Chhattisgarh Swami Vivekanand Technical University, Bhilai (C.G.)

SCHEME OF TEACHING AND EXAMINATION

B.E. VI SEMESTER ELECTRICAL AND ELECTRONICS ENGINEERING

Sr. No.	Board of Study	Subject Code	Subject	Periods per week			Scheme of Exam			Total Marks	Credit L+ (T+P) / 2
							Theory / Practical				
				L	T	P	ESE	CT	TA		
1	Electrical & Electronics Engg.	**325651(25)**	Electrical Power System -II	3	1	-	80	20	20	120	4
2	Electrical & Electronics Engg.	**325652(25)**	Modern Instrumentation Techniques	4	0	-	80	20	20	120	4
3	Electrical & Electronics Engg.	**325653(25)**	Advanced Microprocessors and Peripherals	3	1	-	80	20	20	120	4
4	Electrical & Electronics Engg.	**325654(25)**	Power Electronics Devices and Circuits	3	1	-	80	20	20	120	4
5	Electrical & Electronics Engg.	**325655(25)**	Digital Signal Processing	3	1	-	80	20	20	120	4
6	*Refer Table -1*		Professional Elective -1	4	0	-	80	20	20	120	4
7	Electrical & Electronics Engg.	**325661(25)**	Digital Signal Processing Lab	-	-	3	40	-	20	60	2
8	Electrical & Electronics Engg.	**325662(25)**	Power System Simulation Lab	-	-	3	40	-	20	60	2
9	Electrical & Electronics Engg.	**325663(25)**	Power Electronics Devices and Circuits Lab	-	-	3	40	-	20	60	2
10	Electrical & Electronics Engg.	**325664(25)**	Advanced Microprocessors and Peripherals Lab	-	-	3	40	-	20	60	2
11	Management	**300665(76)**	Managerial Skills	-	-	2	-	-	40	40	1
12	Electrical & Electronics Engg.		Library	-	-	2	-	-	-	--	1
			Total	**20**	**4**	**16**	**640**	**120**	**240**	**1000**	**34**

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 Elective – 1

S. No.	Board of Study	Subject Code	Subject
1	Electrical & Electronics Engg.	**325671(25)**	Medical Electronics
2	Electrical & Electronics Engg.	**325672(25)**	Computer Organization and Architecture
3	Electrical & Electronics Engg.	**325673(25)**	Testing & Commissioning of Electrical Equipments
4	Electrical & Electronics Engg.	**325674(25)**	Simulation &Programming
5	Electrical & Electronics Engg.	**325675(25)**	Distributed Generation

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

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

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Electrical Power System-II**	Code:	**325651(25)**
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**

Objective:
This course is an extension of Electrical Power systems course. It deals with basic theory of transmission line modelling and their performance analysis. A detailed study of Power System stability, Load flow studies and economic power dispatch is part of the curriculum for students.

Outcomes:
1. Student should be able to make a one line representation of Power System.
2. Student should be able to evaluate fault currents for different faults at different locations in Power System.
3. Students should be able to identify cases of stable and unstable Power Systems.

UNIT I **Representation of Power System:** Single line diagram, impedance diagram, reactance diagram, equivalent impedance of three phase transformer, per unit quantities, P.U. impedance of three phase transformer, positive sequence impedance diagram in per unit system, Expression for three phase power in p.u.

UNIT II **Symmetrical Components:** Expression for positive, negative & zero sequence components, existence of sequence components of current & voltages for three phase circuit, sequence impedance of alternator & transmission line, Sequence network of unloaded generator, zero sequence network of three phase transformers, phase shift in star-delta transformer.

UNIT III **Fault Calculations:** Single line to ground fault, Line to line fault, Double line to ground fault on unloaded generator, faults through impedance, open conductor faults, unsymmetrical fault on power system, Three phase short circuit on synchronous machine, Three phase short circuit on power system, Calculation of different current ratings and interrupting capacity of circuit breaker.

UNIT IV
a) **Economic operation of power systems:** Input output curves , criteria for economical distribution of power between generating units in a plant, Expression for transmission line loss in terms of loss formula coefficients, criteria for economical distribution of power between generating plants
b) **Load Flow Studies:** Bus admittance matrix, formation of load flow equation, Gauss Siedel method, Newton Raphson method.

UNIT V **Power System Stability:** The stability problem, steady-state stability, transient stability, Swing equation, Equal area criterion of stability, application of equal area criterion, critical clearing angle.

Text Books:

1. Elements of power system analysis By W.D. Stevenson (4th Ed. Mc Graw Hill)
2. Power System Engg. By I.J. Nagrath & Kothari (Tata McGraw Hill)

Reference Books:

1. Power System Analysis and Design by B.R. Gupta (3rd Ed S. Chand)
2. Power System Engg. BY A. Chakrabarti, M.L. Soni,P.V.Gupta, V.S.Bhatnager(6th Ed Dhanpat Rai & Co.)
3. Electrical Power System by Ashfaq Hussain (4th Ed. CBS Pub. & Dist.)

