Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Electronics) Sem – VII (2014 Course)

Semester- VII **Contact Hours: 23 Hrs/week**
Total Credits: 25
Total Marks: 750

Sr. No.	Subject	Teaching Scheme(Hrs)			Examination Scheme (Marks)						Total Marks	Credits
		L	T	P		Continuous Assessment			Tw &Pr	TW & OR		
					End Semester Exam	Unit Test	Tutorials / Assignments	Attendance				
40	Computer Networks	3	0	2	60	20	10	10	-	50	150	4
41	Programmable Logic Controllers & Applications	3	0	2	60	20	10	10	50	-	150	4
42	Electronic System Design	3	0	0	60	20	10	10	-	-	100	3
43	Advanced Communication System	2	0	0	60	20	10	10	-	-	100	2
44	ELECTIVE-I	3	1	0	60	20	10	10	-	50	150	4
45	Project Stage-I	0	0	4	-	-	-	-	-	50	50	4
46	In-plant Training	0	0	0	-	-	-	-	-	50	50	4
	Total	**14**	**01**	**08**	**300**	**100**	**50**	**50**	**50**	**200**	**750**	**25**

Elective-I

1) Mobile & Broadband Communication
2) Digital Image processing
3) Advanced Digital Signal Processing
4) Advance Computer Programming

Bharati Vidyapeeth University, Pune

Faculty of Engineering & Technology

Programme : B.Tech (Electronics) Sem – VIII (2014 Course)

Semester- VIII **Contact Hours: 28 Hrs/week**
Total Credits: 25
Total Marks: 750

Sr. No.	Subject	Teaching Scheme(Hrs)			Examination Scheme (Marks)						Total Marks	Total Credits
		L	T	P	End Semester Exam	Continuous Assessment			Tw &Pr	TW & OR		
						Unit Test	Tutorials / Assignments	Attendance				
47	Optical Fiber Communication	3	0	2	60	20	10	10	50	-	150	4
48	Biomedical Engineering	3	0	2	60	20	10	10	-	50	150	4
49	Wireless Network	3	1	0	60	20	10	10	-	-	100	4
50	Elective-II	3	1	0	60	20	10	10	-	50	150	4
51	Seminar	0	0	2	-	-	-	-	-	50	50	1
52	Project Stage-II	0	0	8	-	-	-	-	-	150	150	8
	Total	**12**	**02**	**14**	**240**	**80**	**40**	**40**	**50**	**300**	**750**	**25**
53	Environmental Studies	3	0	0	60	20	10	10	-	-	100	0

Elective-II

1) Agricultural Electronics
2) SOC (System on Chip)
3) Speech Processing
4) Fuzzy Logic & Neural Network

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VII

SUBJECT: - Computer Networks

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Practical: 02 Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW& OR: 50 marks
	Credits: 04

Course Prerequisites:
Analog communication, Digital communication systems.

Course Objectives:

1. To introduce various topologies and types of computer networks.
2. To introduce network hardware & OSI layers.
3. To know how of congestion control mechanism.
4. To familiarize the TCP/IP protocol.

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.

Contents:

Unit I **[06 Hours]**

Introduction to computer networks

Networks definition & requirements, Networks topologies, Types of networks, network software issues, reference models- OSI TCP/IP and Hybrid.

Unit II **[06 Hours]**

Physical layer

Transmission media Guided media-twisted pair, coaxial cable, optical fiber, unguided media-RF allocation, terrestrial microwave, satellite communication, cellular telephone, EIA 232 D interface standard, modem-types, block schematic & standards network device: network connectors, Hubs, Switches, Routers, Bridges, NIC, Fast Ethernet, Gigabit Ethernet.

Unit III **[06 Hours]**

Data Link Layer

Design issues, error detection and correction, elementary data link protocols, sliding window protocols, HDLC-types of stations, modes of operation, HDLC frame formats, additional features, Medium access sub layer – channel allocation problem, multiple access protocols, IEEE 802 standards for LANS & WANS.

Unit IV **[06 Hours]**

Network Layer

Design issues, Routing algorithms – shortest path, distance vector routing, link state routing, flow based routing, routing for mobile hosts, Congestion control – congestion prevention policies-leaky bucket algorithm, token bucket algorithm, congestion control in virtual circuit subnet and choke packets, RSVP.

Unit V **[06 Hours]**

TCP/IP Protocol suit overview

TCP/IP and internet, IP protocol and it's header format, addressing, subnetting, other networks layer protocol – ARP, RARP, ICMP, IGMP, TCP, UDP, DHCP, Domain name system (DNS), Email, HTTP, IPV 6.

Unit VI **[06 Hours]**

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.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Experiments

1. Study of Networking.
2. Introductions to Network Simulation.
3. Study of LAN.
4. Study of Installation of Widows 2003 Server & introduction to DHCP.
5. i)Character transfer using Simplex method
   ii) Character transfer using Full-Duplex method
6. Simulation and implementation of bit stuffing Simulation and implementation of CRC
7. Study of Medium Access sub layer protocols and simulate using Network Simulator.
8. Simulation and implementation of
   i) Stop-and Wait protocol
   ii) Go-Back-N protocol
   iii) Selective repeat Protocol
9. Simulation and implementation of i) Distance Vector Routing Algorithm ii)Link State Routing algorithm
10. Study of Token Bucket Algorithm.
11. Study of TCP/IP Protocol Suite and Simulation Address resolution protocols.

List of Assignments:

1. Study of types of Networks and topologies.
2. Study of Network Hardware.
3. Study of TCP/IP Architecture
4. Study of Physical Layer
5. Study of Data Link Layer.
6. Describe the various Encoding techniques.
7. Study of Network Layer.
8. Study of Congestion control Mechanism.
9. Study of Session layer.
10. Study of Presentation layer.
11. Study of Application layer.
12. Study of Network security Mechanism.

Text Books

1. Andrew Tanenbaum, “Computer networks”, Prentice Hall.
2. B. A. Forouzan, “Data Communications and Networking”, Tata McGraw Hill, 4th Edition

References

1. S. Keshav, “An Engineering Approach to Computer Networking” , Pearson Education
2. J.F. Kurose and K. W. Ross, “Computer Networking – A top down approach featuring the Internet”, Pearson Education, 5th Edition
3. D. Comer, “Computer Networks and Internet/TCP-IP”, Prentice Hall
4. William Stallings, “Data and computer communications”, Prentice Hall
5. L. Peterson and B. Davie, “Computer Networks – A Systems Approach” Elsevier Morgan Kaufmann Publisher, 5 th Edition.
6. T. Viswanathan, “Telecommunication Switching System and Networks”, Prentice Hall

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem: -VII

SUBJECT: - Programmable Logic Controllers and Applications

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End semester Exam: 60 marks**
Practical: 02 Hours/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignments: 10 marks
	TW &Pr: 50 marks
	Credits: 04

Course prerequisites:

Digital Electronics, Embedded systems, Power Electronics

Course objective:

1. To make the student aware of automation in industries.
2. To introduce the student to the programmable logic controllers.
3. To give the know-how of NC, CNC machines & their role in manufacturing industries.
4. To impart the knowledge of protocols & networking of PLCs

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

1. Write the ladder logic for applications using logical & mathematical instructions.
2. Write the ladder logic for applications using program & data flow instructions.
3. Interface digital & analog input/output to the PLC
4. Identify NC, CNC machines and networking of PLCs.
5. Identify the components of SCADA and HMI.

