Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Digital Communication** Code: **C028511(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course Objectives:

1. To study signal space representation of signals and discuss the process of sampling, quantization that are fundamental to the digital transmission of analog signals.
2. To study baseband and band pass signal transmission and reception techniques.
3. To study digital modulation methods and optimum receiver.
4. To study the noise in digital communication, correlator, optimum filter, matched filter.

Unit-1-Basics of Digital Communication: Sampling theorem: Low pass signal, Band-pass signal, Aliasing effect, Interpolation Formula, Natural sampling, Flat-top sampling, Signal recovery through holding, Generation and Detection of PAM, PWM, PPM. TDM-PAM, Aperture Effect, Channel bandwidth for PAM signal, TDM, Multiplexing T1 Lines-The T2, T3, T4 Lines.

Unit-11-Digital transmission of analog data: Quantization: Quantization of signals, PCM, TDM-PCM system, Companding (u-law, A- law) DPCM, Delta modulation, Adaptive delta modulation, Continuously variable slope delta modulator (CVSD). Noise in PCM and DM: PCM transmission: Calculation of SNR in PCM. Delta modulation transmission: signals to quantization noise ratio Calculation.

Unit-111-Principle of digital data transmission: Digital communication system, Line coding: PSD of various line codes, Polar signaling, On-Off signaling, Bipolar signaling, Pulse shaping: Nyquist criterion for zero ISI, Scrambling, Regenerative repeater: Eye diagram, Detection error probability for polar signal, ON-Off and bipolar signals.

Unit 1V-Digital modulation techniques: Fundamentals of BASK, BPSK and BFSK, Generation, detection, spectrum and geometrical representation of BPSK and BFSK, Fundamentals of DPSK, DEPSK and QPSK, Generation and detection of DPSK, DEPSK and QPSK, Signal space representation of QPSK. M-ary PSK. MSK Signaling Scheme.

Unit-V-Spread spectrum modulation : Introduction , Direct sequence (DS) Spread Spectrum, use of spread spectrum with CDMA, ranging using DS spread spectrum, Frequency hopping spread spectrum, generation and characteristics of PN sequences, acquisition of FH signal, tracking of FH signal, acquisition and tracking of a DS signal.

Name of Text Book:

1. Principles of communication system by Taub & Schilling, 3 rd Ed., McGraw-Hill Education (unit I, unit II, unit IV, unit V)

2. Modern Digital and Analog Communication Systems by B.P. Lathi,3 rd Ed., Oxford university press (unit III).

Reference books

1. Fundamentals of communication systems by John.G. Proakis, Pearson education, 2006.

2. Communication system by A. Bruce Carlson, Paul Crilly, Paul B. Crilly, McGraw-Hill Education

3. Digital communications by Simon Haykin, Wiley India Private Limited,2006.

Course outcome:

1. Design digital communication systems, given constraints on data rate, bandwidth, power, fidelity, and complexity.

2. Analyze the performance of a digital communication in terms of probability of error of digital modulation Technique.

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Design of Electronics Circuit** Code: **C028512(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course Objectives:

1. To design simple circuits like amplifiers using op-amps.
2. To design linear and non-linear applications of operational amplifiers.
3. To Gain knowledge about A/D and D/A converters
4. To gain knowledge in designing a stable voltage regulators
5. To introduce the theory and applications of analog multipliers and PLL.

UNIT I Fundamentals of differential amplifiers and operational amplifiers: Current mirror, BJT differential amplifier analysis using r-parameters. Introduction to operational amplifier :op-amp Symbol , Block schematic of op-amp, Ideal op-amp characteristics, AC and DC characteristics, Open loop configuration of op-amp, Closed loop configuration of op-amp: Voltage series feedback amplifier, Voltage shunt feedback amplifier, Differential amplifier. The practical opamp: Input offset voltage, Input bias current, Input offset current, Total output offset voltage, Thermal drift. Frequency response of an op-amp: Frequency response, Compensating networks, Slew rate.

UNIT II Operational amplifier applications: Basic op-amp circuits: Summing, Scaling and Averaging amplifiers. Current to voltage and Voltage to current converter, Bridge amplifier, Instrumentation amplifier, Differentiator, Integrator, Non-linear Circuits: Logarithmic Amplifiers, Precision Rectifier, Peak Detector, Sample and Hold Circuits. OP-AMP as Comparator, Schmitt Trigger, Square wave generator and Triangular Wave Generator, Monostable Multivibrator. IC Analog Multiplier applications: Divider circuit, Square rooting circuit, RMS detector.