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Modern Instrumentation Techniques**	Code:	**325652(25)**
Total Theory Periods:	**48**	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**

Objectives of the course

1. To understand the concept of Current transformer and Potential transformer.
2. To provide students the fundamental knowledge about the error presents in instruments.
3. To provide students with the fundamental knowledge of different types of Transducer and their application.
4. To provide students with the fundamental knowledge about the PLC and their programming.

Outcomes of the course

1. Student can understand the use of CT and PT as a protective and measuring device.
2. Student would be able to select proper Transducer for measurement of various Electrical quantities.
3. Student would be able to find error and calibrate the instruments.
4. Student can write programs for different processes using PLC.

UNIT I **Errors in Measuring Instruments:** Errors in measurement, general and statistical analysis of errors, Instrument transformers, errors of CTs and PTs, methods of reduction of errors of instrument transformers, Testing of CTs (Absolute and Silabee's methods), Testing of PTs: Absolute and method using wattmeter.

UNIT II **Passive and Active Electrical Transducers:** Resistive, capacitive, inductive, piezoelectric, photovoltaic, Hall effect transducers, selection of transducers, transducers characteristics, semiconductor photo-diode, photo transistor, frequency generating transducers, pressure inductive transducers, LVDT, differential output transducer, thermistor, strain gauge, measurement of angular and linear velocity using electrical transducers, reluctance pulse pick-ups, AC tachogenerators.

UNIT III **Data Acquisition System and Recorders:** Introduction of DAS, Objective of DAS, Signal conditioning of inputs, single and multi-channel DAS, Computer based DAS, Sample and hold, Multiplexing, D/A, A/D conversion general description of Data loggers, Digital transducers, optical encoders, resistive digitial encoders, shaft encoders.

Recorders: Introduction, Strip chart recorders, General description of XY recorders, galvanometer type recorders, potentiometric recorders.

UNIT IV **PLC:** Introduction, PLC and Operations, Basic ladder diagram, General PLC Programming Procedure, Devices to which PLC Input and Output Modules are connected.

UNIT V **Basic PLC Programming and Functions:** Programming On-Off inputs to produce On-Off outputs, Relation of Digital Gate Logic to Contact / Coil Logic, Creating Ladder diagrams from process control descriptions.

Basic PLC Functions, Register Basics, PLC Time Functions, PLC Counter Functions.

Text Books:

1. Electrical and Electronics Measurements and Instrumentation: . Purkait, B Biswas, S. Das and C. Koley, McGraw hill
2. Electronic Measurements and Instrumentation: K. Lal Kishore, Pearson.
3. Programmable Logic Controllers, John W.Webb, Ronald A. Reis, Prentice Hall .

Reference Books:

1. Electronic Instrumentation by H. S. Kalsi, McGraw Hill
2. Instrumentation Measurement and Analysis: Nakra and Chaudhry, McGraw Hill.
3. Electronic Instruments and Instrumentation Technology" by M.M.S. Anand, PHI Publications.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Advanced Microprocessors and Peripherals**	Code:	**325653(25)**
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 Objective:

1. To get the basic knowledge of microprocessor architecture.
2. To get the knowledge of the instruction set for 8086 microprocessors and write assembly programs that meet requested specifications
3. To get the basic knowledge of the memory and I/O interfaces, address decoding, and bus transactions.
4. To get the basic knowledge of 32 bit Microprocessor and multiprocessor and their architecture.

Course Outcomes:

1. Student will get the basic knowledge of microprocessor architecture
2. Student will have working knowledge of the instruction set for 8086 microprocessors and to write and debug assembly programs that meet requested specifications
3. Student will have basic knowledge of the memory and I/O interfaces, address decoding, and bus transactions.
4. Student will have the basic knowledge of 32 bit microprocessor and multiprocessor and their architecture.

UNIT I **Architecture & Instruction Set for 8086**: Introduction to processors of Intel 8086 family ; Intel 8086– Programming model; Registers and flags; Internal architecture ; Pipelining; Instruction set; Addressing modes; Data Transfer Instruction; Arithmetic Instructions; Branching and Looping Instructions; NOP and Halt, Flag Manipulation Instructions; Logical, Shift and Rotate Instruction; Byte and String Manipulation: String Instructions REP Prefix; simple programs; Assembler Directives and Operators (any fifteen).