Contents

Unit I

Process Control & Automation **[06 Hours]**

Definition of Process control, PID Controller, Cascade control, Analog control, Digital control, Types of Automation, Advantages and limitations of Automation, controllers & actuators. Introduction to PLC, architecture, working of PLC, functions of PLC, selection of PLC, ladder programming

Unit II

Transmitters and Signal Conditioning **[06 Hours]**

Need of transmitters,2-Wire & 3-Wire transmitters, Standardization of signals, Current, Voltage and Pneumatic signal standards, Necessity of Analog input, output interface to PLC. Analog and Digital signal conditioning for various parameters, Smart and Intelligent transmitters.

Unit III

Input and Output modules **[06 Hours]**

Various functions of PLC like mathematical, logical, dataflow, special functions. Interfacing of Input and Output devices with PLC. Sourcing & sinking, Classification of input & output modules,discrete & analog modules.

Unit IV

PLC and Human Machine Interface (HMI) **[06Hours]**

PLC based automated systems. High frequency inputs. PLC programming standard IEC61131, Soft PLC techniques. IT Interfaces required: for ERP, MIS, MES. Supporting Applications interfaces: RFID, Barcode, Vision Systems. HMI: Block Diagram, Types, Advantages, Applications.

Unit V

SCADA & Distributed control system **[06Hours]**

Elements of SCADA, Features of SCADA, MTU- functions of MTU, RTU- Functions of RTU, Applications of SCADA, Communications in SCADA- types & methods used, Introduction to DCS, Architecture of DCS, Input and output modules, communication module, Specifications of DCS

Unit VI

Automation and CNC (Computer Numeric Control) Machines [06 Hours]

Introduction of NC and CNC Machines: Need of CNC machines, Applications of CNC machines in manufacturing, Advantages of CNC machines.

Networking of PLCs - Network topology, industrial network, bus network, Device bus network, Process bus network, Modbus protocol Device net, Controlnet, AS-I interface, Foundation field bus, Profibus

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Practicals:

1. Application examples based on timers & counters.
2. Design & implement ON-OFF controller circuit
3. Application examples based on data flow instructions.
4. Application examples based on mathematical instructions.
5. Application examples using One shot rising instruction.
6. Application examples using advanced instructions.
7. Examples based on Industrial application s
8. Interfacing of analog inputs to PLC.

List of Assignments:

1. Conduct survey for different types of PLC programming.
2. Selection of PLC for a application with specifications.
3. Classify the timers & Counters with applications.
4. Design of signal conditioning circuit for any one analog application.
5. Identify sinking & sourcing PLC input output module.
6. Interface switch & sensor to PLC as input.
7. Communication between PLC HMI using Modbus protocol
8. Identify the applications of soft PLC.
9. Study of DCS in any industrial plant.

10. Practical examples where SCADA has played important role.
11. Identify different types of CNC machines (with applications) in industries.
12. Justify the need of networking of PLCs.

Text Books:

1. John W. Webb, Ronold A Reis, "Programmable Logic Controllers, Principles and Applications"; 5th Edition, Prentice Hall of India Pvt. Ltd

2. MadhuchhandaMitra, SamarjitSen Gupta, "Programmable Logic controllers and Industrial Automation"; Penram International Publishing India Pvt. Ltd

Reference Books:

1. Curtis Johnson, "Process Control Instrumentation Technology"; 8th Edition, PearsonEducation

2. Kilian, "Modern control technology: components & systems, Delmar 2nd edition.

3. Bela G Liptak, Process software and digital networks, 3rd edition, 2002.

4. Pollack. Herman, W & Robinson., T. "Computer Numerical Control", Prentice Hall. NJ.

5. Pabla, B.S. &Adithan, M. "CNC Machines", New Age Publishers, New Delhi

6. Stuart A. Boyer, SCADA supervisory control and data acquisition, ISA Publication

Reference Books

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem: -VII

SUBJECT: - Electronic System Design

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End semester Exam: 60 marks**
Practical: 00Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignments: 10 marks
	Credits: 03

Course Pre-requisites:

Analog Electronics, Digital Electronics, Microprocessors & Microcontrollers, VLSI Design.

Course Objectives:

1. To introduce analog and digital interfacing techniques
2. To create awareness of EDA tools and techniques for testing and fault diagnosis
3. To imbibe the importance of international standards for electronic systems and packaging techniques
4. To enable the students to design electronic systems compliant with EMI specifications

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

1. Address interfacing issues in analog and digital circuits.
2. Use EDA tools and Laboratory Instruments for testing and fault diagnosis.
3. Identify various international standards, specifications for electronic systems.
4. Use grounding and shielding techniques for safety in electronic systems and PCB designing.

Contents:

Unit I

Hardware Design- Analog **[06 Hours]**

Analog Signal Conditioning: Factors affecting choice of Op-Amps in signal conditioning, applications, Need for Instrumentation Amplifiers- Case study. Error budget analysis with Case study. ADCs: Interpretation of ADC specifications from design view point, considerations in selecting references (Vref for ADC). DACs: Interpretation of DAC specifications.

Unit II

Hardware Design- Digital **[06 Hours]**

Interface examples for LED, HB LED, LCD, Keyboard, Relays (Electromagnetic and Solid State). Microcontrollers: Comparative study of different Microcontroller architectures,

Factors affecting choice of Microcontroller for different applications with case study.

Introduction to buses and protocols used in Electronic products- I2C, SPI, CAN, Lin, Flexray.

Unit III

EDA Tools and Standards **[06 Hours]**

Different approaches to development of application software for Electronic Product. Debugging tools and techniques for software- Features of EDA, CAD, Simulators, Assemblers, ICE, and IDE. Documentation practices and templates for above software. Introduction to various international s standards like IEEE, FCC, IEC, BS & ISO standards.

Unit IV

Testing and Fault Diagnosis **[06 Hours]**

Analyses- DC/ Operating Point Analysis, AC (Frequency Response), Transient, Sensitivity, Monte Carlo. Debugging/ Fault finding- Features and limitations of Analog CRO, DSO, Logic Analyzer and Mixed Signal Oscilloscopes in finding hardware/software faults.

Unit V

ESD and Packaging **[06 Hours]**

Packaging & Enclosures of Electronic System: Need for Environmental Testing, Effect of environmental factors on electronic systems: Temperature, Humidity, Vibration and Shock tests, nature of environment and safety measures. Packaging's influence and its factors.Cooling in/of Electronic System: Heat transfer, approach to thermal management, mechanisms for cooling, operating range, basic thermal calculations, cooling choices, heat sink selection.

Unit VI

PCB Design and EMC **[06 Hours]**

PCB Design practices for Analog and Mixed signal circuits, High speed digital circuits, Precision circuits, Grounding of Electronic Systems: Safety grounds, signal grounds, single-point ground systems, multipoint-point ground systems, hybrid grounds, functional ground layout, practical low frequency grounding, hardware grounds, grounding of cable shields, ground loops, shield grounding at high frequencies.