UNIT III Active Filters: Introduction to filtering: Frequency response, Characteristics and terminology, advantage of Active filters, Design of Low –pass Butterworth Filters, Sallen and key Circuits, Resistive gain Enhancement, RC-CR Transformation, Design of Band – pass Butterworth Filters, Deliyannis-Friend Circuit, Stagger-Tuned Band pass filter Design, Q Enhancement of the Friend circuit. Design of Low – pass and Band-pass Chebyshev Filters, Sensitivity concepts and their Application to Sallen and key Circuits.

UNIT IV Special ICs: 555 Timers ICs and their Applications: missing pulse detector, Pulse Width modulation, FSK Generator, Pulse position modulator. IC 565 PLL and its Applications: Phase locked loops operation, Lock and Capture range, LM565PLL-Application of PLL as AM/FM/FSK/ detectors, frequency translators, phase shifter, tracking filter, signal synchronizer and frequency synthesizer. IC 566 Voltage controlled oscillator, Voltage Regulators: OP-AMP Regulators, IC Regulators, Fixed Voltage Regulators (78/79, XX), SMPS.

UNIT V Analog to digital and digital to analog converters: Sample and hold circuits and sample and hold IC (LF 398), Types of D/A converter : The binary weighted resistor network, The R-2R ladder network, The inverted ladder, D/A specification. A/D converter : Parallel-comparator type, Dual slope, Successive approximation, Voltage to time and Voltage to frequency converters, A/D specification.

Text Book:

1. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications (Unit-I,II)
2. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education(Unit-I, II,IV)
3. Analog Filter Design; Van –Valkenburg ; Holt –Standers International Edn. (Unit-III)
4. Linear Integrated Circuits by D.Roy Choudhary and Shail B Jain,3rd Ed., New Age International (Unit-IV)
5. Digital integrated Electronics by Herbert Taub and Donald Schilling, McGraw Hill (Unit- V)

Reference Books:

1. Integrated Electronics by Millman& Halkias,6th Ed., TMH Publishing Co.
2. Operational Amplifiers and Linear Integrated Circuits, Lal Kishore,2nd Ed., PHI
3. Operational Amplifiers and Linear Integrated Circuits, Coughlin and Driscoll, 6th Ed., PHI

Course Outcomes:

1. Gain knowledge about Differential amplifier and operational amplifier.
2. Designing circuits for op-amp applications.
3. Gain knowledge about A/D and D/A converters.
4. Get knowledge about various types of voltage regulator.
5. Understand PLL circuits and multiplier circuits.

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Microcontroller & Embedded system** Code: **C028513(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course objectives:

- To make students familiar with the basic blocks of microcontroller device and Embedded system in general.
- To provide comprehensive knowledge of the architecture, features and interfacing with 8051 microcontroller.
- To use assembly and high level languages to interface the microcontrollers to various applications.

UNIT I Introduction to Microcontroller: A brief History of Microcontrollers, Harvard Vs Von-Neumann Architecture; RISC Vs CISC, Classification of MCS-51family based on their features (8051, 8052, 8031, 8751, AT89C51), Pin configuration of 8051.
8051 Processor Architecture and Instruction Set: Registers of 8051, Inbuilt RAM, Register banks, stack, on-chip and external program code memory ROM, power reset and clocking circuits, I/O port structure, Addressing modes, Instruction set and programming.

UNIT II Counter/Timer and Interrupts of 8051: Introduction, Registers of timer/counter, Different modes of timer/counter, Timer/counter programming, Interrupt *Vs* Polling, Types of interrupts and vector addresses, register used for interrupts initialization, programming of external interrupts, Timer interrupts.

UNIT III Asynchronous Serial Communication and Programming: Introduction to serial communication, RS232 standard, GPIB, Max 232/233 Driver, 8051 Serial Port Programming.

UNIT IV Interfacing with 8051: Interfacing and programming of: ADC (0804,0808/0809,0848) & DAC (0808), stepper motor , 4x4 keyboard matrix, LCD, Interfacing (only) of different types of Memory , Address decoding techniques.

UNIT V Embedded Systems: Introduction to an Embedded Systems, Defining the Embedded System, Real Life Examples of Embedded Systems, Characteristics of Real-Time Embedded Systems, Basics Of Developing For Embedded Systems.

