

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Scheme of Teaching and Examination

B.E. VII Semester Electronics & Telecommunication Engineering

Sl. No.	Board of Study	Code No.	Subjects	Period Per Week			Scheme of Exam			Total Marks	Credit L+(T+P)
				L	T	P	Theory/ Practical				
							ESE	CT	TA		
1	Electronics & Telecom.	328731(28)	Microwave Communication and Engineering	4	1	-	80	20	20	120	5
2	Electronics & Telecom.	328732(28)	Computer Networks	3	1	-	80	20	20	120	4
3	Electronics & Telecom.	328733(28)	Wireless Communications	3	1	-	80	20	20	120	4
4	Electronics & Telecom.	328734(28)	Management Concepts & Techniques	3	1	-	80	20	20	120	4
5	Refer Table -2		Professional Elective - II	3	1	-	80	20	20	120	4
6	Electronics & Telecom.	328761(28)	Microwave Communication and Engineering Lab	-	-	4	40	-	20	60	2
7	Electronics & Telecom.	328762(28)	Computer Networks Lab	-	-	4	40	-	20	60	2
8	Electronics & Telecom.	328763(28)	Advance Communication Lab	-	-	4	40	-	20	60	2
9	Electronics & Telecom.	328764(28)	Minor Project	-	-	4	100	-	40	140	2
10	Management	328765(28)	Innovative & Entrepreneurial Skills	-	-	2	-	-	40	40	1
11	Electronics & Telecom.	328766(28)	**Practical Training Evaluation and Library	-	-	1	-	-	40	40	1
TOTAL				16	5	19	620	100	280	1000	31

L-Lecture, T- Tutorial, P - Practical, ESE- End Semester Examination, CT - Class Test, TA - Teacher's Assessment

*** To be completed after VI Semester and before the commencement of VII Semester*

Table -2

Professional Elective - II

Sl. No.	Board of Study	Code	Subject
1	Electronics & Telecom.	328741(28)	Digital Circuit Design with Verilog HDL
2	Electronics & Telecom.	328742(28)	System Design with ARM
3	Electronics & Telecom.	328743(28)	Robotics & Controls
4	Electronics & Telecom.	328744(28)	Radar and Navigational Aids
5	Electrical and Electronics	325745(25)	Industrial Automation
6	Electronics & Telecom.	328746(28)	Neural Network & Fuzzy Logic
7	Electronics & Telecom.	328747(28)	RF Communication Design
8	Electronics & Telecom.	328748(28)	VLSI System Design
9	Electronics & Telecom.	328749(28)	Digital Image Processing

Note (1)- 1/4th of total strength of students subject to minimum of twenty students is required to offer an elective in the college a particular academic session.

Note (2) - Choice of elective course once made for an examination cannot be changed in future examinations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Microwave Communication & Engineering**

Code: **328731(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. Learn about wave propagation through waveguide
2. Learn about transmission in rectangular waveguide
3. Learn about microwave tubes
4. Learn about transferred electron device
5. Learn the theory of microwave cavity and there various applications
6. Learn designing of microwave filters

UNIT – I Introduction to Microwaves and Linear Beam Tubes: Need of Microwave Communications; Microwave Region and Bands; Advantages and Limitations of Microwave Systems; Failure of Conventional Tubes at High Frequencies; Klystron - Velocity Modulation Power Output and Efficiency; Reflex Klystron- Velocity Modulation Power Output and Efficiency; Helix TWT- Amplification Process and Working.

UNIT – II Microwave Crossed-Field Tubes: Difference between Linear Beam Tubes & Crossed Field Tubes, Magnetron- Cavity Magnetron: Principle and Operation, Mode of Oscillation, Strapping and Mode Jumping, Voltage Tunable Magnetron, Inverted Coaxial Magnetron. Forward wave and Backward wave Crossed Field Amplifier.

UNIT – III Microwave Devices: Microwave Bipolar Transistor: Structure, Operation, Characteristics and Power Frequency Limitations of Microwave Transistors, Microwave Field-Effect Transistor: JFET, MESFET, MOSFET, Microwave diode: Tunnel Diode, PIN diode, Crystal diode.

UNIT – IV Avalanche Transit Time Devices: Physical Structure, Principle of Operation, Characteristics, Power Output and Efficiency of IMPATT, TRAPATT and BARITT Diodes, Parametric Amplifiers: Parametric Up Converters and Parametric Down Converters.
Transfer Electron Devices: Gunn Diode, Gunn Effect: Principle and Mode of Operation.

UNIT – V Microwave Components and Measurement: Rectangular Cavity Resonators, Q of a Cavity Resonator, Reentrant Cavities, Slow-Wave Structure, Microwave Hybrid Circuits, S-parameters and their properties, Wave Guide Tees, Hybrid Ring, Waveguide Corners, Bends and Twists, Two Hole Directional Coupler, S-Matrix, Circulator and Isolator, Hybrid Coupler, Microwave Measurement, Microwave Bench, Precautions, Power Measurement, Bolometric Method, Attenuation, VSWR, Impedance, Frequency and Q of the Cavity.

Text Books:

1. Microwave Devices and Circuits by Samuel Y. Liao, 3rd Ed., Pearson Education
2. Foundations of Microwave Engineering by R .E. Collin, TMH Pub.

Reference Books:

1. Microwave Principles by Herbert J. Reich, Princeton N.J., Van Nostrand.
2. Microwaves by Gupta, New Age International Publishers
3. Microwave Semiconductor Devices by Roy & Mitra, PHI
4. Microwave Engineering by D. M. Pozar, 2nd Edition, John Wiley.
5. Microwave Circuit Design by G. D. Vendelin, A. M. Pavio and U. L. Rohde, John Wiley.
6. Microwave Transistor Amplifiers: Analysis and Design by Guillermo Gonzalez, 2nd Edition, Prentice Hall.

