Chhattisgarh Swami Vivekanand Technical University, Bhilai

SCHEME OF TEACHING AND EXAMINATION

B.E. VIIth 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
				L	T	P	Theory / Practical				
							ESE	CT	TA		
1	Electrical Engg.	324731(24)	Switchgear & Protection	4	1	-	80	20	20	120	5
2	Electrical & Electronics Engg	325732(25)	Soft Computing and its Applications	4	1	-	80	20	20	120	5
3	Electrical Engg.	324733(24)	Electrical Drives	4	1	-	80	20	20	120	5
4	Electrical & Electronics Engg.	325734(25)	Microcontrollers and Applications	4	1	-	80	20	20	120	5
5	**Refer Table -2**		**Professional Elective -II**	4	1	-	80	20	20	120	5
6	Electrical & Electronics Engg.	325761(25)	Switchgear & Protection Lab	-	-	3	40	-	20	60	2
7	Electrical & Electronics Engg.	325762(25)	Electric Drives Lab	-	-	3	40	-	20	60	2
8	Electrical & Electronics Engg.	325763(25)	Microcontrollers and Applications Lab	-	-	3	40	-	20	60	2
9	Electrical & Electronics Engg.	325764(25)	Minor Project	-	-	4	100	-	40	140	2
10	Electrical & Electronics Engg.	325765(25)	Innovative & Entrepreneurial Skills	-	-	1	-	-	40	40	1
11	Electrical & Electronics Engg.	325766(25)	** Practical Training Evaluation and Library	-	-	1	-	-	40	40	1
			Total	**20**	**5**	**15**	**620**	**100**	**280**	**1000**	**35**

L- Lecture T- Tutorial P- Practical , ESE- End Semester Exam CT- Class Test TA- Teacher's Assessment
** To be completed after VI Sem. and before the commencement of VII Sem .

S.No.	Board of Study	Subject Code	Subject
1	Electrical Engg.	324741(24)	Power Apparatus System
2	Electrical & Electronics Engg.	**325742(25)**	Illumination Engineering
3	Electrical Engg.	324747(24)	Digital Image Processing
4	Electrical & Electronics Engg.	**325744(25)**	Fiber optics
5	Electrical & Electronics Engg.	**325745(25)**	Industrial Automation
6	Electrical & Electronics Engg.	325746(25)	Electrical Machine Design

Note -1/4th of total strength of students is required to offer an elective in thecollege in a particular academic session.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE/EE**
Subject: Switchgear & Protection **Code: 324731(24)**
Total Theory Periods: 40 **Total Tut Periods:12**
Total Marks in End Semester Exam: 80
Minimum number of Class tests to be conducted: 2

Course Objectives:

1. To understand the principle of protective schemes and various faults in the Power System Scenario.
2. To study the various types of the circuit breakers, the arc quenching phenomena and the protection against over voltages.
3. Teach students the protection systems used for electric machines, transformers, bus bars, overhead and underground feeders.

Course Outcomes: At the end of the course, students:

1. Design the relevant protection systems for the main elements of a power system.
2. Analyze with over current, differential, and ratio protection devices and their application in a coordinated protection scheme.
3. Do the stability problems and clearing of faults to mitigate these problems.

UNIT I: Protective relays:

Trip circuit & circuit Breaker, Current transformer & protection, instantaneous over current relay, I.D.M.T. Relay, Differential relay, Directional relay, Generalized torque expression, impedance relay, reactance relay, mho relay.

UNIT II:

a) Generator protection – Differential protection of stator, inter turn fault protection, protection against unbalance loading, protection of rotor against ground fault, protection against field failure, protection against failure of prime mover, field suppression in alternators.

b) Transformer protection – difficulties in differential protection, mode of C.T. connection for differential protection of three phase transformer, protection against magnetizing inrush current, core balance earth leakage protection.

c) Bus bar protection- Differential protection, frame leakage protection.

UNIT III:

a) Feeder protection- protection of ring main feeder, protection of parallel feeders.

b) Transmission line protection-Over current protection of lines, Three step distance protection, effect of power swings on distance relay, Directional comparison carrier current protection, phase comparison carrier current protection, carrier aided distance protection.