Names of Text Books:

1. The 8051 Microcontroller and Embedded Systems using Assembly and C, Mazidi, Mazidi & McKinlay, 2nd Ed., PHI.(Unit-I,II,III,IV)
2. Embedded system, Frank Vahid.(Unit-V)

Names of Reference Books:

1. 8051 Programming, Interfacing and Applications K. J. Ayala, Penram Pub.
2. 8 bit Microcontrollers & Embedded Systems Manual**.**
3. Programming and Customizing the 8051 Microcontroller, Predko; TMH
4. Microcontrollers: Architecture, Programming, Interfacing and System Design, Rajkamal, Pearson Education.

Course Outcome:.

1. To understand Microcontroller 8051 its architecture and its instruction set.
2. Gain knowledge about Counter/timer and interrupts in 8051 Microcontroller and Programming concepts.
3. Students will be able to do serial communication programming and gain knowledge of serial communication.
4. Students will be able to understand interfacing Microcontroller 8051 with devices.

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Control Systems** Code: **C028514(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course Objectives:

1. To Impart the knowledge of fundamental concepts of Feedback control system
2. To develop the concept of Mathematical Modeling in control system
3. To analyze the concept of Stability Analysis in Time and Frequency Domain
4. To understand the designing concept of State Model

UNIT – I: **Representation of Control system :** Types of Control System : Open loop , Closed loop with examples. Evaluating Transfer function of a system using Block Diagram Representation and Signal Flow Graph techniques.

UNIT-II: Feedback Characteristics & Time response analysis of Control Systems: Reduction of parameter variation by use of feedback, Control over system dynamics by use of feedback, Control of the effects of disturbance signals by use of feedback.

Time Response Analysis: Time response of second order control system, Performance specifications, steady state error and error constants. Response with P, PI, PD and PID Controllers.

UNIT – III: Stability Analysis using Routh Hurwitz & Root Locus Technique : The concept of Stability, Routh- Hurwitz stability criterion , Relative stability analysis, Introduction to The Root locus concept, Construction of Root loci, Performance analysis of control system using Root loci

UNIT – IV: Frequency Response Analysis using Polar and Bode Plot: Introduction, Correlation between Time and Frequency Response, Polar Plots, Bode Plots, Gain Margin, phase Margin , All-Pass , Minimum and non minimum phase System.

UNIT – V:Frequency Response Analysis and State Variable Analysis : Nyquist Stability Criteria, Assessment of stability using Nyquist Plot.

State Variable Analysis: Concepts of state, state variables and state model, State models for linear continuous time systems, Diagonalization, Solution of state equations, Concepts of controllability and observability.

Names of Text Books:

1. Control System Engineering , Nagrath and Gopal , New Age International Publications
2. Automatic Control System, B. C. Kuo, PHI publication
3. Linear Control System, B.S. Monke, Khanna Publishers

Names of Reference Books:

1. Modern Control Engineering, Ogata , Pearson Publication
2. Modern Control Engineering, Roy Choudhury, PHI publication

Course Outcome:.

On successful completion of the course, the student will be able to:

1. Model physical control systems using BDRT, SFG.
2. Analyze feedback characteristics and time response analysis of P, PI, and PD & PID Controllers.
3. Analyze the stability of control system in time domain using Routh- Hurwitz and Root-locus techniques.
4. Analyze the stability of control system in frequency domain using Polar plots, Bode plots and Nyquist Plots.
5. Analyze and design the state model of feedback controllers.

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Digital Communication Laboratory** Code: **C028521(028)**
Total Lab Periods: 36 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 study Signal sampling and reconstruction techniques.
2. To study the effect on reconstructed waveform of the use of sample / hold circuit.
3. To study the TDM Pulse Amplitude Modulation / Demodulation & to draw their waveforms.
4. To study Time Division Multiplexing of Pulse Code Modulation /Demodulation
5. To study A-Law and μ-Law Companding.
6. To perform experiment with delta modulation techniques and to study the waveforms.
7. To perform experiment with adaptive delta modulation techniques and to study the waveforms.
8. To study the Equalizers Circuits.
9. To study ASK Modulation.
10. To study FSK Modulation.
11. To study PSK Modulation.
12. To study ASK Demodulation.
13. To study FSK Demodulation.
14. To study PSK Demodulation.
15. To study DPSK generation and detection.
16. To study QPSK generation and detection.
17. To study the effect of Noise in digital modulation techniques.