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Assignments:

1. State factors affecting choice of Op-Amps in signal conditioning.
2. State the need for Instrumentation Amplifier with an example.
3. State the need for signal conditioning circuits with an example
4. State selection criteria of Microcontroller for application with case study of one application.
5. Explain in details the I2C protocol for interfacing peripherals
6. Explain in details the SPI protocol for interfacing peripherals
7. Explain following International standards in detail
    a. IEEE standards.
    b. FCC standards.
    c. IEC standards.
    d. BS standards.
    e. ISO standards.
8. List the different Layout design & Tools available in market and write the specifications in detail.
9. State need for Environmental Testing. Temperature, Humidity, Vibration and Shock tests etc.
10. State the need of Cooling in an Electronic system.
11. Explain the PCB design practices for Analog and Mixed signal circuits, High speed digital circuits, Precision circuits.
12. State the need for Grounding of Electronic Systems.

Text Books

1. Bernhard E. Bürdek, “History, Theory and Practice of Product Design”, SpringerScience, 2005
2. Paul Horowitz, “Art of Electronics”, Cambridge University Press.

Reference Books

1. Howard Johnson, Martin Graham, “High-speed Digital design- A Handbook of Black Magic”, Prentice Hall Publication.
2. G. Pahl and W. Beitz J. Feldhusen and K.-H. Grote, “Engineering Design – A Systematic Approach”, Springer,2007.
3. Tim Williams, “EMC for Product Designers”, Elsevier, Fourth edition 2007.
4. Jerry C Whitaker, “The Electronics Handbook”, CRC Press, IEEE Press, ISBN 08493-8345-5.
5. David Bailey, “Practical Radio Engineering and Telemetry for Industry”, Elsevier ISBN 07506 58037.
6. Pressman, “Software Engineering - A Practitioner's Approach”.
7. W.Bosshart“Printed Circuit Boards - Design & Technology”, 1st edition, Tata McGraw Hill.
8. G. Pahl and W. Beitz J. Feldhusen and K.-H. Grote, “Engineering Design – A Systematic Approach”, Springer, 2007.
9. John G. Webster, “Measurement, Instrumentation, and Sensors Handbook”, CRC Press, 1999.
10. Peter Wilson, “The Circuit Designer’s Companion”, Elsevier Ltd, 2012

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) Sem: - VII

SUBJECT: - Advanced Communication System

Teaching Scheme	**Examination scheme**
Lectures: 02 Hours/week	**End Semester Exam:60 Marks**
Practical: 00Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	Credits: 02

Course Prerequisite:

Analog Communication, Digital Communication Systems

Course Objectives:

1. To introduce radar & satellite communication system with its working principle and implementation techniques.
2. To enable student to integrate communication technologies in multidisciplinary applications.
3. To make the student aware of advanced communication techniques.

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

1. Compare radio frequency and microwave frequency communication with respect to its working principle and its applications.
2. Describe satellite subsystem and analyze link budget for satellite.
3. Identify the fundamentals of orbital mechanics, the characteristics of common orbits used in satellite communications
4. Explore the concept of cognitive radio communication.
5. Apply different modulation techniques and access techniques for wireless communications.

Contents:

Unit I **[04 Hours]**

Introduction to microwave techniques

Introduction to microwave fundamentals, microwave frequencies and microwave devices, microwave transmission lines- reflection coefficient and transmission coefficient, standing waves , wave guides, rectangular wave guides, TE mode wave, power transmission in wave guide, power losses, excitation of modes in wave guide

Unit II **[04 Hours]**

Satellite communication

Basic transmission theory, system noise temperature and G/T ratio, orbital mechanics, look angle determination, satellite subsystem.

Unit III **[04 Hours]**

Satellite link design

Design of downlink, link budget, design of uplink, modulation techniques, multiplex techniques, earth station, application overview-Radio and satellite navigation, GPS position location.

Unit IV **[04 Hours]**

Radar

Radar fundamentals, radar principle, radar range equation, types of radar pulsed radar system, MTI, radar beacons, FMCW radar, Doppler radar, phased array radar, plane array radar.

Unit V **[04 Hours]**

Cognitive radio

Cognitive Radio Architecture, Dynamic Access Spectrum, Spectrum Efficiency, Spectrum Efficiency gain in SDR and CR, Spectrum Usage, OFDM as PHY layer , OFDM Modulator, OFDM Demodulator

Unit VI **[04 Hours]**

Mobile Communication

Mobile telephone service, Transmission protocols, Introduction to GSM, GPRS, CDMA switching techniques, Quality of service (QOS).

Content Delivery Methods: Chalk & talk, Power point presentation

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End semester Examination

List of Assignments:

1. Study of microwave components and equipments
2. Study of measurement of microwave frequency
3. Simulation of microwave building blocks
4. Study of Radar communication
5. Study of Satellite communication
6. Simulation of radar building blocks
7. Simulation of satellite communications building blocks

8. Visit to Mobile Telephone Switching Office (MTSO).
9. Compare GSM, GPRS and CDMA switching techniques.
10. Explain in detail the concept of cognitive radio
11. Analysis of 3G and 4G systems using any appropriate simulation tool.
12. Study of Transmission of Audio signal over satellite link.

Text books:

1. M.L. Sisodia , "Microwave and Radar Engineering" 1st Edition, New Age International Publisher.
2. Timothy Pratt, "Satellite Communication", 2nd Edition, Wiley India Pvt. Limited.

Reference Books:

1. Liao Samuel Y, "Microwave Devices and Circuits", Prentice Hall Publisher.
2. Andreas Molisch, "Wireless Communications", Wiley IEEE Press.
3. Mischa Schwartz, "Mobile Wireless Communications", Cambridge University Press.
4. Peter A. Rizzi, "Fundamentals of Microwave Engineering", Prentice hall of India.
5. Louis E. Frenzel , "Communication Electronics principle and application", 3rd Edition; Tata McGraw Hill

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VII

SUBJECT: - Elective-I Mobile and Broadband Communication

Teaching Scheme

Lecture: 3 Hours/week

Tutorial: 01 Hour/week

Examination scheme

End semester Exam: 60 Marks

Unit Test: 20 marks

Attendance: 10 marks

Assignment: 10 marks

TW & OR: 50 marks

Credits: 04

Course Prerequisites:

Analog Communication, Digital Communication

Course Objectives:

1. To make students familiar with fundamentals of mobile communication systems
2. To make students familiar with GSM and CDMA technologies.
3. To make students familiar with B-ISDN, services of B-ISDN, ATM networks.

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

1. Develop mobile communication systems (cellular theory) and the characteristics of different multiple access techniques in mobile communication
2. Analyze the different inter-networking challenges and solutions in wireless mobile Networks and Transport Layers.
3. Develop applications that are mobile-device specific and demonstrate current practice in mobile communication contexts.