UNIT II **Operating modes and bus timings:** Basic 8086 system bus architecture, Pin configuration, Minimum mode Configuration, Maximummode configuration; 8086 memory interface – memory banks; memory interfacing with 8086 inminimum and maximum mode; System Bus Timings, Bus Standards. Interrupts of microprocessor
8086: Interrupt pointer, type numbers, processing of interrupt, internal and external interrupts;interrupt priorities.

UNIT III **I/O Interfaces:** Programmable interrupt controller (PIC) 8259, Programmable DMA Controller (8257). (Architectureand Functioning only) Programming for Interfacing of 8253/8254, 8251, 8 bit ADC (0808/0809) and DAC(0800) with 8086.

UNIT IV **Coprocessors and Multiprocessing:** Multiprocessor configurations; Coprocessor, closely coupled, loosely coupled configurations; The 8087 Numeric data processor, NDP's data types; processor architecture; Interconnection of 8087 with CPU; Instruction types (no programming); I/O Processor 8089, Architecture, Communication between CPU and IOP.

UNIT V **Introduction to 32-bit Processors:** Intel 80386 architecture; signal groups of 386DX; Special 80386 Registers; Real operating mode; 386 protected mode operation; Memory management; interrupts and exceptions; management of tasks; 386 virtual 8086 mode operation; Comparison of 80486 with 80386 processor. Introduction to RISC and CISC Processor

Text Books:

1. Microcomputer Systems: 8086/8088 Family - Architecture, Programming, and Design; Y. Liu and G. A. Gibson, PHI.
2. Microprocessor & Interfacing – Douglas V. Hall, TMH

Reference Book s:

1. The 8086 Microprocessor: Programming & Interfacing the PC, Kenneth J. Ayala, Penram International Publishing (India).
2. Advanced microprocessors and peripherals – A. K Ray, K. M. Bhurchandi, 2nd edition TMH pvt. Ltd.
3. The Intel Microprocessor 8086/8088, 80186/80188, 80286, 80386, 80486, Pentium & Pentium Pro Processor: Architecture, Programming & Interfacing – Brey & Sharma, Pearson Education.
4.Advanced microprocessor, Rajasree, New Age International Publishers

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Power Electronics Devices & Circuits**	Code:	**325654(25)**
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:

1) To understand and develop the firing circuit requirement for different power semiconductor devices used as switches.
2) To understand the concepts of different types of AC-DC, DC-DC & DC-AC controlled converters for Industrial applications.
3) To analyze the effect of controlled and uncontrolled converters in Power system and their mitigation.
4) To design and develop the commutation circuits for semi controlled power semiconductor devices.
5) To understand the rating specification for design and development of the protection circuits for Semiconductor devices.

Course outcomes:

To gain knowledge of various application of semiconductor switches by understanding theirstatic anddynamic characteristics.
To understand the performance characteristics of controlled AC-DC converters for R, RL & RLE loads.

1. To gain knowledge on basic DC-DC converters and their operation under continuous /discontinuous modeof conduction for RLE loads
2 To identify and formulate the requirements for four quadrant operation of DC motor.
3. To differentiate and understand the significance of various commutation circuits and their consequence on device stress
4 To understand the principle of DC-AC conversion and the different topology for three phase to three phase and single phase to single phase DC-AC conversion.

UNIT I **Power Semiconductor Devices:** Silicon controlled rectifier (SCR), structure, principle of operation, two-transistor analogy, switching characteristics, trigger requirement , series and parallel operation of SCRs, ratings and protection, Triac structure and principle of operation only, Modern semiconductor devices,power BJT, MOSFET, IGBT structure, static characteristics.

UNIT II **Phase Controlled Rectifiers:** Principle of phase control, performance parameters, single-phase half wave controlled mid -point full controlled converters and half controlled converters for R,RL and RLE load, comparison of controlled converters with and without freewheeling diode, Effect of source inductance in single-phase.Single phase dual converter in circulating and non circulating mode.
Three-phase half wave and fully controlled bridge converter, three-phase semi-converter.

UNIT III **DCto DC Converters:** Forced Commutation Techniques for thyristor: Self commutation, Impulse commutation, Resonant pulse commutation and Complementary commutation
Principle of chopper operation, controlled strategies, step up chopper, step down chopper, chopperconfigurations, Performance parameter of step down chopper with R-L-E load for continuous and discontinuous conduction .Working principle of Voltage commutated, Current commuted and Load commuted thyristor chopper.

UNIT IV **DC to AC Converter:** Inverter: Classification of inverters, voltage source inverter, current source inverter, Series and modified series resonant thyristor inverter. Performance parameters of single phase half bridge and full bridge inverter for R-L loads, 3-phase inverter-180 degree and 120 degree conduction mode using ideal switches for balanced R load only. Pulse width modulated switching scheme for voltage control.SPWM and modified SPWM of 1-phase inverters, PWM with Unipolar and Bipolar Voltage Switching. (Elementary analysis only)

UNIT V **Cyclo-converters & AC Controllers:** Basic principle of operation, step-up and step down single-phase to single-phase cyclo-converter.Principle of On-off and phase control, AC controller circuit configurations, Performanceparameters of Single phase bidirectional controllers for R and RL only.