UNIT IV: Static relays

Amplitude & phase comparators, duality between amplitude & phase comparators, circulating current amplitude comparators, coincidence type phase comparator, block spike phase comparator, integrating phase comparator, Hall effect sine phase comparator, Design of directional relay, reactance relay, mho relay, impedance relay, quadrilateral characteristics relay using cosine phase comparator and amplitude comparator.

UNIT V: Circuit Breakers

Initiation of Arc, High resistance arc interruption, current zero arc interruption, Recovery voltage, Factor affecting recovery voltage, Restriking voltage, rate of rise of restriking voltage, Breaking of capacitive current, current chopping, Resistance switching, Circuit Breaker rating, Circuit Breaker testing, Minimum oil circuit breaker, Air Blast circuit Breaker, SF-6 Circuit Breaker.

Text Books

1. Paithankar Y. G., Bhide S. R., "Fundamentals of Power System Protection" Prentice Hall of India Limited, New Delhi , 2nd Edition, 2010.

2. Badri Ram, Vishwakarma D N., "Power System Protection and Switchgear" Tata McGraw Hill Publishing House Limited, New Delhi, 2005.

Reference books

1. Wadhwa, C.L., "Electrical Power Systems", New Age International Publishers Limited, 2006, New Delhi,6th Edition, 2010

2. Sunil, S.Rao, "Switchgear Protection and Power Systems (Theory, Practice & Solved Problems", Khanna Publishers Limited, New Delhi, 12th Edition, 2008.

3. Soni, M.L., Gupta, P.V., Bhatnagar, U.S. and Chakrabarti, A., "A Text Book on Power Systems Engineering", Dhanpat Rai & Sons Company Limited, New Delhi, 2008.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE**
Subject: Soft Computing and its applications **Code: 325732(25)**
Total Theory Periods: 40 **Total Tut Periods:12**
Total Marks in End Semester Exam: 80
Minimum number of Class tests to be conducted: 2

Course Objective:

1. It deals with Introduction and different architectures of neural network
2. It deals with the Application of Neural Networks
3. It deals with Fuzzy Logic Controller
4. It deals with applications of Fuzzy logic

Course Outcomes:

1. To expose the students to the concepts of feed forward neural networks.
2. To provide adequate knowledge about feedback neural networks.
3. To teach about the concept of fuzziness involved in various systems.
4. To provide adequate knowledge about fuzzy set theory.
5. To provide comprehensive knowledge of fuzzy logic control and adaptive fuzzy logic and to design the fuzzy control using genetic algorithm.
6. To provide adequate knowledge of application of fuzzy logic control to real time systems.

Unit I: Introduction to Neural Network:
Concept, biological neural network, evolution of artificial neural network, McCulloch-Pitts neuron models, Learning (Supervise & Unsupervised) and activation function ,Models of ANN-Feed forward network and feedback network, Learning Rules- Hebbian, Delta, Perceptron Learning and Windrow-Hoff, winner take all.

Unit II: Supervised Learning:
Perceptron learning,- Single layer/multilayer, linear Separability, Adaline, Madaline, Back propagation network, RBFN. Application of Neural network in forecasting, data compression and image compression.

Unit III: Unsupervised learning:
Kohonen SOM (Theory, Architecture, Flow Chart, Training Algorithm)Counter Propagation (Theory , Full Counter Propagation NET and Forward only counter propagation net),ART (Theory, ART1, ART2). Application of Neural networks in pattern and face recognition, intrusion detection, robotic vision.

Unit IV: Fuzzy Set:
Basic Definition and Terminology, Set-theoretic Operations, Member Function ,Formulation and Parameterization, Fuzzy rules and fuzzy Reasoning, Extension Principal and Fuzzy Relations, Fuzzy if-then Rules, Fuzzy Inference Systems. Hybrid system including neuro fuzzy hybrid,

neuro genetic hybrid and fuzzy genetic hybrid, fuzzy logic controlled GA. Application of Fuzzy logic in solving engineering problems.

Unit V: Genetic Algorithm:
Introduction to GA, Simple Genetic Algorithm, terminology and operators of GA (individual, gene, fitness, population, data structure, encoding, selection, crossover, mutation ,convergence criteria). Reasons for working of GA and Schema theorem, GA optimization problem s including JSPP (Job shop scheduling problem), TSP (Travelling salesman problem), Network design routing ,timetabling problem.