Contents:

Unit I

Mobile and Personal Communication **[05 Hours]**

Past, Present, and Future, The Cellular Concept, Multiple Access Technologies for Cellular System, Cellular System Operation and Planning: General Principles, Initial Implementations of the Cellular Concept: Analog Cellular Systems

Unit II

Digital Cellular Mobile Systems **[07 Hours]**

GSM Standardization and Service Aspects, GSM Reference Architecture and Function Partitioning, GSM Radio Aspects, Security Aspects, GSM Protocol Model, IS-95: The North American CDMA Digital Cellular Standard, Introduction, Service Aspects, Network Reference Model and Security Aspects, 4G Systems: Introduction to OFDM and MC-CDMA

Unit III

Mobile Network & Transport Layer **[06 Hours]**

Mobile IP, DHCP (Dynamic Host Control Protocol), Mobile adhoc networks, Mobile Transport Layer, Traditional TCP, Indirect TCP, Snooping TCP, Mobile TCP, Fast and Selective retransmission and recovery, Transaction oriented TCP, TCP over 2.5/3G wireless networks, Support for Mobility, File systems, Wireless application protocol, i-mode, SyncML, WAP 2.0.

Unit IV

ISDN **[05 Hours]**

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

B-ISDN architecture and standards, B-ISDN Services **[06 Hours]**

Conversational, Messaging, Retrieval, Distribution, Business and Residential requirements, B-ISDN protocols, User plane, Control plane, Physical layer, Line coding, Transmission structure, SONET Requirement, Signal Hierarchy, System Hierarchy.

Unit VI

ATM **[07 Hours]**

Overview, Virtual channels, Virtual paths, VP and VC switching, ATM cells, Header format, Generic flow control, Header error control, Transmission of ATM cells, Adaptation layer, AAL services and protocols, ATM switching, ATM cell processing in a switch, Matrix type switch, Input, Output buffering, Central buffering, ATM Traffic and congestion Control, Requirements for ATM Traffic and Congestion Control, Cell-Delay Variation, ATM Service Categories.

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. Analyze Cellular Concept & cellular hierarchy.
2. Study of Cellular system operation & planning.
3. Analyze GSM architecture & GSM service aspects.
4. Study of CDMA Digital cellular standards.
5. Study of design principles of Mobile IP, mobile transport layer.
6. Analyze and study of architecture of ISDN standards and addressing.
7. Study of B-ISDN Protocols.
8. Analyze design principles of ATM cells, AAL services, protocols and ATM switching.

List of Assignments:

1. Visit mobile station/telephone switching & prepare visit report.
2. To carryout telephone signal switching system using EPBX trainer.
3. To carry out AT commands mobile communication using GSM trainer.
4. To transfer data between two computers using ISDN terminal adapter modem.
5. To understand CDMA trainer using DSSS technology.
6. Analyze digital & analog cellular systems.
7. To study Mobile IP & Mobile Transport Layer
8. Analyze ISDN protocol architecture, ISDN connections, Addressing, Interworking.
9. To study B-ISDN protocols, User plane, Control plane, Physical layer & Line coding.

10. Analyze handoff management in mobile communication by virtual lab.
11. To study AAL services and protocols and ATM switching.
12. Analyze ATM Traffic and congestion Control.

Text Books:

1. Jochen Schiller, Mobile Communications, Pearson Education,2nd Edition.
2. Raj Pandya, Mobile and personal communication Systems and Services, Prentice Hall of India.
3. William Stallings, ISDN and Broadband ISDN with Frame Relay and ATM, Prentice-Hall, 4th Edition.

Reference Books:

1. William C.Y. Lee, Mobile Cellular Telecommunications- Analog & Digital Systems, Mc.Graw Hill, 1995
2. Theodore S. Rappaport, Wireless Communications (principles and practices), Prentice Hall of India, 2nd Edition.
3. Balajikumar, Broadband Communications - Mc-Graw Hill.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) SEM:- VII

SUBJECT:- Elective - I Digital Image Processing

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Tutorial: 01 Hour/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & OR: 50 Marks
	Credits: 04

Course prerequisites:

Signals and Systems, Digital Signal Processing.

Course objective:

1 To introduce the image fundamentals and enhancement techniques.

2 To introduce the image segmentation and representation techniques.

3 To familiarize various morphological operations on image.

4 To introduce the concepts of image registration and image fusion.

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

1. Demonstrate the fundamentals of digital image processing.

2. Design the image enhancement filters.

3. Analyze morphological operations and its effects on image.

4. To perform various morphological operations on image.

5. Determine features of various images by using segmentation method.

Contents:

Unit I

Fundamentals Digital Image Processing **[06 Hours]**

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, Relationships between pixels, Color models, Noises in color images.

Unit II

Image Enhancement **[06 Hours]**

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

Multi Resolution Analysis and Compressions **[06 Hours]**

Multi resolution analysis, Image pyramids, Multi resolution expansion, Wavelet Transforms, Image compression, Fundamentals Models, Elements of Information Theory, Error free Compression, Lossy Compression, Compression Standards.

Unit IV

Morphological Operations in Image Processing **[06 Hours]**

Dilation and erosion, Opening and Closing, Hit or Miss transformation, Morphological algorithms, Extensions to grey scale images, Image Watermarking.

Unit V

Image Segmentation and Feature Extraction **[06 Hours]**

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

Applications of Digital Image Processing **[06 Hours]**

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, Image processing in 3D, 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. Study of Reading and Displaying Image in different File Format.
2. Study of Simple Binary and Gray Level Transformation.
3. Study of Histogram and Histogram Equalization of Image
4. Study of Smoothing of Image in Special Domain using Averaging and Medium Method.
5. Study of Edge Detection of Image using First and Second Order.
6. Study of Morphological Operations.
7. Study of Segmentation using Thresholding.
8. Study of Image Compression using DCT.
9. Study of Hough transforms.
10. Study of Feature Detection and Feature Identification.
11. Study of Image Sources in 2D and 3D.
12. Study of Iris Recognition.

List of Assignments:

1. Discuss Digital image representation and Color Model.
2. Study of Fundamental steps in digital image processing and components.
3. Study of Spatial domain, Gray level transformations and Intensity transformation functions.
4. Discuss Histogram processing, Fourier Transform, Gaussian filters.
5. Perform various Morphological Operations on image.
6. Study of Dilation and erosion, Opening and Closing, Image Watermarking.
7. Analysis of resolutions of Image and color intensity.
8. Study Wavelet Transforms, Image compression and Compression.
9. Study image Segmentation and Thresholding, Hough transform.
10. Study of Boundary descriptors, Localized feature detection and extraction.
11. Discuss Video Motion Analysis.
12. Study of applications of Digital Image Processing in 2D and 3D.

Text Books:-

1. Gonzalez, Rafel C. and Woods, Richard E., "Digital Image Processing", Second Edition, Prentice Hall, 2006.
2. Jain, Anil K., "Fundamentals of Digital Image Processing", Prentice Hall of India, New Delhi.