List of Equipments/Machine Required:

- Communication Trainer Kits, Function Generator, Power Supply, CRO, Discrete Components.
- Experiments can be implemented in hardware circuits or Simulated using C, C++, Simulation Software.

Recommended Books:

1. Principles of Communication Systems –Taub and Shilling, Tata McGraw Hill.

2. Handbook of Experiments in Electronics and Communication Engineering, Rao, Vikas Publishing House Pvt. Ltd.

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Design of Electronics Circuit lab** Code:**C028522(028)**
Total Lab Periods: 36 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 design an inverting and non-inverting amplifier using OPAMP (741) and study its frequency response.
2. To design a summing amplifier using op-amp (741).
3. To design a differential amplifier using op-amp (741) and find its CMRR.
4. To determine SVRR and slew rate of an op-amp (741).
5. To measure the input impedance of an voltage follower using op-amp (741)
6. To measure input offset voltage, input bias current and input offset current for op-amp 741.
7. To design an op-amp integrator circuit and analyze outputs for different input signals.
9. To design an op-amp Differentiator circuit and analyze outputs for different input signals.
10. To design and study comparator circuit using op-amp (741).
11. To design a Sample & Hold circuit and to study its output response
12. To design a square rooting circuit using multiplier.
13. To design chebyshev filter using OPAMP and to plot its frequency response.
14. To design All Pass filter using OPAMP and to plot its frequency response.
15. To design Band-pass filter using OPAMP and to plot its frequency response.
16. To design HPF using OPAMP.
17. To design LPF using OPAMP.
18. To design an application of 555 timer in monostable mode.
19. To design an application of 555 timer in astable mode.
20. To study the voltage regulation of 78XX and 79XX series of voltage regulators.
21. To design a DAC using Weighted Resistor method.
22. To design a ADC using parallel comparator method.

List of Equipments/Machine Required:

Discrete components, Power Supply, Function Generator, CRO

Recommended Books:

Laboratory Manual for Operational Amplifiers and Linear ICs, David Bell, PHI

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Microcontroller & Embedded systems Laboratory** Code: **C028523(028)**
Total Lab Periods: 36 Batch Size: 30
Maximum Marks: 40 Minimum Marks: 20

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

1. Write a microcontroller 8051 program to transfer the bytes into RAM locations starting at 50H,assuming that ROM space starting at 240H contains CHHATTISGARH by using – a) Counter, b) null char. for end of string .
2. Write a microcontroller 8051 program to get hex data on the range of 00-FFh from port 0 and convert itto decimal. Save the digits in R7, R6 and R5, where the least significant digit is in R7.
3. Write a microcontroller 8051 program to add two 16 Bit unsigned numbers. Operands are two RAM variables. Results to be in R1-R0 pair.
4. Write a microcontroller 8051 program to subtract an unsigned 16 Bit number from another. Operandsare two RAM variables. Results to be in R1-R0 pair.
5. Write a microcontroller 8051 program to add two unsigned 32-bit numbers. Operands are two RAMvariables. Results to be in R1-R0 pair.
6. Write a microcontroller 8051 program to add two 16 Bit signed numbers.
7. Write a microcontroller 8051 program to convert a binary number to equivalent BCD
8. Write a microcontroller 8051 program to convert a packed BCD number to two ASCII numbers and place them in R5 and R6.
9. Write a microcontroller 8051 program to calculate the square root of an 8-bit number using iterative method.
10. Write a microcontroller 8051 program that generates 2kHz square wave on pin P1.0, 2.5 kHz on pin P1.2and 25 Hz on pin P1.3.
11. Write a microcontroller 8051 program for counter 1 in mode 2 to count the pulses and display the state of the TL1 count on P2. Assume that the clock pulses are fed to pin T1.
12. Write a microcontroller 8051 program to transfer letter "N" serially at 9600 baud, continuously. Assume crystal frequency to be 11.0592 MHz.
13. Write a microcontroller 8051 program to transfer word "CSVTU" serially at 4800 baud and one stop bit, continuously. Assume crystal frequency to be 11.0592 MHz.
14. Write a microcontroller 8051 program to receive bytes of data serially, and put them in P1. Set the baud rate at 2400 baud, 8-bit data, and 1 stop bit. Assume crystal frequency to be 11.0592 MHz.

List of Equipments/Machine Required:

Microcontroller kit, Interfacing kit, Keyboard, Monitor, SMPS for Microcontroller

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Computer Networks** Code: **C028531(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

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, Biphase, Bipolar, Transmission of Digital Data: DTE DCE Interface, EIA-232D,Null Modem, Modems: Traditional Modem, 56KModem.