Course outcomes:

1. Understand the reason why TEM wave are impossible in a Waveguide.
2. Understand the working of Microwave Tubes.
3. Understand the different modes of operation of Gunn Diodes.
4. Understand microwave components such as Tee Junction and Directional Couplers.
5. Understand designing and transformation of Microwave Filters.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Computer Networks**

Code: **328732(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To make students understand the basic model of data communication, OSI Model, TCP/IP suite and various concepts of networking.
2. To make students acquainted with Data Link Layer and various flow control and error control protocol.
3. To familiarize students with different LAN protocols like Ethernet, Token ring and Token Bus and FDDI.
4. To teach students about connecting devices, Network and transport layer protocols.
5. To give knowledge of the Application layer functions, protocols, switching and switched networks like ATM.

UNIT-I Introduction to Data Communication, Data networking and Internet: Communication System Model, Data Communication Networks, Protocol, Need of Protocol, TCP/ IP Protocol Suite ,OSI Model, Transmission Modes, Categories of Network, Topologies of Network. Signal Encoding Techniques: Digital to Digital Conversion-Unipolar, Polar: NRZ, RZ, Biphasic, Bipolar, Transmission of Digital Data: DTE- DCE Interface, EIA-232D, Null Modem, Modems: Traditional Modem, 56K Modem.

UNIT-II Data Link Control Protocol: Data Link Layer: Design Issues, Framing, Error Detection and Correction: CRC, Elementary Protocols-Flow Control: Stop and Wait, Sliding Window, Error Control: Stop-and -Wait, Go-Back-N, Selective Repeat. HDLC: Modes, Frames, Data Transparency, Bit Stuffing.

UNIT-III Local Area Network: Project 802, Basic of – IEEE802.1, LLC, MAC, PDU; ETHERNET : Access Method: CSMA/CD, Implementation: Thick Ethernet, Thin Ethernet, Twisted Pair Ethernet, Switched Ethernet, Fast Ethernet, Gigabyte Ethernet, Token Ring, FDDI, Introduction to Wireless LAN-IEEE802.11 : Architecture, MAC: CSMA/CA.

UNIT-IV Internet and Transport Protocol: Principle of Internetworking, Connecting devices: Repeaters, Hubs, Bridges, Routers. Internet Protocol: IP Addressing, IPV4 Header, Comparison of IPV4 and IPV6, Subnetting, ARP, RARP, ICMP, IGMP. Transport Layer Protocols: UDP, TCP: TCP Header format, ISDN services.

UNIT-V Application layer and Wide Area Network: Application Layer: The Web and HTTP, FTP, SMTP, DNS, WAN: Circuit and Packet switching, Asynchronous Transfer Mode-ATM architecture: Virtual Connection, Identifiers, Cells, Connection Establishment and Release. Switching: VPC switch; ATM Layers: AAL

Text Books:

1. Data Communication and Computer Networking by B.A. Forouzan, 3rd Ed., Tata McGraw Hill.
2. Data and Computer Communications by William Stalling ,7th Edition,Pearson Education.

Reference Books:

1. Computer Networks by Andrew S Tanenbaum, 4th Edition. Pearson Education/PHI
2. An Engineering Approach to Computer Networks-S. Keshav, 2nd Edition, Pearson Education
3. Understanding communications and Networks, 3rd Edition, W.A Shay, Thomson

Course Outcomes:

1. Students will be able to understand the working of internet based on OSI model and TCP/IP protocol suite.
2. Students will be able to analyze practical requirements of LAN on the basis of various topologies, signalling techniques and various interfaces.
3. Students will have deep understanding of various protocols used at Data Link Layer and will be able to analyze the advantages and disadvantages of various available protocols for flow and error control.
4. Students will be able to analyze various Ethernet standards ,other standards and will be able to choose an appropriate standard according to requirement of LAN.
5. Students will be able to identify various internetworking devices and formation of Headers of IP and TCP.
6. Students will get idea about various Application layer functions and some protocols along with switching techniques and ATM.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Wireless Communications**

Code: **328733(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To give students brief history of the evolution of mobile communications throughout the world.
2. To give knowledge of cellular concepts and its designing aspects.
3. To give students a detailed overview of GSM, its architecture, interfaces, frames etc.
4. To familiarize students about advanced modulation techniques used in mobile communications.
5. To teach students about the practical limitations on the performance of wireless communication systems.

UNIT –I Introduction to wireless communications: Evolution of Mobile Radio Communication, Different Wireless Communication Systems. Comparison of Various Wireless Communication System, Introduction to Modern Wireless Communicating System- Second Generation(2G), Third Generation (3G) and Fourth Generation (4G).

UNIT –II Cellular Concepts and System Design Fundamentals: Cellular Concepts and Frequency Reuse, Channel Assignment Strategies and Handoff Strategies, Interference and System Capacity Channel Planning for Wireless Systems, Trunking and Grade of service, Improving coverage and capacity in Cellular System.

UNIT –III Global Systems for Mobile : System Architecture, GSM frequency bands, GSM PLMN, GSM subsystems, GSM interface, Mapping of GSM Layer on to OSI Layers, GSM Logical Channel and Frame, Structure, GSM Burst, Data encryption in GSM, Mobility Management.

UNIT –IV Modulation Techniques: Constant Envelope Modulation, MSK, GMSK, Combined Linear and Constant Envelope Modulation Technique, MPSK, QAM, OFDM, Introduction to Spread Spectrum, PN Sequence, DS-SS, FH-SS, Performance of DS-SS and FH-SS.

UNIT –V Transmission problems: Introduction to Radio Wave Propagation: The basic Propagation Mechanisms: Reflection, Diffraction, Scattering, Path Loss, Shadowing, Time dispersion, Time Alignment, Combined Signal Loss, High Bit Error Rate, Solution To Transmission Problems, Channel Coding, Interleaving, Diversity, Fundamental of Equalization Frequency Hopping.

Textbooks:

1. Wireless Communications by T.S. Rappaport, Pearson Education
2. Principles and Application of GSM by Vijay K. Garg, Pearson Education.

Reference books:

1. Mobile Communications – Schiller, Jochen; 2nd Indian Reprint, Pearson Education Asia – Addison Wesley Longman Pte. Ltd.
2. Mobile Communication Engineering by W.C. Lee, TMH Pub.