Text Books:

1. Power Electronics Circuits, Devices and Applications: Muhammad H. Rashid, PHI
2. Power Electronics: P.S. Bhimbra, Khanna Publishers

Reference Books:

1. Power Electronics Converters, applications and Design: Mohan, Undeland, Robbins, John Wiley& Sons
2. A text book of Power Electronics: S.N Singh, DhanpatRai& Co.(P)Ltd.
3. An Introduction to Thyristor and its applications: M. Ramamoorty, East-West Press

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Digital Signal Processing**	Code:	**325655(25)**
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 determine the zero-input and zero-state responses of system described by constant-coefficient difference equations, and determining the complete response of such systems.
- To determine the linear and circular convolutions of discrete-time systems.
- To evaluate the Discrete-Time Fourier Transform.
- To evaluate and plot the frequency (magnitude and phase) of linear-time invariant systems.
- To determine the Discrete-Fourier transform of a sequence.

Course Outcomes:

- Design digital IIR filters by designing prototypical analog filters and then applying analog to digital conversion techniques such as the bilinear transformation.
- Design digital FIR filters using the window method.
- Use a computer to design digital filters via the frequency sampling approach and the Remez exchange Algorithm.
- Implement digital filters in a variety of forms: direct form I and II, parallel, and cascade, and then analyze their sensitivity to finite precision effects such as input quantization, coefficient quantization, and multiplication round-off.
- Analyze signals using the discrete Fourier transform (DFT).
- Understand circular convolution, its relationship to linear convolution.

UNIT I **Introduction to Digital Signal Processing:** Development of DSP, Analog and Digital signals, DSP Applications (Radar, Speech, Vocoder)
DFTs and FFTs -Linear and Circular convolutions: Circular Convolution (Concentric Circle method, DFTs and IDFTs, Matrix method), Performing Linear Convolution using DFTs, Fast Fourier Transform (FFT), Radix-2 FFT algorithm, Decimation-in-time (DIT) Radix-2 algorithm, Decimation-in-Frequency (DIF) Radix-2 algorithm. Use of the FFT algorithm in linear filtering and correlation.Radix-4 FFT algorithm, Decimation-in-time (DIT) Radix-4 FFT, Decimation-in-frequency (DIF) Radix-4 FFT.

UNIT II **Other Discrete-Transforms:** Discrete Cosine transforms, A family of sine and cosine discrete transforms, Discrete Hartley Transform, Hadamard transform.
FIR Filter Approximations: Ideal characterization of standard filters- Low-pass, High-pass, Band-pass and Band-stop filters, Differentiators, Hilbert Transforms, Symmetric and Anti-symmetric FIR filters FIR filter approximations by window functions- Hanning window, , Hamming and Blackmann window, FIR filter Approximation by Frequency Sampling, Maximally flat FIR filter approximation.

UNIT III **IIR Filter Approximations:** Introduction, Analog Filter specification, Continuous –time to discrete time transformation-Impulse Invariance method, Bilinear transformation, Design of low-pass Butterworth Filter, Design of low-pass Chebyshev Filter, frequency Transformation in discrete-time domain- Low-pass to low-pass, low-pass to high-pass, low-pass to band-pass, low-pass to band-stop transformation.

UNIT IV **Digital Filters:** Introduction, Basic structures of non-recursive digital filters- Direct form, Cascade form and Linear-phase form, Basic structures of recursive digital filters- Direct form, cascade form, Parallel form, State-space structure, Ladder form.

UNIT V **Finite Word Length Effects:**
Fixed point and floating point number representations - Comparison - Rounding and Truncation errors, Quantization effects in Analog-to Digital Conversion of Signals, Output noise power from a digital system, Coefficient quantization effects in Direct Form realization of IIR filters, Coefficient quantization effects in Direct Form realization of FIR filters.

TEXT BOOKS:

1. Digital Signal Processing by S Salivahanan, AVallavaraj, Tata McGraw-Hill Education
2. Digital Signal Processing by S. Palani and K. Kalaiyarasi, Ane books, Pvt. Ltd.