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: Project802,Basicof–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 Internet working, Connecting devices: Repeaters, Hubs, Bridges, Routers. Internet Protocol: IP Addressing, IPV4Header,Comparison ofIPV4andIPV6, Sub netting, 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

Name of Text Books:

1. DataCommunicationandComputerNetworkingbyB.A.Forouzan,3rdEd.,TataMcGrawHill.
2. DataandComputerCommunicationsbyWilliamStalling,7thEdition,PearsonEducation.

Name of 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 , signaling techniques and various interfaces.
3 Students will have deep understanding of various protocols usedat 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 Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Computer organization & Architecture** Code: **C028534(022)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course objective:

- To know about Central processor organization.
- To know about Control unit organization.
- To provide an Insight into Arithmetic processor design.
- To provide an insight into Input/output organization & Memory organization.

UNIT I Central Processor organization: Bus organized computer, Memory address structure, Memory data register, program counter, Accumulator, Instruction register, Program counter, Accumulator, Instruction register, Instruction field, Micro operations, Register transfer languages, Instruction field, Decoding and execution, Instruction formats and addressing modes.

UNIT II Control unit organization : Instruction sequencing, Instruction interpretation, Hardwired control, Micro- programmed control organization, Control memory, Address sequencing, Micro-instruction, Formats, Micro-program sequence, Microprogramming.

UNIT III Arithmetic processor design: Addition and subtractions algorithm, Multiplication algorithm, Division algorithm Processor configuration, Design of control unit and floating point arithmetic.

UNIT IV Input Output organization: Programmed I/O., I/O, addressing, I/O instruction, Synchronization, I/O interfacing, Interrupt mechanism, DMA, I/O processors and data communication, RISC, CISC, Loosely Coupled & Tights Coupled system.

UNIT V Memory organization and multiprocessing: Basic concepts and terminology, Memory hierarchy, Semiconductor memories (RAM, ROM), Multiple module, Memories and interleaving (Virtual memory, Cache memory, Associative memory), Memory management hardware requirements, RISC & CISE Processor.

Name of Text Books:

1. Computer System Architecture by M. Morris Mano, PHI
2. Computer Organization Architecture by J.P. Hayes, PHI

Name of Reference Books:

1. Digital Computer Logic Design By M. Morris Mano, PHI
2. Structured Computer Organization by Andrew S. Tanenbaum PHI
3. Computer Organization and Design, Pal-Chauduri, PHI

Course Outcomes:

At the end of the course

- Student will be able to understand Central processor organization.
- Student will be able to understand Instruction set and micro programming.
- Student will be able to understand Algorithm in arithmetic control unit.
- Student will be able to understand Input/output and memory organization

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Nano Electronics** Code: **C028532(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course Objectives

The objective of this course is to familiarize the students with the concepts of Nano electronics. The course intends to give students a broad understanding of:

a) Fundamentals, fabrication technologies and applications of nanoscale structures.
b) Device application of nanostructures in electronics.
c) Concepts of Carbon nanotubes and their applications.
d) Fundamentals of molecular electronics and their applications.

UNIT I -INTRODUCTION TO NANOTECHNOLOGY : Background to Nanotechnology: General concepts in Nanotechnology, Introduction to the principles of quantum mechanics, Quantization effects, Wave-particle duality, Classification of different areas of Nanotechnology, Top- down and Bottom -up approach.

Nano material preparation- Plasma Arcing, Chemical Vapor Deposition, Sol-Gels, Electro deposition, Ball Milling, Molecular Beam Epitaxy.

Characterization techniques: Electron Microscopy, Scanning Probe Microscopy, Raman Microscopy, UV-Vis absorption spectroscopy, Fourier Transform Infra- red Spectroscopy

UNIT II -FUNDAMENTALS OF NANOELECTRONICS : Electron transport in semiconductors and nanostructures: Time and length scales of the electrons in solids, Statistics of electrons in solids and low-dimensional structures - Electron transport in nanostructures.
Two-dimensional semiconductor nanostructures, Quantum wells, wires and dots, Strained layers, Effect of strained layers, MOSFET structures, Heterojunctions, Superlattices.
Fundamentals of logic devices: requirements, dynamic properties, threshold gates, classifications of logic devices: two terminal devices, field effect devices, coulomb blockade devices, spintronics.

