Neural Networks A comprehensive foundation,, Simon Haykin,Prentice Hall International Inc- 1999.
3. Neural and Adaptive Systems: Fundamentals through Simulations, José C. Principe Neil R. Euliano , W. Curt Lefebvre, John-Wiley & Sons, 2000
4. Pattern Classification, Peter E. Hart, David G. Stork Richard O.Duda,Second Edition,2000
5. Pattern Recognition, SergiosTheodoridis , Konstantinos Koutroumbas, Fourth Edition, Academic Press, 2008
6. A First Course in Fuzzy Logic, Third Edition, Hung T. Nguyen, Elbert A. Walker, Taylor & Francis Group, LLC, 2008
7. Introduction to Fuzzy Logic using MATLAB, S. N. Sivanandam ,S.Sumathi, S. N. Deepa, Springer Verlag, 2007

PROJECT STAGE - II

Lecture: 00 hours/week | TW & Oral: 150 marks

Practical: 08 hours/week | Total Credits: 08

Course prerequisites:

Project Stage -I

Course objective:

1. To familiarize the students with the product developmentcycle
2. To impart the importance of working as a team.
3. To introduce the student to literature survey and documentation process.
4. To encourage the students to visualize and formulate a viable solutionto practical engineering problems.

Course Outcomes:

On successful completion of this course, students will be able to

1. Implement solution for an Engineering problem.
2. Test and troubleshoot the implemented design.
3. Execute the project implementation & financial budget in a timely manner.
4. Student will be able to contribute and work effectively as team member.
5. Generate project report and present it effectively.

Project Stage –II includes various steps such as:

1. System design
2. Testing
3. System documentation
4. Project report

SEMINAR

Lecture: 00 hours/week TW & Oral : 50 marks

Practical: 02 hours/week Total Credits: 1

Course prerequisites:

Electronics Engineering, Telecommunication Engineering

Course objective:

1. To develop ability of thinking and motivation for seminar
2. To expose the students to the state of the art
3. To develop ability to perform literature survey
4. To develop Seminar presentation and Technical Communication Skills

Course Outcomes:

On successful completion of this course, students will be able to

- Effectively communicate his technical idea or project
- Learn master survey and literature survey techniques
- Write Motivational Statement
- Present the topic

Seminar Documentation should include

Cover Title page, plagiarism assessment, report Certificate from Guide, Abstract, list of Figures, List of Tables, Abstract, Presentation Slide using Microsoft power point including bibliography/references in IEEE standard format.

The student shall submit the seminar report in standard format, duly certified for satisfactory completion of the work by the concerned Guide and head of the department.

RULES REGARDING ATKT, CONTINUOUS ASSESSMENT AND AWARD OF CLASS

Standards of Passing and ATKT Rules

1. For all courses, both UE (Universtiy Evaluation) and IA (Internal Assessment) constitue separate heads - of - passing (HoP). In ordar to pass in such courses and to 'earn' the assigned credits.
   a) The learner must obtain a minimum grade point of 5.0 (40 % Marks) at UE and also a minimum grade point of 5.0 (40 % Marks) at IA.

   OR

   b) If he/she fails in IA, the learner passes in the course provided he/she obtains a minimum of 25% in IA and GPA for course is atleast 6.0 (50% Aggregate). The GPA for a course will be calculated only if the learner passes at the UE.
2. A student who fail at UE in a course has to reappear only at UE as a backlog candidate and clear the HoP. Similarly, A student who fails in a course at IA has to reappear only at IA as backlog candidate and clear the HoP.

Rules of ATKT

1. A student is allowed to carry backlog of courses prescribed for B.Tech Sem - I, III, V, VII to B.Tech Sem - II, IV, VI, VIII respectively.
2. A student is allowed to keep term of Sem - III, if he/she is failing in any number of subjects of Sem I & II.
3. A student is allowed to keep term of Sem - V, if he/she is failing in any number of subjects of Sem - III & IV but passed in all subjects of Sem - I & II.
4. A student is allowed to keep term of Sem - VII, if he/she is failing in any number of subjects of Sem - V & VI but passed in all subjects of Sem - III & IV.

Award of Class for the Degree Considering CGPA

Award of Honours

A student who has completed the minimum credits specified for the programme shall be declared to have passed in the programme. The final result will be in terms of letter grade only and is based on the CGPA of all courses studied and passed. The Criteria for the Award of Honours at the End of the Programme are as given below.

Range of CGPA	Final Grade	Performance Descriptor	Equivalent Range of Marks (%)
9.50 ≤ CGPA ≤ 10.00	0	Outstanding	80 ≤ Marks ≤ 100
9.00 ≤ CGPA ≤ 9.49	A+	Excellent	70 ≤ Marks ≤ 80
8.00 ≤ CGPA ≤ 8.99	A	Very Good	60 ≤ Marks ≤ 70
7.00 ≤ CGPA ≤ 7.99	B+	Good	55 ≤ Marks ≤ 60
6.00 ≤ CGPA ≤ 6.99	B	Average	50 ≤ Marks ≤ 55
5.00 ≤ CGPA ≤ 5.99	C	Satisfactory	40 ≤ Marks ≤ 50
CGPA Below 5.00	F	Fail	Marks Below 40