REFERENCE BOOKS:

1 Digital Signal Processing: C. Ramesh BabuDurail, Laxmi Publications
2 Digital Signal Processing: Sanjit. K. Mitra, Mc Graw Hill
3 Digital Signal Processing Principles, Algorithms and Applications: John G Proakisand Manolakis, Pearson

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Digital Signal Processing Laboratory**	Code:	**325661(25)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum marks in ESE:	**40**	Minimum marks in ESE:	**20**

List of Experiments to be performed:

1. To generate Analog Signals.
2. To generate discrete sequences.
3. To illustrate the sampling of a continuous signal
4. To convolve two given signals.
5. To correlate two given signals .
6. To design LPF using recursive structures
7. To design HPF using recursive structure
8. To design BPF using recursive structure
9. To design BSF using recursive structure
10. To design LPF using non-recursive structures
11. To design HPF using non-recursive structure
12. Program for the design of FIR Low pass, High pass, Band pass and Band stop filters using Blackman window technique
13. Program for the design of FIR Low pass, High pass, Band pass and Band stop filters using Hamming window technique
14. Program for the design of FIR Low pass, High pass, Band pass and Band stop filters using Hamming window technique
15. Experimentation with application of DSP in Speech Processing/Image Processing

List of Equipments/Machine Required:

C++ Compiler, MATLAB with Tool boxes, DSP Processor kit, Digital Storage CRO, Spectrum Analyzer.

Recommended Books: 1. Digital Signal Processing, Vallavaraj, Salivahanan, Gnanapriya, TMH

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Power System Simulation Laboratory**	Code:	**325662(25)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum marks in ESE:	**40**	Minimum marks in ESE:	**20**

List of Experiments to be performed:

1. Determination of the phase sequence of a three phase supply by static method.
2. Determination of vector group (Dy_1) of a three phase transformer.
3. Determination of vector group (Dy_{11}) of a three phase transformer.
4. Determination of zero sequence impedance and currents for different connections of a three phase transformer.
5. Determination of the zero sequence reactance of a synchronous generator.
6. Determination of Negative Sequence Reactance of synchronous generator.
7. Study of the effect of load angle δ on the stability of synchronous machines.
8. Determination of the fault current in case of three phase fault on a power system.
9. Determination of the fault current in case of line to ground fault on a power system.
10. Determination of the fault current in case of line to line fault on a power system.
11. Determination of the fault current in case of double line to ground fault on a power system.
12. Determination of the change in fault current with the change in the fault location of the power system.
13. Computer Simulation of balanced and unbalanced faults on a power system and observation of the change in system currents and voltages from that of a healthy system.
14. Simulation of Short, Medium & Long transmission line.
15. Computer simulation of a simple system, formation of the bus admittance/ impedance matrix and power flow on the system using software.

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Power Electronics Devices and Circuits Laboratory**	Code:	**325663(25)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum marks in ESE:	**40**	Minimum marks in ESE:	**20**

List of Experiments to be performed:

1. To study and plot the V-I characteristics of an SCR.
2. To study and plot the drain characteristics of a MOSFET.
3. To study and plot the drain characteristics of a IGBT.
4. To study single-phase half-wave bridge controlled rectifier for R and RL load.
5. To study single-phase full-wave bridge controlled rectifier for R and RL load with and without freewheeling diode.
6. To study of three-phase half-wave controlled rectifier for resistive load.
7. To study of three-phase full-wave controlled rectifier for resistive load.
8. To study step down and step up chopper circuit.
9. To study class A/B/C forced commutation chopper circuits.
10. To study Single Phase series inverter with R and RL loads.
11. To study Single Phase parallel inverter with R and RL loads.
12. To study the bipolar and unipolar switching scheme of a single phase full bridge inverter using MATLAB / PSPICE simulation.
13. To study the three phase VSI for 180/120 mode of conduction using MATLAB / PSPICE simulation.
14. To study Single Phase step down cycloconverter for R and RL loads.
15. To study single-phase AC voltage control by using TRIAC for R and RL loads.

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Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Advanced Microprocessors &Peripherals Laboratory**	Code:	**325664(25)**
Total Lab Periods:	**36**	Batch Size:	**30**
Maximum marks in ESE:	**40**	Minimum marks in ESE:	**20**

List of Experiments to be performed:

1. To write a program to perform subtraction X-Y where X and Y are 48 bit numbers.
2. To write a program to multiply 4 and 5 in ASCII and store the result.
3. To write a program to convert 8-bit binary number to its equivalent gray code.
4. To write a program to find the factorial of a given 8-bit number.
5. To write a program to add series of 20 bytes.
6. A block of 200 – signed bytes is present in memory from address BA: EA add all thepositive bytes and store 8 bit signed result in memory after this block.
7. To write a program to compare two data blocks.
8. To write a program to scan for a specific word in the block and to store the location of theword at a suitable memory location.
9. To write an assembly language program to solve following arithmeticequation:3AX+5DX+BP.
10. To write a program to arrange a data block in ascending order.
11. To write a program to arrange a data block in descending order.
12. To write a program to count the number of odd and even bytes in a data block.
13. To write a program to insert a specific data byte under certain given conditions.
14. To write program to input a 4 bit BCD number, look up the seven segment code for thisnumber and output to the display.
15. Write an assembly language program to generate a triangular wave of frequency 500Hz,8086 operates at 8 MHz and the amplitude of the triangular wave should be +5V.

