Chhattisgarh Swami Vivekanand Technical University, Bhilai

Scheme of Teaching & Examination

B.E. VI SEMESTER

APPLIED ELECTRONICS AND INSTRUMENTATION

S. No.	Board of Studies	Subject Code	Subject Name	Periods Per Week			Scheme of Exam. (Theory/ Practical)			Total Marks	Credit L+(T+P)/2
				L	T	P	ESE	CT	TA		
1	Electronics and Instrumentation	**312651(27)**	Process Dynamics & Control	3	1	-	80	20	20	120	4
2	Electronics and Instrumentation	**312652(27)**	Programmable Logic Controller	3	1	-	80	20	20	120	4
3	Applied Electronics and Instrumentation	**312653(12)**	Virtual Instrumentation	3	1	-	80	20	20	120	4
4	Electronics and Instrumentation	**312654(27)**	Digital Signal Processing	3	1	-	80	20	20	120	4
5	Electronics and Telecomm.	**312655(28)**	Microcontroller & Embedded Systems	3	1	-	80	20	20	120	4
6	*Refer Table - 1*		Professional Elective -1	3	-	-	80	20	20	120	3
7	Applied Electronics and Instrumentation	**312661(12)**	Programmable Logic Controller Laboratory	-	-	2	40	-	20	60	1
8	Applied Electronics and Instrumentation	**312662(12)**	Microcontroller & Embedded Systems Laboratory	-	-	4	40	-	20	60	2
9	Applied Electronics and Instrumentation	**312663(12)**	Digital Signal Processing Laboratory	-	-	4	40	-	20	60	2
10	Applied Electronics and Instrumentation	**312664(12)**	Electronics Simulation Laboratory	-	-	4	40	-	20	60	2
11	Management	**300665(76)**	Managerial Skills	-	-	2	-	-	40	40	1
			Library	-		1	-	-			-
			Total	**18**	**5**	**17**	**640**	**120**	**240**	**1000**	**31**

L: Lecture **T:** Tutorial **P:** Practical
ESE: End Semester Examination **CT:** Class Test **TA:** Teachers' Assessment

Note: Industrial Training of eight weeks is mandatory for B.E. students. It is to be completed in two equal parts. The first part must have been completed in summer after IV semester The second part to be completed during summer after VI semester after which students have to submit a training report which will be evaluated by college teachers during B.E. VII semester

Table - 1 (Professional Electives – I)

S. No.	Board of Studies	Subject Code	Subject Name
1	Electronics and Instrumentation	**312671(27)**	Data Structure using 'C++'
2	Electronics and Instrumentation	**312672(27)**	Microelectronic Devices & VLSI Technology
3	Electronics and Instrumentation	**312673(27)**	Telecommunication Switching & Computer Network
4	Electronics and Instrumentation	**312674(27)**	Microwave Instrumentation
5	Electronics and Instrumentation	**312675(27)**	Semiconductor Components & Materials
6	Electronics and Instrumentation	**312676(27)**	Telematics

Note:

1. 1/4thof 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.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Instrumentation/Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Process Dynamics & Control**	Code:	**312651(27)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
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:

- 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:

- Understand process variables, degrees of freedom, and Self regulation, first & second order Process System.
- 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 **Process Dynamics:** Elements of process control, process variables, degrees of freedom, Characteristics of liquid system, gas system, Mathematical model of thermal, liquid & gas process, Self regulation, First & second order Process System, Introduction of Electronic controllers and hydraulic controllers, Servo mechanism, Process and Instrumentation Diagrams.

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:

1. Curtis Johnson, D., “Process Control Instrumentation Technology”, Prentice Hall Of India,1996.
2. Eckman, D.P., “Automatic Process Control”, Wiley Eastern,1985.

Reference Books:

1. Peter Harriot: “Process Control” , Tata McGraw Hill publisher.
2. Patranabis, D: “Principles of Process Control”, Tata McGraw Hill 1981.
3. Pollard A.: “Process Control, Heinemann educational books”, London,1971
4. Coughanoner and Koppel: “Process Systems Analysis and Control” Tata McGraw Hill 1991.
5. K. Krishnaswamy: ‘’Process Control” New Age Publishers.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Instrumentation/Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Programmable Logic Controller**	Code:	**312652(27)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
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:

- 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:

1. John Webb, W, Ronald Reis, A: “Programmable logic controllers principles and applications”, 3/e, Prentice Hall Inc.
2. Krishna Kant: “Computer Based Industrial Control”, Prentice Hall India.