UNIT III SILICON MOSFETs & QUANTUM TRANSPORT DEVICES : Silicon MOSFETS - Novel materials and alternate concepts: -Scaling rules, Silicon-dioxide based gate dielectrics, Metal gates, Junctions & contacts, Advanced MOSFET concepts. Quantum transport devices based on resonant tunneling: Electron tunneling – resonant tunneling diodes, Resonant tunneling devices;

Single electron devices for logic applications, applications of single electron devices to logic circuits.

UNIT IV-CARBON NANOTUBES : Fullerenes, types of nanotubes, Formation of nanotubes, Assemblies, Purification of carbon nanotubes, Electronic properties, Synthesis of carbon nanotubes.

Functionalization of Carbon Nanotubes: covalent functionalization of CNTs, non-covalent functionalization of CNTs, Carbon nanotube interconnects, Carbon nanotube FETs, Nanotube for memory applications, Prospects of all carbon nanotube nanoelectronics, Graphene transistors and circuits. Sensor applications of CNTs. Computer applications (Nano chip), Optical and telecommunication applications.

UNIT V-MOLECULAR ELECTRONICS

Electrodes & contacts, Functions, Molecular electronic devices, First test systems, Simulation and circuit design, Fabrication, Future applications: MEMS, NEMS, Robots, Random access memory – mass storage devices.

Electronic Circuits & Applications**:** Vertical Transistors: Fin-FET circuits and applications, Surround Gate FET,MODFETs.

Heterojunction bipolar transistor, Hybrid Nano/CMOS circuits and applications, Nanowire arrays, Quantum dot lasers, Quantum Well modulators, OLED'S.

Text Books

1. Nanoelectronic Circuit Design, N.K Jha, D Chen, Springer

2.Nanotechnology and Nanoelectronics, W.R.Fahrner, Springer

3**.** Nanotechnology in Microelectronics & Optoelectronics, J.M Martine Duart, R.J Martin Palma, F. Agullo Rueda, Elsevier

Reference Books

1. Nanoelectronics, K. Iniewski, McGraw-Hill

2. Rainer Waser (Ed.), Nanoelectronics and Information Technology: Advanced Electronic Materials and Novel Devices, Wiley-VCH, 2003.

3. T. Pradeep, NANO: The Essentials – Understanding Nanoscience and Nanotechnology, TMH, 2007

Course Outcomes

Upon the successful completion of the course, students will be able to:

- Discuss the types of nanotechnology, molecular technology and the preparation of nano materials.
- Explain the fundamentals of electron transport, semiconductor nanostructures and devices such as logic devices, field effect devices, and spintronics.
- Describe the concepts of silicon MOSFET and Quantum Transport Devices and single electron devices.
- Explain the functionalization as well as summarize the types, synthesis, interconnects and applications of carbon nano tubes.
- Explain the concepts, functions, fabrications and applications of molecular electronics.

Chhattisgarh Swami Vivekananda Technical University, Bhilai
Name of program: Bachelor of Technology
Branch: Electronics & Telecommunication
Semester: V

Subject: **Optoelectronic devices and circuits** Code: **C028533(028)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course Objectives

1. Explain key concepts in quantum and statistical mechanics relevant to physical, electrical and optoelectronic properties of materials and their applications to optoelectronic devices and photonic integrated circuits that emit, modulate, switch, and detect photons
2. Describe fundamental and applied aspects of optoelectronic device physics and its applications to the design and operation of laser diodes, light-emitting diodes, and photo detectors.
3. Describe techniques to improve the operation of optoelectronic devices and device characteristics that have to be optimized for new applications by employing their understanding of optoelectronic device physics

UNIT I Optical processes in semiconductors – electron hole recombination, absorption, Franz-Keldysh effect, Stark effect, quantum confined Stark effect, deep level transitions, Auger recombination

UNIT II Lasers – threshold condition for lasing, line broadening mechanisms, axial and transverse laser modes, heterojunction lasers, distributed feedback lasers, quantum well lasers, tunneling based lasers, modulation of lasers.

UNIT III Optical detection – PIN, APD, modulated barrier photodiode, Schottky barrier photodiode, wavelength selective detection, microcavity photodiodes.

