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) Advance Computer Programming

Bharati Vidyapeeth University, Pune
Faculty of Engineering & Technology
Programme: B.Tech (E&TC) Sem – VIII (2014 Course)

Semester- VIII **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
4) Fuzzy Logic & Neural Network

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - Computer Networks

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

Course Prerequisites:
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.

Contents

Unit I **[06Hours]**

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 **[06Hours]**

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 **[06Hours]**

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 **[06Hours]**

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 **[06Hours]**

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 **[06Hours]**

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: 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, 5th Edition.
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**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - Project Management & Finance

Teaching Scheme

Lecture: 03 Hours/week

Examination Scheme

End Semester Exam: 60 Marks

Unit Test: 20marks

Attendance: 10 marks

Assignment: 10 marks

Credits: 03

Course Prerequisite:

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.

Contents

Unit I **[06 Hours]**

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 Hours]**

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 Hours]**

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 Hours]**

Project Implementation:

Project Monitoring and Control with PERT/Cost, Computers applications in Project Management, Contract Management, Project Procurement Management.

Unit V **[06 Hours]**

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 Hours]**

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**

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

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

SUBJECT: - Mobile & Broadband Communication

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

Course prerequisites:

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

Contents

Unit I

Introduction to Mobile Communication [06 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

Unit II

Wireless LAN [06 Hours]

Introduction, Infrared radio transmission infrastructure and adhoc networks, Detailed study of IEEE 802.11, HIPER LAN, Bluetooth, Wireless ATM

Unit III

Mobile Network Layer & Transport Layer [06 Hours]

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

ISDN [06 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.

Unit VI

B-ISDN protocols [06 Hours]

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**

BharatiVidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: Radio Frequency Engineering

Teaching Scheme

Lecture: 02 Hours/Week

Examination Scheme

End Semester Exam: 60 Marks

Unit Test: 20 marks

Attendance: 10 marks

Assignment: 10 marks

Credits: 02

Course Prerequisites:

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.

Contents

Unit I

RF Behavior of Passive Components **[04 Hours]**

HF Resistors, HF Capacitors, HF Inductors, Chip Components. Circuit Board Considerations: Chip Resistors, Chip Capacitors, Surface Mounted Inductors.

Unit II

RF Measurement & Bandwidth Estimation **[04Hours]**

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

High Frequency Amplifier Design **[04 Hours]**

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

Low Noise Amplifier Design **[04 Hours]**

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

RF Oscillators **[04 Hours]**

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

Mixers **[04 Hours]**

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

Bharati Vidyapeeth Deemed University
College of Engineering, Pune

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

SUBJECT: Elective-I Wireless Sensor Network

Teaching Scheme	**Examination Scheme**
Lecture: 03 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:

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.

Contents

Unit I

Introduction **[03 Hours]**

Unique constraints & challenges, Advantages of sensor networks, Sensor network application, Collaborative processing, Key definitions of sensor network

Unit II

Localization & Tracking **[03 Hours]**

A tracking scenario, Problem formulation, distributed representation and interface of states, tracking multiple objects, sensor models, Performance, Comparison & Matrices

Unit III

Networking Sensors **[03 Hours]**

Key assumption, Medium access control, General issues, Geographic & Energy-aware routing, Attribute-based routing, IDSQR, Directed diffusion, Rumor routing.

Unit IV

Infrastructure Establishment **[03 Hours]**

Topology control, Clustering, Time Synchronization, Interval Methods, Reference broadcasts, Localization services, Ranging Techniques, Range Based localization algorithms

Unit V

Sensor Tasking and Control **[03 Hours]**

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

Sensor Network Databases and introduction of IOT **[03 Hours]**

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**

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - Elective I Advanced Digital Signal Processing

Teaching Scheme
Lecture: 03 Hours/week
Tutorial: 01 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:

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.

1. 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

2. Manolakis, D.G., Ingle, V.K. and Kogon, M.S., "Statistical and Adaptive Signal Processing", Artech House. 2005.
3. Diniz, P.S.R., "Adaptive Filtering: Algorithms and Practical Implementation", Kluwer. 1997
4. S. D. Apte, "Advanced Digital Signal Processing," Wiley Publications, 2014.
5. Leon Cohen, "Time-Frequency Analysis", Prentice Hall,1995.
6. K.P Soman, K.I Ramchandran, N.G.Reshmi, "Insight into Wavelets- from theory to Practice," PHI Learning Private Limited, Third Edition, 2010.
7. 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**

BharatiVidyapeeth Deemed University
College of Engineering, Pune

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

SUBJECT: Elective-I Digital Image Processing

Teaching Scheme
Lecture: 03 Hours/week
Tutorial: 01 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:

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.

