**Chhattisgarh Swami Vivekanand Technical University, Bhilai**

**Scheme of teaching & Examination**

**B.E. VI SEMESTER**

**ELECTRONICS AND INSTRUMENTATION**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Board of Studies</th>
<th>Subject Code</th>
<th>Subject Name</th>
<th>Periods Per Week</th>
<th>Scheme of Exam. (Theory/ Practical)</th>
<th>Total Marks</th>
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<td>Programmable Logic Controller</td>
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**L**: Lecture  
**T**: Tutorial  
**P**: Practical  

**ESE**: End Semester Examination  
**CT**: Class Test  
**TA**: Teachers’ Assessment

**Table - 1 (Professional Electives -1)**

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Board of Studies</th>
<th>Subject Code</th>
<th>Subject Name</th>
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<tbody>
<tr>
<td>1</td>
<td>Electronics and Instrumentation</td>
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<td>Data Structure using 'C++'</td>
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<td>Microelectronic Devices &amp; VLSI Technology</td>
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<td>3</td>
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<td>Telecommunication Switching &amp; Computer Network</td>
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<td>Telematics</td>
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**Note:**
1. 1/4th of total strength of students to minimum of twenty students is required to offer an elective in the college in a particular academic session.
2. Choice of elective course once made for an examination cannot be changed in future examinations.

**Name of the Programme: Bachelor of Engineering  :::::::  Duration of the programme: Four Years**
Chhattisgarh Swami Vivekanand Technical University, Bhilai

<table>
<thead>
<tr>
<th>Branch:</th>
<th>Electronics &amp; Instrumentation/Applied Electronics &amp; Instrumentation</th>
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<tbody>
<tr>
<td>Subject:</td>
<td>Process Dynamics &amp; Control</td>
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<td>80</td>
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<td>Minimum Marks in ESE:</td>
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**Course Objectives:**
- To develop and apply Mathematical & Engineering skills to identify, formulate, and solve industrial process problems.
- This subject seeks to close the gap between Instrumentation & Mechanical Engineering.
- This subject provides the knowledge of different types of controller & their application in plant such as oil & refinery.

**Course Outcomes:** The students will be able to:
- Know the importance of on-off, proportional, integral and derivative modes, composite control modes - PI, PD and PID control modes.
- Understand different tuning methods like continuous cycling method, Ziegler - Nichol's tuning.

**UNIT I**

**UNIT II**
**Basic Control Actions:** Characteristics of on-off, proportional, single -speed floating control, Integral and derivative modes, Composite control modes - PI, PD and PID control modes, Response of controllers for different types of test inputs, Typical control schemes for level, flow, pressure and temperature.

**UNIT III**
**Control Scheme & Controller Tunings:** Tuning of controllers by process reaction curve method, Ziegler - Nichol's tuning, Feed Forward control, Ratio control, Cascade control, Averaging control, Multivariable control, Split range control, Inferential control, Batch and continuous process.

**UNIT IV**
**Final Control Elements:** I/P & P/I Convertor, Electric, Pneumatic & Hydraulic actuator, valve positioner, Characteristics of control valve, globe, butterfly, diaphragm, ball valves, control valve sizing, Cavitation & flashing in control valves, valve accessories: Volume boosters, Pressure boosters.

**UNIT V**
**Applications:** Distillation column, Control of top and bottom product compositions, Reflux ratio, Control of chemical reactor, Control of heat exchangers, Steam boiler, Drum level control and combustion, Drying, Filtration, Humidification /Dehumidification.

**Text Books:**

**Reference Books:**
Chhattisgarh Swami Vivekanand Technical University, Bilai

Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation

Subject: Programmable Logic Controller

Duration of the programme: Four Years

Course Objectives:
- Helps Students to know about basic PLC.
- To know about various applications of PLC.
- To gain knowledge about basic component of PLC.
- To gain knowledge about programming procedure of PLC.