Text Book

1. S.N. Shivnandam, "Principle of soft computing", Wiley.
2. S. Rajshekaran and G.A.V. Pai, "Neural Network , Fuzzy logic And Genetic Algorithm", PHI.

References Book:

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1. Jack M. Zurada, "Introduction to Artificial Neural Network System" JAico Publication.
2. Simon Haykins, "Neural Network- A Comprehensive Foudation"
3. Timothy J.Ross, "Fuzzy logic with Engineering Applications", McGraw-Hills 1

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE/EE**
Subject: Electrical Drives **Code: 324733(24)**
Total Theory Periods: 40 **Total Tut Periods:12**
Total Marks in End Semester Exam: 80
Minimum number of Class tests to be conducted: 2

Course Objectives:

1. Describe the structure of Electric Drive systems and their role in various applications
2. Understand basic requirements placed by mechanical systems on electric drives.
3. Describe the operation of dc motor drives to satisfy four-quadrant operation to meet mechanical load requirements.
4. Design torque, speed and position controller of motor drives.
5. Describe the operation of induction machines in steady state that allows them to be controlled in induction-motor drives.
6. Learn speed control of induction motor drives in an energy efficient manner using power electronics.
7. Describe operation of tractions.

Course Outcomes: Students will be able to describe:

1. Electric drive systems for different mode of operations.
2. Operation of tractions.
3. Speed control of DC and AC machines using Power Electronics.
4. Design of ratings on the basis of heating and cooling.

UNIT I: Electric Drives

Basic concept of electric drives its advantages and types, choice of electric drives, Fundamental equations, speed torque conversions and multi quadrant operation,drive parameters, component of load torque, nature and classification of load torques, calculation of time and energy loss in transient operation, steady state stability and load equalization.

UNIT II:Control and Rating of Electric Drives

Modes of operation of electric drives, Closed loop control of drives, closed loop control of multi motor drives, Selection of motor power rating-Heating and Cooling of motors, Selection of motor power rating under different loading conditions, Continuous, Short and Intermittent periodic duty.

UNIT III:DC Drives

Review of dc motors and their performance, Braking: Regenerative braking, Dynamic braking,

Plugging. Transient Analysis of separately excited dc motor with armature and field control, Transient Analysis of starting and dynamic braking of dc separately excited dc motor. Speed control, Controlled Rectifier fed dc drives: single phase and three phase half controlled and fully controlled, Multi quadrant operation of dc drives, Chopper Controlled dc drives.

UNIT IV: Induction and Synchronous Motor Drives

Review of conventional method of starting, and Speed control, Braking: Regenerative braking, Dynamic braking, Plugging. Speed control by stator voltage control, supply frequency control, Voltage source inverter (VSI) and current source inverter (CSI) fed three-phase induction motor drives, Static rotor resistance control induction motor drive, Slip power recovery drives. Synchronous motor drives: Speed control of synchronous motor using voltage and current source inverters, Self-controlled synchronous motor drives

UNIT V: Traction Drives

Electric Traction system, Nature of traction load, calculation of Traction drive rating and energy consumption, Important feature of traction drives, Motors employed in traction, Conventional method for AC and DC traction drives control, Semiconductor converter controlled drives employing DC motors, AC motors for 25 KV AC traction..

Text Books:

1. "Fundamentals of electrical drives",G K Dubey, 2ndedition, NarosaPb
2. "Electric Drives'' VedamSubramanyam, TMH Pbs.

Reference Books:

1. "Electric Motor Drives" R. Krishnan,PHIPb
2. "Modern Power Electronics and A C Drives'' B K Bose, Pearson Education

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI

Semester: VIIth **Branch: EEE**
Subject: Microcontrollers and applications **Code: 325734(25)**
Total Theory Periods: 40 **Total Tut Periods: 12**
Total Marks in End Semester Exam: 80
Minimum number of Class tests to be conducted: 2

UNIT – I Introduction to Micro controller:
A brief History of 8051, 8052, 8031, 8751, AT89651, Pin configuration of 8051, 89C52RD2.

UNIT – II Instruction Set of 8051
Assembly language programming , Internal structure of 8051 , Power resetting , Built up RAM & ROM, I/O programming and Addressing modes.