Reference Books:

1. Lukcas. M.P: “Distributed control systems”, Van Nostrand Reinhold Co.
2. Moore.: “Digital control devices” , ISA Press.
3. Hughes, T: “Programmable logic controllers”, ISA Press.
4. Mckloni, D.T.: “Real time control networks” ISA Press.
5. Deshpande, P.B, and Ash, R.H: “Elements of process control applications”, ISA Press.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Virtual Instrumentation**	Code:	**312653(12)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
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:

- To develop and apply mathematical& engineering skills to identify, formulate, and solve Virtual Simulation Programming.
- This subject seeks to close the gap between Engineering &Industrial field.
- This subject provides the knowledge of different types of Virtual Programming Technique used in Industries & Production Companies.

Course Outcomes: The students will be able to:

- Understand Basics of Lab VIEW Programming and their application in different Industrial Instruments.
- Know the Performance of Virtual Programming.
- Understand an identification& their measurement system used in Industrial Sensors.
- Identify the problems encountered in measurement and control of Programming.

UNIT I **Review of Virtual Instrumentation:** Historical perspective, advantages, block diagram and architecture of a virtual instrument, data-flow techniques, graphical programming in data flow, comparison with Conventional programming.

UNIT II **VI Programming Techniques:** VIS and sub-VIS, loops and charts, arrays, clusters and graphs, case and sequence structures,

UNIT III **Data Acquisition Basics:** formula nodes, local and global variables, string and file I/O, counters & timers, software and hardware installation

UNIT IV **Use of Analysis Tools:** Fourier transforms, power spectrum, correlation methods, windowing & filtering. VI applications in various fields.

UNIT V **Common Instrument Interfaces:** Current loop, RS 232C/ RS485, GPIB, System buses, interface buses: USB, PCMCIA, VXI, SCXI, PXI, etc., networking basics for office & Industrial applications, VISA and IVI, image acquisition and processing. Motion control.

Text Books:

1. Gary Johnson, Labview Graphical Programming, Second edition, McGraw Hill.
2. Lisa K. wells & Jeffrey Travis, Labview for everyone, Prentice Hall.

Reference Books:

1. Sokoloff, Basic concepts of Labview 4, Prentice Hall.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Digital Signal Processing**	Code:	**312654(27)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**10**
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 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 II **Infinite Impulse Response Filters:** Introduction, IIR Filter Design by Approximation of Derivatives, IIR Filter Design by Impulse Invariant Method, IIR Filter Design by Bilinear Transformation, Butter worth Filter Design, Chebyshev Filter Design, Inverse Chebyshev Filters, Frequency Transformation.

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.

UNIT V **Applications of DSP and Digital Signal Processors:** Introduction, Applications of DSP in Speech Processing, Applications of DSP in Image Processing, Applications of DSP to Radar, DSP Based Measurement System. Overview of Digital Signal Processors, Selecting Digital Signal Processors, Applications of PDSPs.

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:

1. "Discrete Time Signal Processing" by Oppenheim & Schafer, Pearson - PHI
2. "Digital Signal Processing" by J. Johnson, Pearson – PHI
3. "Digital Signal Processing" by Proakis, Manolakis& Sharma, Pearson Education
4. "Digital Signal Processing" by Hussain, Umesh Publications

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering/Electronics & Instrumentation/Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Microcontroller & Embedded System**	Code:	**312655(28)**
Total Theory Periods:	**40**	Total Tutorial Periods:	**12**
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:

- 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-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, Data Programming, RS232 standard, RS422 Standard, 1488 and 1489 standard, GPIB, Max 232/233 Driver.

UNIT IV **Interfacing with 8051:** Interfacing and programming of: ADC (0804,0808/0809,0848) & DAC (0808), stepper motor , 4x4 keyboard matrix, Relays, LED and Seven segment display, 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, Embedded design challenges and development issues.