Course Outcomes: The students will be able to:
- Understand basic structure of PLC, overview of PLC systems- Input/Output modules.
- Know the MCR functions and various applications of different jump functions and Analog PLC operation.
- 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).

UNIT I Introduction of PLC: Definition and history- block diagram, Basic structure of PLC, Overview of PLC systems- Input/Output modules, Input/output analog devices, Input/output digital devices, - Power supplies –ISO slots, PLC advantage and disadvantages

UNIT II Basics programming of PLC: General PLC programming procedures, PLC scanning, PLC input Instructions, operational procedures, Digital logic gates, Boolean algebra PLC programming, PLC registers.

UNIT III PLC Intermediate Functions: PLC basic functions - timer functions- on delay timer, off delay timer, Counter functions- up counter, down counter, Arithmetic functions - PLC Addition and subtraction, multiplication, Division and square root function, PLC trigonometric and log functions, Number comparison functions.

UNIT IV PLC advanced Functions: The skip function and applications, MCR functions and applications, jump functions- jump with non return, jump with return. Analog PLC operation, Types of analog modules, PLC analog signal processing, BCD or multibit data processing, PLC-PID functions.

UNIT V Implementation of DCS: Evolution of DCS advantages of digital computer control, Communication in DCS, DCS system integration with PLC and computers, Data loggers: Data acquisition systems (DAS): alarms, computer control hierarchy levels. Direct Digital control (DDC), Supervisory digital control (SCADA)

Text Books:

Reference Books:
3. Hughes, T: “Programmable logic controllers”, ISA Press.

Name of the Programme: Bachelor of Engineering  :::::::  Duration of the programme: Four Years
Chhattisgarh Swami Vivekanand Technical University, Bhilai

**Branch:** Electronics & Instrumentation  
**Subject:** Bio Medical Instrumentation  
**Duration:** Four Years

<table>
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<tr>
<th>No.</th>
<th>Code:</th>
<th>Theory</th>
<th>Tutorial</th>
<th>Assignments</th>
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**Course Objectives:**
- To develop and apply mathematical & engineering skills to identify, formulate, and solve medical problems.
- This subject seeks to close the gap between Engineering & Medical field.
- This subject provides the knowledge of different types of Biomedical Instruments used in Hospitals & medical Field.

**Course Outcomes:** The students will be able to:
- Understand Basics of Medical Terminology and their application in different Medical Instruments.
- Know the Operational activity of Human Body & its behavioral analysis.
- Understand of various disease identification & their measurement system used in medical diagnosis & Treatment.
- Identify the problems encountered in measurement of biomedical signal.

**UNIT I**  
**Concept of Biomedical Electronics:** Biomedical Engineering, Biometrics, Brief Review of Human Anatomy & Physiology, Components of man instrument system, Sensors used in biomedicine, Physiological system of the Body, cells & their structure, Resting & Action Potential (Generation & Propagation), The heart & cardiovascular system, Basic structure of Heart, Electrocardiographic lead system, The Electrocardiogram, Electrocardiography.

**UNIT II**  
**Electrodes, Transducers and Recorders:** Electrode theory, Types of Electrodes, Chemical Electrodes, Biomedical signal conditioning Devices, Amplifiers, Biopotential recorders, Display devices and recorders: Potentiometer, galvanometer, Electrostatic UV recorder, magnetic tape recorder, Electroencephalography (EEG) Recording setup & Analysis, Electromyography, (EMG) Recording Setup, Introduction of Electoretinography (ERG) and Electroculogram (EOG).

**UNIT III**  

**UNIT IV**  
**Therapeutic Equipment & Biotelemetry:** Biotelemetry, Introduction of Biotelemetry system, Radio telemetry system, Problems in implant telemetry, Pace Makers, types of pacing modes, power sources in Pacemaker, types of Defibrillators, Methods of stimulation, Stimulator, types of stimulators.