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, Color models, Noise in color images, Image conversion – RBG to Gray, RGB to Binary.

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]

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

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, 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**

BharatiVidyapeeth Deemed University
College of Engineering, Pune

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

SUBJECT: Elective-I Advanced Computer Programming

Teaching scheme	**Examination scheme**
Lecture: 03 Hours/week	**End Semester Exam: 60 marks**
Tutorial: 01Hour/week	**Unit Test: 20 marks**
	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 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 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 Makingand Branching and Decision Making and Looping, Classes Objects andMethods, 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, DELETE Statement, 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, 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:

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 & Telecommunications) 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 & Telecommunications) 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 & Telecommunications) Sem: -VIII

SUBJECT: - Optical Fiber Communication

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & PR: 50 Marks
	Total Credits:04

Course Prerequisites:

- 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, Laserdi odes 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

Introduction **[6 Hrs]**

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

Advance Optical Communication **[6 Hrs]**

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

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

Class: B. Tech (E & TC) Sem:-VIII

SUBJECT: - Satellite Communication

Teaching Scheme	**Examination Scheme**
Lecture: 3 Hours/week	**End semester exam: 60 Marks**
Practical: 2 Hours/week	**Unit Test: 20marks**
	Attendance: 10 marks
	Assignment: 10 marks
	TW & PR: 50 Marks
	Credits: 04

Course Prerequisite: 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: Introduction of Satellite Communication [6Hrs]

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: Satellite subsystem [6Hrs]

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: Satellite Link Design [6Hrs]

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: Satellite Networks [6Hrs]

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: Low Earth Orbit and Non Geo-Stationary satellite system [6Hrs]

Introduction, Orbit considerations, Coverage and Frequency Consideration, Delay and Throughput Consideration, Operational NGSO constellation design: Iridium, Teledesic.

UNIT 6: Satellite Radio and GPS [6Hrs]

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

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - Software Defined Radio

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 usedfor Software defined radio.
2. To introduce the design of antenna systems to accommodate the need of a software definedradio (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.

Contents:

Unit 1

Introduction to Software Defined Radio [**6 Hrs]**

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

RF design for SDR devices **[7 Hrs]**

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

Signal Processing Hardware Components **[5 Hrs]**

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

Software Architecture and Components **[6 Hrs]**

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

Application & Smart antennas [6 Hrs]

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

Low-Cost Experimental Software Radio Platform [6 Hrs]

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

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - Elective - II Speech & Audio Processing

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: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.

Contents:

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)

BharatiVidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - Elective - II Artificial Intelligence and Robotics

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
	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

Content

UNIT 1

Scope of AI **[6 Hrs]**

Games, theorem proving, natural language processing, vision and speech processing, robotics, expert systems, AI techniques- search knowledge, abstraction.

UNIT 2

Problem solving **[6 Hrs]**

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

Knowledge Representation **[6 Hrs]**

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

Handling uncertainty and learning **[6 Hrs]**

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

Robotics **[6 Hrs]**

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

Direct and Inverse Kinematics **[6 Hrs]**

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

Bharati Vidyapeeth Deemed University

College of Engineering, Pune

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

SUBJECT: - 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-I

The Case for a New SOC Design Methodology **[6 Hrs]**

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

Unit-II

SOC Design Today [6 Hrs]

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

Unit-III

A New Look at SOC Design [6 Hrs]

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 [6 Hrs]

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 [6 Hrs]

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

Unit-VI

The future of SOC Design [6 Hrs]

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

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

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

Subject: - Elective-II Fuzzy Logic & Neural Network

Teaching Scheme	**Examination Scheme**
Lecture: 03 Hours/week	**End semester exam: 60 Marks**
Tutorial: 01 Hour/week	**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

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

Class: B.Tech (Electronics& Telecommunications) 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 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

Bharati Vidyapeeth Deemed University,
College of Engineering, Pune

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

SUBJECT: - Seminar

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

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.