Course Outcomes

1. Students will have idea about the growth in mobile communications that gives rise to technological improvements.
2. Students will be able to visualize the use of frequency reuse to increase the systems capacity and also other designing aspects.
3. Students will be able to understand the architecture of the GSM and mechanism to support mobility of the GSM terminals.
4. Students will see how modulation techniques are used to transport the message signal via a radio channel with best possible quality with minimum radio spectrum.
5. Students will be able to understand various transmission problems and their counter measures.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Management Concepts and Techniques**

Code: **328734(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To enable the students to acquire knowledge about the principles of management
2. To get an idea of human resource management
3. To get an idea about marketing management
4. To give an insight to the production/operation management
5. To give an insight to the organization of a business and public sector companies.

UNIT-I: Basic Management and Techniques: Planning: Nature Purpose and Objectives of Planning, Organizing: Nature and Purpose of Organizing, Authority and Responsibility, Staffing, Performance Appraisal, Controlling: Process of Controlling, Control Techniques.

UNIT-II: Human Resource Management: Nature and Scope of Human Resource Planning, Training and Development, Recruitment and Selection, Career Growth, Absenteeism, Grievances, Motivation and its types, Need of Motivation, Models of Motivation, Leaders, Types of Leaders, Leadership Styles, Roles and Functions of Leaders, Conflict Management: Types and causes of Conflict, Group and Team Working, Organizational Design and Development.

UNIT-III: Marketing Management: Marketing Environment, Industrial Markets (B2B Marketing) and Buyer Behaviour, Marketing Mix, Overview of Advertising and Sales Promotion, Channels of Distribution. Financial Management and Accounting Concepts: Concept of Book Keeping, Overview of Financial Statements and Breakeven Analysis.

UNIT-IV: Production/Operations Management: Production Systems, Facilities, Planning, Location, Layout and Movement of Materials, Materials Management, Maintenance Management, PERT and CPM.

UNIT-V: Organizing a Business: Forms of Ownership Organization: Sole Proprietor, Partnership, Private and Public Ltd. Companies, Choice of suitable form of Business Organization. Public Sector: Central Government, Public Corporation, Local Government, Organization neither Public nor Private Sector, Clubs & Society, Cooperative Societies.

Text Books:

1. Industrial Management and Engineering Economics, K. C. Arora, Khanna Pbs.
2. Industrial Engineering and Production Management, Martand Telsang, S. Chand
3. Industrial Management and Organization, Ahuja, Khanna Pbs.
4. Industrial Engineering and Management, O. P. Khanna, DRD.

Reference Books:

1. Industrial Organization and Management, Ramchandran, Ramana Mutrhy, TMH.
2. Management Science, Ramchandra, TMH.
3. Industrial Engineering and Production Management, Mahajan, DRP.
4. Business Organisation & Management by R.K. Sharma, Shashi K. Gupta, Kalyani Publisher, New Delhi.
5. Principles of Business Organisation by Y.K. Bhushan, S. Chand.

Course Outcome:

At the completion of the course, the student will be able to:

1. Define the concept of management and discuss why organizations are needed, why managers are necessary, and why management is a challenge.
2. Identify the essential characteristics of decision making and indicate the range and types of decisions a manager is asked to make.
3. Analyze the leadership function, recognizing leadership as the relationship between a supervisor and subordinates in an organizational environment.
4. Recognize the symptoms of organizational conflict, describe its sources, and discuss the manager's role in conflict management.
5. Recognize the link between planning and controlling, and the various means by which managers measure and compare performance to objectives.
6. To understand and differentiate between the various types of organizational structures and patterns.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Microwave Communication
and Engineering Lab**

Code:328761(28)

Total Lab Period: **50**

Batch Size: 30

Maximum Marks: **40**

Minimum Marks 20

List of Experiments: (At least Ten experiments are to be performed by each student)

1. To measure the VSWR at all the three open ports of a Directional Coupler.
2. To measure the Coupling Factor, directivity and insertion loss of a Directional Coupler.
3. To study mode characteristics of a Reflex Klystron and hence to determine mode number, transit time, Electronic Tuning Sensitivity (ETS) and Electronic Tuning Range (ETR).
4. To study the characteristics of Wave Propagation in a Wave Guide by studying standing wave pattern and hence to plot $\omega - \beta$ diagram and verify relationship between guide wavelength (λ_g) and free space wavelength λ .
5. To study the V-I characteristics of a GUNN Diode and to measure output power and frequency vs voltage.
6. To study and measure square wave modulation through PIN voltage.
7. To energize a GUNN Oscillator.
8. To energize a Reflex Oscillator.
9. To calibrate Phase Shifter.
10. To measure Dielectric Constant.
11. To study the characteristic and behavior of a Magic Tee.
12. To study the characteristics and behavior of Isolator and Circulators.
13. To study the characteristics and behavior of Attenuator (fixed and variable type).
14. To measure Microwave Frequency using Frequency Meter.
15. Measurement of Q of a cavity.
16. To study the function of Multiple Directional Coupler by measuring the following parameters:
 - a. To measure main-line and auxiliary-line VSWR.
 - b. To measure the Coupling Factor and Directivity of the Coupler.
17. To study the characteristics of the Reflex Klystron Tube and to determine its electronic tuning range.
18. To determine the frequency and wave length in a Rectangular Wave Guide working on TE₁₀ mode.
19. To determine the standing wave ratio and reflection coefficient.

List of Equipments Required:

Microwave source, Isolator, Variable attenuator, Fixed Attenuator, Frequency meter, Slotted line, Tunable probe, Circulators, Matched terminations, Gunn/Klystron power supply, Detector mount, Cooling fan, Magic Tee, Phase shifter, Movable short, Dielectric Material.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Computer Networks Lab**

Code:328762(28)

Total Lab Period: **50**

Batch Size: 30

Maximum Marks: **40**

Minimum Marks 20

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Introduction to Local Area Network with its cables, connectors and topologies.
2. To build CAT-5 UTP Ethernet cable (Cross-over and Straight –Through)
3. Installation of Switches, their cascading and network mapping.
4. Installation of UTP, NIC and LAN card to connect two PC.
5. Case Study of Ethernet (10 base 5, 10 base 2, 10 base T)
6. Installation and working of Remote Desktop.
7. Installation and working of Telnet (Terminal Network).
8. Installation and working with FTP (File Transfer Protocol).
9. Installation and connecting Computers to share disk and printer
10. Installation of Modem and Proxy Server.
11. Working with Null Modem.
12. Introduction to Server administration.
13. Simulation of LAN Protocols: Token Bus, Token Ring etc. using simulator.