**UNIT V**  

**Name of Text Books:**
2. “Biomedical Instrumentation” – Dr. A. Arumugam, Anuradha Agencies, Chennai.

**Name of Reference Books:**
1. “Electronics in Medicine and Biomedical Instrumentation” – Nandini K. Jog, PHI India
4. “Introduction to Biomedical Engineering”, Domach, Pearson Education

**Name of the Programme:** Bachelor of Engineering  
**Duration of the programme:** Four Years
**Course Objective**
- To provide knowledge about the Discrete Fourier Transform and the FFT Algorithms.
- To provide knowledge about the Applications of IIR & FIR filters.
- To provide knowledge about the Realization of digital filters.
- To make familiar the students about the Applications of DSP in various fields.

**Course Outcomes:** The students will be able to:
- Understand Basics knowledge and their application in different Digital Filters.
- Know the Applications of Digital Signal Processors.
- Understand of various Finite Impulse Response Filters.
- Identify the Discrete Fourier Transform and Fast Fourier Transform.

UNIT I  **DFT and FFT:** Introduction, Discrete Fourier Transform (DFT), Properties of DFT, Computation of DFT & IDFT, Relationship of the DFT to other transforms. Fast Fourier Transform (FFT), Radix-2 Decimation In Time (DIT) and Decimation In Frequency (DIF) FFT Algorithms, Inverse FFT Computation, Comparison between DIT and DIF Algorithms.


UNIT III  **Finite Impulse Response Filters:** Introduction, Magnitude and Phase Response of Digital Filters, Linear Phase FIR Filters, Frequency Response of Linear Phase FIR Filters, Design of FIR Filter using Window Techniques, Design of FIR Filter using Frequency Sampling Method, Comparison between IIR & FIR Filters.

UNIT IV  **Realization of Digital Filters:** Realization of IIR Filters- Direct Form-I, Direct Form-II, Cascade Form and Parallel Form Realizations. Lattice Structure and Lattice-Ladder Structure. Realization of FIR Filters- Direct Form, Cascade Form and Linear Phase Realizations. Lattice Structure and Polyphase Realization.


**Name of Text Books:**
1. “Digital Signal Processing” by Salivahanan, Vallavaraj, Gnanapriya, TMH
2. ”Digital Signal Processing” by P. Ramesh Babu, SCITECH

**Name of Reference Books:**
3. “Digital Signal Processing” by Proakis, Manolakis& Sharma, Pearson Education

**Name of the Programme: Bachelor of Engineering**  
**Duration of the programme: Four Years**
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Electronics & Telecommunication Engineering/Electronics & Instrumentation/Applied Electronics & Instrumentation

Subject: Microcontroller & Embedded System

Duration of the programme: Four Years

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.

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.

UNIT I Introduction to Microcontroller: A brief History of Microcontrollers, Harvard Vs Von-Neumann Architecture; RISC Vs CISC, Classification of MCS-51 family 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 IV Interfacing with 8051: Interfacing and programming of: ADC (0804, 0808/0809, 0848) & DAC (0808), stepper motor, 4x4 keypad matrix, Relays, LED and Seven segment display, LCD, Interfacing (only) of different types of Memory, Address decoding techniques.


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)
2. Embedded system, Frank Vahid.(Unit-IV)

Names of Reference Books:
2. 8 bit Microcontrollers & Embedded Systems Manual.
3. Programming and Customizing the 8051 Microcontroller, Predko; TMH

Name of the Programme: Bachelor of Engineering    :::::::    Duration of the programme: Four Years
List of Experiments: (At least ten experiments are to be performed by each student)

1. To study the input and output module.
2. To study run, uploading and downloading of plc programming.
3. To Study the interfacing of PLC with optical sensors.
4. To Study the interfacing of PLC with proximity sensors.
5. To design and simulate of simple logic gate programming.
6. To design and simulate of universal logic gate programming
7. Study of timer programming
8. Study of counter programming
9. To design and simulate of relay control by using PLC.
10. To Study the Speed Control of DC Motor by using PLC.
11. To Study the different types of Switches Control by using PLC.
12. Study of Analog Module for PLC
13. To design and simulate of Conveyor Control by PLC
14. To design and simulate of Water Level Control by PLC
15. To design and simulate of Elevator Control using PLC
16. To design and simulate of Traffic Light Control by PLC
17. To design and simulate of Temperature Control using PLC
18. To design and simulate of bottling plan.