UNIT – III: Counter and Timer details
Counter and timer programming using 8051, interrupt programming, Types of interrupt.

UNIT – IV: Asynchronous serial communication
Data programming, RS232 standard, RS422 Standard, 1488 & 1489 standard, GPIB, Max 232 Driver, Serial communication programming.

UNIT – V Interfacing
ADC & DAC interfacing, stepper motor interfacing, keyboard interfacing, Memory interfacing, embedded design concept, Embedded design card, 8096 Architecture.

Text Books:
1. Microcontrollers: Architecture, Programming, Interfacing and System Design, Rajkamal, Pearson Education.
2. The 8051 Microcontroller and Embedded Systems using Assembly and C, Mazidi, Mazidi & McKinlay, 2nd Ed.,PHI.

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. Handbook of Microcontrollers, Myke Predko, TMH

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE**
Subject: Switchgear Protection Lab **Code: 325761(25)**
Total Marks in End Semester Exam: 40

List of experiments: (To be performed minimum 10 experiments)

1. To study Over current Relay static type & draw characteristics.
2. To study under voltage relay Electromechanical type & draw characteristics.
3. To study over voltage relay Electromechanical type & draw characteristics.
4. To study IDMT Over current relay Electromechanical Type & draw current verses time characteristics.
5. To study IDMT earth fault relay electromechanical type draw current verses time characteristics.
6. To study operating characteristics of percentage-biased differential relays tp plot the characteristics of percentage biased differential relay for 30%, 40%, & 20%.
7. To determine the characteristics of instantaneous relays.
8. To study Bucholz Relays.
9. To study Solid State O.C.R.
10. To study Merz Price Protection of transformer (Simulation Model).
11. To study Static type negative sequence relay.
12. To study the time-grading protection of feeder [simulation Model].
13. To study the current-grading protection of feeder [simulation Model].
14. To study the time-current grading protection of feeder [simulation Model].
15. To study the simulation model for short, medium, & long transmission line.

Apparatus Required:

1. Relays
2. Transformer
3. Alarm
4. Auxiliary power supply
5. Variable voltage source
6. Digital meter, digital time totalizer

Reference Book:

1. Protection –Westing House.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: B.E. VII **Branch: EEE.**
Subject: Electric Drives Lab **Code: 325762(25)**
Total Practical Periods: 36
Total Marks in End Semester Exam: 40

List of experiments: (To be performed minimum 10 experiments)

1) To study the heating time constant for a Continuous Duty Motor

2) To Study the heating time constant of a Short time Duty Motor

3) To Study the cooling time constant of a Short time Duty Motor

4) To Study the heating time constant of a Short Time Duty Motor

5) To Study the cooling time constant for an Intermittent Duty Motor

6) Performance and speed control of D.C drive using 1/3-phase full converter

7) Performance and operation of a four quadrant chopper on D.C drive

8) Study and performance of electrical Dynamic braking and Plugging of D.C shunt motor

9) Study of V/F control operation of 3-ϕ Induction motor

10) Simulation of PWM VSI fed 3-ϕ Induction motor control using MATLAB/PSPICE/PSIM software

11) Study of solid state stator voltage control of 1-ϕ Induction motor (using AC voltage regulator)

12) Performance and speed control of 3-ϕ Induction motor using 3-ϕ voltage source inverter

13) To study frequency control Synchronous motor drive

14) Study of AC motors for 25KV Ac traction

15) Study of Resistance wielding and Arc welding

Text Books
Same as theory subject, as syllabus is derived from theory syllabus.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE**
Subject: Microcontroller & Embedded System Lab **Code: 325763(25)**
Total Practical Periods: 50
Total Marks in End Semester Exam: 40

Experiments to be performed:

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) a Counter, b) null char for end of string .

2. Write a microcontroller 8051 program to get hex data on the range of 00-FFh from port 0 and convert it to 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. Create a program to print powers of 2 from 2^0 to 2^7.

10. Write a microcontroller 8051 program to add two floating-point numbers.

11. Write a microcontroller 8051 program that generates 2kHz square wave on pin P1.0, 2.5 kHz on pin P1.2.

12. Write a microcontroller 8051 program for counter 1 in mode 2 to count the pulses and display the state o the TL1 count on P2. Assume that the clock pulses are fed to pin T1.