Recommended Books:-

1. Computer Network and Internet by Douglas E. Comer (Pearson Education)

List of Softwares required:-

1. Windows 2003 server/Windows 2000server.
2. NetSIM ,NS-2, Simulator.

List of Hardwares required:-

1. LAN Trainer Kit, LAN Card Cable, Connectors, Switch, cables, Crimping Tools.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Electronics & Telecommunication	Semester: VII
Subject: Advance Communication Lab	Code: 328763(28)
Total Lab Period: 50	Batch Size: 30
Maximum Marks: 40	Minimum Marks 20

List of Experiments: (At least Ten experiments are to be performed by each student)

1. Implementation/simulation of PN sequence generator using linear feedback shift register technique.
2. Implementation/simulation of QAM modulation and demodulation.
3. Implementation/simulation of GMSK modulation and demodulation using GMSK trainer module.
4. Implementation/simulation of MSK modulation and demodulation.
5. Implementation/simulation of MPSK modulation and demodulation.
6. Implementation/simulation of DS-CDMA with BER using CDMA trainer module.
7. Implementation/simulation of Frequency hopping spread spectrum technique (FHSS).
8. To understand RF environment, GSM technology its network GSM capability and data services using GSM trainer module.
9. Implementation/simulation of encryption and decryption of voice in GSM (A5 algorithm).
10. Simulation of Huffman code algorithm.
11. Simulation of Run length code algorithm.
12. Simulation of Shannon–Fano code algorithm.
13. Simulation of Linear block code algorithm.
14. Simulation of Hamming code algorithm.
15. Simulation of Cyclic code algorithm.
16. Simulation of BHC code algorithm.

List of Equipments Required:

1. PCs, simulation software, trainer kits.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Minor Project**

Code:**328764(28)**

Total Practical Period: **50**

Total Marks in End Semester Examination: 100

- The students are expected to take up a Project under the guidance of a faculty from the Institute.
- The topic of the project should be justified for the degree of BE (Electronics & Telecommunication)
- The project selected should ensure the satisfaction of the urgent need to establish a direct link between education, national development and productivities.
- The students may be asked to work individually or in a group having not more than FOUR students.
- The student/group of student shall collect all necessary information from literature on selected topic/project.
- It should include the scope of project, identification of necessary data, source of data, development of design method and identification, methodology, software analysis.
- Students should deliver a seminar on the selected Project/topic.
- The students are expected to submit the report in standard format approved by the University in partial fulfillment of the requirement for the degree of B.E. (Electronics & Telecommunication).
- There will be an external viva-voce at the end of the semester and the students are to demonstrate the project at the time of viva-voce.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Innovative & Entrepreneurial Skill**

Code: **328765(28)**

Total Practical Periods: **28**

Total Tutorial Periods: **NIL**

Unit I Innovation: Innovation: an abstract concept; creativity, innovation and imagination; types of innovation - classified according to products, processes or business organizations.

Unit II Entrepreneurship: who is an entrepreneur? Entrepreneurship: A state of Mind, Emergence of entrepreneur; Role of Entrepreneur; A Doer not a Dreamer- Characteristics of an entrepreneur; Factors affecting entrepreneurial growth – Social, cultural, personality factors, psychological and Social Factors. Impact of Entrepreneurship for sustainable development.

Unit III Difference between entrepreneur and entrepreneurship: Difference between entrepreneur and intrapreneur, Common Entrepreneurial competencies/Traits; Entrepreneurship stimulants, Obstacles inhibiting Entrepreneurship; Types of entrepreneurs, Functions of an entrepreneur.

Unit IV Identification of Business Opportunities: Introduction, Sources of Business of Product Ideas, Steps in Identification of Business opportunity and its SWOT Analysis.

UNIT-V Techno-Economic Feasibility of the project: Introduction, Techno- Economic feasibility of the Project, Feasibility Report, Considerations while preparing a Feasibility Report, Proforma of Feasibility Report, Role of Institutions and entrepreneurship..

Reference Books:

1. Competing through Innovation-Bellon & Whittington, Prentice Hall of India
2. A Guide to Entrepreneurship – David Oates- JAICO Publishing House.
3. Entrepreneurship- Rober D Hisrich, Peters, Shepherd- TMH
4. Entrepreneurship in Action- Coulter, Prentice Hall of India
5. Entrepreneurship Management and Development – Ajith Kumar, HPH
6. Fundamentals of entrepreneurship- Mohanty, PHI
7. Patterns of Entrepreneurship- Jack M Kaplan, Wiley, student Edition. *Course Outcomes*

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Industrial Automation**

Code: **325745(25)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To develop and apply Mathematical and Engineering skills to identify, formulate and solve industrial process problems.
2. This subject seeks to close the gap between Instrumentation and Mechanical Engineering.
3. This subject provides the knowledge of different types of controller & their applications.
4. This subject provides the basic knowledge of PLC and DCS.

UNIT – I Introduction to Process Control: Process Control Block Diagram, Control System Evaluation, Digital Control, Supervisory Control, Direct Digital Control, Networked Control Systems, Distributed Digital Control, Smart Sensor, Definitions of the terms used to describe Process Control. Data Acquisition Systems: DAS Hardware, DAS Software, Data Logger.

UNIT – II Controller Principles: Process Characteristics, Process Equation, Process Load, Process Lag, Self-Regulation, Control System Parameters: Error, Variable Range, Control Parameter Range, Control Lag, Dead Time, Cycling, Controller Modes: Discontinuous Controller Mode, Two Position Mode, Multi Position Mode, Floating Control Mode, Continuous Control Mode, Proportional Control Mode, Integral Control Mode, Derivative Control Mode, Composite Control Modes: PI Control, PD Control, PID Control.