List of Equipments/Machine Required:
Plc modules, power supply, different sensors and plc software.

**Name of the Programme:** Bachelor of Engineering

**Duration of the programme:** Four Years

**Chhattisgarh Swami Vivekanand Technical University, Bhilai**

- **Name of program**: Bachelor of Engineering
- **Branch**: Electronics & Instrumentation
- **Subject**: Microcontroller & Embedded Systems Laboratory
- **Total Lab Periods**: 36
- **Maximum Marks**: 40
- **Semester**: VI
- **Code**: 327662(27)
- **Batch Size**: 30
- **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 character 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 it into 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. Operands are 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 RAM variables. 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 2 kHz 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 Vivekanand Technical University, Bhilai

Name of the Programme: Bachelor of Engineering

Duration of the Programme: Four Years

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of the Programme: Bachelor of Engineering

Branch: Electronics & Instrumentation

Subject: Digital Signal Processing Laboratory

Semester: VI

Code: 327663(27)

Total Lab Periods: 36

Batch Size: 30

Minimum Marks: 20

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

List of Experiments to be performed:

1. To generate Analog Signals.
2. To sample a sinusoidal signal at Nyquist rate.
3. To convolve two given signals.
4. To correlate two given signals.
5. To design LPF using recursive structures.
6. To design HPF using recursive structure.
7. To design BPF using recursive structure.
8. To design BSF using recursive structure.
9. To design LPF using non-recursive structures.
10. To design HPF using non-recursive structure.
11. To design BPF using non-recursive structure.
12. To design BSF using non-recursive structure.
13. To generate discrete sequences.
14. To calculate DFT and IDFT of a given sequence.
15. To calculate FFT of a given sequence.
16. To design IIR Filter using Impulse Invariant Method.
17. To design IIR Filter using Bilinear Transformation.
18. To design FIR Filter using Frequency Sampling Method.

(Institutes may append more Programmes/Experiments based on the infrastructure available)

List of Equipments/Machine Required:

MATLAB with Tool boxes, DSP Processor Kit.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program: Bachelor of Engineering

Duration of the program: Four Years

Chhattisgarh Swami Vivekanand Technical University, Bhilai

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<th>Name of the Program: Bachelor of Engineering</th>
<th>Duration of the program: Four Years</th>
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<tbody>
<tr>
<td>Branch: Electronics &amp; Instrumentation</td>
<td>Semester: VI</td>
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<tr>
<td>Subject: Biomedical Instrumentation Laboratory</td>
<td>Code: 327664(27)</td>
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<tr>
<td>Total Lab Periods: 36</td>
<td>Batch Size: 30</td>
</tr>
<tr>
<td>Maximum Marks: 40</td>
<td>Minimum Marks: 20</td>
</tr>
</tbody>
</table>

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

1. Processing of simulated ECG signal
2. Processing of simulated EEG signal
3. Processing of simulated Heart sound
4. To measure pH value of given solution pH meter.
5. Find out concentration of (Na or K) by flame photo meter in the given sample.
6. To measure transmittance and absorption of a solution using Single beam spectrophotometer.
7. To study water analysis kit & measure pH, temperature, conductivity of a given solution.
8. To measure the dissolved O2 of a given solution.
10. Study of Respiration Rate Monitor system.
11. Study of Ultrasonic investigation with the eye dummy.
13. Study of Phonocardiograph System
14. Study of Doppler Sonography
15. To study and measure the blood glucose.

List of equipments:
Electronic Workbench, biomedical sensor, biomedical trainer kit.