13. Write a microcontroller 8051 program to transfer letter “N” serially at 9600 baud, continuously. Assume crystal frequency to be 11.0592 MHz.

14. 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.

15. Write a microcontroller 8051 program to receive bytes of data serially, and put them in P1. Set the baud rate at 2400 baud, 8-bit data, and 1 stop bit. Assume crystal frequency to be 11.0592 MHz.

List of Equipments/Machine Required:

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

Recommended Books:

1).Programming and Customizing the 8051 microcontroller, 1st Edition; by: Predko, Myke; McGraw Hill
International .
2). Embedded system by Raj Kamal TMH.

CHHATISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE**
Subject: Power Apparatus System **Code: 324741(24)**
Total Theory Periods: 40
Total Marks in End Semester Exam: 80
Minimum number of Class tests to be conducted: 2

Course Objective

1. Impart theoretical knowledge of design of electrical transmission line, different types of substation, bus-bar arrangement.
2. Introduce the concept of Different types of earthing system.
3. To provide the theoretical insights overvoltage production and protection from these.
4. Deliberate & discuss the concept of reliability of transmission line.

Course Outcome:

1. To facilitate students understand the practical application of different types of apparatus used in power stations.
2. Graduates opting for C.S.E.B., NHPC, NTPC, and other industry as a career are likely to come across substations and shall be able to deliver more efficiently with their prior knowledge & by co-relating the concepts of substation, bus-bar scheme, earthing, protection introduced to them during engineering.
3. Students will gain the knowledge of different substation , mechanism of lightning, reliability of transmission line. This shall also impart them the understanding & importance of conducting these tests in real-life situations.
4. Apart from gaining the knowledge of above topics, students would develop analytical ability to understand the system dynamics and become capable of applying analytical approach to engineering challenges ahead.

UNIT – I Transmission System Components : Types Of Insulator , Conductors, Towers , Span, Conductor Configuration Spacing, Clearance , Sag & Tension Calculation, Voltage Distribution Over The Insulator String , String Efficiency , Selection of Conductor Size, Number of Circuit , Ground Wire, Surge Impedance Loading.

UNIT-II Distribution System : Types, Primary & Secondary Distribution System, Voltage Drop In AC & DC System, Selection of Distribution Voltage , Size of Conductor, Kelvin's Low, General Design Consideration Load Estimation Substation Equipment Protection System, Design of A Typical Distributions System (Rural / Town/ Industrial)

UNIT-III Power System Grounding : Different Methods, Isolated Neural , Solid Grounding, Effective Grounding, Resistance & Impedance Grounding, Zig Zag Transformer Grounding, Effect of Grounding on System Over Voltages. Merits & Demerits Of Various Grounding Systems.

UNIT-IV Surge Protection & Insulation : Coordination : External & Internal Overvoltage Mechanism of Lightening Discharge , Wave Shapes Of Stroke Current, Line Design On Direct Stroke Over Voltage Protection , Earth Wire, Rod Gap , TRF , Expulsion Tube , Surge Diverter Selection Of BIL , International Recommendation , Selection of Arrestor Rating, Coordination of Protector Devices With Apparatus Insulation.

UNIT-V Reliability of T&D System : Definitions : Outage , Bath Tub Curve , Causes of Failures, Two State Model, Failure & Repair Rate, Probability Density Function, Reliability of Series / Parallel System , Reliability Planning , Preparation of Reliability Models, Numerical Problems related to reliability of transmission and distribution system.

TEXT BOOKS :

1. "Power System Analysis & Design", BR Gupta S.Chand Publications
2. "Substation Design & Equipment" Gupta &Sation – DhanpatRai.Publications

REFERENCE BOOKS:

1. Transmission & Distribution" – Westinghouse
2. "Electrical Power System Design" – M V Deshpande (TMH)

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester:VIIth **Branch: EEE**
Subject: Illumination Engineering **Code: 325742(25)**
Total Theory Periods:
Total Marks in End Semester Exam:
Minimum number of Class tests to be conducted:

Course Objective: This course is designed to develop a comprehensive understanding of illumination design practice for buildings. It familiarizes the student with lighting units, lighting equipment, lighting design, and lighting calculations.