UNIT – III Analog Controllers: Introduction, Electronic Controllers: Error Detector, Single Controller Modes, Composite Controller Modes, Pneumatic Controllers: General features, Mode Implementation.

UNIT – IV Programmable Logic Controller: PLC Architecture, Basic Structure, PLC Programming: Ladder Diagram, Ladder Diagram symbols, Ladder Diagram circuits, PLC Communications and Networking, PLC Selection, I/O Quantity and Type, I/O Remoting requirements, Memory size and type, Programmer Units, PLC Installation, Advantages of using PLCs.

UNIT – V Distributed Control System: Introduction, Overview of Distributed Control Systems, DCS Software configuration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLCs and Computers, Features of DCS, Advantages of DCS.

Text Books:

1. Process Control Instrumentation Technology by C.D. Johnson, PHI
2. Computer Aided Process Control by S.K. Singh, PHI

Reference Books:

1. Introduction to Instrumentation & Control by A.K. Ghosh, Eastern Economy Edition
2. Intelligent Instrumentation, by George C. Barney, Prentice Hall India.

Course Outcomes:

The students will be able to:

- 1 Understand process variables, degrees of freedom, and Self regulation, first & second order Process System.
- 2 Know the importance of on-off, proportional, integral and derivative modes, composite control modes - PI, PD and PID controllers.
- 3 Understand, Communication in DCS, DCS system integration with PLC and computers, Data loggers, Data Acquisition systems (DAS), computer control hierarchy levels and Direct Digital control (DDC).

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program:	Bachelor of Engineering	Semester:	VII
Branch:	Electronics & Telecommunication	Code:	328742(28)
Subject:	System Design with ARM		
Total Theory Periods:	40	Total Tutorial Periods:	12
Class Tests:	Two (Minimum)	Assignments:	Two (Minimum)
ESE Duration:	Three Hours	Maximum Marks: 80	Minimum Marks: 28

Course Objectives:

1. To understand the fundamentals of ARM processors and architecture.
2. To gain knowledge of internal features of ARM Processors.
3. To understand various standards, protocols and transmission techniques.
4. To have an insight into design methodology.
5. To gain knowledge of design optimization.

- UNIT -I Introduction to 16 / 32-bit Microcontrollers:** Introduction to RISC processor, Difference between CISC & RISC, ARM Microcontrollers and Processor Cores, ARM-7/ARM-9 Architecture and Organization, ARM7TDMI Processor Block Diagram, ARM7TDMI Main Processor logic, ARM/THUMB Programming Model, ARM/THUMB Instruction Set, ARM Exception Handling, More ARM Instructions, ARM/THUMB Assembly Programming.
- UNIT- II Timers & Interrupts:** Data handling, Interfacing with Memory, Interrupts, Timers, ARM Bus, I/O Devices, Controllers, Simple & Autonomous I/O Controllers,
- UNIT-III Bus Standards and Protocols:** Parallel, Multiplexed, Tristate, and Open-Drain Buses, Bus Protocols, Serial Transmission Techniques & Standards, Wireless protocols CAN & Advanced Buses.
- UNIT –IV Design Methodology:** Design Methodology, Design Flow, Architecture Exploration, Functional Design, Functional Verification, Synthesis, Physical Design,
- UNIT –V Design Optimization:** Design Optimization, Area Optimization, Timing Optimization, Power Optimization, Design for Test , Fault Models and Fault Simulation, Scan Design and Boundary Scan, Built-In Self Test (BIST), Non-technical Issues.

Text Books

1. Data books of ARM7/ARM9 J. Staunstrup and W. Wolf, editors, Hardware/Software Co-Design: Principles and Practice, Kluwer Academic Publishers.

Reference Books:

1. ARM System-on-Chip Architecture, by Steve Furber , 2nd Edition, Pearson Education.
2. Arm System Developer'S Guide: Designing And Optimizing System Software (Paperback) by Sloss Andrew N. Et.Al, 1st Edition, Publisher: Morgan Kaufmann Publishers.

Course Outcome:

1. Student will be able to understand the fundamental of ARM architecture that includes register array, cache, virtual memory, pipeline and memory management units
2. Student will be able to understand the assembly language instructions for ARM processor
3. Student will be able to understand the internal features of ARM Processor
4. Student is able to create small embedded system using ARM controller and realization of hardware based design through team project
5. Implementation of control system algorithms using ARM Controller

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics &
Telecommunication**

Semester: **VII**

Subject: **Robotics & Controls**

Code: **328743(28)**

Total Theory Periods: **40**

Total Tutorial 12

Class Tests: **Two (Minimum)**

Periods: Assignments: Two (Minimum)

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To study overview of robot mechanisms, dynamics, and intelligent controls.
2. To study basic robot co-ordinate configurations.

UNIT – I Introduction to Robotics: Evolution of Robots and Robotics, Laws of Robotics, Progressive Advancement in Robots, Robot Anatomy, Human Arm Characteristics, Design and Control Issues, Manipulation and Control, Sensors and Vision, Programming Robots, The Future Prospects, Notations.

UNIT – II Coordinate Frames, Mapping and Transforms: Coordinate Frames, Description of Objects in Space, Transformation of Vectors, Inverting a Homogeneous Transform, Fundamental Rotation Matrices

UNIT – III Robotic Sensors and Vision: The Meaning of Sensing, Sensors in Robotics, Kinds of Sensors used in Robotics, Robotic vision, Industrial Applications of Vision-Controlled Robotic Systems, Process of Imaging, Architecture of Robotic Vision Systems, Image Acquisition, Description of Other components of Vision System, Image Representation, Image Processing.

UNIT – IV Control of Manipulators: Open- and Close-Loop Control, The Manipulator Control Problem, Linear Control Schemes, Characteristics of Second-Order Linear Systems, Linear Second-Order SISO Model of a Manipulator Joint, Joint Actuators, Partitioned PD Control Scheme, PID Control Scheme, Computed Torque Control, Force Control of Robotic Manipulators, Description of Force-Control Tasks, Force-Control Strategies, Hybrid Position/Force Control, Impedance Force/Torque Control.