Reference book:
Handbook of Biomedical Instrumentation by R.S. Khandpur, Tata McGraw Hill publisher

Biomedical Instrumentation & Measurement by L. Cromwell, F.J. Weibell and E.A. Pfeiffer, 2nd Ed., PHI
Objective:
The course is introduced to develop managerial skills tremendously and enrich the abilities to enable one to meet the challenges associated with different job levels. Managerial skills are essential for overall professional development of an individual apart from gaining technical knowledge in the subject.

Course Objectives
Upon completion of this course, the student shall be able
- To define and explain the concept of managerial, written and oral communication skill;
- To understand the leadership skill;
- To develop self-appraisal and understand distinction between leader and manager;
- To develop positive attitude and thinking; and
- To understand managerial functions and develop creativity.

UNIT I Managerial Communication Skills: Importance of Business Writing: writing business letters, memorandum, minutes, and reports- informal and formal, legal aspects of business communication, oral communication- presentation, conversation skills, negotiations, and listening skills, how to structure speech and presentation, body language.

UNIT II Managerial skills - Leadership: Characteristics of leader, how to develop leadership; ethics and values of leadership, leaders who make difference, conduct of meetings, small group communications and Brain Storming, Decision making, How to make right decision, Conflicts and cooperation, dissatisfaction: Making them productive.

UNIT III Proactive Manager: How to become the real you: The journey of self-discovery, the path of self-discovery, Assertiveness: A skill to develop, Hero or developer, Difference between manager and leader, Managerial skill check list, team development, How to teach and train, time management, Stress management, Self-assessment.

UNIT IV Attitudinal Change: Concept of attitude through example, benefits of right attitude, how to develop habit of positive thinking, what is fear? How to win it? How to win over failure? How to overcome criticism? How to become real you? How to Motivate? How to build up self confidence?

UNIT V Creativity: Creativity as a managerial skill, Trying to get a grip on creativity. Overview of Management Concepts: Function of Management: Planning, organizing, staffing, controlling.

Course Outcome
- The students will be able to develop formal and informal, negotiation, written and oral communication skill;
- The students will be able to develop manage groups, resolve conflicts and leadership skill and decision making qualities;
- The students will be able to develop self-appraisal, teaching, training and managing stress and time;
- The students will be able to develop positive thinking, motivating team members and winning race; and
- The students will be able to develop creativity and fundamental management functions.

Text Books:

Reference Books:
1. How to develop a pleasing personality by Atul John Rego, Better yourself books, Mumbai,2006
2. The powerful Personality by Dr. Ujjawal Patni & Dr. Pratap Deshmukh, Fusion Books, 2006
3. How to Success by Brian Adams, Better Yourself books, Mumbai, 1969
Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation  
Semester: VI
Subject: Data Structure using ‘C++’ (Professional Elective – I)  
Code: 327671(27)
Total Theory Periods: 40  
Total Tutorial Periods: NIL
No. of class Tests to be conducted: 2 (Minimum)  
No. of assignments to be submitted: 2 (Minimum)
ESE Duration: Three Hours  
Maximum Marks in ESE: 80  
Minimum Marks in ESE: 28

Course Objective:
- To provide knowledge about C++
- To make students aware about features of object oriented property.
- To provide knowledge about algorithms and their implementation.
- To provide knowledge about Dictionaries & Priority Queues.

Course Outcomes: The students will be able to:
- Understand Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions and friend functions.
- Know the Operator Overloading, Inheritance basics, base and derived classes, inheritance types, base class access control.
- Understand Realizing a Priority Queue using Heaps and External Sorting- Model for external sorting.

UNIT I  
C++ Class Overview- Class Definition, Objects, Class Members, Access Control, Class Scope, Constructors and destructors, parameter passing methods, Inline functions, static class members, this pointer, friend functions, dynamic memory allocation and deallocation (new and delete), features of object oriented property.