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:

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.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Programmable Logic Controller Laboratory**	Code:	**312661 (12)**
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 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.

Recommended Books: John Webb, W, Ronald Reis, A.,: " Programmable logic controllers principles and applications", 3/e, Prentice Hall Inc.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Microcontroller & Embedded Systems Laboratory**	Code:	**312662 (12)**
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 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 Micro controller.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Digital Signal Processing Laboratory**	Code:	**312663 (12)**
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)*

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.

Recommended Book: Digital Signal Processing by Salivahanan, Vallavaraj, Gnanapriya, Tata McGraw Hillpublisher

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Electronic Simulation Laboratory**	Code:	**312664 (12)**
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, implement and Simulate Fixed bias and self bias transistorized circuit for determining the bandwidth
2. To Design, implement and Simulate Fixed bias and self bias for studying the low frequency and high frequency effect.
3. To Design, implement and Simulate Miller integrator for determining the nonlinearities.
4. To Design, implement and simulate current Sweep generator for determining the nonlinearities.
5. To Design, implement and Simulate Inverting and non inverting amplifier for determining the bandwidth
6. To Design, implement and Simulate Integrator & differentiator for studying output responses for different inputs.
7. To Design, implement and Simulate zero crossing detector & comparator for studying output responses for different inputs.
8. To Design, implement and Simulate Series Voltage regulator.
9. To Design, implement and Simulate 1st & 2nd order LPF for determining the bandwidth and studying output responses for different inputs.
10. To Design, implement and Simulate 1st & 2nd order HPF for determining the bandwidth
11. To Design, implement and Simulate Half ware & Full ware rectifier way op-Amp for determining the bandwidth.
12. To Design, implement and Simulate Series and Shunt Clipper for studying output responses
13. To Design, implement and Simulate Clamping circuit for studying output responses for different inputs
14. To Design, implement and Simulate Clamping Circuit with op-Amp for studying output responses for different inputs.
15. To Design, implement and Simulate Instrumentation Amplifier using three op-Amp for determining the bandwidth
16. To Design, implement and Simulate Monostable&Astable using 555 timer
17. To Design, implement and Simulate R -2R ladder type Digital to analog converter
18. To Design, implement and Simulate Flash type Analog to digital

List of Equipments/Machine Required:
Lab VIEW, Desktop PCs, Simulation Software for Analog Circuits like MULTISIM, PSPICE etc.

Recommended Books:
1. Experiments and SPICE Simulations in Analog Electronics Laboratory, Maheswari&Anand, PHI
2. Manuals of MUSLTISIM
3. Manuals of PSPICE

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Name of Program:	**Bachelor of Engineering**		
Branch:	**Common to All Branches**	Semester:	**VI**
Subject:	**Managerial Skills**	Code:	**300665 (76)**
No. of Lectures:	**2/Week**	Tutorial Period:	**NIL**
Total Marks in ESE:	**NIL**	Marks in TA:	**40**
Minimum number of Class Tests to be conducted:	**Two**		

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 develop positive thinking, motivating team members and winning race; and
- The students will be able to develop creativity and fundamental management functions.

Text Books:

1. Basic Managerial Skills for all by E.H. Mc Grawth, Prentice Hall India Pvt Ltd,2006
2. Basic Employability Skills by P. B. Deshmukh, BSP Books Pvt. Ltd., Hyderabad, 2014

Reference Books:

1. How to develop a pleasing personality by Atul John Rego, Better yourself bools, 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

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering /Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Data Structure using 'C++' (Professional Elective – I)**	Code:	**312671(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:

1. Data structures and Algorithms in C++, Michael T. Goodrich, R. Tamassia and .Mount, Wiley student edition, John Wiley and Sons.
2. Data structures, Algorithms and Applications in C++, S. Sahni, University Press (India) Pvt. Ltd, 2nd edition, Universities Press Orient Longman Pvt. Ltd.