UNIT – V Robot Applications: Industrial Applications, Material Handling, Processing Applications, Assembly Applications, Inspection Application, Principles for Robot Application and Application Planning, Justification of Robots, Robot Safety, Non-Industrial Applications, Robotic application for sustainable Development.

Text Books

1. Robotics & Control by R.K. Mittal & I.J. Nagrath, TMH Publications
2. Robotics for Engineers by Yoram Korean, McGraw Hill Co.
3. Introduction to Robotics by S.K. Saha, McGraw-Hill Education.

Reference Books

1. Robotics Control Sensing, Vision and Intelligence by K.S.Fu, R.C.Gonzalex, C.S.G.Lee, McGraw Hill.
2. Kinematics and Synthesis of Linkages by Hartenberg and Denavit, McGraw Hill.
3. Kinematics and Linkage Design by A.S. Hall - Prentice Hall
4. Kinematics and Dynamics of Machinery by J.Hirchhorn, McGraw Hill.

Course Outcomes:

By studying this course, students will be

1. Familiar with the concept development and key components of robotics technologies.
2. Understand basic mathematic manipulations of spatial coordinate representation and transformation.
3. Able to undertake practical robotics experiments that demonstrate the above skills.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Radar & Navigational Aids**

Code: **328744(28)**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Total Tutorial Periods: **12**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. Main objective of this course is to make the students understand the basic concept in the field of Radar and Navigational aids.
2. Students are taught about different types of Radar Systems.

UNIT – I Principles and Applications: Basic Radar, Radar Block Diagram, Radar Frequencies, Applications of Radar, Radar Range Equation, Probabilities of Detection of False Alarm Integration of Radar Pulses, Radar Cross Section of Targets.

UNIT – II MTI And Pulse Doppler Radar: Introduction to Doppler and MTI Radar, Delay Line Cancellers, Staggered PRF, Range Gated Doppler Filter, Limitations to MTI Performance, Tracking with Radar, Monopulse Tracking, Conical Scan and Sequential Lobing, Limitations to Tracking Accuracy, Low Angle Tracking, Tracking in range, Comparison of Trackers.

UNIT – III Propagation of Radar Waves: Forward Scattering from a Flat Earth, Scattering from Round Earths Surface, Atmospheric Refraction – Standard Propagation, Non-Standard Propagation, Diffraction, Attenuation by Atmospheric Gases, External or Environmental Noise, Other Propagation Effects.

UNIT – IV Antennas for Detection of Radar Signals: Parabolic Antennas, Introduction to Phased Array, Cosecant Squared Antenna, Radome.

UNIT – V Radar Transmitter and Receiver: Radar Receiver, Receiver Noise Figure, Superheterodyne Receiver, Duplexers and Receiver Protectors, Radar Displays, introduction to ECM and ECCM, Linear Beam Power Tubes, Solid State Power Sources, Magnetron.

Text Books:

1. Introduction to Radar Systems by M.I Skolnik, TMH Pub. Co.
2. Microwave Radar and Navigational Aids by A.K. Sen and A.B. Bhattacharya, Khanna Publisher.

Reference Books:

1. Radar: Principles, Technology, Applications by Edde, Pearson Education Pub.
2. Elements of Electronic Navigation by Nagaraj, TMH Pub.

Course Outcomes:

1. To become familiar with fundamentals of Radar.
2. To gain in depth knowledge about the different types of Radar and their operation.
3. Need for signal detection in Radar and various Radar signal detection techniques.
4. To become familiar with Radio Navigation techniques

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Digital Circuit Design with Verilog HDL**

Code: **328741(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To understand basics of Verilog HDL Language, including its use in synthesis of digital designs.
2. To gain knowledge of modeling, simulation and verification of designs with Verilog HDL.
3. To understand combinational circuit design of digital systems with Verilog HDL.
4. To understand sequential circuit design of digital systems with Verilog HDL.
5. To understand designing using Mealy State and Moore State Model.

UNIT-I Overview of Digital Design with Verilog-HDL: Emergence of HDLs, Typical Design Flow, Importance of HDLs, Popularity of Verilog HDLs. Design Methodologies, Modules, Instances, Lexical conventions, Data Types, System Tasks and Compiler directives.

UNIT-II Modeling in Verilog-HDL: Modules and Ports, **Gate-Level Modeling:** Gate Types, Gate Delays; **Dataflow Modeling:** Assignment Statement, Delays, Expressions, Operator Types, Operands; **Behavioral Modeling:** Structured Procedures, Procedural Assignment, Timing Controls, Conditional Assignment Statements, Loops, Sequential and Parallel, Blocks, Generate Blocks.

UNIT-III Combinational Circuit Design: Multiplexers, Demultiplexers, Encoder, Decoders, Code Converters, Arithmetic Comparisons Circuits, Tasks and Functions.

UNIT-IV Sequential Circuit Design: Flip-Flops: SR, JK, T and D; Registers: Shift Registers, Parallel Access Shift Registers; Counter: Asynchronous Counters, Synchronous Counters, Counters with Parallel load, BCD counter.

UNIT-V FSM: Basic Design Steps, State Diagram, State Table, State Assignment, State Assignment Problem, One Hot Encoding, Mealy State Model, Moore State Model, Design Example: Serial Adder, Vending Machine, Bus Architecture.

Text Books:

1. VERILOG HDL: A Guide to Digital and Synthesis, IEEE 1364-2001 Compliant, Samir Palnitkar, Pearson Ed.
2. Fundamentals of Digital Logic with Verilog Design, Stephen Brown & Zvonko Vranesic, The McGraw-Hill.

Reference Books:

1. Design Through Verilog-HDL, T.R. Padmanbhan and B. Bala Tripura Sundari; IEEE Press
2. Verilog Hdl Synthesis: A Practical Primer, J. Bhasker PHI.