UNIT II  
Function Overloading, Operator Overloading, Generic Programming- Function, Inheritance basics, base and derived classes, inheritance types, base class access control, runtime polymorphism using virtual functions, abstract classes, exception handling.

UNIT III  
Algorithms, performance analysis- time complexity and space complexity. Review of basic data structures- The list ADT, Stack ADT, Queue ADT.

UNIT IV  
Dictionaries, linear list representation, skip list representation, operations insertion, deletion and searching, hash table representation, hash functions, collision resolution-separate chaining, open addressing-linear probing, quadratic probing, double hashing, rehashing, extendible hashing, comparison of hashing and skip lists.

UNIT V  
Priority Queues: Definition, ADT, Realizing a Priority Queue using Heaps, Definition, insertion, Deletion, External Sorting- Model for external sorting, Multiway merge, Polyphase merge.

Text Books:

Reference Books:

Name of the Programme: Bachelor of Engineering  :::::::  Duration of the programme: Four Years
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation
Subject: Microelectronic Devices & VLSI Technology (Professional Elective – I)

Duration of the programme: Four Years

Course Objective:
- To develop the understanding of NMOS / PMOS Transistor, MOS Device Design Equation, CMOS Inverter.
- To understand the static CMOS designing of combinational logic gates.
- To develop an understanding of designing sequential logic circuits using FPGA & CPLD architecture.
- To understand the combinational Logic Design.

Course Outcomes: The students will be able to:
- Understanding NMOS / PMOS Transistor, Threshold Voltage Equation, Body Effect, MOS Device Design Equation, Sub Threshold Region, Channel Length Modulation.
- Know the Static CMOS Design, NAND Gate, NOR Gate, Ratioed Logic Pass transistor Logic, Transmission Gate.
- Understand Static Latch and Register, S-R Latch Circuit, D-Latch and Triggered Flip Flop, FPGA and CPLD Architecture.

UNIT I  MOS Transistor Theory: n MOS / p MOS Transistor, Threshold Voltage Equation, Body Effect, MOS Device Design Equation, Sub Threshold Region, Channel Length Modulation. CMOS Inverter.
UNIT II Designing Combinational Logic Gates In CMOS-Static CMOS Design, NAND Gate, NOR Gate, Ratioed Logic Pass transistor Logic, Transmission Gate.
UNIT III Designing Sequential Logic Circuit: Introduction, Static Latch and Register, S-R Latch Circuit, D-Latch and Triggered Flip Flop, FPGA and CPLD Architecture, VLSI Design style with FPGA and CPLD.
UNIT IV Combinational Logic Design: Introduction to VHDL; Operators, Data Types, Libraries; Entity, Architecture; Data flow, Structural and Behavioral Programming, Generic, Signal, Generate, Process, Loops, Case, Variable, Procedure, Component and Configuration.
UNIT V Sequential Logic Design: Sequential Design by VHDL: Flip-Flop and Shift Registers; FSM: Moore and Mealy Machine, Counter, Sequence Detector, Basic Concepts of Operator Overloading, Blocks, and Delays.

Textbook:

References:
2. VHDL Primer by J. Bhaskar, PHI
5. VHDL Programming by Perry, TMH Pub

Name of the Programme: Bachelor of Engineering       Duration of the programme: Four Years
# Chhattisgarh Swami Vivekanand Technical University, Bhilai

### Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation
### Subject: Telecommunication Switching & Computer Network (Professional Elective – I)

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<th>Total Theory Periods:</th>
<th>40</th>
<th>Total Tutorial Periods:</th>
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<tr>
<td>No. of class Tests to be conducted:</td>
<td>2 (Minimum)</td>
<td>No. of assignments to be submitted:</td>
<td>2 (Minimum)</td>
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<tr>
<td>ESE Duration:</td>
<td>Three Hours</td>
<td>Maximum Marks in ESE:</td>
<td>80</td>
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<tr>
<td></td>
<td></td>
<td>Minimum Marks in ESE:</td>
<td>28</td>
</tr>
</tbody>
</table>

## Course Objective:
- Acquire fundamental knowledge of data communication, network criteria, transmission mode, switching system, multiplexing in computer networks.
- Acquire fundamental knowledge about services provided by data link layer and network layer and its protocol.
- Acquire fundamental knowledge about LAN and its types.
- Understand the concepts of OSI model, the major functions of each of the layers of the OSI and the Internet protocol and protocol architecture.