Reference Books:

1. "Data structures and Algorithm Analysis in C++", Mark Allen Weiss, Pearson Education. Ltd., Second Edition.
2. "Data structures and algorithms in C++", 3rd Edition, Adam Drozdek, Thomson
3. "Data structures using C and C++", Langsam, Augenstein and Tanenbaum, PHI.
4. "Problem solving with C++", The OOP, Fourth edition, W. Savitch, Pearson education.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering /Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Microelectronic Devices & VLSI Technology (Professional Elective – I)**	Code:	**312672(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 develop the understanding of n MOS / p MOS 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:

- Understandn MOS / p MOS 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, Delays.

Textbook:

1. Rabey, "Digital Integrated Circuits Design", Pearson Education, Second Edition, 2003
2. Neil Weste and Harris, Banerjee, "Principles of CMOS VLSI Design: A System Perspective," 2nd edition, Pearson Education (Asia) Pte. Ltd., 2000.
3. Fundamentals of Digital Logic with VHDL Design, Brown Tata McGraw Hill publisher

References:

1. Douglas A Pucknell & Kamran Eshraghian, "Basic VLSI Design" PHI 3rd Edition (original Edition – 1994),2005
2. VHDL Primer by J. Bhaskar, PHI
3. "Principles of CMOS VLSI Design " Neil Weste and Eshraghian (Second Edition) Pearson Education Asia(Addison – Wesley Publication Company
4. Modern VLSI Design - System-on-chip Design, Wolf, PHI pub.
5. VHDL Programming by Perry, TMH Pub
6. Verilog HDL by Palntikar, Pearson Education Pub.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering /Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Telecommunication Switching & Computer Network (Professional Elective – I)**	Code:	**312673(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:

- 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.

UNIT I **Introduction:** Perspective of Network, Protocols and Standards, Switching Paradigm: Circuit Switched, Message Switched and Packet Switched, Asynchronous and Synchronous Transmission. Line Configuration, Network Topologies, Link Configuration, Transmission Modes, Categories of Networks, Multiplexing: Review of SDM, FDM, TDM AND WDM.

UNIT II **Physical & Data Link Layer:**V.24/EIA 232, Standard DTE-DCE Interface, Null Modem, Modem Standards, Physical Media, Data Link Layer: Flow Control, Slop & Wait, Sliding Window, Error Control: Basics of Cyclic Redundancy Check (CRC), ARQ, Stop & Wait, ARQ, Sliding Window ARQ, HDLC, Brief Details of Other Data Link Control Protocols.

UNIT III **Local Area Network:** IEEE 802.1, LLC, MAC, PDU; Ethernet: Access Method: CSMA/CD, Addressing, Electrical Specification, Frame Format, Implementation, Switched Ethernet, Fast Ethernet, Gigabit Ethernet; Token Bus; Token Ring: Access Methods: Token Passing, Addressing, Electrical Specification, Frame Format, Implementation; FDDI: Access Methods: Token Passing, Addressing, Electrical Specification, Frame Format, Implementation: Physical Medium Dependent (PMD) Layer, Wireless LAN-IEEE 802.11, Comparison.

UNIT IV **Telecom Switching Networks:** Evolution of Telecommunication, Basics of Switching Systems, Basics of Strowger Switching System, Design of Switching System, Combinational Switching: Two Stage, Three Stage & N-Stage Combinational Switching, Network Traffic Load & Parameter, Grade Of Service, Blocking Probability, Subscriber Loop System, Switching Hierarchies &Routing, Numbering Plan.

UNIT V **Other OSI Layers:** Review of OSI: Standardization Within OSI Framework, The OSI Layers: Network Layer, Transport Layer, Session Layer, Presentation Layer, Application Layer; TCP/IP Protocol Suite: The TCP/IP Approach; Principles of Internetworking: Architectural Approaches, Connection Mode Operation; Internet Protocol: IP Addresses, Transport Services: Type of Service, Protocol Mechanism; TCP: TCP Services, TCP Header Format.

Text Books:

1. Forouzan B.A., “Data Communication And Computer Networking”, Tata Mcgraw Hill, 2nd Edition.
2. Vishwanathan Thiagarajan, “Telecommunication Switching Systems And Networks”, PHI.

Reference Books

3. Stalling William. “Data and Computer Communications”, PHI.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering /Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Microwave Instrumentation (Professional Elective – I)**	Code:	**312674(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 $TM_{mnp}$and TE_{mnp}modes in a Rectangular Cavity Resonator.
- Know the Radio Direction Finding System, Direction Finding using Loop Antenna, Direction Finding using Adcock Antenna, Long Range Navigational Aid (LORAN).