UNIT IV Optoelectronic modulation - Franz-Keldysh and Stark effect modulators, quantum well electro-absorption modulators, electro-optic modulators, quadratic electro-optic effect quantum well modulators, optical switching and logic devices

UNIT V Optoelectronic ICs – hybrid and monolithic integration, materials and processing, integrated transmitters and receivers, guided wave devices

Name of Text / Reference Books:

1. Semiconductor Optoelectronic Devices, Pallab Bhattacharya, 2 nd Ed; Pearson Education, 2002
2. Photonics: Optical Electronics in modern communication, Amnon Yariv & Pochi Yeh, 6 th Ed; Oxford Univ. Press, 2006
3. Fundamentals of Photonics, B E Saleh and M C Teich, Wiley-Interscience; 1991

Course Outcomes

By the end of the course, students are expected to learn

- The skill of designing and setting up experiments to characterize LEDs, laser diodes, optical amplifiers, photodiodes, solar cells and electro-optics modulators.
- Understand the basic working mechanism of the devices,
- Have the practical knowledge and an understanding of the trade-offs when using these devices in their respective applications.

Chhattisgarh Swami Vivekananda Technical University, Bhilai

Name of program: Bachelor of Technology

Branch: Electronics & Telecommunication

Semester: V

Subject: **Advanced Data Structures and Algorithms** Code: **C022535(022)**
Total Theory Periods: 40 Class Tests: Two (Minimum)
Total Tutorial Periods: 10 Assignments: Two (Minimum)
ESE duration: Three Hours Maximum Marks: 100 Minimum Marks: 35

Course Objectives:

- Understand and apply linear data structures-List, Stack and Queue.
- Understand the graph algorithms.
- Learn different algorithms analysis techniques.
- Apply data structures and algorithms in real time applications
- Able to analyze the efficiency of algorithm.

UNIT I Linear Data Structures : Introduction - Abstract Data Types (ADT) – Stack – Queue – Circular Queue - Double Ended Queue - Applications of stack – Evaluating Arithmetic Expressions - Other Applications - Applications of Queue - Linked Lists - Singly Linked List - Circularly Linked List - Doubly Linked lists – Applications of linked list – Polynomial Manipulation.

UNIT II Non - linear Tree Structures Binary Tree – expression trees – Binary tree traversals – applications of trees – Huffman Algorithm - Binary search tree - Balanced Trees - AVL Tree - B-Tree - Splay Trees – Heap operations- -Binomial Heaps - Fibonacci Heaps- Hash set.

UNIT III Graphs: Representation of graph - Graph Traversals - Depth-first and breadth-first traversal - Applications of graphs - Topological sort – shortest-path algorithms - Dijkstra‟s algorithm – Bellman-Ford algorithm – Floyd's Algorithm - minimum spanning tree – Prim's and Kruskal's algorithms.

UNIT IV Algorithm and Analysis: Algorithm Analysis – Asymptotic Notations - Divide and Conquer – Merge Sort – Quick Sort - Binary Search - Greedy Algorithms – Knapsack Problem – Dynamic Programming – Optimal Binary Search Tree - Warshall‟s Algorithm for Finding Transitive Closure.

UNIT V Advanced Algorithm Design and Analysis: Backtracking – N-Queen's Problem - Branch and Bound – Assignment Problem - P & NP problems – NP-complete problems – Approximation algorithms for NP-hard problems – Traveling salesman problem-Amortized Analysis.

Text / Reference books:

1.Anany Levitin “Introduction to the Design and Analysis of Algorithms” Pearson Education, 2015
2. E. Horowitz, S. Sahni and Dinesh Mehta, “Fundamentals of Data structures in C++”, University Press, 2007

3. E. Horowitz, S. Sahni and S. Rajasekaran, “Computer Algorithms/C++”, Second Edition, University Press, 2007
4. Gilles Brassard, “Fundamentals of Algorithms”, Pearson Education 2015
5. Harsh Bhasin, “Algorithms Design and Analysis”, Oxford University Press 2015
6. John R. Hubbard, “Data Structures with Java”, Pearson Education, 2015
7. M. A. Weiss, “Data Structures and Algorithm Analysis in Java”, Pearson Education Asia, 2013
8. Peter Drake, “Data Structures and Algorithms in Java”, Pearson Education 2014
9. T. H. Cormen, C. E. Leiserson, R. L. Rivest, and C. Stein, "Introduction to algorithms", Thrid Edition, PHI Learning Private Ltd, 2012
10. Tanaenbaum A.S., Langram Y. Augestein M.J, “Data Structures using C” Pearson Education , 2004.
11. V. Aho, J. E. Hopcroft, and J. D. Ullman, “Data Structures and Algorithms”, Pearson Education, 1983

Course Outcomes:

1: Describe, explain and use abstract data types including stacks, queues and lists
2: Design and Implement Tree data structures and Sets
3: Able to understand and implement non linear data structures - graphs
4: Able to understand various algorithm design and implementation

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the Program: **B Tech** Semester: **V**
Subject: **Environmental Studies** Code: C000506(020)
Period per week (L-T-P): **(2-0-0) / Week** Non-Credit
Total Contact Hours: **40** No. of assignments to be submitted: **05**

PREREQUISITE: Knowledge of basic Chemistry, Physics and Mathematics.