## Course Outcomes:
- Knowledge about the data transmission, standard & protocol and transmission mode.
- Knowledge about the OSI model & its various layer and TCP/IP protocol suite
- Knowledge about LAN and its architectures.
- Knowledge about telecommunication switching system.


## Text Books:
2. Vishwanathan Thigaarajan, “Telecommunication Switching Systems And Networks”, PHI.

## Reference Books
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation  Semester: VI
Subject: Microwave Instrumentation (Professional Elective – I)  Code: 327674(27)

Total Theory Periods: 40  Total Tutorial Periods: NIL
No. of class Tests to be conducted: 2 (Minimum)  No. of assignments to be submitted: 2 (Minimum)
ESE Duration: Three Hours  Maximum Marks in ESE: 80  Minimum Marks in ESE: 28

Course Objectives:
- Ability to know the basics of microwave in industries like Process industries and automation, Communication, Aerospace, Naval, Space and Military Services.
- Familiarity with the applications and control of microwave instruments.
- Capability to enter the microwave based field for higher studies and research and development.

Course Outcomes: The students will be able to:
- Understand Region and Band Designations, Advantages and Applications of Microwave.
- Know the Rectangular Cavity Resonator, Circular Cavity Resonator, Application of Cavity Resonators, Field Expressions for \( T_{M_{nm}} \) and \( E_{M_{nm}} \) modes in a Rectangular Cavity Resonator.

UNIT I  Introduction of Microwave: History, Region and Band Designations, Advantages and Applications of Microwave.
UNIT III  Cavity Resonators: Rectangular Cavity Resonator, Circular Cavity Resonator, Application of Cavity Resonators, Expressions for \( T_{M_{nm}} \) and \( E_{M_{nm}} \) modes in a Rectangular Cavity Resonator, Field Expression for \( T_{E_{nm}} \) and \( T_{M_{nm}} \) modes in a Circular Cavity Resonator.
UNIT IV  Microwave Tubes: Klystrons, Travelling Wave Tube (TWT), Magnetrons. (Only theory and application)
UNIT V  Solid State Microwave Devices: Varactor Diodes, PIN Diode, Tunnel Diode, Transferred Electron Devices: Gunn Diode, Avalanche Transit-Time Devices: Physical Structure, Principle of operation; Characteristics; Power output; Efficiency of IMPATT, TRAPATT and BARITT Diodes; Parametric amplifiers. (Only theory and application)
Satellite Navigation:

Name of Text Books:
1. “Microwave and Radar Engineering” by M. Kulkarni, Umesh Publications
2. “Radar Systems and Radio Aids to Navigation” by Dr. A. K. Sen and Dr. A. B. Bhattacharya, Khanna Publishers

Name of Reference Books:

Name of the Programme: Bachelor of Engineering  Duration of the programme: Four Years
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation
Subject: Semiconductor Components & Materials (Professional Elective – I)

Duration of the Programme: Four Years

Course Objective:
- To gain knowledge about properties of insulators in static field.
- To know about the basic properties of dielectric materials.
- To gain knowledge about magnetism.
- Familiarize Students with conductivity of metals.
- To gain knowledge about properties of insulators in alternating field.

Course Outcomes: The students will be able to:
- Understand Static dielectric constant, Polarization and dielectric constant, Atomic interpretation of the dielectric constant of monatomic gases.
- Understand Magnetic dipole moment of a current loop, Magnetization from a macroscopic viewpoint, orbital magnetic dipole moment and Angular momentum of two simple atomic models, Lenz's law and induced dipole moments.
- Know the diamagnetism, origin of permanent magnetic dipoles in matter, paramagnetic spin systems, and some properties of ferromagnetic materials, spontaneous magnetization and the Curie weiss law.