COURSE OUTCOME:

1. Appreciate the history of light and lighting, with special emphasis on technology, energy efficiency, and its interaction with architecture;
2. Understand and be able to use basic lighting terminology; and
3. Comprehend the relationships among light, vision and color
4. Understand the basic operation and performance characteristics of electric light sources
5. Understand how ballasted light sources operate as a system
6. Be able to identify commonly used electric light sources and understand where and how they are applied
7. Identify and recognize the various types of luminaires offered today, by mounting type, by light source, and by application
8. Understand the various types of lighting controls available today, how they work, and why they are important.
9. Appreciate the complexities involved in designing lighting for residential and commercial spaces

UNIT I: FUNDAMENTALS OF ILLUMINATION
Optical systems of human eye, Radiation, Colorimetry-Different color specification systems and their limitations Types of illumination, day lightening, supplementary artificial lightening & total lightening, Quality of good lightening, factors affecting the lightening-shadow, glare, reflection, color rendering & stroboscopic effect. Methods of artificial lighting-lighting system-direct, indirect, semi direct, semi indirect. Lightening scheme-general and localized. Properties of light. Good and bad effects of lighting & perfect level of illumination.

UNIT II: MESUREMENT OF LIGHT
Definition of Luminous flux, luminous intensity, lumen, candle power, illumination. MHCP, MSCP, MHSCP, lamp efficiency, brightness or luminance, Laws of illumination-Inverse square

law and Lambert's Cosine law, illumination at horizontal and vertical plane from point source, concept of polar curve. Calculation of luminance and illumination in case of linear source, round source and flat source.

UNIT III: LIGHT SOURCES & CONTROL

Daylight, Lamp development, construction and characteristics: Incandescent lamp, Discharge lamps: fluorescent lamps, CFL, mercury vapor, sodium vapor, metal halide and induction lamp. LED and its application in Materials of Lamps, General classification of lamps & its electrical and photometric parameters, Variation of lamp parameters with supply voltage, temperature, humidity etc

Lamp testing procedures. Light field, Optical control methods, Advanced techniques of using reflection, refraction, polarization, interference, diffraction, diffusion and absorption in optical control. Materials used for Luminaire manufacturing. Control gear: ballast, standard and electronic type Basics of Mechanical, thermal and electrical design of luminaire. Luminaire photometry, Luminaire testing procedures. Introduction to Luminaire for hazardous area application

UNIT IV: INTERIOR LIGHTING DESIGN & CALCULATION

Objectives, quality and quantity of lighting. Lamp /Luminaire selection andVplacement, design considerations and calculation. Glare Consideration andVcontrol. Principal of lighting design-Indoor lighting design by lumen method, by point by point method. Designing problems and solution and designing documentation for: applications like residential, offices, educational institute, industries, religious buildings, art galleries/museums, retail stores, indoor sports centers, eating outlets etc. Applicable IS standards

UNIT V: EXTERIOR LIGHTING SYSTEM

Road lighting system, Utility area lighting, Sports lighting, Decorative flood lighting. Design Consideration for Emergency lighting. Applicable IS standards

Text Books:

1. Designing with light: Lighting Handbook., Anil Valia;Lighting System 2002
2. Lamps and Lighting., M.A. Cayless and A.M. Marsden; Edward Arnold
3. Interior Lighting for Designers., Gary Gorden, ;John Wiley & Sons Inc.

Reference Book:

1. .IESNA lighting Handbook., Illuminating Engineering Society of North America
9th edition 2000
2. .Simplified Design for Building Lighting., M.Schiler; John Wiley & Sons Inc
2. IS 3646 : Part I : 1992, *Code of practice for interior illumination*

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: VIIth **Branch: EEE**
Subject: Digital Image Processing **Code : 324747(24)**
Total Theory Periods: 40
Total Marks in End Semester Exam: 80

Course Objectives:
This course is designed to teach students the fundamentals of digital image. The primary objective of this course is to introduce students to basic principles of digital images, image data structures, and image processing algorithms.