List of Equipments/Machine Required:

- 8086Microprocessor kit, Keyboard, Assembler, PCs.

Recommended Books:

- The Intel8086/8088 Microprocessor Architecture, Programming,Design and Interfacing –Bhupinder Singh Chhabra, DhanpatRai Publications.

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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:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Medical Electronics (Professional Elective – I)**	Code:	**325671(25)**
Total Theory Periods:	**48**	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
The course is designed to make the student acquire an adequate knowledge of the physiological systems of the human body and relate them to the parameters that have clinical importance. The fundamental principles of equipment that are actually in use at the present day are introduced.

Course Outcomes
i. To provide an acquaintance of the physiology of the heart, lung, blood circulation and circulation respiration.
ii. To make the students understand the various sensing and measurement devices of electrical origin.
iii. To provide the latest ideas on devices of non-electrical devices.
iv. To bring out the important and modern methods of imaging techniques.
v. To provide latest knowledge of medical assistance / techniques and therapeutic equipments.

UNIT I **Human Physiology and Basics:** Brief introduction to human physiology, Basic components of bio-medical instruments, bioelectric signals, action potentials, Bio-electrodes.

UNIT II **Transducers and Electro-Physiological Measurements:** Biomedical Transducers: displacement, velocity, force, acceleration, flow, temperature, potential, dissolved ions and gases, Analysis of EEG, ECG, EMG, EOG, & Bio-Potential Amplifiers for ECG, EMG, EEG, etc.

UNIT III **Monitoring Systems:** Patient care and monitoring system, Remote monitoring through telephone, Internet, Satellite link.

UNIT IV **Electrical Parameter Measurements:** Cardiovascular measurement-blood pressure, blood flow, stroke volume, Impedance Plethysmography, Cardiac output, heart sound etc. Instrumentation for respiratory and nervous systems.

UNIT V **Assisting and Therapeutic Equipments and Safety:** Safety aspects associated with Biomedical Instrumentation. Recent advances in Bio-Medical Instrumentation, Microprocessor based systems, Laser & optical Fiber systems.

Text books:
1. Biomedical Instruments & Measurements: Leslie Cromwell, Fred J.Weibell, Erich A.Pfeiffer,
2. P E Handbook of Biomedical Instrumentation:R.S.Khandpur, TMH

Reference books:
1. Biomedical Instrumentation:Arumungam, Anuradha Agencies.
2. Introduction to biomedical engineering:Domach, Pearson Education.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Computer Organization & Architecture (Professional Elective – I)**	Code:	**325672(25)**
Total Theory Periods:	**48**	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

This subject aims to give an idea of evolution of computers, their various types and generations. It introduces the hardware and software in a computer system. It also gives knowledge of data transfer schemes, memory and its management. It also gives an idea arithmetic processor design and parallel processing.

Course Outcomes

By the end of this course we will learn to:

- Basic computer architecture and functioning.
- Data transfer schemes
- Instructions, programs and subroutine execution.
- Types of memory and their management.

UNIT I Basic Computing elements of analog computer, time and amplitude scaling simulation of linear simple and simultaneous differential equations and transfer functions, nonlinear function generators.

UNIT II Requester transfer and Micro- Operations: Register transfer language, Inter – Register transfer, Arithmetic, Logic and shift micro operations, Control functions. Computer Organization and Design: Instruction, codes computer instructions, Timing and, control Execution of instructions, Input-Output and interrupts, Design of computer.

UNIT III Central Processor organization: Processor bus organization, ALU, Stack Organization, Instruction formats, Addressing modes, Data transfer and manipulation, Program control, Parallel processor. Micro program control organization: Control memory, Address sequencing, Microprogram example, Microprogram sequencer, & Microinstruction formats.

UNIT IV Arithmetic Processor Design: Comparison and subtraction, Algorithm for addition, Subtraction, Multiplication, division, Processor Configuration, Design of Control. Arithmetic algorithms: Arithmetic with signed 2's complement numbers, Multiplication and Division, Floating point arithmetic operations, Decimal Arithmetic Unit and operations

UNIT V I/O Organization: I/O interfaces, asynchronous data transfer, DMA, Priority interrupt, I/O processor, Multiprocessor system organization. Memory organization: Various memories – Auxiliary, Associative, Cache, Microcomputer, Virtual ones, and Memory Hierarchy, Memory Management hardware. Computer software: Assembly language, Assembler, program loops, subroutines, system.