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. Mark Nixon, Alberto Aguado, "Feature Extraction and Image Processing", Academic Press, 2008.
5. Ardeshir Goshtasby, "2D and 3D Image registration for Medical, Remote Sensing and Industrial Applications", John Wiley and Sons,2005.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem :- VII

SUBJECT: - Elective-I Advanced Digital Signal Processing

Teaching Scheme
Lecture: 3 Hours/week
Tutorial: 1 Hour/week

Examination Scheme
End semester exam: 60 Marks
Unit Test: 20 marks
Attendance: 10 marks
Assignment: 10 marks
TW & OR: 50 Marks
Credits: 04

Course Prerequisites:

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.

Contents:

Unit I **[06 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 **[06 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 **[06 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 **[06 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 **[06 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 **[06 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**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VII

SUBJECT: - Elective-II Advanced Computer Programming

Teaching scheme	**Examination scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Tutorial:01Hour/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & Oral: 50 marks
	Credits: 04

Course prerequisites:

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

Contents

Unit I **[06 Hours]**

Object Oriented Programming:

Programming fundamentals, Basic Concepts, Different Programming Paradigms, Evolution of Different Programming Languages and their Characteristics, Object-Oriented Paradigm, Objects and Classes, Data Abstraction and Encapsulation,

Inheritance, Polymorphism, DynamicBinding, Message Communication, Benefits of OOP, Applications of OOP, Java Language as an OOP Language.

Unit II **[06 Hours]**

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 Making and Branching and Decision Making and Looping, Classes Objects and Methods, Arrays, Strings and Vectors, Interfaces.

Unit III **[06 Hours]**

Threads:

Packages in Java, Multithreaded Programming concepts and applications, Managing Errors and Exceptions, Managing Input/Output Files in JAVA.

Unit IV **[06 Hours]**

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 Hours]**

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, DELETEStatement, and Installation of MySQL or PL SQL. Setting MySQL / PL SQLUser Account.

Unit VI **[06 Hours]**

Database Connectivity:

Introduction to JDBC, JDBC Architecture, Types of JDBC drivers, ResultSet, 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**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VII

SUBJECT: - Project stage - I

Teaching scheme	**Examination scheme**
Practical: 04 Hours/week	**TW & Oral: 50 marks**
	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

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VII

SUBJECT: - In-plant Training

Teaching scheme	**Examination scheme**
-	**TW& OR: 50 marks**
	Credits: 04

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.

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VIII

SUBJECT: - Optical Fiber Communication

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Practical: 02 Hours/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignments: 10 marks
	TW & PR: 50 marks
	Total credits: 04

Course prerequisites:

Analog Electronics, Analog Communication

Course objective:

1. To lay down the foundation for optical communication engineering.
2. To introduce the working of optical transmitter and receiver.
3. To familiarize the students to optical devices and concepts of various modulation techniques.
4. To introduce the students to Optical Fiber measurement techniques.

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

1. Demonstrate the advantages and applications of optical fiber communication.
2. Identify different optical Sources/detectors with their operating principle.
3. Choose the multiplexing technique and optical amplifier for optical communication.
4. Select the connectors /couplers in Optical fiber link and explain measurement technique for the optical fiber losses.

Contents:

Unit I **[06 Hours]**

Introduction:

Advantages of optical fiber communication over other communication systems, Ray theory transmission, Electromagnetic mode theory for optical propagation, types of fibers, transmission characteristics of optical fibers-attenuation, scattering losses, fiber bend loss, dispersion, polarization, preparation of optical fibers.

Unit II **[06 Hours]**

Optical transmitter

Optical sources: Basic Concepts, Light Emitting Diodes, Semiconductor Laser, Laser Diodes, Line Coding, Laser Characteristics. Different modulation schemes**.** **Optical transmitters:** LED drive circuits for digital and analog transmission.

Unit III **[06 Hours]**

Optical Receivers and Optical links:

Optical receiver: Detector responsivity, Rise time and Bandwidth, P-N Photo Diode, P-I-N Photo Diode, Avalanche Photo Diode, Receiver Noise, Receiver Sensitivity.

Point to point Links: System design considerations, Link Power budget, Rise Time budget, Multichannel transmission techniques.

Unit IV **[06 Hours]**

WDM concept and Optical Amplifier:

WDM Concept, WDM Light wave Systems, WDM Components, System Performance Issues, Time Division Multiplexing, Sub Carrier Multiplexing, Code Division Multiplexing. Types of Optical Amplifier and its applications, Amplifier Noise, Optical SNR, Raman Amplifier.

Unit V **[06 Hours]**

Optical Components and Optical Networks:

Power launching & Coupling: Fiber optic splices, connectors & couplers & Coupling losses. Optical couplers, Isolators and Circulators. Network Concepts, network Topology, SONET/SDH.

Unit VI **[06 Hours]**

Optical Fiber measurements and application.

Fiber attenuation measurements, Fiber dispersion measurements, fiber numerical aperture measurement, reflectance and return loss measurements. OTDR. Application in military, industrial applications and applications in local area network.

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of practicals:

1. Optical Source Characteristics: Aim: To plot the electrical and optical characteristics of different light sources.
2. Numerical Aperture of fiber: Aim: To estimate the numerical aperture of given fiber.
3. To measure the attenuation of given MMSI and SMSI fibers.
4. To measure the attenuation variation in length of optical cable.
5. To measure the attenuation due to bending of optical fiber.
4. Optical Detector Characteristics: Aim: To plot the frequency response of detectors with different values of load resistor.
5. Fiber Bandwidth/Data rate: Aim: To estimate the bandwidth of given fiber.
6. Transmission of analog signal using a simple fiber optic link.
7. Transmission of Digital signal using a simple fiber optic link.
8. To perform Frequency modulation using optical fiber.
9. To perform PWM using optical fiber
10. To find the optical power using “Optical Power Meter”.
11. To find the optical response using “OTDR”.
12. Determination of input, output and transfer characteristics of Optocoulper.

List of Assignments:

1. Explain different types of optical fibers.
2. Study of Electromagnetic mode theory of optical propagation.
3. Classify the types of optical connectors and couplers.
4. Study of the fiber optic analog and digital lab using Virtual Lab.
5. Study of the fiber optic bidirectional communication using Virtual Lab
6. Study of bending losses in optical fiber using virtual lab.
7. Study of LED and Detector characteristics using Virtual Lab
8. Study of attenuation loss in optical fiber using Virtual Lab
9. Numerical based on acceptance angle, N.A. and Number of guided modes.
10. To find power efficiency, optical power in LEDs.
11. Calculation of optical power budget.
12. Measurement of attenuation in optical fiber.

Text Books

1. Gerd Keiser, "Optical Fiber Communications", Tata McGraw Hill, Fourth Edition.

2. John M. Senior, Optical Fiber Communications-Principles and Practice, Prentice Hall of India, second Editio

References

1. Jasprit Singh, "Opto Electronics – As Introduction to materials and devices", Tata Mc Graw-Hill International Edition, 1998.
2. Djafar K.Mynbaev and Lowell L.Scheiner " Fiber optic communication Technology" Pearson education, 2001.
3. Eric Udd, Fiber Optic Sensors, John Wiley, New York, 1991.
4. J.H. Franz and V. K. Jain, " Optical Communication - Components and systems", Narosa Publishing house, 2000.
5. Bhattacharya "Semiconductor Opto Electronic Devices", PHI Learning, New Delhi, 1995

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem: - VIII

SUBJECT: - Biomedical Engineering

Teaching Scheme

Lecture: 3 Hours/week

Practical: 2 Hours/week

Examination Scheme

End Semester Exam: 60 marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

TW & OR: 50 marks

Credits: 04

Course prerequisites:

Analog Electronics, Instrumentation and control system.