Course Outcome: Students will be able to:

1. Use VLSI design methodologies to understand and design complex digital systems.
2. Create circuits that realize specified digital functions.
3. Identify logic and technology-specific parameters to control the functionality, timing, power, and parasitic effects.
4. Complete a significant VLSI design project having a set of objective criteria & design constraints.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Neural Network and Fuzzy Logic**

Code: **328746(28)**

Total Theory Periods: **40**

Total Tutorial Periods: **12**

Class Tests: **Two (Minimum)**

Assignments: **Two (Minimum)**

ESE Duration: **Three Hours**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. The main objective of this course is to provide the student with the basic understanding of neural networks and fuzzy logic fundamentals, Program the related algorithms and Design the required and related systems.
2. To learn the various architectures of building an ANN and its applications.
3. To learn the advanced methods of representing information in ANN like self organizing networks, associative and competitive learning
4. To learn the fundamentals of Crisp sets, Fuzzy sets and Fuzzy Relations.

UNIT-I Introduction to Artificial Neural Networks: Elementary Neurophysiology, Models of a Neuron, Neural Networks viewed as Directed Graphs, Feedback from Neurons to ANN, Artificial Intelligence and Neural Networks, Network Architectures, Single-Layered Feed forward Networks, Multi-Layered Feed Forward Networks, Recurrent Networks, Topologies.

UNIT-II Learning and Training: Activation and Synaptic Dynamics, Hebbian, Memory based, Competitive, Error-Correction Learning, Credit Assignment Problem: Supervised and Unsupervised learning, Memory models, Stability and Convergence, Recall and Adaptation.

UNIT-III A Survey of Neural Network Models : Single-Layered Perceptron – Least Mean Square Algorithm, Multi- Layered Perceptrons – Back Propagation Algorithm, XOR – Problem, The Generalized Delta Rule, BPN Applications, Adalines and Madalines – Algorithm and Applications.

UNIT-IV Applications: Talking Network and Phonetic Typewriter, Speech Generation and Speech Recognition, Neocognitron, Character Recognition and Handwritten Digit Recognition, Pattern Recognition Applications.

UNIT-V Neural Fuzzy Systems: Introduction to Fuzzy Sets, Operations, Relations, Examples of Fuzzy Logic, Defuzzification, Fuzzy Associative Memories, Fuzziness in Neural Networks and Examples.

Text Books:

1. Artificial Neural Networks by B. Yagna Narayan, PHI.
2. Neural Networks Fuzzy Logic & Genetic Algorithms by Rajshekaran & Pai, Prentice Hall.

Reference Books:

1. Neural Networks by James A. Freeman and David M. Strapetuns, Prentice Hall.
2. Neural Network & Fuzzy System by Bart Kosko, PHI.
3. Neural Network Design by Hagan Demuth Deale Vikas Publication **House**.

Course Outcomes:

1. Students will be able to understand Artificial Neural Network concept with the help of Biological Neural Network.
2. Students will be able to implement algorithms to train ANN by using learning algorithms.
3. Students will be able to test fuzzy set operations and binary relations.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **RF Communication Design**

Code: **328747(28)**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Total Tutorial Periods: **12**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To understand concepts of Radio frequency design.
2. To gain knowledge of smith Chart fundamentals.
3. To understand concepts of RF filter design.
4. To have insight into active RF components.
5. To learn modeling using active RF components.

UNIT-I Introduction: Importance of Radiofrequency Design, Dimensions and Units, Frequency Spectrum, RF Behavior of Passive Components, Transmission Line Analysis, Microstrip Transmission Lines, Terminated Lossless Transmission Line: Voltage Reflection Coefficient, Propagation Constant and Phase Velocity, Standing Waves, Special Terminated Conditions: Input Impedance of Terminated Lossless Line, Short Circuit Transmission Line, Open Circuit Transmission Line, Quarter Wave Transmission Line, Sourced and Loaded Transmission Line.

UNIT-II The Smith Chart: Reflection Coefficient in Phasor Form, Normalized Impedance Equation, Parametric Reflection Coefficient Equation, Graphical Representation, Impedance Transformation for General Load, Standing Wave Ratio, Special Transformation Conditions, Admittance Transformations, Parallel and Series Connections: Parallel Connections of R and L Connections, Parallel connections of R and C Connections, Series Connections of R and L Connections, Series Connections of R and C Connections, Example of a T Network.

UNIT-III RF Filter Design: Filter Types and Parameters, Low Pass Filter, High Pass Filter, Bandpass and Bandstop Filter, Insertion Loss, Special Filter Realizations: Butterworth Type Filter, Chebyshev Type Filters, Denormalization of Standard Low Pass Design, Filter Implementation: Unit Elements, Kuroda's Identities and Examples of Microstrip Filter Design, Coupled Filters: Odd and Even Mode Excitation, Bandpass Filter Design, Cascading bandpass filter elements, Design examples.

UNIT-IV Active RF Components: Semiconductor Basics: Physical Properties of Semiconductors, PN-Junction, Schottky Contact, Bipolar-Junction Transistors: Construction, Functionality, Temperature Behaviour, Limiting Values, RF Field Effect Transistors: Construction, Functionality, Frequency Response, Limiting Values, High Electron Mobility Transistors: Construction, Functionality, Frequency Response.

UNIT-V Active RF Component Modeling: Transistor Models: Large-signal BJT Models, Small-signal BJT Models, Large-signal FET Models, Small-signal FET Models, Measurement of Active Devices, DC Characterization of Bipolar Transistors, Measurements of AC parameters of Bipolar Transistors, Measurement of Field Effect Bipolar Transistors' Transistor Parameters, Scattering Parameter Device Characterization.

Text Books:

1. RF Circuit Design Theory And Application by Reinhold Ludwig 2nd Edition Pearson Ed.
2. RF Circuit Design by Christopher Bowick, Newnes.
3. Wireless Communication Electronics: Introduction to RF circuits, Springer India ltd; (2014)

Reference Books:

1. Electromagnetic Field Theory and Transmission Lines by Gottapu Sasibhushan Rao, Wiley Precise India.
2. Fields and Waves- A Fundamental Approach by Deepak Sood, University Science Press.