COURSE OBJECTIVES:

1. Basic knowledge of environment, ecology, ecosystems, biodiversity and conservation.
2. Fundamentals of natural resources, control, uses and its impact on environment.
3. Human population, growth, growing needs and its impact on society and environment.
4. Types of environmental pollution, legislations, enactment and management.

COURSE DETAILS:

UNIT I: Introduction to environmental studies, ecology and ecosystems (06 hours)

Introduction to environment; Concept and structure of ecology and ecosystem, energy flow; Community ecology; Food chains and webs; Ecological succession; Characteristic features of forest, grassland, desert and aquatic ecosystem; Multidisciplinary nature of environmental studies, scope and importance; Concept of sustainability and sustainable development.

UNIT II: Biodiversity and conservation (06 hours)

Introduction to biological diversity and levels of genetic, species and ecosystem diversity; Biogeographic zones of India; Biodiversity patterns and global biodiversity hot spots; Threats to biodiversity, habitat loss, conflicts and biological invasions; In-situ and Ex-situ conservation of biodiversity: Ecosystem and biodiversity services.

UNIT III: Natural resources and environment (08 hours)

Concept of Renewable and non-renewable resources; Land resources, land use change, land degradation, soil erosion; Desertification; Deforestation: causes, consequences and remedial measures; Water: Use and over-exploitation of surface and ground water, floods, droughts, conflicts over water (international & inter-state); Energy resources: environmental impacts of energy generation, use of alternative and nonconventional energy sources, growing energy needs.

UNIT IV: Human communities, social issues and environment (08 hours)

Basic concept of human population, growth and communities; Impacts on environment, human health, welfare and human rights; Resettlement and rehabilitation; Environmental natural disaster: floods, earthquake, cyclones, tsunami and landslides; Manmade disaster; Environmental movements; Environmental ethics: role of gender and cultures in environmental conservation; Environmental education and public awareness; Human health risks and preventive measurements.

UNIT V: Environmental pollution, policies, legislations, assessment and practices (12 hours)

Environmental pollution: Causes, effects and controls of air, water, soil, noise and marine pollution; Concept of hazardous and non-hazardous wastes, biomedical and e-wastes; Solid waste management and control measures; Climate change, global warming, ozone layer depletion, acid rain and their societal impacts; Environment laws: Wildlife Protection Act, Forest Conservation Act, Water (Prevention and control of Pollution) Act, Air (Prevention & Control of Pollution) Act, Environment Protection Act, Biodiversity Act, International agreements negotiations, protocols and practices; EIA, EMP.

On completion of each unit, students have to submit one assignment from each unit.

COURSE OUTCOMES (CO):
On completion of the course, students will able to:

1. Interpret and demonstrate the concept of ecology and ecosystem for environmental sustainability.
2. Define and establish the diversified knowledge of biodiversity and its conservation.
3. Explain the uses of natural resources efficiently and its impact on environment.
4. Illustrate and solve the simple and complex social issues relating to human communities.
5. Exemplify and make useful solution to combat the environmental degradation with the aid of national and international legislations and protocols there under.
6. Demonstrate and elucidate the complicated issues and anthropological problems for societal development.

TEXT BOOKS:

1. De, A.K., (2006).*Environmental Chemistry*, 6th Edition, New Age International, New Delhi.
2. Bharucha, E. (2013). *Textbook of Environmental Studies for Undergraduate Courses*. Universities Press.
3. Asthana, D. K. (2006).*Text Book of Environmental Studies*. S. Chand Publishing.

REFERENCE BOOKS:

1. Odum, E. P., Odum, H. T., & Andrews, J. (1971).*Fundamentals of ecology*. Philadelphia: Saunders.
2. Basu, M., Xavier, S. (2016). Fundamentals of Environmental Studies, Cambridge University Press, India.
3. Sharma, P. D., & Sharma, P. D. (2005).*Ecology and Environment*. Rastogi Publications.

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