Text Books:

1. Computer System Architecture: M. M. Mano, Pearson Edn.
2. Computer Architecture and Organization, J.P. Hayes Int'1 student edition, McGraw – Hill.

Reference Books:

1. Structured Computer Organization: A. S. Tannabaum,
2. Computer Organization: V.C.Hamacher et al, McGraw Hill
3. Introduction of Digital computer Design: V. Rajaraman& T.Radhakrishnman, PHI

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Testing and Commissioning of Electrical Equipments (Professional Elective – I)**	Code:	**325673(25)**

Total Theory Periods:	**48**	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:

1. To learn the industrial standards in testing and commissioning of electrical equipments.
2. To understand the common problems in installing and commissioning of electrical equipments.
3. To learn about safety measures and maintenance procedures for various electrical equipments.

Course Outcomes:

After studying the subject students will be able to understand the common problems arising while commissioning of electric equipments. They will also be able to learn about the routine tests to be performed and maintenance measures for various equipments.

UNIT I **Power Transformers:** Insulation resistance measurement and Meggering electrical equipment, temperature effect, polarization index, causes of poor insulation resistance, Drying out of transformer, Checks before paralleling, parallel operation Commissioning checks, Maintenance of transformer, maintenance of bushing and tap changers, Functions of breather, conservator, Troubles, Causes of failures, Ratings, Significance of impedance voltage, voltage regulation , Inspection, Storage, Handling, Transportation, civil works, site facilities, Commissioning tests capitalization of losses, Transformers oil: types, composition, properties, maintenance, testing, filtration, insulation resistance.

UNIT II **Instrument transformers/Traction, Rectifier Transformer:** Current transformers (CT): applications, accuracy class, magnetization curve, burden, effect of open secondary, terms and definitions, type tests, routine tests on CTs, precautions, typical ratings, Voltage transformer (VT, PT): application, specifications, ratings, connections, accuracy class, and burdens, Types of VT construction. Traction transformers: Types, Special considerations, design and constructional features, Traction transformers for thyristor-controlled locomotives, Rectifier transformers: comparison between rectifier transformer and power transformer, utility factor, design feature of rectifier transformer, transductors.

UNIT III **Rotating machines:** Troubles with D.C. Machines and Remedies, Troubles with Commutator, Maintenance of Commutator and Brushes, Troubles with D.C. Motors, Test to detect the causes of the troubles, Earth-fault Test. Testing of Induction Motors: Type Tests, Routine Tests, Commissioning Tests, Degree of Protection, Noise and its Control, Explosion Proof Motor, Installation and commissioning of induction machine and Rotating Machines.

UNIT IV **Parameters of Industrial Rotating Machines:** Drying-Out of Electrical Rotating Machines and Insulation Resistance Measurements Steps in drying-Out, Permissible Temp-rise, Log-sheets, Insulation Resistance, Power Required, Period of Drying Out, Polarisation Index, Definition of Degree of Protection and cooling Systems, standard IP codes, Definition, Types, Standard Designations, IC Code, Ratings of Industrial Rotating Machines: Thermal Rating, Operation Duties, Duty factor, Continuous Rating, Intermittent Duty, Short Time Duty STR, DTR, MCR.

UNIT V **Safety Precautions and live line Maintenance:**
Shocks, Safety procedures, Permission to work, Safety Clearances, Procedures, Permit to work, Electric Field and Clearances, Live Line Maintenance, Hot-Line Maintenance, Safety, tools, Degree of Exposures, Biological effects of Electric Field, Electric shock and effects.

TEXT BOOKS:

1. Testing Commissiong Operation & Maintenance of Electrical Equipment – S.Rao, DhanpatRai& Sons.
2. Electrical Power Distribution- Pabla, TMH

REFRERNCE BOOKS:

1. Transformers – Bharat Heavy Electrical Limited.

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Simulation & Programming (Professional Elective – I)**	Code:	**325674(25)**
Total Theory Periods:	**48**	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:

1. To Learn the basic programming concepts in C++ and MATLAB
2. To use C++ and MATLAB for solving important Engineering problems
3. To develop rational thinking and visualize the theoretical concepts of various engineering subjects with the help of programs and models.

Course Outcomes:

After studying the subject students will be able to understand the basic programming in C++ and MATLAB. They will also be able to solve various engineering problems through Programming and Simulation through these software.

UNIT I **Basic Programming elements in C++:** Introduction to computer systems; number systems, integer, signed integer, fixed and floating point arithmetic; Input/output; Constants, Variables, Strings, expressions and operators; Looping and control structures; header files, pre-processor directives, Compiling and linking.

UNIT II **Programming through functional decomposition in C++:** Design of functions and their interfaces (concept of functional decomposition), scope and lifetime of variables, passing by value, passing by reference. Recursive function, function overloading and default arguments; Library functions. Arrays and passing arrays to functions, Dynamic data and pointers, use of pointers in linked structures.