Course objectives:

1. To introduce various biopotentials, their measurements, and interpretations associated with human body.
2. To familiarize the student with medical equipments.
3. To expose the students to clinical laboratory equipments.
4. To imbibe the importance of patient's safety.

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

1. Classify systems in a human body and Identify bio-potentials
2. To acquire and analyze ECG, EMG, EEG signals.
3. Correlate the parameters like B.P., ECG and PCG with the functioning of heart.
4. Categorize life saving equipments such as cardiac and respiratory equipments according to their applications.
5. Identify the equipments present in ICU/NICU and clinical laboratory.

6. Recognize physiotherapy equipments used for pain relief and describe various electrodes and techniques used for surgery.

Contents:

Unit I **[06 Hours]**

Human body & Origin of Bio-potentials

Human body: cell structure, overview of different systems in the body: cardiovascular system, respiratory system, nervous system, musculoskeletal system, gastrointestinal system, endocrine system and lymphatic system, Origin of Bio-potentials: action potential and muscle Contraction, bio-potentials such as ECG, EEG, EMG.

Unit II **[06 Hours]**

Electrocardiograph, Phonocardiograph and Blood pressure measurements

Electrocardiography: ECG lead system, typical set up for ECG, electrodes used for ECG, Phonocardiograph: heart sounds and heart murmurs, microphones used in Phonocardiograph (PCG), recording set up of PCG, Blood pressure measurement techniques: direct and indirect methods, relationship between ECG, PCG and Blood pressure as a function of time.

Unit III **[06 Hours]**

Cardiac and Respiratory Equipments

Types of defibrillator, defibrillator electrodes, types of pacemaker, pacemaker leads and batteries, ventilator and Modes of ventilator.

Unit IV **[06 Hours]**

ICU and NICU-Architecture and monitoring systems

Architecture of ICU and NICU**,** patient monitoring system, central monitoring system**,** ambulatory monitoring system, Baby incubator and Phototherapy unit

Unit V **[06 Hours]**

Clinical Laboratory Instruments

Colorimeter, spectrophotometer, flame-photometer, blood cell counter, auto analyzer and pH/blood gas monitoring.

Unit VI **[06 Hours]**

Physiotherapy & surgical diathermy instruments and Patient Safety

Short wave diathermy machine, microwave diathermy machine, surgical diathermy unit, types of electrodes used for electro-surgery, Patient safety: grounding, shielding and effect of electrical current on human body.

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 of Blood Pressure measuring techniques (Analog & Digital).
2. Study of ECG waveform & Heart Rate measurement using ECG system.
3. Study of Phonocardiograph.
4. Detection of Apnea and Tachyapnea using respiration rate monitor and Respiration Simulator.
5. Study of DC Defibrillator.
6. Study of External Pacemaker.
7. Study of Spectrophotometer.
8. Study of Surgical Diathermy Unit.

List of Assignments:

1. State in your own words: Human body systems and their functions.
2. Choose any two Bio-potentials and state the vital role with the help of diagrammatic representation.
3. Differentiate between heart sounds and heart murmurs. Where and why they originate?
4. Association between ECG and B. P as a function of time.
5. Elaborate concepts of cardiac equipments.
6. Importance of Ventilator as a life supporting instrument.

7. Sketch ICU and NICU Architecture. Categorize and locate ICU and NICU equipments and their significance.
8. Describe central monitoring system for 8 bedded ICU.
9. Categorize blood tests and give importance of various clinical laboratory equipments.
10. By applying acquired knowledge select appropriate physiotherapy equipment for pain relief and explain.
11. Identify the equipment used for surgery in O.T. and describe.
12. Visit to the hospital/industry to understand the concepts of biomedical instruments.

Text Books

1. R. S. Khandpur, "Hand book of Biomedical Instrumentation", Tata McGraw Hill Publishing Company limited, New Delhi.
2. Leslie Cromwell, Fred J. Weibel, Erich A. Pfeiffer, "Biomedical Instrumentation and Measurements", Second Edition, PHI.

Reference Books:

1. Joseph J. Carr & John M. Brown, "Introduction to Biomedical Equipment Technology", Forth Edition, PHI.
2. John G. Webster, "Medical Instrumentation- Application and Design", Third Edition, John Wiely and Sons Inc., New York.
3. Richard Aston, "Principles of Biomedical Instrumentation and Measurement", Merrill Macmillan Publishing Company, New York.
4. Dr. M. Arumugam, "Biomedical Instrumentation", Anuradha Agencies.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VIII

Subject: - Wireless Networks

Teaching Scheme

Lecture: 03Hours/week

Tutorial: 01 Hour/week

Examination Scheme

End Semester Exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignments: 10 marks

Credits: 04

Course Prerequisites:
Digital Communication

Course Objectives:

1. To familiarize the students with fundamentals of wireless communication systems
2. To introduce the concepts and techniques associated with Wireless Cellular Communication systems.
3. To familiarize with state of art standards used in wireless cellular systems.
4. To introduce new technologies in wireless systems

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

1. Identify the types of wireless communication systems.
2. Analyze the radio channel characteristics.
3. Analyze improved data services in cellular communication.
4. Work with GSM/CDMA/UWB technologies.

Contents:

Unit I

Introduction **[06 Hours]**

Wireless network generations, evolution of next-generation networks,Systems and Design Fundamentals, Propagation Models Description of cellular system, Frequency Reuse, Co channel and Adjacent channel interference, Propagation Models for Wireless Networks, Multipath Effects in Mobile Communication, Models for Multipath Reception.

Unit II

Cellular Communications **[06 Hours]**

Introduction to Cellular Communications, cellular terminology, cell structure and cluster, Frequency reuse, Multiple Access Technologies, Cellular Processes-Call Setup, Handover etc, Teletraffic Theory, Capacity Building, Blocking Probability

Unit III

GSM **[06 Hours]**

GSM: Architecture and Protocols - Air Interface, GSM Multiple Access Scheme, GSM Channel Organization, Traffic Channel multiframe, Control (Signaling) Channel Multiframe, Frames, Multi- frames, Super-frames and Hyper-frames, GSM Call Set up Procedure, GSM Protocols and Signaling, Location Update Procedure, Routing of a call to a Mobile Subscriber.

Unit IV

CDMA **[06 Hours]**

Introduction to CDMA, Spread spectrum, CDMA call processing, Walsh codes, Variable tree OVSF, PN Sequences, Multipath diversity, RAKE Receiver, CDMA Receiver Synchronization, power control in CDMA.

Unit V

3G and 4G Wireless Standards/UWB **[06 Hours]**

GPRS, EDGE technology, IMT-2000 standards, UMTS technology, WCDMA, LTE, 4G Technologies, Multicarrier Modulation, OFDM-MIMO Systems, WiMAX, UWB Definition and Features, UWB Wireless Channels, Bit-Error Rate Performance of UWB.