Course Outcomes:

1. Students will be able to understand Importance of Radiofrequency Design.
2. Students will be able to understand concepts of Smith Chart.
3. Students will be able to understand Designing Concepts.
4. Concepts of active RF components is made clear.
5. Students will be able to understand Modeling concepts of active RF components is done and measurement of various parameters of semiconductor devices.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **VLSI System Design**

Code: **328748(28)**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Total Tutorial Periods: **12**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To understand concepts of Minimization and Transformation of Sequential Machines.
2. To gain knowledge for digital designing.
3. To gain knowledge about SM chart.
4. To understand Fault Modeling & Test Pattern Generation.
5. To be able to diagnose fault in sequential circuits.

- UNIT-I Minimization and Transformation of Sequential Machines:** The Finite State Model: Capabilities and Limitations of FSM, State Equivalence and Machine, Minimization-Simplification of Incompletely Specified Machines, Fundamental Mode Model, Flow Table, State Reduction, Minimal Closed Covers, Races, Cycles and Hazards.
- UNIT-II Digital Design:** Digital Design Using ROMs, PALs and PLAs, BCD Adder, 32-bit Adder, State Graphs for Control Circuits, Scoreboard and Controller, A Shift and Add Multiplier, Array Multiplier, Keypad Scanner, Binary Divider.
- UNIT-III SM Charts:** State Machine Charts, Derivation of SM Charts, Realization of SM Chart, Implementation of Binary Multiplier, Dice Game Controller.
- UNIT-IV Fault Modeling & Test Pattern Generation:** Logic Fault Model, Fault Detection & Redundancy, Fault Equivalence and Fault Location, Fault Dominance, Single Stuck at Fault Model, Multiple Stuck at Fault Models, Bridging Fault Model, Fault Diagnosis of Combinational Circuits by Conventional Methods, Path Sensitization Techniques, Boolean Difference Method: Kohavi Algorithm, Test Algorithm, D Algorithm, PODEM, Random Testing, Transition Count Testing, Signature Analysis and Test Bridging Faults.
- UNIT-V Fault Diagnosis in Sequential Circuits:** Circuit Test Approach, Transition Check Approach – State Identification and Fault Detection Experiment, Machine Identification, Design of Fault Detection Experiment.

Text Books:

1. Fundamentals of Logic Design by Charles H. Roth, 5th Ed., Cengage Learning.
2. Digital Systems Testing and Testable Design by Miron Abramovici, Melvin A. Breuer and Arthur D. Friedman- John Wiley & Sons Inc.
3. Logic Design Theory by N. N. Biswas, PHI.

Reference Books:

1. Switching and Finite Automata Theory by Z. Kohavi, 2nd Ed., 2001, TMH.

Course Outcomes:

1. Students will be able to understand minimization and transformation of sequential machines
2. Students will be able to design different combinational circuits.
3. Students will be able to design and implementation using SM chart.
4. Students will be able to generate test pattern and able to diagnose fault in sequential circuits.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of program: **Bachelor of Engineering**

Branch: **Electronics & Telecommunication**

Semester: **VII**

Subject: **Digital Image Processing**

Code: **328749(28)**

Total Theory Periods: **40**

Class Tests: **Two (Minimum)**

ESE Duration: **Three Hours**

Total Tutorial Periods: **12**

Assignments: **Two (Minimum)**

Maximum Marks: 80 Minimum Marks: 28

Course Objectives:

1. To know the basic components of an image processing system.
2. To understand the basics of the human visual system as they relate to image processing including spatial frequency resolution and brightness adaptation.
3. To teach the students about various image enhancement techniques and transformation of images.
4. To have an illustrative idea about various edge detection techniques.
5. To give knowledge about the need of thresholding and types of thresholding techniques.
6. To have a brief idea about approaches to restoration and image compressions.

UNIT I Introduction to Image Processing: Applications and Fields of Image Processing, Fundamental steps in Digital Image Processing, Elements of Visual Perception, Image Sensing and Acquisition, Basic Concepts in Sampling and Quantization, Representing Digital Images.

UNIT II Image Enhancement in the Spatial Domain: Some basic gray level Transformations, Histogram Processing, Histogram Modification, Image Subtraction, Spatial Filtering, Sharpening Spatial Filters, Use of First and Second Derivatives for Enhancement, Image Enhancement in the Frequency Domain, Gaussian Filters, Homomorphic Filtering, Pseudocolouring: Intensity Slicing, Gray level to Color Transformation.

UNIT III Image Segmentation: Some Basic Relationships between Pixels, Point, Line and Edge Detection, Gradient Operators, Canny Edge Detection, Pyramid Edge Detection, Edge Linking and Boundary Detection, Hough Transform, Chain Codes, Boundary Segments, Skeletons, Boundary Descriptors, Fourier Descriptors.

UNIT IV Thresholding: The Role of Illumination, Global Thresholding, Adaptive Thresholding, Use of Boundary Characteristics for Histogram Improvement and Local Thresholding, Region based Segmentation, Region Growing, Region Splitting and Merging.

UNIT – V Image Restoration: Degradation Model, Restoration in Spatial Domain, Geometric Transformation, Spatial Transformation, Approach to Restoration, Inverse & Wiener Filtering, Image Compression: Basics of Image Compression.

Text Books:

1. Digital Image Processing by Gonzalez & Woods, Pearson Education.
2. Introduction to Digital Image Processing by Alasdair Mc Andrew, Cengage learning.
3. Fundamental of Digital Image Processing by A K Jain, PHI.

Reference Book:

1. Image Processing, Analysis and Machine Vision by Milan Sonka, Thomson Learning.
2. Digital Image Processing by Pratt W.K, John Wiley & Sons.
3. Digital Image Processing by Madhuri A. Joshi, PHI

Course Outcomes:

1. Students will understand how images are represented; Understand image types such as binary images, gray-scale images, color and multi-spectral images.
2. Emphasis will be to develop engineering skills and intuitive understanding of the tools used in Image Processing.
3. Students will be able to do various operations on images like Image enhancement, transformation, sharpening etc.
4. Students can analyze various edge detection techniques and their algorithms.
5. Students will be able to use various thresholding techniques and segmentations.
6. Students will be able to visualize approaches used in image restoration.