Course Outcomes: A student who successfully completes this course should be able to:
understand the digital image processing fundamentals, hardware and software, digitization, enhancement and restoration
to apply image processing techniques in time and frequency domains
work in the field of technical communication

UNIT I: Fundamentals of Image Processing
Origins of Digital Image Processing, Examples of fields that use Digital Image Processing, Fundamental steps, Components, Elements of Visual Perception, Light and the Electromagnetic Spectrum, Sensing and Acquisition, Sampling and Quantization Relationship between Pixels.

UNIT II:Image Enhancement in the Spatial Domain
Gray Level Transformation, Histogram Processing, Enhancement using Arithmetic or Logic Operation, Basics of Spatial Filtering, Smoothing Spatial Filters, Sharpening Spatial Filters, Image Enhancement in the Frequency Domain, Introduction to the Fourier Transform, Smoothing frequency - Domain Filters, Sharpening Frequency Domain Filters.

UNIT III: Image Restoration
Models of Image Degradation, Noise Models, Restoration in the presence of Noise, Periodic Noise Reduction, Linear, Position-Invariant Degradations, Inverse Filtering.

UNIT IV: Colour Image Processing
Fundamentals, Colour models, Pseudocolour Image Processing, Basics of Full-Colour Image Processing, Colour Transformations, Smoothening and Sharpening, Colour segmentation, Noise in Colour Images.

UNIT V: **Image Compression**

Fundamentals, Image Compression Models, Elements of Information Theory, Error Free compression, Lossy Compression, Image Compression Standards.

Text Book:

1. Digital Image Processing by Rafael E. Gonzalez & Richard E. Woods, LPE, Pearson Edu. India.

Fundamentals of Digital Image Processing by Anil. K. Jain, LPE, Pearson Edu. India.

Reference Books:

1. Digital image Processing by William .K. Pratt, John Wiley & Sons Publishe

Chhattisgarh Swami Vivekanand Technical University, Bhilai

Semester: VIIth **Branch: EEE**
Subject: Fibre Optics **Code: 325744(25)**
Total Theory Periods: 40
Total Marks in End Semester Exam: 80
Minimum number of Class tests to be conducted: 2

UNIT I: Introduction to optical communication, principle of light transmission, optical fiber modes and configuration, mode theory for circular wave guides, single mode fibers, multimode fibers, numerical aperture, mode field diameter, fiber material, fiber fabrication techniques.

UNIT II: Optical sources, LEDs, LASER diodes, Modal reflection noise, Power launching and coupling, Population inversion, Fiber splicing, Optical connectors, Photo detectors, PIN, Avalanche detectors, Response time, Avalanche multiplication noise.

UNIT III: Signal degradation in optical fibers, attenuation losses, Signal distortion in optical wave guides, material dispersion, Wave guide dispersion, Chromatic dispersion, Intermodal distortion, Pulse broadning in graded index fiber, mode coupling, Advanced fiber designs: Dispersion shifted, Dispersion flattened, Compensating fibers, Design optimization in single mode fibers.

UNIT – IV: Coherent optical fiber communication, Modulation techniques for homodyne and heterodyne systems, Optical fiber link design, Rise time budget and link power budget, Long haul systems, Bit eror rate, Line coding, NRZ,RZ, Block codes, Eye pattern.

UNIT – V: Advanced system techniques, Wavelength division multiplexing, Optical amplification, Semiconductor amplifier, EDFA comparision between semiconductor and optical amplifier, Gain bandwidth, Photonic switching, Optical networks, Optical fiber bus, Ring topology, Star architecture, FDDI and SONET standards.

TEXT BOOKS: -

1. "Optical Fibre Communication", Gerd Keiser, Mc Graw Hill International Ed.
2. Optical Fiber Communication" A.K. Ghatak & K. Tyagarajan.
3. Optical Fibre Communication: Principals and Techniques", John M. Senior, PHI New Delhi

Reference Books:-

1. Fibre Optics: Principles and Applications", N.S. Kapany, Academic Press, New York.
2. Fibre Optics System Network Applications", Terry Edwards, John Wiley & Sons.
3. Fibre Optics Test & Measurements", Dennis Drickson, Prentice Hall PTR, NJ USA.
4. Fibre Optic Communication Technology", D. Jafar, K. Mynbaev & Lowell L. Schenier, Pearson Education, Asia.it's Applications, S.C. Gupta, PHI India

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE**
Subject: Industrial Automation **Code: 325745(25)**
Total Theory Periods: 40
Total Marks in End Semester Examination: 80
Minimum number of Class tests to be conducted: Two
COURSE OBJECTIVE:

1.To explain basic Devices in Automated Systems and to distinguish different controllers employed in Automated Systems.
2. To identify safety in Industrial Automation.
3. To recognize fundamentals of programming including
- Programming
- Coils
- Contacts
- Timers and Counters
- Logical Program Development.