Unit VI

Emerging Wireless Network Technologies **[06 Hours]**

WLAN technology, HIPERLAN, WPAN, WMAN, Mobile Ad-hoc network(MANET), Mobile IP and mobility management, Mobile TCP, Wireless sensor networks, RFID technology, WATM, Wireless application protocol, Home RF.

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. Comparison of different wireless network generations.
2. Study of design principles of propagation models of cellular system.
3. Analyze the concept of frequency reuse, interference and multipath effects.
4. Study of design principles of cellular structure.
5. Study of multiple access technologies.
6. Analyze different methods of capacity expansion in cellular system.
7. Study of GSM architecture, channels and call setup procedure.
8. Study of CDMA calls processing.
9. Study of LTE & 4G network design issues.
10. Study of HIPERLAN standards& MANET.
11. Study of wireless sensor networks and WATM.
12. Study of WAP standards & Home RF.

List of Assignments:

1. Visit mobile station/telephone switching & prepare visit report.
2. To carry out AT commands mobile communication using GSM trainer.
3. To understand CDMA trainer using DSSS technology.
4. Analyze Radio Propagation and Propagation Path Loss Models on Scilab.
5. Analyze principles of cellular communication on Scilab (Refer Wireless Communications by T. L. Singal).
6. Analyze capacity of CDMA, calculate processing gain, number of users per cell, bandwidth efficiency, open loop power control in CDMA on Scilab. (Refer Scilab

Textbook Companion for Wireless Communications and Networking by V. Garg)

7. Prepare Ad-hoc network at your premises using mobile terminals/ laptops etc and analyze parameters like capacity, flexibility, complexity etc.
8. Comparison of HIPERLAN, WATM .
9. Understand about Wi-Fi network and its' different standards, protocols and requirements for connecting a Wi-Fi network on Virtual LAB. (Refer VLAB IIT Kharagpur, Advanced network Technologies Lab)
10. Simulating WiMAX network on Virtual LAB.(Refer VLAB IIT Kharagpur, Advanced network Technologies Lab)
11. Study the basics of Mobile and Adhoc network, various standards and different routing protocols including proactive and reactive on virtual lab.
12. Analyze Wireless Sensor Network Data Acquisition, Transmission, and Aggregation on virtual lab.

Text Books:

1. T L Singal, Wireless Communications, McGraw Hill Education India, 2014.
2. Kaveh Pahlavan, Prashant Krishnamurthy, Principles of Wireless Networks, Pearson Education Publication.

Reference Books:

1. William C.Y. Lee, Mobile Cellular Telecommunications- Analog & Digital Systems, Mc.Graw Hill, 1995

2. Wireless Communications (principles and practices) -(2nd Edition)-Theodore S. Rappaport (Prentice Hall of India).

3. Vijay Garg, Wireless Communication & Networking, Morgan Kaufmann Series

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VIII

SUBJECT: - Elective II Agricultural Electronics

Teaching Scheme

Lecture: 3 Hours/week

Tutorial: 1Hours/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:

Basic Electronics, Instrumentation & control systems.

Course Objectives:

1. To inculcate the ability to recognize environmental problems and to provide solutions to agricultural sector.
2. To give overview of technology of advanced topics like DAS, SCADA and Virtual Instrumentation.
3. To enable students to select practices needed to develop and implement the Engineering Automation for Agricultural sector.
4. To introduce Greenhouse Technology & Role of Electronics Governance.

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

1. Describe the role of computers & virtual instrumentation.
2. Provide communication solution for interpreting environmental parameters with Electronics systems.
3. Describe Instrument technology used in agriculture & apply knowledge of Electronics in Agriculture.

4. Describe Greenhouse Technology & Role of Electronics Governance

Contents

Unit I

Review of computers & Virtual instrumentation [06Hours]

Data loggers, Data acquisitions systems (DAS), Supervisory control and data acquisition (SCADA), Basics of PLC, Functional block diagram of computer control system, alarms, interrupts. Virtual Instrumentation: Historical Perspective, advantages, Block diagram and architecture of virtual instrument, data flow techniques, graphical programming in data flow, comparison with conventional programming.

Unit II

Communication Systems [06Hours]

Use of field buses, functions, international standards, field bus advantages and disadvantages, Instrumentation network: sensor networks, Open networks-advantages and limitations, HART Network, Foundation field bus network. Profibus PA: Basics, architecture, model, network design. Foundation field bus segments: General consideration, network design

Unit III

Instrument technology for agriculture [06Hours]

Instrument for measurement of pH, Electrical conductivity, gas analysis, humidity, leaf area, chlorophyll content, and soil moisture & temperature.

Unit IV

Precision Farming [06Hours]

An introduction to precision farming. GIS/GPS positioning system for precision farming, Yield monitoring and mapping, soil sampling and analysis. Computers and Geographic information systems. Precision farming- Issues and conditions. Role of electronics in farm machinery for precision farming.

Unit V

Electronics in Agriculture [06Hours]

Instrument for crop monitoring – moisture measurement – capacitive, infrared reflectance and resistance. Monitoring soil and weather – measurement of soil properties and meteorological parameters – irrigation control systems. Instruments for crop establishment monitoring. Crop spraying – selective crop spraying – flow control. Yield monitoring. Technology for precision farming. Instruments for protected cultivation – green house environment control – transducers and control system. Instruments and systems for crop handling processing and storage.

Unit VI

Applications & Electronics Governance [06Hours]

Greenhouse: History of modeling and control of Greenhouse, Identification of control and manipulation variables for Greenhouse. Crop Preservation : Importance of Preservation of various commodities and parts of plants, Drying process for preservation, Variable identification for drying process, Electronic control system for grape drying process. Agriculture & Electronics Governance: Governance products & services in agriculture sector, Role of Electronics Governance in Agricultural sector.

Content Delivery Methods: Chalk & talk, Power point presentation NPTEL videos.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

List of Tutorials/Experiments

1. Case study of PLC for irrigation system.
2. Case study of Latest irrigation system.
3. Study of Profibus protocol for networking.
4. Role of GIS/GPS positioning system for precision farming.
5. Study of Computers and Geographic information systems for precision farming.
6. Concept of crop preservation.

List of Assignments:

1. Study of Data Acquisition Systems (DAS).
2. Study of Data logger.
3. Study of basics of PLC and applications in Agriculture electronics.
4. Study of Communication systems used in Agriculture electronics.
5. Study of Transducers and control systems.
6. Study of electronics systems for PH, gas, humidity, conductivity and temperature measurement.
7. Study of selective crop spraying, flow control, yield monitoring, green house environment control.
8. Study of Electronics Governance in Agricultural sector**.**
9. Describe GIS/GPS positioning system for precision farming.
10. Describe advantages and disadvantages of field bus and Open networks.
11. Write a note on HART Network.
12. Write a note on Greenhouse.

Text Books

1. Curtis Johnson, “Process Control Instrumentation Technology”; 8th Edition, Pearson Education

2. Stuart A. Boyer, SCADA supervisory control and data acquisition, ISA Publication

Reference Books

1. De Mess M. N. Fundamental of Geographic Information System. John Willy & sons, New York, Datta S.K.1987.

2. K. Krishna Swamy, “Process Control”; New Age International Publishers

3. Kuhar, John. E. 1977. The precision farming guide for agriculturalist. Lori J. Dhabalt, USA

4. Manual of Soil & Water conservation Engineering. Oxford

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Class: B.Tech (Electronics) SEM: -VIII

SUBJECT: - Elective-II System on Chip

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End Semester Exam: 60 Marks**
Tutorial: 1Hour/week	**Unit Test: 20 marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & OR: 50 Marks
	Credits: 4

Course Prerequisites: Digital Electronics, VLSI Design

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-I

SOC Design Methodology **(06 Hours)**

The age of Megagate SOCs, The fundamental trends of SOC design, An improved design methodology for SOC design.

UNIT -II

SOC Design **(06 Hours)**

Hardware System Structure, Software trends, Current SOC Design Flow, Six Major Issues in SOC Design.

UNIT -III

SOC Architecture **(06 Hours)**

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 -IV

System-Level Design of Complex SOCs **(06 Hours)**

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 -V

Advanced Topics in SOC Design **(06 Hours)**

Pipelining for Processor Performance, Inside Processor Pipeline Stalls, Optimizing Processors to Match Hardware, Multiple Processor Debug and Trace, Issues in Memory Systems

UNIT -VI

Scope of SOC **(06 Hours)**

The designer's dilemma in SOC design, The SOC design transition, future of SOC design, Future applications of complex SOC.

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.

Content Delivery Methods: Chalk & talk, Power point presentation NPTEL videos.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination

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. SudeepPasricha and NikilDutt, On-Chip Communication Architectures System on Chip

7. Interconnect, Elsevier, 2008

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem: - VIII

SUBJECT: - Elective-II Speech Processing

Teaching scheme	**Examination scheme**
Lecture: 3 Hours/Week	**End Semester Exam: 60 marks**
Tutorial: 1 Hour/Week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignments: 10 marks
	TW& Oral: 50 Marks
	Credits 04

Course Prerequisite:

Engineering Mathematics-III, Signals and Systems, Digital Signal processing

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Course Objective:

1. To introduce acoustic theory and time domain models for speech processing.
2. To give overview of sampling, quantization and different modulation techniques.
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

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Course Outcomes: At the end of the course, a student will be able to

1. Describe the mechanisms of human speech production and articulation mode of different classes of speech sounds determiner their acoustic characteristics.
2. Represent the speech signal in time domain and frequency domain.
3. Describe and implement methods & systems for efficient quantization and coding of speech signals.
4. Analyze and synthesize speech using different methods.

5. Distinguish between different speech recognition modes.

Contents

Unit I **[06 Hours]**

Speech Production and Hearing

Anatomy & physiology of speech organs,articulatory,acoustic phonetics.acostic theory of speech production,prosody,Anatomy & physiology of ear, sound perception, speech perception, vowel perception, consonant perception.

Unit II **[06 Hours]**

Speech Analysis

Short time speech analysis, time domain parameters, frequency domain parameters, LPC analysis, cepstral analysis, pitches estimation.

Unit III **[06 Hours]**

Coding of Speech Signals

Quantization, redundancies, Time domain, waveform coding Linear delta modulation, Adaptive delta modulation, adaptive differential pulse code modulation, Linear prediction based vocoders, phase vocoders channel vocoders and cepstral vocoders.

Unit IV **[06 Hours]**

Speech Synthesis

Principles of speech synthesis, synthesis methods, text to speech synthesis, Synthesis by rule, applications.

Unit V **[06 Hours]**

Speech Enhancement

Introduction, nature of interfering sounds speech enhancement techniques spectral subtraction & filtering, harmonic filtering, spectral subtraction, Adaptive noise cancellation.

Unit VI **[06 Hours]**

Automatic Speech Recognition

Parametric representation of speech, evaluation of similarity of speech patterns, various modes of speech recognition like MFCC, DTW, HMM Application**.**

Content Delivery Methods: Chalk & talk, Power point presentation.

Assessment Methods:

1. Unit Test
2. Continuous Assessment
3. End Semester Examination.

List Tutorials/Experiments:

1. To study spectral analysis of a noisy signal using MATLAB.
2. To obtain LPC coefficients.

3. To study the spectrogram of an audio signal using MATLAB.
4. To study VQ for speech.
5. To perform text to speech synthesis using MATLAB.
6. Estimation of fundamental frequency using Cepstrum.
7. To find Cepstral pitch period using method of autocorrelation.
8. To plot Welch power spectral density estimates for vowels ‘a’ ‘e’.
9. To find Cepstral coefficients of voiced signal.
10. Speech classification on basis of frequency.

List of Assignments:

1. List out different speech processing applications.
2. Implement a Non-stationary nature of speech signal using Virtual laboratory.
3. Write a MATLAB program to find the envelope of the sound for the flute (Bansuri).
4. Describe any two speech recognition models.
5. Discuss different speech features like LPC, Cepstrum, MFCC, and Pitch.
6. Classify the different coders on the basis of waveform, parametric & transform domain coding of speech.
7. List out different applications of speech synthesis.
8. Different classifiers used in speech recognition.
9. Mention a real time application of speech technology.
10. Describe different types of software’s used for speech processing.
11. Discuss different speech enhancement techniques.
12. Classify the different Audio File formats.

Text Books

1. Doulgas O Shaughnessy “Speech Communication”. Human and Machines Second Edition University Press.
2. Dr.Shaila D. Apte “Speech and Audio Processing,” Wiley.

References

1. Lawrence Rabiner & Biing-Hwang Juang “Fundamentals of Speech Recognition Englewood Cliffs NJ:” PTR Prentice Hall (Signal Processing Series), c1993, ISBN 0-13-015157-2
2. L.R. Rabiner and R.W. Schafer **“**Digital Processing of Speech Signals” Prentice Hall.

3. Sadoaki Furui. “Digital Speech Processing: Synthesis and Recognition” CRC Press.

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (Electronics) Sem:-VIII

Subject: - 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.

Contents:

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
Fuzzy Control Systems **[06 Hours]**

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
Artificial Neural Network -I **[05 Hours]**

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

Artificial Neural Network -II **[07 Hours]**

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

Adaptive Neuro-Fuzzy Inference Systems (ANFIS) **[06 Hours]**

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

Syllabus for Unit Test:

Unit Test-I	**Unit- I, II, III**
Unit Test-II	**Unit- IV,V, VI**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VII

SUBJECT: - Seminar

Teaching Scheme	**Examination Scheme**
Practical: 02 Hours/week	**TW & Oral: 50 marks**
	Total Credits: 01

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

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

1. Effectively communicate his technical idea or project
2. Learn master survey and literature survey techniques
3. Write Motivational Statement
4. 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.

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

Class: B.Tech (Electronics) Sem:- VIII

SUBJECT: - Project stage - II

Teaching Scheme	**Examination Scheme**
Practical: 08 Hours/week	**TW & Oral: 150 marks**
	Total Credits: 08

Course prerequisites:

Project Stage -I

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. 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