UNIT III **Object Oriented Programming Concepts in C++:** Data hiding, abstract data types, classes and access control; Class implementation- default constructor, constructors, copy constructor, destructor, operator overloading; object oriented design (an alternative to functional decomposition), inheritance and composition; Dynamic binding and virtual functions; Polymorphism; Dynamic data in classes.

UNIT IV **MATLAB Programming and Common Applications of MATLAB Functions:**
Matrices in MATLAB and their applications, Generating a simple linear plot and plot annotations, writing a MATLAB program, writing MATLAB functions with single and multiple arguments, MATLAB library functions, Application of MATLAB in Electrical & Electronics Engineering: DSP Applications: Generating and plotting various waveforms, DFT, FFT, Control System Applications: Laplace transform, Transfer Function and State Space forms, Pole-Zero plot, time response analysis: step, ramp and impulse response, Bode plots, root locus plots andNyquist plots.Image Processing with MATLAB: Image as a Matrix, Extracting Image features.

UNIT V **Modeling with MATLAB-Simulink:**
Introduction to SIMULINK, making SIMULINK model for various systems, creating and masking sub-systems in SIMULINK, Simulation of Electrical and Electronics Circuits with MATLAB/SIMULINK: Basic Circuit Simulation with R,L,C elements and their time response, Power Electronics: Simulating Single and Three phase rectifiers, FFT analysis for input/output waveforms, Converter simulation with DC/AC motor load, Design of firing circuits. OPAMP Applications (using SimScape): Inverting and Non-inverting Amplifiers, Adder, Integrator and Differentiator, Creating Graphical User Interface (GUI), linking m-file and SIMULINK model, Introduction to various Toolboxes of MATLAB/Simulink, Introduction to MATLAB-Hardware Interface.

Text Books:

1. Programming in C++: Balaguruswami, TMH.
2. Programming in MATLAB: A Problem Solving Approach, Ram N Patel and Ankush Mittal, Pearson Education, India.
3. Modelling& Simulation using MATLAB-SIMULINK: Dr. Shailendra Jain, Wiley India

Reference Books:

1. C++ How to Program: Deitel and Deitel,Prentice Hall
2. Let us C: Y. Kanetkar, BMB publications

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Branch:	**Electrical & Electronics Engineering**	Semester:	**VI**
Subject:	**Distributed Generation (Professional Elective – I)**	Code:	**325675(25)**
Total Theory Periods:	**48**	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:

1. To become aware of the modern energy generation scenario.
2. To learn the principles and applications of various non-conventional energy sources.
3. To learn about the interconnection of various energy generating systems and their impact on the environment.

Course Outcomes:

After studying the subject students will be able to visualize the working principles and design aspects of various renewable energy sources and their interconnection.

UNIT I **Concepts of Distributed Generation:** Centralized Generation: Main features, Economics, Advantages & Disadvantages De-centralised/ Distributed / Embeded/Dispersed Generation, Operation of Distributed Generation Systems, Consideration of Reliability & Economics Advantages & Disadvantages, Introduction to energy conversion, Principles of renewable energy systems-technical and social implication.

UNIT II **Direct energy conversion (DEC):** DEC devices-photo voltaic system-solar cells-cell efficiency-Limitations-PV modules-Battery back up-Systems design -Lighting and water pumping applications.

UNIT III **Other Energy Sources-I:** Fuel cells, types-losses in fuel cell, ApplicationBiofuels-classification -biomass conversion process-application, Ocean thermal energy conversion systems.

UNIT IV **Other Energy Sources- II**: Thermionic Conversion – Principles of working. Hydrogen Energy – Principles of conversion, production of H2. Tidal and wave power-applications, Micro and mini hydel power, Hybrid Energy System implementation –case study, Geo Thermal Energy.

UNIT V **Deregulated Systems:** Deregulated Systems: Reconfiguring Power systems, Unbundling of Electric Utilities, Competition and Direct access.

Text Books:

1. G.D. Rai, Non-Conventional energy Sources, Khanna Publications, New Delhi.
2. Sukhatme, S.P., Solar Energy -Principles of Thermal Collection and Storage, TataMcGraw –Hill, New Delhi.

Reference Books:

1. Kreith, F. and Kreider,J.F., Principles of Solar Engineering,Mc-Graw-Hill Book Co.
2. James Larminie, Andrew Dicks,Fuel Cell Systems,John Weily & Sons Ltd.
3. J.F. Manwell, J.G. McGowan, A.L. Rogers, Wind Energy Explained John Willy & Sons Ltd.
4. E.J. Womack MHD Power Generation Engineering aspects, Chapman and Hall Publication.