UNIT I **Introduction of Microwave:** History, Region and Band Designations, Advantages and Applicatio Microwave.
Review of Electromagnetic: Maxwell's Equations, Ampere's Law, Faraday's Law, Gauss's Law, Equations, TEM/TE/TM wave definitions.

UNIT II **Cavity Resonators:** Rectangular Cavity Resonator, Circular Cavity Resonator, Application of Cavity Reson Field Expressions for TM_{mnp} and TE_{mnp} modes in a Rectangular Cavity Resonator, Field Expression for TE_{n} TM_{nmp} modes in a Circular Cavity Resonator
Microwave Tubes: Klystrons, Travelling Wave Tube (TWT), Magnetrons. (Only theory and application)

UNIT III **Solid State Microwave Devices**: Varactor Diodes, PIN Diode, Tunnel Diode, Transferred Electron De Gunn Effect Diode, Avalanche Transit- Time Devices: Physical Structure, Principle of operation; Character Power output and Efficiency of IMPATT, TRAPATT and BARITT Diodes; Parametric amplifiers. (Only t and application)

UNIT IV **Radar:** Introduction, Block diagram, Classification, Free space Radar Range Equation, Factors Affecting I of Radar, Pulsed Radar System, Radar Receiver – general principles/Salient Features, Modulators, Displays, Target Detection, Scanning and Tracking with Radars, Doppler Effect, CW Doppler Radar, M Target Indicator (MTI) Radar, Frequency Modulated CW Radar.

UNIT V **Radio Navigational Aids:** Radio Direction Finding System, Direction Finding using Loop Antenna, Dir Finding using Adcock Antenna, Long Range Navigational Aid (LORAN)
Satellite Navigation:
Doppler Navigation, Principles of Operation of GPS, GPS Segments, Format of GPS Navigation Me Sources of Errors in GPS, DGPS, Applications of GPS and DGPS, GPS Receivers, GPS for VTMS.

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:

1. "Microwave Devices and Circuits" by Samuel Y. Liao, 3rd Ed., Pearson Education
2. "Microwave Engineering" by Annapurna Das and Sisir K. Das, Tata McGraw Hill publisher
3. "Introduction to Radar Systems" by Merrill I. Skolnik, 3rd Ed., Tata McGraw Hill publisher

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering /Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Semiconductor Components & Materials (Professional Elective – I)**	Code:	**312675(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 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, 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, Piezoelectricity.

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 IV **Atomic Interpretation of Magnetic Properties of Materials:** Classification of magnetic materials, diamagnetism, origin of permanent magnetic dipoles in matter, paramagnetic spin systems, some properties of ferromagnetic materials, spontaneous magnetization and the Curie weiss law, Ferromagnetic domains and coercive force, Antiferromagnetic materials, Ferrimagnetic materials.

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:

1. A.J. Dekker, "Electical engineering Materials", Prentice Hall of India Reprint 2005

Name of Reference Books:

1. G.K. Mithal, "Electrical Engineering Materials", Khanna Publication 2nd Edition.
2. Robert M. Rose, "Structure and Properties of Materials", Willley Eastern Vol. IV
3. S.O. Pillai, "Solid State Physics", New Age International
4. Kakni, "Material Science", Tata McGraw Hill publisher

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electronics & Telecommunication Engineering /Electronics & Instrumentation /Applied Electronics & Instrumentation**	Semester:	**VI**
Subject:	**Telematics (Professional Elective – I)**	Code:	**312676(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 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, dialing 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, dialing 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 signaling protocol, principle of quality of service, quality of service requirements, integrated services, RSVP (Resources reservation protocol), differentiated services.

Text Book:

1. "Telematics", V.S. Bagad, Technical Publications, Pune.
2. "Electronic Communication", D. Roody and J. Coolen, PHI, India.

Reference Books:

1. "Principles of Communication Systems", H. Taub and D.L. Schilling, Mc-Gaw Hills.
2. "Telecommunication & computers", J. Martin, PHI India.