Course outcome:

1.Student will explain various reasons for employing automation in a manufacturing environment and describe various applications.
2.Students will be able to describe the basic function of a sensor and an actuator in an automated system and give examples of both categories.
3. Students will be able to Select an appropriate sensor and/or actuator for a given automated application.
4.Students will be able to use a Programmable Logic Controller (PLC) and embedded microcontroller, to perform specified control functions.

Unit – I: Introduction to process control

Process Control Block Diagram, Control System Evaluation, DigitalControl: Supervisory Control, Direct Digital Control, Networked Control Systems, Distributed Digital Control.Smart Sensor. Definitions of the terms used to describe process control. Data Acquisition Systems: DASHardware, DAS Software. Data Logger.

Unit – II: Controller Principles

Process Characteristics: Process Equation, Process Load, Process Lag, Self-Regulation. Control System parameters: Error, Variable Range, Control parameter Range, Control Lag,Dead Time, Cycling, Controller Modes. Discontinuous Controller Mode: Two Position Mode, MultipositionMode, Floating Control Mode. Continuous Control Mode: Proportional Control Mode, Integral ControlMode, Derivative Control Mode. Composite Control Modes: PI Control, PD Control, PID Control

Unit – III: Analog Controllers

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

Unit – IV: Programmable Logic Controller

Evaluation of PLC, PLC Architecture, Basic Structure. PLC Programming: Ladder Diagram – Ladder diagram symbols, Ladder diagram circuits. PLC Communicationsand Networking, PLC Selection: I/O quanttyt and Type, I/O Remoting requirements, Memory size and type,Programmer Units. PLC Installation, Advantages of using PLCs.

Unit – V: Distributed Control System: Introduction, Overview of Distributed Control System, DCS Softwareconfiguration, DCS Communication, DCS Supervisory Computer Tasks, DCS Integration with PLCs andComputers, Features of DCS, Advantages of DCS.

Text Books:

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

Reference Books:

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

CHHATTISGARH SWAMI VIVEKANAND TECHNICAL UNIVERSITY, BHILAI (C.G.)

Semester: VIIth **Branch: EEE**
Subject: Electrical Machine Design **Code: 325746(25)**
Total Theory Periods:
Total Marks in End Semester Exam:
Minimum number of Class tests to be conducted:

UNIT –I

Basic design principles and approaches, specification- ISI specifications for conductors, Transformer, transformer oil and induction motors. Standard specifications for rotating electrical machinery as per IEC publications, Magnetic and electric loading, out put equations and output coefficients, Main dimensions. Ratings- Machine ratings based on thermal considerations. Typical temperature gradients in transformers and three phase induction motors., Heating cooling and temperature rise, Ventilation-Methods of cooling transformer. design of tank. Types of ventilation methods of cooling 3-phase induction motors, cooling circuits and type of enclosures. Quantity of cooling medium, Air,Hydrogen, water and Oil.

UNIT-II

D C Machine: No. of poles and main dimensions, armature, windings, Magnetic circuit and Magnetisation curve, Commutator and brushes.

UNIT- III

Transformer : Magnetic circuit, core construction and design, winding types, insulation, Loss allocation and estimation, Reactance, Temperature rise. Overall dimensions and weight.

UNIT-IV

Induction Machine-3 phase: Rating specifications, standard frame sizes, Main dimensions specific loadings, Design of stator windings, Rotor design – slots and windings, calculations of equivalent circuit parameters.

UNIT-V

Synchronous Machine: Main dimensions, Magnetisation characteristic, Field winding design.

Text Books:

1. A Course in Electrical Machine Design A. K. Sawhney, Dhanpat Rai.
2. Principles of Electrical Machine Design, R. K. Aggarwal, S. K. Kataria & Sons.

Referance Book

1. Design of Electrical Machine By V.N. Mittle
2. Performance & design of A.C. Machines By M.G.Say