UNIT I  Dielectric Properties of Insulators in Static Fields: Static dielectric constant, Polarization and dielectric constant, Atomic interpretation of the dielectric constant of monatomic gases, Qualitative remarks on the dielectric constant of polyatomic molecules, Internal field in solids and liquids, Static dielectric constant of solids, Some properties of ferroelectrics materials, Spontaneous polarization, Piezolectricity.

UNIT II  Behavior of Dielectric in Alternating Fields: Frequency dependence of the electronic polarizability, Ionic polarization as a function of frequency, complex dielectric constant of non-dipolar solids, dipolar relaxation, dielectric losses.

UNIT III  Magnetic Properties of Materials: Summary of concepts pertaining to magnetic fields, Magnetic dipole moment of a current loop, Magnetization from a macroscopic viewpoint, orbital magnetic dipole moment and Angular momentum of two simple atomic models, Lenz's law and induced dipole moments.


UNIT V  Conductivity of Metals & Super Conductivity: Ohm's law and the relaxation time of electrons, Relaxation time, collision time, and mean free path, Electron scattering and the resistivity of metals, Heat developed in a current carrying conductor, Thermal conductivity of metals, Superconductivity, Type I & II super conductor, Schottkey diode.

Name of the Text Books:

Name of Reference Books:

Name of the Programme: Bachelor of Engineering  Duration of the programme: Four Years
Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch: Electronics & Instrumentation/Applied Electronics & Instrumentation
Subject: Telematics (Professional Elective – I)

Semester: VI
Code: 327676(27)

Duration of the programme: Four Years

Chhattisgarh Telecommunication and Computers, J. Mortin, PHI, India.

Name of the Programme: Bachelor of Engineering

Duration of the programme: Four Years

Course Objective:
- To provide knowledge about basic operation of Telephone Switching and Traffic Engineering.
- To gain knowledge about various switching elements and multistage switching systems.
- To gain knowledge about cellular & mobile system and their operation.
- To gain knowledge about the IP telephony, its structure and various features.

Course Outcomes: The students will be able to:
- Understand simple telephone communication, basics of switching system, dialling mechanism, digital switching, stored program control, centralized SPC, distributed SPC.
- Know the features of GSM, services provided by GSM, radio link aspect, GSM architecture, GSM channel structure, call flow sequences, code division multiple access.
- Understand Voice over internet protocol (VoIP), VoIP signaling protocol, principle of quality of service, quality of service requirements.

UNIT I Telephone Switching and Traffic Engineering: Evolution of telecommunication, simple telephone communication, basics of switching system, dialling mechanism, digital switching, stored program control, centralized SPC, distributed SPC, software architecture of SPC, enhanced services in SPC, traffic engineering

UNIT II Switching Networks: Single stage network, two stage networks, three stage network, four stage network, time division switching, time division space switching, time division time switching, time multiplexed space switching, time multiplexed time switching, combination switching, three stage combination switching.

UNIT III Mobile Cellular Telephony: Limitation of conventional mobile telephone system, communication frequency band, introduction of mobile cellular telephony, the cellular concept, cellular mobile telephone system, cellular system types, mobile environment, frequency reuse, co-channel interference, adjacent co-channel interference, handoff mechanism, frequency management, channel assignment, dropped call, cell splitting, mobile radio propagation.

UNIT IV Digital Cellular System: Global system for mobile communication, features of GSM, services provided by GSM, radio link aspect, GSM architecture, GSM channel structure, call flow sequences, code division multiple access.

UNIT V IP Telephony: Voice over internet protocol (VoIP), VoIP signalling protocol, principle of quality of service, quality of service requirements, integrated services, RSVP (Resources reservation protocol), differentiated services.

Text Book:

Reference Books: