C24_CURRICULUM

DIPLOMA IN

ELECTRICAL AND ELECTRONICS ENGINEERING

Offered By

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING

TELANGANA : HYDERABAD

IV SEMESTER

S. NO	Course		Teaching Scheme					Examination Scheme						
			Instruction Periods per week			Total Periods per semester	Credits	Continuous Internal Evaluation (CIE)			Semester End Examination (SEE)			
	Code	Course Name	L	T	P			Mid Sem 1	Mid Sem 2	Internal Evaluation	Max marks	Min marks	Total Marks	Min marks for passing including internal
1	SC-401	Advanced Engineering Mathematics	4	1	0	75	2.5	20	20	20	40	14	100	End Marks shall be ≥35% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
2	EC-402	Microprocessors & Microcontrollers	4	1	0	75	2.5	20	20	20	40	14	100	
3	EE-403	Ac Machines	4	1	0	75	2.5	20	20	20	40	14	100	
4	EE-404	Electrical Estimation & Installation	4	1	0	75	2.5	20	20	20	40	14	100	
5	EE-405	Electrical Power Systems - T & D	4	1	0	75	2.5	20	20	20	40	14	100	
6	ME-416	Basic Mechanical Engineering	4	1	0	75	2.5	20	20	20	40	14	100	
7	EE-407	Electrical Wiring & Installation Lab	1	0	2	45	1.25	20	20	20	40	20	100	End Marks shall be ≥50% of Topper Marks and Subject Total Shall be ≥ D-Hybrid Grade Minimum
8	EE-408	Ac Machines Lab	1	0	2	45	1.25	20	20	20	40	20	100	
9	EE-409	Cad Lab	1	0	2	45	1.25	20	20	20	40	20	100	
10	HU-410	Employability Skills Lab	1	0	2	45	1.25	20	20	20	40	20	100	
			28	6	8	630	20	200	200	200	400	164	1000	

SC-401 - ADVANCED ENGINEERING MATHEMATICS

Course Title	Advanced Engineering Mathematics	Course Code	SC-401
Semester	IV	Course Group	Foundation
Teaching Scheme in Periods (L : T : P)	4:1:0	Credits	2.5
Methodology	Lecture + Tutorial	Total Contact Periods	75
CIE	60 Marks	SEE	40 Marks

Pre requisites:

This course requires the knowledge of Engineering Mathematics at Diploma first year level and Applied Engineering Mathematics at Diploma 3rd Semester level.

Course Outcomes (Cos):

At the end of the course, the student will have the ability to:

CO 1	Solve Differential Equations of first order and first degree with appropriate method
CO 2	Solve the higher order Homogeneous Linear Differential Equations with constant coefficients.
CO 3	Solve the Higher order Non-Homogeneous Linear Differential Equations with constant coefficients.
CO 4	Expand given functions as a Fourier Series in the given intervals.
CO 5	Find the Laplace Transforms of simple functions using its properties.
CO 6	Solve Linear Differential Equations with constant coefficient by using Laplace and inverse Laplace Transformations.

Course Contents:

Unit – I **Duration: 15 Periods (L:12 – T:3)**

Differential Equations of First Order and First Degree:

Definition of a Differential Equation - Order and Degree of a Differential Equations-Formation of Differential Equations - Solutions of Ordinary Differential Equations of first order and first degree: Variable Separable Method, Homogeneous Differential Equations, Exact Differential Equations, Linear Differential Equations and Bernoulli's Equation-Problems leading to engineering applications by using above methods.

Unit – II **Duration: 10 Periods (L: 8– T:2)**

Higher order Homogeneous Linear Differential Equations with constant coefficients:

Homogenous Linear Differential Equations with constant coefficients of second and higher order- - Problems leading to engineering applications.

Unit-III **Duration: 12 Periods (L: 10 – T: 2)**

Higher order Non-Homogeneous Linear Differential Equations with constant coefficients:

Complimentary Function (C.F), Particular Integral (P.I) and General Solution (G.S) of Non-Homogeneous Linear Differential Equations with constant coefficients- Second and Higher order Non-Homogenous Linear Differential Equations with constant coefficients of the form $f(D)y = X$, where $f(D)$ is a polynomial in D and X is in the form k(a constant), e^{ax}, Sin (ax), Cos ax, x^n (n= 1,2,3)- Related engineering problems with emphasis on second order Non-Homogeneous Linear Differential Equations.

Unit – IV

Fourier Series: **Duration: 13 Periods (L:10 – T:3)**

Periodic functions - Orthogonality Property of Trigonometric functions - Representation of a function as Fourier series over the interval $(c, c + 2\pi)$ - Euler's formulae - Sufficient conditions for existence of Fourier series for a function $f(x)$ - Fourier series of functions over the interval $(0, 2\pi)$ and $(-\pi, \pi)$ - Fourier series of odd and even functions in the interval $(-\pi, \pi)$.

Unit – V

Laplace Transformations: **Duration: 12 Periods (L: 10 – T: 2)**

Definition of Laplace Transform -Sufficient conditions for Existence of Laplace Transform, Laplace Transform of some elementary functions -Linearity Property -First Shifting Theorem - Laplace Transforms of Derivatives - Laplace Transforms of Integrals - Multiplication t^n-Division by t - Related problems.

Unit – VI **Duration: 13 Periods (L:10 – T:3)**

Inverse Laplace transforms and Applications of Laplace Transformations:

Definition of Inverse Laplace Transform- Inverse Laplace Transform of elementary functions – Linearity Property – First Shifting Theorem - Inverse Laplace Transforms by using Partial fractions -Inverse Laplace Transform of Derivatives - Inverse Laplace Transform of Integrals - Multiplication by s^n Division by s- Definition of Convolution of two functions –Convolution Theorem (without proof) and its Applications - Applications of Laplace Transforms in solving Second order Linear Differential Equations with constant coefficients under the Initial conditions-Problems leading to engineering applications.

Reference Books:

1. Advanced Engineering Mathematics-Erwin Kreyszig, John Wiley Publications.
2. Advanced Engineering Mathematics- R.K. Jain and S.R.K. Iyengar, Narosa Publications.
3. Higher Engineering Mathematics-B.S.Grewal, Khanna Publications.
4. Laplace Transforms - Murray R. Spigel, Schaum's Outline Series, McGRAW-HILL.
5. Integral Transforms – A.R. Vasishtha and R. K. Gupta,KrishnanPrakashan Publications.

Suggested E-Learning references:

1. https://www.khanacademy.org/
2. https://www.wolframalpha.com/
3. https://onlinecourses.swayam2.ac.in/
4. http://tutorial.math.lamar.edu/

Suggested Learning Outcomes:

At the end of the course, the student will have the ability to:

1.0 Solve Differential Equations in engineering problems

1.1 Explain the concept of Differential Equations.

1.2 Classify the Differential Equations.

1.3 Find the order and degree of Differential Equations.

1.4 Form a Differential Equation by eliminating arbitrary constants.

1.5 Solve the first order first degree Differential Equations by using Variables Separable Method.

1.6 Solve the first order first degree Homogeneous Differential Equations.

1.7 Solve the first order first degree Exact Differential Equations

1.8 Solve the first order Linear Differential Equation of the form $\frac{dy}{dx} + \text{Py} = \text{Q}$,where P and Q are functions in *x* alone or constants.

1.9 Solve the first order Bernoulli's equations of the form $\frac{dy}{dx} + \text{Py} = \text{Q}y^n$,where P and Q are Functions of *x* alone or constants.

1.10 Solve the problems leading to engineering applications by using above methods.

2.0. Solve the Higher order Homogeneous Linear Differential Equations with constant coefficients.

2.1 Solve Differential Equations of the type:$a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + c = 0$,where *a*, *b* and *c* are constants, when the roots of the Auxiliary Equation are real & distinct.

2.2. Solve Differential Equations of the type:$a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + c = 0$,where *a*, *b* and *c* are constants, when the roots of the Auxiliary Equation are real & equal.

2.3 Solve Differential Equations of the type: $a\frac{d^2y}{dx^2} + b\frac{dy}{dx} + c = 0$,where *a*, *b* and *c* are constants, when the roots of the Auxiliary Equation are complex conjugate pair.

2.4 Solve the Higher order Homogeneous Linear Differential Equations with constant coefficients.

3.0. Solve the Higher order Non-Homogeneous Linear Differential Equations with constant coefficients.

3.1 Explain the concept of Complementary Function and Particular Integral to get General Solution of Non-Homogeneous Linear Differential Equation with constant coefficients.

3.2 Solve the Higher order Non-Homogeneous Linear Differential Equations of the type $f(D)\ y = X$, where $f(D)$ is a polynomial in D and X is a function of the form: k (constant) and e^{ax}.

3.3 Solve the Higher order Non-Homogeneous Linear Differential Equations of the type $f(D)\ y = X$, where $f(D)$ is a polynomial in D and X is a function of the form: Sin ax and Cos ax.

3.4 Solve the Higher order Non-Homogeneous Linear Differential Equations of the type $f(D)\ y = X$, where $f(D)$ is a polynomial in D and X is a function of the form x^n (n = 1, 2, 3).

3.5 Solve engineering problems with emphasis on second order Non-Homogeneous Linear Differential Equations by using above methods.

4.0 Expand given functions as a Fourier Series in the given intervals.

4.1 Define Periodic function with examples

4.2 Explain the Orthogonality Property of functions in an interval.

4.3 Define the Fourier series of a function in the interval $(c, c+2\pi)$ and state Euler's Formulae for determining the Fourier coefficients.

4.4 Write the sufficient conditions for the existence of Fourier series for a function.

4.5 Expand Fourier series of functions in the range $(0, 2\pi)$ and $(-\pi, \pi)$.

4.6 Expand Fourier series for even and odd functions in the interval $(-\pi, \pi)$.

5.0. Understand the Laplace Transforms:

5.1 Define Laplace Transform.

5.2 Explain sufficient conditions for existence of Laplace Transform.

5.3 Obtain Laplace Transforms of some elementary functions.

5.4 State the Linearity Property of Laplace transforms.

5.5 State the First Shifting Theorem on Laplace Transforms.

5.6 Explain the Laplace transform of $f'(t)$ and $f^{(n)}(t)$ in terms of Laplace transform of $f(t)$.

5.7 Explain the Laplace transform of $\int_0^t f(u)du$ in terms of Laplace transform of $f(t)$.

5.8 Explain the Laplace transform of $t^n f(t)$ in terms of Laplace transform of $f(t)$.

5.9 Explain the Laplace transform of $\frac{f(t)}{t}$ in terms of Laplace transform of $f(t)$.

5.10 Solve problems on above methods.

6.0 Understand the Inverse Laplace transforms:

6.1 Define Inverse Laplace Transform and write Inverse Laplace Transforms of standard functions.

6.2 State the Linearity Property of Inverse Laplace transforms.

6.3 State the First Shifting Theorem on Inverse Laplace Transforms.

6.4 Solve problems on Inverse Laplace transforms using Partial fractions.

6.5 Explain Inverse Laplace transforms of the functions: $s^n f(s), \frac{f(s)}{s}$, $f^{(n)}(s)$, $\int_s^\infty f(u)du$.

6.6 Solve the problems on 6.2, 6.3, 6.4 and 6.5.

6.7 Acquire the knowledge of convolution of two functions and state the convolution theorem.

6.8 Evaluate Inverse Laplace transforms of simple functions using Convolution Theorem.

6.9 Use Laplace and Inverse Laplace Transforms to solve second order Linear Differential Equations with constant coefficients under the initial conditions.

6.10 Solve the problems leading to engineering applications.

Suggested Student Activities:

1. Student visits Library to refer Standard Books on Mathematics and collect related material.

2.Quiz.

3. Group discussion.

4. Group Tests.

5. Surprise tests.

6. Seminars.

7. Home Assignments.

8. Mathematics for preparing competitive exams and solving old question papers on Arithmetical ability.

CO-PO Mapping Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapped POs
CO1	3	2	1				3	1,2,3, 7
CO2	3	2					3	1,2, 7
CO3	3	2					3	1,2, 7
CO4	3	2	1				3	1,2, 3,7
CO5	3	2	1				3	1,2, 3,7
CO6	3	2	1				3	1,2,3,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-401
SEMESTER IV, MID –I EXAM, MODEL PAPER
ADVANCED ENGINEERING MATHEMATICS
(Open Book System)

Duration : 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04

2 Each question carries **ONE** mark.

1. Find the order and degree of the differential Equation $\left(\frac{d^3y}{dx^3}\right)^4 + 3\left(\frac{d^2y}{dx^2}\right)^3 - 5\frac{dy}{dx} + y = 0.$
2. Find the Integrating Factor of $(1+x^2)\frac{dy}{dx} + 2xy = \frac{1}{1+x^2}.$
3. Find the roots of auxiliary equation of the differential equation $(2D^2 + 5D - 3)y = 0.$
4. Write the auxiliary equation of the differential equation $a_3\frac{d^3y}{dx^3} + a_2\frac{d^2y}{dx^2} + a_1\frac{dy}{dx} + a_0y = 0.$

PART-B

Instructions: 1. Answer **ALL**questions. 02 × 03 = 06

2. Each question carries **THREE** marks.

5(a) Form the differential equation by eliminating arbitrary constants A and B in the family of curves $y = Acos\,mx + Bsin\,mx$, where *m* is a constant.

OR

5(b) Solve $\frac{dy}{dx} - ytanx = 0.$

6(a) Solve $6\frac{d^2x}{dt^2} - \frac{dx}{dt} - 2x = 0.$

OR

6(b) Solve $(D^2-4)^2y = 0.$

PART- C

Instructions: 1. Answer **ALL** questions 02 × 05 = 10

2. Each question carries **FIVE** marks

7(a) Solve $xy^3dy = (x^4 + y^4)dx.$

OR

7(b) Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + siny)dy = 0.$

8(a) Solve $(D^3 + 3D^2 - 4)y = 0.$

OR

8 b) Solve $(D^3 - 8)y = 0.$

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA EXAMINATIONS (C - 24)
SC-401
SEMESTER IV, MID –II EXAM, MODEL PAPER
ADVANCED ENGINEERING MATHEMATICS
(Open Book System)

Duration: 1: 00 Hour **Max. Marks: 20**

PART-A

Instructions: 1. Answer **ALL** questions. 04 × 01 = 04

2. Each question carries **ONE** mark.

1. Find the Particular Integral of $(D^2 - 5D + 6)y = e^{-x}$.
2. Find the Complementary Function of $2\frac{d^2y}{dx^2} + 3\frac{dy}{dx} - 5y = 6 \sin 2x$.
3. Find a_0 for f(x) = x Cos x in $-\pi < x < \pi$.
4. Find b_1 for f(x) =x in $0 < x < 2\pi$.

PART-B

Instructions: 1. Answer **ALL** questions. 02 × 03 = 06

2. Each question carries **THREE** marks.

(a) Find Particular Integral of $(D^2 - D - 6)y = e^x cosh 3x$.

OR

(b) Solve $(D^2 + 2025)y = \sin 45x$.

(a) Calculate a_1 in the Fourier series expansion of $f(x) = x \sin x$ in the interval $(-\pi, \pi)$.

OR

(b) Find the value of b_n in the expansion of Fourier series for the function f(x) = e^{3x}, where $0 < x < 2\pi$.

PART- C

Instructions: 1. Answer **ALL** questions 02 × 05 = 10

2. Each question carries **FIVE** marks

(a) Solve $(D^2 - 3D + 2)y = e^x$ if y = 3 and $\frac{dy}{dx} = 3$, when x = 0.

OR

(b) Solve $y'' + y = x, y(0) = y'(0) = 1$.

(a) Obtain Fourier series expansion of $|x^3|$ in the interval $(-\pi, \pi)$.

OR

(b) Obtain Fourier series expansion of $f(x) = \begin{cases} x \ if \ 0 < x < \pi \\ 2 \ if \ \pi < x < 2\pi \end{cases}$.

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DIPLOMA EXAMINATIONS (C - 24)
SC-401
SEMESTER IV, SEMESTER END EXAM, MODEL PAPER
ADVANCED ENGINEERING MATHEMATICS

(Open Book System)

Duration: 2: 00 Hours **Max. Marks: 40**

PART-A

Instructions: 1. Answer **ALL** questions. 08 × 01 = 08
2 Each question carries **ONE** mark.

1. Find the order and degree of the Differential Equation $2y''' - 3y' = y$.
2. Find the Particular Integral of $(D^2 + 1)y = e^{\frac{x}{2}}$
3. Find $L(e^{-5t} + 7)$.
4. Verify the differential equation $(x + 2y - 2025)dy - (2x - y + 2024)dx = 0$ is homogeneous or not.
5. Find $L(5\cos 3t + 7\sinh 2t)$.
6. Find $L(te^{\omega t})$.
7. Find $L^{-1}\left(\frac{s}{s^2+81}\right)$.
8. Find $L^{-1}\left(\frac{3}{(s-3)^2}\right)$.

PART-B

Instructions: 1. Answer **ALL** questions. 04 × 03 = 12
2. Each question carries **THREE** marks.

9(a) Solve $(9D^2 - 24D + 16)y = 0$.

OR

9(b) Evaluate $L(2\cos^2 3t)$.

10(a) Solve $(D^2 + D - 2)y = 16$.

OR

10(b) Evaluate $L^{-1}\left(\frac{6}{s^2-4s+7}\right)$.

11(a) Evaluate $L(2\cos^2 3t)$.

OR

11(b) Evaluate $L(5e^{3t}\cosh 2t)$.

12(a) Evaluate $L^{-1}\left(\log\left(\frac{s-2}{s+3}\right)\right)$.

OR

12(b) Evaluate $L^{-1}\left(\frac{1}{s^2(16+s^2)}\right)$.

PART- C

Instructions: 1. Answer **ALL** questions. 04 × 05 = 20

2. Each question carries **FIVE** marks.

13(a) Solve: $x\log x\frac{dy}{dx} + y = \frac{\log x}{x}$.

OR

13(b) Evaluate $\mathrm{L}\left[e^{2t}\left(\frac{1-\cos 3t}{t}\right)\right]$.

14(a) Obtain the Fourier series expansion of the function f(x) = $|\sin x|$ in $(-\pi, \pi)$.

OR

14(b) Evaluate $L^{-1}\left(\frac{s}{(s+1)^2(s^2+1)}\right)$.

15(a) Evaluate $L(f(t))$, where $f(t) = \begin{cases} t & if\ 0 \le t < 2 \\ 3 & if\ t \ge 2 \end{cases}$.

OR

15(b) Evaluate $L\left((t^2 + 2t + 3)\sin 2t\right)$.

16(a) Evaluate$L^{-1}\left(\frac{1}{(s+1)(s+3)}\right)$ using Convolution Theorem.

OR

16(b) Solve the Differential Equation $\frac{d^2x}{dt^2} + 4x = 0$, when $y(0) = y'(0) = 1$ by using Laplace Transform method.

EC-402: MICROPROCESSORS AND MICROCONTROLLERS

Course Title	Microprocessors and Microcontrollers	Course Code	EC-402
Semester	IV	Course Group	Core
Teaching Scheme in Hrs (L:T:P)	4:1:0	Credits	2.5
Methodology	Lecture + Assignments	Total Contact Hours	75
CIE	60 Marks	SEE	40 Marks

Prerequisites: This course requires the basic knowledge of Digital Electronics

Course Outcomes: Upon completion of the course the student shall be able to

CO	**Course Outcome**
CO1	Comprehend the Architecture of 8085
CO2	Comprehend the Architecture of 8051
CO3	Learn addressing modes and instruction set of 8051
CO4	Use 8051 microcontroller instruction set to write Assembly Programs
CO5	Use of various Interfacing devices
CO6	Use 8051 in various applications

Course content and Blue Print of marks for Semester End Examination (SEE)

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>I</td><td>Architecture of 8085 Microprocessor</td><td>12</td><td rowspan="6">Q4</td><td colspan="2" rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>II</td><td>Architecture of 8051 Microcontroller</td><td>17</td></tr>
<tr><td>III</td><td>Addressing modes and Instructionsetof8051</td><td>12</td><td colspan="2" rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>IV</td><td>Programmingof8051</td><td>12</td></tr>
<tr><td>V</td><td>Interfacing Devices</td><td>12</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),Q11(a), Q11(b)</td><td>Q13(b),Q15(a), Q15(b)</td></tr>
<tr><td>VI</td><td>Applications of 8051 Microcontroller</td><td>10</td><td>Q7,Q8</td><td>Q10(b),Q12(a), Q12(b)</td><td>Q14(b),Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course content:

UNIT –1: Architecture of 8085 Microprocessor

Duration: 10 Periods (L: 8 T:2)

Block Diagram of Microcomputer and functions of various blocks – Functional block diagram of 8085 Microprocessor and its working- Different types of buses in microprocessor system – Demultiplexing of Address/ Data Bus- Fetch Cycle, Execution Cycle, Instruction Cycle, Machine Cycle – Fetching and execution of an instruction

UNIT – 2:Architecture of 8051 Microcontroller

Duration: 15 Periods (L: 12 T:3)

Differences between Microprocessors and Microcontrollers -Features of 8051 Microcontroller – Functional block diagram of 8051 Microcontroller and its working – Organization of Program and Data memories –Operation of Timers, Serial Ports – Interrupt system of 8051 – Pin diagram of 8051 and function of each pin

UNIT– 3: Addressing modes and Instruction set of 8051

Duration: 12 Periods (L: 10 T:2)

Types of Computer Languages, High Level and Low Level – Machine Language and Assembly Language – Various addressing modes of 8051 – Assembly Instruction Format – Opcode and Operand – Instruction set of 8051- Data Transfer, Arithmetic, Logical, Boolean, Branch Group Instructions – Instruction size – How various instructions affect flags

UNIT – 4: Programming of 8051

Duration: 13 Periods (L: 9 T:3)

Flowcharts – Simple programs for 8051 involving addition, subtraction, multiplication, division, logical, boolean operations – Finding largest, smallest numbers in a series – programs using counter technique – Subroutine and it use – Types of subroutines – How 8051 handles subroutines – Various types of Debugging

UNIT – 5: Interfacing Devices

Duration: 12 Periods (L: 10 T:2)

Meaning and need for Interfacing – Non-Programmable and Programmable interfacing devices – Parallel Communication - Working of 8255 PPI – Serial Communication – Working of 8251 USART – DMA Concept – Working of 8257 DMA Controller – Need for interrupts

UNIT – 6: Applications of 8051 Microcontroller

Duration: 13 Periods (L: 7 T:3)

Interfacing various devices like Push Buttons, LEDs, Relays, 4X4 matrix Key Board, 7 Segment display unit, LCD

Recommended books

1. Microprocessor Architecture, Programming and Applications with 8085 By Ramesh S Gaonkar (Prentice Hall Publications)
2. Introduction to Microprocessors by A.P.Mathur
3. Fundamentals of Microprocessors and Microcontrollers by B.Ram
4. The 8051 Microcontroller and Embedded systems by Muhammad Ali Mazidi, JaniceGillispie Mazidi, Rolin D. McKinlay (Pearson Publications)
5. The8051 MicrocontrollerbyKennethJ. Ayala (ThomsonDelmar Publications)
6. 8051 Microcontroller – Internals, Instructions, Programming & Interfacing by Subrata Ghoshal
7. 8051 Microcontroller Architecture, Programming and Applications by M.Mahalakshmi (Mahalakshmi Publications)

Suggested e-learning resources

1. www.nptel.com
2. www.electronics4u.com
3. www.guvi.in/courses/robotics/micro-controllers-and-micro-processors/
4. www.electronics-tutorials.ws

Suggested Learning Outcomes

CO1: Comprehend the Architecture of 8085 Microprocessor

1.1 Draw the Block Diagram of a Microcomputer and explain the function of each block.
1.2 Define Microprocessor and know the evolution of various Microprocessors (Intel, Motorola, Zilog, AMD etc)
1.3 Define the terms Address Bus, Data Bus, Control Bus and knowmeaning of System Bus
1.4 Draw the functional Block Diagram of 8085 Microprocessor
1.5 Explain the functions of various units of 8085 µp (Data Registers, Program Counter, ALU, PSW/ Flag Register, Instruction Register, Instruction Decoder, Timing & Control Unit, Interrupt Control, Serial I/O Control)
1.6 Explain the purpose of Stack in a µp based system and use of Stack Pointer
1.7 Illustrate De-multiplexing of Address / Data Bus using a Latch
1.8 Understand the terms Fetch Cycle, Execution Cycle, Instruction Cycle, Machine Cycle, Bus Cycle
1.9 Explain the process of fetching and executing a program by 8085 µp

CO:2 Comprehend the Architecture of 8051 microcontroller

2.1 Differentiate Microprocessors and Microcontrollers.
2.2 Compare various Intel Microcontrollers.
2.3 List features of 8051 Microcontroller.
2.4 Draw the functional Block Diagram of 8051 Microcontroller
2.5 Explain functions of various units of 8051 Microcontroller (General Purpose Registers, Oscillator, ALU, PSW, Instruction Register, Timing and Control Unit, Internal ROM & RAM, Program Counter, Stack Pointer, Data Pointer, Parallel Ports, Serial Port)
2.6 List various Special Function Registers (SFRs) and explain their purpose
2.7 Organization of Program Memory, Data Memory of 8051
2.8 Illustrate Demultiplexing of Address Bus/ Data Bus in 8051
2.9 List Timers of 8051 and explain their operating modes.
2.10 Explain Serial Port modes of operation.
2.11 Explain Interrupt system of 8051.
2.12 Draw the pin Diagram of 8051 Microcontroller.
2.13 List functions various pins of 8051.

CO3: Learn addressing modes and instruction set of 8051

3.1 Define High Level and Low-Level Languages and differentiate them.
3.2 Define the 2 types of Low-Level Languages (Machine Language and Assembly Language)
3.3 Define the term Addressing Mode.
3.4 List and explain various addressing modes of 8051 with examples
3.5 Write the instruction format of 8051
3.6 Define the terms Opcode, Operand
3.7 Define Instruction set and list various groups in the Instruction set of 8051
3.8 Explain Data Transfer Instructions used in 8051
3.9 Explain Arithmetic Instructions used in 8051
3.10 Explain Logical Instructions used in 8051
3.11 Explain Boolean Instructions used in 8051
3.12 Explain Branch Instructions used in 8051
3.13 Classify instructions of 8051 based on their size (1-byte, 2-bye, 3-bye instructions)
3.14 Describe how various instructions affect the Flags in 8051

CO4: Use 8051 microcontroller instruction set to write Assembly Programs

4.1 Write Assembly Language programs for 8051 like

i) Addition of Two 8-bit numbers (with various operands): Sum 8/ 16 bits
ii) Subtraction of Two 8-bit numbers (with various operands): Difference 8/ 16 bits
iii) Multiplication/ Division of Two 8-bit numbers
iv) AND/ OR/ XOR/ Complement operations on 8-bit data
v) Boolean operations
vi) Sum of a series of numbers
vii) Double byte/ multibyte addition/ subtraction
viii) Sum of 1st 'n' natural numbers
ix) To find Largest/ Smallest number in a series
x) Setting up time delay using counter technique

4.2 What is a Subroutine and write its need
4.3 Use of LCALL/ ACALL and RET instructions
4.4 Describe the sequence of things that happen when a subroutine is called and executed
4.5 Concept of Nesting, Multiple ending in subroutines
4.6 What is debugging of a program?
4.7 Explain about single step, break point debugging techniques

CO5: Use of various Interfacing devices

5.1 Define interfacing
5.2 State the need for interfacing devices
5.3 Classify various interfacing devices (Non-programmable and Programmable Interfacing devices)
5.4 Detail about Parallel Communication
5.5 Draw the Block Diagram of 8255 PPI and explain its working
5.6 Draw the control word format of 8255 and explain various modes of operation
5.7 Know the importance of serial communication and its types (Synchronous and Asynchronous)
5.8 Know RS 232 standard and function of various pins on 9 pin RS 232 connector.
5.9 Draw the Block Diagram of 8251 USART and explain its operation
5.10 What is Direct Memory Access (DMA) data transfer and its importance?
5.11 Draw the Block Diagram of 8257 DMA Controller and explain its operation
5.12 What is Interrupt and how it is handled by Microprocessor/ Microcontroller?

CO6: Use 8051 in various applications

6.1 Interface pushbutton switches to 8051
6.2 Interface LEDs to 8051
6.3 Interface relay to 8051
6.4 List the functions of various pins of LCD
6.5 Write command codes for programming an LCD
6.6 Interface LCD to 8051
6.7 Know key press and detect mechanism
6.8 Define Key bounce and Key de-bounce effect
6.9 List Key de-bounce techniques
6.10 Explain Key de-bounce techniques – Hardware and Software techniques
6.11 Interface 4X4 matrix keyboard to 8051
6.12 Interface 7-segment display to 8051
6.13 Write programs for above

Suggested student Activities:

1. Find out latest Microprocessors and Microcontrollers
2. Identify various architectural advancements in latest Microprocessors and Microcontrollers
3. Interface various I/O Devices to Microprocessor/ Microcontroller

CO-PO MAPPING

	Basic and Discipline Specific Knowledge	Problem Analysis	Design/Development of Solutions	EngineeringTools, Experimentation and Testing	Engineering Practices forSociety, Sustainability and Environment	Project Management	Lifelong Learning	Linked PO
CO	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	
CO1	2		1					1, 3
CO2	2		2					1, 3
CO3	1	1	2	1				1, 2, 3, 4
CO4	1	3	1	2		2		1, 2, 3, 4, 6
CO5	2		2	2				1, 3, 4
CO6	2	2	2	3		1	1	1, 2, 3, 4, 6, 7

EE-403 AC MACHINES

Course Title:	**AC Machines**	Course Code	**EE-403**
Semester	**IV Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**60:15:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires knowledge on working of different types of motors and switches.

Course Outcomes

CO1 :	Illustrate the construction and working of single phase transformer
CO2 :	Determine the Equivalent circuit parameters of a single phase transformer
CO3 :	Evaluate the performance of single phase transformers
CO4 :	Demonstrate the construction of three phase transformers and their applications
CO5 :	Illustrate the construction and working of alternators
CO6 :	Analyze the behavior of alternators

Blue Print of Marks for SEE

Unit No	**Unit Name**	**Periods**	**Questions to be set for SEE**				
			R			**U**	**A**
1	Fundamentals of Single Phase Transformers	10	Q4	Q1		Q9(a)	Q13(a)
2	Tests on single phase transformers	15					
3	Performance of single phase transformers	15		Q2		Q10(a)	Q14(a)
4	Three phase transformers	10					
5	Fundamentals of Alternators	15		Q3	Q5,Q6	Q9(b), Q11(a), Q11(b)	Q13(b), Q15(a), Q15(b)
6	Performance of alternators	10			Q7,Q8	Q10(b), Q12(a), Q12(b)	Q14(b), Q16(a), Q16(b)
Total		75	8			8	8

Course Contents

UNIT 1 : Fundamentals of single phase Transformer Duration: 10 Periods (L: 8 - T: 2)

Introduction to transformer-Classifications of transformers,-Construction of transformers-Theory of an ideal transformer –EMF equation derivation –Problems on calculation of EMF-Transformer ratio-Special transformers- expression for copper saving –applications

UNIT 2 :Tests on single phase transformers Duration: 15 Periods (L:12 - T:3)

Working of Transformer on no load – Vector Diagram –Working of Transformer on load – Vector Diagram-Equivalent circuit of transformer-Short circuit test-Open circuit test-Determination of Equivalent circuit parameters-Problems – Sumpner's test

UNIT 3 Performance of single phase transformers Duration: 15 Periods (L: 12 - T: 3)

Regulation-Derivation of approximate equation for regulation based on vector diagram for lagging, leading, unity power factor – Numerical problems on regulation-efficiency- condition for maximum efficiency – problems on efficiency- Calculation of all day efficiency for a given load cycle-problems on all day efficiency

UNIT 4 Three Phase Transformers Duration: 10 Periods (L: 8 - T: 2)

Three Phase Transformers-Construction-Different transformer configurations-Applications of different transformer configurations-parallel operation -Tap changing gear - NO load and ON load tap changing procedure- Applications of three phase transformers.

UNIT 5 Alternators Duration: 15 Periods (L:10 - T: 5)

Alternators –Types of alternators – Brief description of parts with sketches and function of each part, construction- Specifications-Assembly - Exciter and pilot exciter - Stationary armature type construction - Advantages, Concentrated and distributed windings - short pitch and full pitch coils - Effect of chording and distribution factors - EMF equation - Derivation – Problems- phasor diagram for unity, lagging and leading power factor loads.

UNIT 6 Performance of Alternators Duration: 10 Periods (L: 8 – T: 2)

Regulation – Different methods of finding regulation- Calculation of regulation by synchronous impedance method- Necessity for parallel operation –Condition to be fulfilled for Synchronization, Synchronization by lamp methods – Procedure to connect a –Load sharing -Effect of change in excitation and input of an alternator connected to infinite bus.

Reference Books

1. B.L. Theraja-Electrical Technology – Vol –II S.Chand& Co.
2. M.G Say –AC machines
3. P.S. Bhimbra–Electrical machines – Khanna Publishers
4. A.E. Fritzgerald, C. Kingsley and S. Umans Electrical machinery-McGraw Hill
5. MV Deshpande-Electric machines – Wheeler publishing.
6. BR Gupta and VandanaSinghal– Fundamentals of Electric machines

Suggested E-learning references

1. http://electrical4u.com/
2. www.nptel.ac.in
3. https://www.siemens.com/content/dam/internet/siemens-com/global/products-services

Suggested Learning Outcomes

Upon completion of the course, the student shall be able to

CO1: Illustrate the construction and working of single phase transformer

1.1 Define the word 'Transformer'
1.2 Explain the working principle of single-phase transformer.
1.3 State the reasons for not operating transformer on DC Supply
1.4 Classify the transformers based on Number of phases
1.5 Classify the transformers based on Construction
1.6 Classify the transformers based on Function
1.7 Demonstrate about core type transformer
1.8 Demonstrate about the shell type transformer.
1.9 Distinguish between core type and shell type of transformers.
1.10 Define an Ideal Transformer
1.11 Derive an E.M.F equation of a single phase transformer.
1.12 Solve problems on EMF equation
1.13 Define Turns Ratio of transformer
1.14 Define Voltage transformation Ratio of transformer
1.15 Define Current transformation Ratio of transformer
1.16 List the special transformers used in industry.
1.17 Define an Auto transformer
1.18 Write the expression for saving of copper in auto transformer
1.19 List the advantages of autotransformers.
1.20 List the disadvantages of autotransformers.
1.21 List the applications of transformers

CO2: Determine the Equivalent circuit parameters of a single phase transformer

2.1 Explain working of transformer on No-Load with the help of its vector diagram.
2.2 Demonstrate the working of transformer on Load with the help of vector diagram at
2.3 a) Unity power factor b) Lagging power factor c) leading power factor
2.4 List the losses that occur in a transformer.
2.5 Write the formulae for effective resistance and leakage resistance towards primary and secondary of a transformer.
2.6 State the significance of air gap
2.7 Draw the equivalent circuit of a transformer by approximation
2.8 Evaluate the equivalent circuit parameters by conducting No-load test on a single phase transformer.
2.9 Evaluate the equivalent circuit parameters by conducting short circuit test on a single phase transformer.
2.10 Solve simple problems on the computing the equivalent circuit parameters of a single phase transformer
2.11 Identify the terminals of a single-phase transformer by conducting the polarity test.
2.12 Evaluate the performance of a single phase transformer by conducting Sumpner's test.
2.13 Determine the break down voltage of transformer oil by conducting a relevant test.

CO3:Evaluate the performance of single phase transformers

3.1. Define Regulation
3.2. Derive the approximate equation to find regulation of a single-phase transformer.
3.3. Solve problems to calculate the regulation of a single-phase transformer for loads at
a) Unity power factor b) lagging power factor c) leading power factor.
3.4. State the reason for using KVA as unit for transformer rating.
3.5. Derive efficiency of a single phase transformer.
3.6. Determine the condition for maximum efficiency of a single phase transformer
3.7. Solve problems for calculating the efficiency of a transformer.
3.8. Define all day efficiency.
3.9. Solve numerical problems for calculating all day efficiency.
3.10. Define Distribution transformer.
3.11. Define Power Transformer.
3.12. Differentiate between distribution transformer and power transformer.
3.13. Mention the reasons for failures of a transformer
3.14. State the reasons for humming noise near a transformer and the methods to reduce the noise

CO4: Illustrate the construction of three phase transformers and their applications

4.1. State the advantages of 3 phase transformer over single phase transformer
4.2. List the different types of three phase transformers by giving their symbolic representation and voltage relationships.
4.3. List the applications of star-star transformer
4.4. List the applications of delta-star transformers

4.5. List the applications of star-delta transformers
4.6. List the applications of delta-delta transformers
4.7. State the need for parallel operation of transformer.
4.8. Mention the specifications of a transformer
4.9. State the Benefits of using amorphous core in a transformer
4.10. Mention the conditions for parallel operation and load sharing of transformers.
4.11. Draw a legible sketch of a power transformer
4.12. Explain the function of each part of a power transformer.
4.13. State the necessity of cooling of power transformers.
4.14. Explain the methods of cooling of power transformer.
4.15. Explain the 'ON load' and 'OFF load' tap changing.
4.16. Demonstrate the procedure for on load tap changing and no load tap changer
4.17. Mention the purpose of application of a transformer as phase shifter
4.18. Mention the purpose of application of a transformer in HVDC Transmission.
4.19. State the purpose of application of a transformer in traction.

CO5: Illustrate the construction and working of alternators

5.1. Explain the Principle of working of Alternators
5.2. Describe the constructional details of Alternators with legible sketch.
5.3. Classify the alternators based on rotor construction
5.4. Describe the construction and working of Cylindrical rotor alternator
5.5. Describe the construction and working of salient pole rotor alternator
5.6. State the specifications of an alternator
5.7. State the advantage of Stationary Armature.
5.8. List the main parts of alternator
5.9. Mention the materials used for different parts of an alternator
5.10. Derive the expression for Chording factor
5.11. State the effect of chording factor
5.12. Derive the expression for Distribution factor
5.13. State the effect of Distribution factor
5.14. Derive EMF equation of an alternator taking into account distribution factor and pitch factor.
5.15. Solve simple problems on EMF equation
5.16. State the need for an exciter in an Alternator.
5.17. List the various types of exciters
5.18. Explain armature reaction of Alternator at different power factors
5.19. State the reasons for voltage variations on Load.
5.20. Define the term synchronous impedance.
5.21. State the effects of synchronous impedance on the operation of the Alternator
5.22. Draw the equivalent circuit representing armature resistance, leakage reactance and armature reaction reactance
5.23. Obtain the relation between No load EMF and terminal voltage in Alternator.
5.24. Draw the vector diagram for No load EMF of alternator at different load power factors

CO6: Analyze the behavior of alternators

6.1. Define regulation of an alternator.
6.2. List the different methods of finding the regulation of an alternator.
6.3. Calculate the regulation by synchronous impedance method.
6.4. State the expressions for No load e.m.f. of alternator at different power factors.
6.5. Solve problems on Synchronous impedance method.
6.6. Explain the necessity for parallel operation of three phase alternators
6.7. State the conditions for synchronization for three phase alternators
6.8. Define synchronization of alternators
6.9. List the methods of synchronization of alternators
6.10. Explain the procedure for synchronization of alternators by using Dark lamp method for 3 phase alternator
6.11. Explain the procedure for synchronization of alternator by Bright lamp method for 3 phase alternator
6.12. Explain the procedure for synchronization of alternators by using Synchroscope
6.13. Explain the method for adjusting the loads shared by two alternators (or one alternator with Infinite bus bar).
6.14. Appraise of the effect of change in input and excitation of an alternator connected to infinite bus.

Suggested Student Activities

1 Prepare charts on types of transformers clearly labelling the parts.
2 Visit nearby transformer in your surroundings and prepare a report on the observations made during visit along with photos.
3 Visit the transformer manufacturing unit and prepare a report
4 Prepare a report on different transformers available in your Institute.
5 Do the maintenance of 50MVA transformer
6 Make charts of various transformer configurations
7 Quiz
8 Group discussion
9 Surprise test.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation &	Engineering practices for society, sustainability and	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	-	1	-	-	-	1	1, 3, 7
CO2	3	1	2	1	-	-	1	1, 2, 3,4,7
CO3	3	-	-	-	1	-	1	1, 5, 7
CO4	3	-	2	-	1	-	1	1, 3, 5,7
CO5	3	1	2	2	-	-	1	1 2,3,4,7
CO6	3	-	-	2	-	-	1	1,4,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-403 SUBJECT NAME :AC MACHINES
MID SEM -I EXAM MODEL PAPER
TIME: 1 HOUR TOTAL MARKS: 20

PART – A **Marks: 4 X 1=4**

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Define Transformer.
2. Define Turns Ratio in transformer
3. Draw the vector diagram of a transformer on NO load
4. List the losses taking place in a transformer

PART - B **Marks: 2 x 3 = 6**

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5. a) A single phase transformer has 400 turns on the primary winding and 1000 turns on the secondary winding if it is operating at 50Hz supply with a maximum flux of 0.045wb find (i) the primary and secondary induced emf

OR

5 b) What are the advantages of an Auto transformer

6. a) Draw the equivalent circuit of a transformer by approximation

OR

6 b) State the significance of airgap

PART - C **Marks: 2 x 5= 10**

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

7 a) Distinguish between core type and shell type transformers.

OR

7 b) Explain the function of each part of the transformer.

8 a) Explain working of transformer at Load with the help of vector diagram for Unity power

OR

8 b) The resistances and leakage reactance's of a 30 kVA, 2400 V/240 V distribution transformer are $R_1 = 0.68\ \Omega$; $R_2 = 0.0068\ \Omega$; $X_{l_1} = 7.8\ \Omega$; $X_{l_2} = 0.0780\ \Omega$; Where subscript 1 denotes the 2400 V winding and subscript 2 denotes the 240 V winding. Each quantity is referred to its own side of the transformer.Draw the equivalent circuit
referred to High Voltage side

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM –II EXAM MODEL PAPER

SUB CODE: EE-403 **SUBJECT NAME :AC MACHINES**

TIME: 1 HOUR **TOTAL MARKS: 20**

PART – A **Marks: 4 X 1=4**

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Define Regulation
2. Define All Day Efficiency
3. State the applications of star-star transformer
4. State the necessity of cooling of power transformers

PART - B **Marks: 2 x 3 = 6**

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5a) State the reason for using the unit KVA for the transformer rating

OR

5 b) State the reasons for humming noise near a transformer

6 a) State the advantages of 3 phase transformer over bank of three single phase transformers

OR

6 b) State the need for parallel operation of a transformer

.

PART - C **Marks: 2 x 5= 10**

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

7a) Differentiatebetween distribution transformer and power transformer.

OR

7 b) A 500KVA ,6000/400 V ,1-ϕ transformer has a primary and secondary winding resistances of 0.4Ω and 0.0015Ω respectively. The Iron losses are 3.2KW, Calculate the efficiency of transformer on full load assuming the p.f of the load to be 0.8 lagging

8 a) Explain the OFFload tap changing method on a transformer

OR

b) Explain the methods of cooling of power transformer.

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SEMESTER END EXAM MODEL PAPER

SUB CODE: EE-403 **SUBJECT NAME: AC MACHINES**

TIME: 2 HOURS **TOTAL MARKS: 40**

PART – A

Instructions: (1) Answer all questions
(2) Each question carries **one** mark. **Marks: 8 X 1 = 8**

1. List the applications of transformers
2. Define Regulation
3. List the main parts of alternator
4. State the need for parallel operation of a transformer
5. State the specifications of an alternator
6. List the types of exciters
7. Define regulation of an alternator.
8. List the different methods of finding the regulation of alternator

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks. **Marks: 4 X 3 = 12**

9a) State the losses taking place in a transformer

OR

9b) Calculate the e.m.f induced per phase in a 3-ϕ ,8-pole ,50 Hz star connected alternator The stator has 160 slots and 6 conductors per slot. Assume K_p=1 and K_d=0.96.The flux per pole is 0.16 wb

10a) State the advantages of three phase transformers over bank of three single phase transformers

OR

10b) Explain the effect of change in input and excitation of an alternator connected to infinite bus

11a) Classify the alternators based on rotor construction

OR

11b) State the advantage of Stationary Armature.

12a) State the conditions for synchronization for three phase alternator

OR

12 b) Explain the necessity for parallel operation of three phase alternators

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks. **Marks: 4 X 5 = 20**

13a) Derive the E.M.F equation of a single phase transformer.

OR

13 b) Derive the expression for Chording factor

14 a) Explain the function of each part of a power transformer

OR

14b) Explain the procedure for synchronization of alternators by using Dark lamp method for 3 phase alternator

15a) Obtain the relation between No load EMF and terminal voltage in Alternator at leading powerfactor.

OR

15 b). Explain armature reaction of Alternator at different power factors

16a) Explain the procedure of synchronising of alternators by using synchroscope method

OR

16 b) A 200 kVA, 415 V, 50 Hz, 3-ø alternator has effective armature resistance of 0.01 Ω and an armature leakage reactance of 0.05 Ω. Compute the voltage induced in the armature winding when the alternator is delivering rated current at a load pf of 0.8 lag and 0.8 lead

EE-404 ELECTRICAL ESTIMATION AND INSTALLATION

Course Title:	**Electrical Estimation and Installation**	Course Code	**EE-404**
Semester	**IV Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**60:15:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires the knowledge of basic principles of electricity, domestic wiring, electrical workshop, types of loads in power and irrigation use, Earthing, Distribution substations, Over head lines, Department Procedures and Electricity Rules.

Course Outcomes

Upon completion of the course, the student shall be able to

CO1	Infer various wiring systems and safety procedures
CO2	Estimate the material required for given domestic loads
CO3	Plan for the material required for power loads and irrigation pump sets
CO4	Develop Earthing Systems and Distribution substations.
CO5	Estimate material required for Over head lines
CO6	Make use of Department procedures and Electricity act 2003

Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="3">Questions to be set for SEE</th></tr>
<tr><th colspan="2">R</th><th>U</th><th>A</th></tr>
<tr><td>1</td><td>Wiring Systems and Safety Procedures</td><td>12</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>Estimation of Lighting loads</td><td>15</td></tr>
<tr><td>3</td><td>Estimation of Power loads and Irrigation pump sets</td><td>14</td><td rowspan="2">Q2</td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>Estimation of Earthing and Distribution substation</td><td>10</td></tr>
<tr><td>5</td><td>Estimation of Over head Lines</td><td>12</td><td rowspan="2">Q3</td><td>Q5, Q6</td><td>Q9(b), Q11(a), Q11(b)</td><td>Q13(b), Q15(a), Q15(b)</td></tr>
<tr><td>6</td><td>Departmental Procedures, REC and Electrical act 2003</td><td>12</td><td>Q7, Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td></td><td>Total</td><td>75</td><td colspan="2">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT 1 - Wiring Systems and Safety Procedures

Duration: 12 Periods (L: 10 - T: 2)

Types of house wiring systems - Various types of cables – Various types of Main switches - Different types of fuses , fuse carriers and MCBs, ELCB and RCCB - Safety procedures - Electric shock and first aid, causes for fire hazards in Electrical installations.

UNIT 2 -Estimation of Lighting loads

Duration: 15 Periods (L: 12 - T: 3)

Estimation of domestic lighting installation service main - Types of service mains - specification - quantity of materials required for service main – estimation and selection of interior wiring system suitable to a given building - number of circuits - calculation of length of wire and quantity of accessories required - estimates of materials for execution of the domestic wiring installation as per National Electrical act 2003 - wiring layout for a office building, and a residential building with 2 bed room house.

UNIT 3 - Estimation of Power loads and Irrigation pump sets

Duration:14 Periods (L: 11 - T: 3)

Estimation and costing upto 20 KW, calculation of load current based on ratings of various equipment's to be installed - size of wire - length of wire , number of circuits - quantity of accessories for execution of work as per standard practice. Irrigation pump installation - Estimation upto 10 HP service main - type- calculation of size and quantity of wire and other components required - Type of starter and control panel - accessories quantity and estimation Estimate for the installation of submersible pump.

UNIT 4 - Estimation of Earthing and Distribution Substation

Duration:10 Periods (L: 8 - T: 2)

Quantity estimation for materials required in Electrical Earthing both for pipe earthling and plate Earthing suitable to the given equipment or transformer substation. HG fuse operating mechanism, isolators, lightening arrestors for pole mounted substation and plinth mounted substation.

UNIT 5 - Estimation of Over Head Lines

Duration: 12 Periods (L: 10 - T: 2)

Distribution lines of 11 kV and 400Volt OH lines - estimation only -quantity of materials required for lines of length 1 km - of number of poles - Cross arms clamps - insulators - conductor length and size for a given power transmission Distribution transformer erection- Estimation of quantity of materials required for structures, isolators .

UNIT 6 - Departmental Procedures , REC and Electrical Act 2003

Duration:12 Periods (L: 10 - T: 2)

Electrical installation testing - departmental procedure for testing before giving service connection - departmental procedure for obtaining service connection - desirable insulation resistance for domestic and power circuits - Tests for measuring insulation resistance - procedure for conducting insulation resistance test and continuity tests, earth continuity test

Design of rural electrification scheme - Load survey-determination of capacity of transformer - estimation of quantity of materials required for the erection of distribution lines and 11 kV feeder from a nearby 11 kV feeder - determining the economic feasibility of the scheme as per the procedure laid out in NEC, - Extracts from Indian Electricity rules 1956 and code of practice by NEC regarding - domestic power, agricultural industrial wiring installations, erection of 11 kV, 400 Volt distribution lines - pole mounted transformer – New I.E. Rules

Reference Books

1. S.L.Uppal-Electrical Wiring ,Estimating & costing Electrical wiring,
2. J.B.Gupta -Estimating & costing
3. Balbir Singh-Electrical Drawing
4. Arora -Electrical wiring
5. BVS Rao -Maintenance and Operation of Electrical Equipment –Vol-I-TMH
6. S.Rao -Testing, Commissioning Operation & Maintenance of Electrical equipment -TMH
7. CRDargar -Electrical Installation design and drawing -New Asian publishers.

Suggested E-learning references

1. http://electrical4u.com/
2. www.nptel.ac.in
3. https://youtube.com
4. https://3.imimg.com/data3/JA/HU/MY-7591709/copper-earthing-electrodes.pdf

Suggested Learning Outcomes

Upon completion of the Course, the student shall be able to

CO1- Infer various wiring systems and safety precaution

1.1 List the different types of wires used in House wiring.
1.2 List the different types of single phase and three phase cables
1.3 State the uses of standard wire gauge.
1.4 Specify the gauge of wire and number of strands in a multi strand by giving its current carrying capacity
1.5 List the different types of wiring systems
1.6 Discuss about Surface conduit wiring system
1.7 Discuss about Concealed wiring system.
1.8 List the various types of Main Switches
1.9 Select MCB based on the specifications
1.10 List the types of MCBs
1.11 State the applications of MCCB, ELCB and RCCB.
1.12 State the applications of Distribution board
1.13 Specify the fuse carrier material used for Rewirable (Kit Kat) fuses
1.14 Specify the fuse carrier material used for Open type fuse
1.15 Specify the fuse carrier material used for Cartridge fuses.
1.16 State the reasons for fire accidents in Electrical system.
1.17 Discuss the reasons for not using fuse in Neutral wire
1.18 Explain the effects of shocks and electrocution.
1.19 Demonstrate the procedure of first aid for shock treatment to an electrocuted person.

CO2 - Estimate the materials required for Domestic loads

2.1 Explain different types of service mains
2.2 Select the service main suited to the given Load.
2.3 Discuss the merits and demerits of different systems of interior wiring.
2.4 Select the type of wiring system suitable to the given Load
2.5 List the electrical material used in wiring the service mains.
2.6 Estimate the cost of material for the given domestic loads.
2.7 Estimate the material requirement for indoor wiring given the plan of a building and draw the Wiring Layout of a Single Room
2.8 Estimate the material requirement for indoor wiring given the plan of a building and draw the Wiring Layout of a 2-BHK House
2.9 Draw the single line wiring diagram for an office building.

CO3 – Plan for the material required for power loads and irrigation pump sets

3.1 Draw the single line wiring diagram of 3 phase induction motor with DOL starter.
3.2 Draw the single line wiring diagram of 3 phase induction motor with Y-Δ starter.
3.3 Prepare layout and draw single line wiring diagrams as per standard practices for a given set of machines in a workshop / electrical laboratory up to 3 motors.
3.4 Select the type of wiring system and lighting requirements for workshop.
3.5 Select the wire sizes for various circuits in the workshop.
3.6 Specify important material used in the workshop
3.7 Prepare the estimate of the complete installation of workshop as per standard practices.
3.8 Select the type of wiring and service mains used for the irrigation pump set.
3.9 Specify the material used in the execution of the irrigation pump set installation.
3.10 Prepare an estimate for electrification of the irrigation pump set.
3.11 Prepare an estimate for installation of submersible pump

CO4 - Develop Earthing Systems and Distribution substations

4.1 State the purpose of Earthing
4.2 List the types of Earthing
4.3 Select the suitable type of Earthing for a given installation as per IS3043.
4.4 Specify the different components used in electrical Earthing of a given installation
4.5 List the material that are to be used in the earth pit surrounding the earth Electrode
4.6 Prepare the estimate for Pipe Earthing.
4.7 Prepare the estimate for Plate Earthing
4.8 State the concept of maintenance free chemical gel earthing.
4.9 Explain the method of chemical gel earthing.
4.10 Estimate the quantity of material required for pole mounted substation.
4.11 Estimate the quantity of material required for plinth mounted substation

CO5 - Estimate material required for Over head lines

5.1 State the requirements of line supports used in overhead lines

5.2 List the factors influencing the selection of line supports

5.3 List the types of line supports

5.4 Discuss the need for cross arms

5.5 List the types of cross arms

5.6 Calculate the total number of insulators required for the given scheme

5.7 Select the type of insulators to be used for overhead lines.

5.8 Select the type, size and number of cross arms required for the overhead line

5.9 Determine the size and total length of overhead conductor required for the line giving due consideration for the sag.

5.10 Estimate the quantity of material required for given 11 KV overhead lines as per NEC standard practices.

5.11 Estimate the quantity of material required for a given 400V overhead Line as per NEC standard practice.

CO6 - Make use of Department procedures and Electricity act 2003.

6.1 Describe the departmental procedure for obtaining a service connection

6.2 Discuss insulation resistance desirable for a given electrical installation

6.3 Mention the value of earth resistance to be maintained for a given electrical Installation.

6.4 Describe the procedure to test the continuity of wiring in an electrical installation.

6.5 Explain the procedure for conducting insulation test of domestic wiring

6.6 Conduct the Load Survey in a village for
i)Domestic ii) industrial iii) agricultural loads.

6.7 Calculate the capacity of a transformer required assuming suitable diversity factor

6.8 Determine the location point of transformer and calculate the tail end voltage regulations as per the practice in NEC.

6.9 Determine the economic feasibility of the scheme as per the standard norms fixed by REC to execute the scheme.

6.10 State rules applicable to electrical installations as per Electrical act 2003

6.11 State the standards and code of practice followed by NEC in respect of electrical installations and OH lines of 11 KV and 400V pole mounted and Plinth mounted Substations.

6.12 State the function of Central Electricity Authority

6.13 State new I.E. Rules relating to safety and electric supply given by the Central Electricity Authority- 2010.

Suggested Student Activities

1. Student visits to the houses which are under construction so as to visualize the pipe layout and accessories fixtures
2. Student visits Distribution Substation i.e., Pole mount and Plinth mount
3. Visit to nearby field and understand the Irrigation pump estimation
4. Visit to small industry or workshop and estimate the load and rating of the accessories required
5. Group discussion
6. Surprise test
7. Student visits to the Industries, Malls and software companies which operate at night to understand the importance of Lighting , to shops which provide lighting solutions
8. Quiz

CO-PO Mapping Matrix

	Basic and Discipline specific Knowledge	Problem Analysis	Design/Development of solutions	Engineering Tools	Engineering practices for society sustainability	Project Management	Life-long learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3				1		1	PO1,5,7
CO2	3	2	2	1	1	2	1	PO1,2,3,4,5,6,7
CO3	3	2	2	1	1	2	1	PO1,2,3,4,5,6,7
CO4	3		2		1	2	1	PO1,3,5,6,7
CO5	3	3	3	2	2	2	1	PO1,2,3,4,5,6,7
CO6	3	1		2	2	1	1	PO1,2,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-404

ELECTRICAL ESTIMATION AND INSTALLATION

MID SEM -I MODEL PAPER

TIME: 1 HOUR **TOTAL MARKS: 20**

PART – A **Marks: 4 X 1=4**

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. State the use of standard wire gauge.
2. State the reason for fire accidents in Electrical system
3. What is a service main?
4. Define interior wiring?

PART - B **Marks: 2 x 3 = 6**

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5 a) List the different types of single phase and three phase cables

OR

5 b) List the types of MCBs

6 a) Draw the single line wiring layout for an office building.

OR

6 b) Find no of sub circuits of domestic load : 100 W lamps- 10 no ; Ceiling fans – 5 no; florescent lamp – 5 no and 1 H.P motor of efficiency 85%. Assume missing data.

PART - C **Marks: 2 x 5= 10**

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks

7 a) Explain Concealed wiring system

OR

7 b**)** Explain the effects of shocks and electrocution.

8 a) Write the merits and demerits of interior wiring

OR

8 b) Explain different types of service mains

STATE BOARD OF TECHNICAL EDUCATION & TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-404
ELECTRICAL ESTIMATION AND INSTALLATION
MID SEM – II MODEL PAPER

TIME : 1 HOUR **TOTALMARKS:20**

PART-A **Marks : 4X1 = 4**

Instructions: (1) Answer all questions
(2) Each question carries **one** mark.

1. Write step to solve estimation on power load
2. What are steps to solve estimation on irrigation pump set
3. State the purpose of earthing
4. State the different ratings of transformer used for pole mounted substation

PART - B **Marks: 2 x 3 = 6**

Instructions: (1) Answer the following questions.
(2) Each question carries **three** marks.

5a) Write starters used depends on rating and type of motors .

.

OR

5 b) Draw sketch of service line and irrigation pump set of 7.5 KW is to be installed at distance of 20 m from a 3-phase,415 V distribution line.

6 a) List the types of earthing

OR

6 b) Estimate the materials required for plinth mounted substation

PART - C **Marks: 2 x 5= 10**

Instructions: (1) Answer the following questions.
(2) Each question carries **five** marks.

7 a) Draw wiring diagram of 5.5 kw,3-phase,400 V motor. The distance between the L.T pole and the pump set shed (5x3x3m) is 10 m.

OR

7 b) An agricultural pump set of 7.5kw,3-phase, 415 V motor is to be installed at distance of 20 m distribution line. Find size of cable and length of cable.

8 a) Estimate the quantity of material required for pole mounted substation

OR

8 b) Estimate the quantity of material required for plate earthing

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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SUB CODE: EE-404
ELECTRICAL ESTIMATION AND INSTALLATION
SEMESTER END EXAM MODEL PAPER

TIME: 2 HOURS **TOTAL MARKS: 40**

PART – A

Instructions: (1) Answer all questions
(2) Each question carries **one** mark. **Marks: 8 X 1 = 8**

1. List the different types of wires used in house wiring
2. State the purpose of earthing.
3. List the types of line supports
4. State the uses of standard wire gauge
5. State the need for cross arms
6. State the requirements of line supports used in overhead lines
7. State rules applicable to electrical installations as per Electrical act 2003
8. State the function of Central Electricity Authority

PART - B

Instructions: (1) Answer the following questions
(2) Each question carries **three** marks. **Marks: 4 X 3 = 12**

9a) State the merits and demerits of different systems of interior wiring

OR

9b) List the factors influencing the selection of line supports

10a) State the types of earthing in electrical installations

OR

10b) Describe the departmental procedure for obtaining a service connection

11a) List the type of insulators to be used for overhead lines

OR

11b) List the types of cross arms

12a) State the value of earth resistance to be maintained for a given electrical installations

OR

12 b) Write Survey the load particulars in a village

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks. **Marks: 4 X 5 = 20**

13a). List the reasons for not using fuse in Neutral wire
.

OR

13b) Estimate the materials required for erection 3 phase, 5 wire distribution line of length 2 km and assume the span between the two poles is 60 m over a 8 m long PSCC poles.

14 a) Estimate the materials for Plate Earthing

OR

14b) Explain the procedure for conducting insulation test of domestic wiring

15a) Estimate the quantity of material required for a 11kv, 3-phase over head line with 6/1x2.59 mm ACSR conductor for 1 km long on 8 m PSCC poles. The span between two poles is 75 m.

OR

15b) Write Eight main components of overhead lines

16a) Explain insulation resistance for a given electrical installation

OR

16 b) Explain the test procedure for continuity of wiring in an electrical installation

EE-405 ELECTRICAL POWER SYSTEMS -T&D

Course Title:	**Electrical Power Systems – T & D**	Course Code	**EE-405**
Semester	**IV Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**60:15:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires the knowledge of transformers and Basic circuit analysis.

Course Outcomes

CO1 :	Analyze about transmission lines and its performance
CO2 :	Apply the concept of HVDC Transmission systems
CO3 :	Analyze Transmission and Distribution line structures and its constructional and performance features
CO4 :	Apply the concepts of cables in transmission and distribution
CO5 :	Detail the equipment in a substation
CO6 :	Classify and analyse the Distribution systems

Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to beset for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>1</td><td>Transmission lines</td><td>15</td><td rowspan="6">Q4</td><td rowspan="2">Q1</td><td rowspan="2"></td><td rowspan="2">Q9(a)</td><td rowspan="2">Q13(a)</td></tr>
<tr><td>2</td><td>HVDC Transmission systems</td><td>10</td></tr>
<tr><td>3</td><td>Line structures for Transmission and Distribution</td><td>15</td><td rowspan="2">Q2</td><td rowspan="2"></td><td rowspan="2">Q10(a)</td><td rowspan="2">Q14(a)</td></tr>
<tr><td>4</td><td>cables</td><td>10</td></tr>
<tr><td>5</td><td>Substations</td><td>10</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b), Q11(a), Q11(b)</td><td>Q13(b), Q15(a), Q15(b)</td></tr>
<tr><td>6</td><td>Distribution systems& Introduction to Smart Grid</td><td>15</td><td>Q7,Q8</td><td>Q10(b), Q12(a), Q12(b)</td><td>Q14(b), Q16(a), Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

Course Contents

UNIT1 – Transmission lines **Duration:15 Periods(L:12– T:3)**

Need for transmission lines-AC & DC Transmission, Effect voltage and frequency, Types of conductors- current distortion effects- Transmission line conductors – Calculation of Transmission line Inductance and capacitance- Transposition of O.H. lines- Regulation - calculation of Regulation- Types of transmission lines - Ferranti's effect- Corona in transmission lines- Effects of corona.

UNIT2–HVDC Transmission Systems **Duration: 10Periods (L:8– T:2)**

High voltage DC Transmission – Need- Basic Concepts – Basic block diagram- Types of HVDC transmission- HVDC projects in India - Advantages and disadvantages of HVDC transmission - Basics of protection of HVDC systems.

UNIT3–Line structures for Transmission and Distribution:

Duration: 15 Periods(L:12–T:3)

Components of overhead line- Line supports - Cross arms- Pole guys- Conductors spacing and ground clearance- Sag - Factors affecting sag - calculating sag.- Disadvantages of loose span -Insulators, Requirements of insulators- Types of Insulators- Voltage distribution across string of Insulators- string efficiency- Flashover, Puncture- improving string efficiency - Arcing horns and guard rings- Causes for failure of insulators

UNIT4-Cables **Duration: 10 Periods(L:8– T:2)**

Cables - Comparison between over head lines and underground cables- Classification of cables - General construction of cables -Types of cables - Insulation resistance of cables

UNIT5 -Sub-stations **Duration: 10 Periods(L:8– T:2)**

Definition and classification of sub-stations – Equipment in substations – Purpose of each –equipment - Substation auxiliary supply – Line diagram of 33KV/11KV and 11KV/400V substation

UNIT6 –Distribution Systems and Introduction to Smart Grid

Duration: 15Periods (L:12– T:3)

Primary and secondary distribution – Feeders- distributers -service mains, Classification of Distribution systems -Radial and Ring systems – Voltage drop calculations in DC and AC - Definition of Electric Grid - Concept of Smart Grid - Difference between conventional & smart grid.

Reference Books

1. S.L.Uppal-ElectricalPower
2. Soni,Guptha,Bhatnagar-ElectricalPowerSystems-DhanpatRai& Sons
3. A.T.Starr-Generation,TransmissionandUtilisation
4. C.L.Wadhwa -Electrical PowerSystems-Newageinternational(P)limited
5. NEDCAP-Non ConventionalEnergyGuideLines
6. JBGuptha-Electricalpowerplants
7. G.D. RoyNonconventionalenergysources
8. CLWadhwa-Electrical powerSystems -NewAgeInternational(P)limited.
9. KRPadiyar-HVDCPowerTransmissionsystemTechnology
10. S.N.Singh-ElectricalPower generation,transmissionanddistribution.

Suggested E-learning references

1. http://electrical4u.com/
2. www.nptel.ac.in
3. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/

Suggested Learning Outcomes

Upon completion of the subject, the student shall be able to

CO1: Analyze about transmission lines and its performance

1.1 Explain the need for transmission lines and distribution lines

1.2 Classify the transmission lines based on supply voltage and number of conductors used (AC and DC)

1.3 State the advantages of D.C and A.C. transmission systems.

1.4 Explain the effect of voltage on Transmission lines.

1.5 Explain effect of frequency on Transmission lines.

1.6 Explain the effect of voltage on line efficiency, voltage drop, line loss, active power and Reactive Power and volume of conductor material.

1.7 State the type of transmission line conductors

a) Solid b) Stranded c) Hollow d) Bundled conductors

1.8 State the relative merits of different types of above conductors

1.9 Explain the current distortion effects

Skin effect, Proximity effect, Spirality effect and Kelvin's law

1.10 State the formula for inductance of

a) 1 phase system b) 3 phase symmetrical and asymmetrically spaced round conductors (No derivation)

1.11 Determine the value of inductance of 1 phase and 3 phase for the given the diameter and spacing between conductors

1.12 State the formula for capacitance of a) 1 phase system b) 3 phase symmetrical and asymmetrically spaced round conductors (No derivation)

1.13 Determine the value of capacitance of 1 phase and 3 phase for the given the diameter and spacing between conductors.

1.14 State the need for transposition of overhead lines

1.15 Define short, medium and long lines.

1.16 Define `regulation' and percentage regulation in transmission lines.

1.17 Express approximate formula for percentage regulation in short transmission lines

1.18 Calculate the regulation for short transmission line using the approximate formula.

1.19 State the reason for Ferranti' effect

1. 20 What is corona in transmission lines.

1.21 List the factors affecting corona.

CO2 : Apply the concepts of HVDC transmission

2.1 State the need of HVDC

2.2 Explain the basic concepts of HVDC transmission

2.3 Detail the block diagram of HVDC.

2.4 List the types of HVDC transmission.

2.5 List the locations of HVDC Projects in India.

2.6 Outline the advantages and disadvantages of HVDC transmission

2.7 Analyze the protective measures to be adopted for HVDC system

CO3 : Analyze Transmission and Distribution line structures and its constructional and performance features

3.1 Identify the primary components of overhead lines.
3.2 List the requirements of line supports
3.3 List the factors influencing the selection of the line supports
3.4 List the types of line supports
3.5 Outline the advantages and disadvantages of the above line supports
3.6 What is the need for cross arms
3.7 State the necessity for pole guys
3.8 Explain types of fixing of guys (bow guy, fly guy and pole strut)
3.9 State the factors affecting the conductor spacing and ground clearance of transmission lines.
3.10 Define `sag'
3.11 State the factors affecting the sag
3.12 State the formula for calculating sag.
a) for the supports are at the same level and b) the supports are at different levels in air and with the effect of wind and ice.
3.13 Solve the problems on above.
3.14 State the disadvantages of loose spans (sag more than prescribed value)
3.15 State the need of insulators in transmission and distribution lines
3.16 List the requirements of insulators
3.17 List applications of the Pin type, Strain type, Suspension type and Shackle type insulators
3.18 Explain the voltage across a string does not distribute uniformly across the individuals discs
3.19 State the formula for voltage across individual insulator for a string of 3 insulators and also the formula for string efficiency
3.20 Define the terms Flashover, Puncture and String-efficiency
3.21 List the methods of improving string efficiency
3.22 State the need for arcing horns and guard rings
3.23 List causes of failure of insulators in transmission and distribution lines

CO4: Apply the concepts of cables used in transmission and distribution

4.1 Define cables
4.2 Compare overhead lines with underground cables
4.3 State the classification of cables based on
a) Number of conductors
b) Voltage
c) Insulation and lead sheathing
d) The methods of improving the dielectric stress
4.4 Explain the construction of different types of cables
a)Low voltage cables b)H.T cables c)Super tension cables and d)EHV cables
4.5 State the equation for the insulation resistance of a cable
4.6 Solve simple problems on insulation resistance

CO5: Detail the equipment in a substation

5.1 Explain the need for substations

5.2 List the types of substations.

5.3 List the equipment used in substation.

- Busbars
- Insulators
- Transformers
- Switchgear
- Indicating and metering equipment
- Protective relays
- Lightening arrestors
- Cables
- Fire fighting equipment

5.4 Specify the function of each of the equipment listed above..

5.5 Explain about auxiliary supply in substation

5.6 Outline the line diagram of 33KV/11KV substation

5.7 Draw the line diagram of 11KV/400V substation

CO6: Classify and analyse the Distribution systems

6.1 Compare primary distribution and secondary distribution

6.2 Explain Feeder, distributors and service mains

6.3 Classify the type of distribution systems according to

i) Type of current ii) Construction iii)Service iv) No of wires v) Scheme of connection

6.4 List the type of distribution systems

6.5 State the advantages and disadvantages of radial, parallel and ring main systems

6.6 List the steps involved in the voltage drop calculations in A.C. distributors

6.7 Solve problems on voltage drop calculations in D.C & A.C. Distributors

6.8 Define Electric grid and smart grid

6.9 Need of smart grid

6.10 Compare conventional and smart grid.

Suggested Student Activities

- Student visits Library to refer to Electrical Manuals.
- Student prepares the models of the power plants
- Student visits Power generating stations familiarize with the equipment.
- Visit Power near by substations and gets familiar with the components.
- Students may be asked to prepare model project of the power system.
- Prepare charts on different Generating stations in our state mentioning their locations.
- Gather information of HVDC transmission projects in India and prepare a report
- Identify different insulators in your surroundings and prepare a report
- Watch You Tube videos on SMART GRID and MICRO GRID and prepare a summary report
- Group discussion.
- Surprise tests and Quiz.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/ DevelopmentofSolution	Engineering Tools, Experimentation&Testing	Engineeringpracticesforsociety, sustainability and environment	ProjectManagement	Lifelong learning	LinkedPO
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	3						PO1,2
CO2	3	3					1	PO1,2,7
CO3	3	3						PO1,2
CO4	3	2						PO1,2
CO5	3	1						PO1,2
CO6	3	2					1	PO1,2,7

STATE BOARD OF TECHNICAL EDUCATION &TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MIDSEM-I EXAMMODEL PAPER

SUB CODE: EE-405 **TIME:1 HOUR**
SUBNAME: ELECTRICAL POWER SYSTEMS (T&D) **TOTALMARKS:20**

PART–A **Marks:4X1=4**

Instructions:(1) Answer all questions
(2)Each question carries **one** mark.

1. State the need of transmission lines.
2. State the types of transmission lines based on distance of transmission.
3. List the types of HVDC
4. State the need of HVDC

PART-B **Marks:2 x3 = 6**

Instructions:(1)Answer the following questions.
(2)Each question carries **three** marks.

5a) Illustrate the effect voltage on transmission lines

OR

5b) List the types of conductors in transmission lines.

6a) List the HVDC stations in India with specifications

OR

6b) Outline the line diagram of mono polar HVDC system

PART- C **Marks:2x5=10**

Instructions:(1)Answer the following questions.
(2)Each question carries **five** marks.

7a) A single phase transmission line has a resistance of 0.2 ohms and an inductive reactance of 0.4 ohm. Find the voltage at the sending end to give 500KVA at 2kV at the receiving end at load power factor of 0.707 lagging

OR

7 b) In a 3-phase overhead line conductors are symmetrically spaced at a distance of 3 m. The diameter of each conductor is 1cm. Calculate the capacitance per km of each conductor.

8a) Discuss the protective measures used in HVDC..

OR

8 b) Distinguish different HVDC systems

STATE BOARD OF TECHNICAL EDUCATION&TRAINING, TELANGANA
MID SEM -II EXAM MODEL PAPER

SUB CODE: EE-405 **TIME: 1 HOUR**
SUB.NAME: ELECTRICAL POWER SYSTEMS (T&D) **TOTAL MARKS:20**

PART–A **Marks: 4X1=4**

Instructions:(1) Answer all questions
(2) Each question carries **one** mark.

1. State the components of transmission lines.
2. List the types of line supports.
3. List types of cables.
4. State the formula for insulation resistance of a cable.

PART-B **Marks:2 x3 = 6**

Instructions:(1)Answer the following questions.
(2)Each question carries **three** marks.

5a) List the requirements of insulators.

OR

5b) List the factors affecting the sag.

6a) Distinguish between overhead lines and underground cables

OR

6b) List the methods to improve dielectric stress

.

PART- C **Marks:2x5=10**

Instructions:(1) Answer the following questions.
(2)Each question carries **five** marks.

7a) Define string efficiency and write the formula for string efficiency of 3 disc insulator.

OR

7b) State the type of insulators and mention their applications.

8a) Sketch Super tension cable and mention the significance of each layer

OR

8b) Distinguish different types of cables

STATE BOARD OF TECHNICAL EDUCATION&TRAINING, TELANGANA
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END SEM EXAM MODEL PAPER

SUB CODE: EE-405 **TIME:2 HOUR**
SUB.NAME: ELECTRICALPOWERSYSTEMS (T&D)
TOTALMARKS:40

PART–A

Instructions:(1)Answer all questions
(2)Each question carries **one** mark. **Marks:8 X1 = 8**

1. List the types of HVDC transmission.
2. List the components of overhead lines.
3. List the types of cables.
4. Define Sag
5. What is the need of substation
6. State the need of bus bar in substation.
7. State the type of distribution system according to number of wires.
8. State the purpose of Feeder.

PART-B

Instructions:(1)Answer the following questions
(2)Each question carries **three** marks. **Marks:4 X3 =12**

9 a) Classify the current distortion effects.

OR

9 b) List the equipment used in substation

10 a) List the factors influencing the selection of line supports

OR

10 b) List the advantages of Radial system of distribution.

11a) State the purpose of Lightening arrestor

OR

11b) List the types of cables

12a) Distinguish between primary distribution and secondary distribution

OR

12 b) List out the steps to calculate voltage drop in AC distribution

PART- C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks. **Marks:4 X5 = 20**

13a) Distinguish DC and AC transmission systems

OR

13(b) Explain about the types of insulators used in substations.

14 a) Sketch HT cable and mention the significance of each layer.

OR

14b) Distinguish Feeder, Distributor and service mains.

15 a) Draw the Electrical line diagram of 11KV/400V substation.

OR

15b) Write the function of each component used in a substation.

16 a) Distinguish Parallel feeders and ring mains

OR

16 b) A single phase AC distributor AB 300 meters long is fed from end and is loaded as (i) 100 Amps at 0.707 p.f lagging 200 meters from point A (ii) 200amps at 0.8 lagging 300meters from point A.The total resistance and the reactance of the distributor is 0.2 ohms and 0.1 ohms per km respectively. Calculate the total voltage drop in the distributor. The load power factors refer to the voltage at the far end.

ME-416 BASIC MECHANICAL ENGINEERING

Course Title:	**Basic Mechanical Engineering**	Course Code	**ME-416**
Semester	**IV Semester**	Course Group	**Core**
Teaching Scheme in Periods (L:T:P)	**60:15:0**	Credits	**2.5**
Methodology	**Lecture + Tutorials**	Total Contact Periods	**75**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires the basic knowledge of basic sciences at secondary school level

Course Outcomes

CO1	Compute stress, strain values and find the changes in axial, lateral and volumetric dimensions of bodies of uniform section under the action of normal forces.
CO2	Design of shaft on the basis of strength and rigidity.
CO3	Explain the Construction and working of IC Engines.
CO4	Describe the working of Boilers
CO5	Describe the construction and working of Steam and Hydraulic turbines
CO6	Compare various types of Pumps and select a lubricant for specific application.

Blue Print of Marks for SEE

<table>
<tr><th rowspan="2">Unit No</th><th rowspan="2">Unit Name</th><th rowspan="2">Periods</th><th colspan="4">Questions to be set for SEE</th></tr>
<tr><th colspan="3">R</th><th>U</th><th>A</th></tr>
<tr><td>1</td><td>Simple Stresses & Strains</td><td>13</td><td rowspan="6">Q4</td><td colspan="2">Q1</td><td>Q9(a)</td><td>Q13(a)</td></tr>
<tr><td>2</td><td>Torsion in Shafts</td><td>12</td></tr>
<tr><td>3</td><td>I.C Engines</td><td>15</td><td colspan="2">Q2</td><td>Q10(a)</td><td>Q14(a)</td></tr>
<tr><td>4</td><td>Boilers</td><td>10</td></tr>
<tr><td>5</td><td>Turbines</td><td>12</td><td rowspan="2">Q3</td><td>Q5,Q6</td><td>Q9(b),
Q11(a),
Q11(b)</td><td>Q13(b),
Q15(a),
Q15(b)</td></tr>
<tr><td>6</td><td>Pumps & Lubricants</td><td>13</td><td>Q7,Q8</td><td>Q10(b),
Q12(a),
Q12(b)</td><td>Q14(b),
Q16(a),
Q16(b)</td></tr>
<tr><td colspan="2">Total</td><td>75</td><td colspan="3">8</td><td>8</td><td>8</td></tr>
</table>

COURSE CONTENT

UNIT-1 Simple Stresses & Strains **Duration: Periods 13(L: 10 – T:3)**

Stress – strain - Poisson’s ratio - elastic limit - statement of Hooke’s law - stress-strain diagram with salient features for ductile materials under tensile stress - Elastic moduli - Young’s modulus - Modulus of rigidity, - Bulk modulus - Working stress - Ultimate stress - Factor of safety- Related numerical problems.

UNIT-2 Torsion in Shafts **Duration: Periods 12(L: 10– T:2)**

Classification of shafts - Function of shafts - Polar moment of inertia - Torsion equation- Maximum torque - Power transmitted by the shaft - Design of shaft based on strength and rigidity - Related numerical problems.

UNIT-3 I.C Engines **Duration: Periods 15 (L: 13 – T: 2)**

Classification of heat engines and I.C engines –Construction of IC engines-Various parts of Petrol and Diesel engines- 2-stroke and 4- stroke engines-Comparison between 2-stroke and 4- stroke engines-Comparison between petrol and diesel engines - Functions of carburetor, fuel injection pump- Governing of I.C engines.

UNIT-4 Boilers **Duration: Periods 10 (L:8– T: 2)**

Boilers - Classification of boilers –Fire tube and water tube boilers-Comparison between Fire tube and water tube boilers -Construction and working of Simple vertical, Cochran, Lancashire, Babcock and Wilcox, Lamont and Benson boilers- Different boiler mountings and accessories.

UNIT-5 Turbines **Duration: Periods 12(L: 10 – T: 2)**

Steam turbine -Working principle of impulse and reaction steam turbines- Comparison between impulse and reaction turbines -Working principle of the De Level and Parson's reaction turbines - Classification of hydraulic turbines- Construction and working of Pelton wheel, Francis and Kaplan turbines-Comparison of different water turbines.

UNIT-6 Pumps& Lubricants **Duration: Periods 13 (L: 10– T: 3)**

Hydraulic pumps – Classification –Construction and working of Reciprocating and Centrifugal pumps- Comparison between Reciprocating and Centrifugal pumps - Working principle of Jet and Submersible pumps -Lubricants - properties ,types, examples and their applications.

RECOMMENDED BOOKS

1. Strength of materials by Ramamrutham
2. Strength of materials by Surender Singh
3. Strength of materials by S.B.Junarker
4. General Mechanical Engineering by Lakshminarayana
5. Hydraulic Machinery by Jagadishalal
6. Strength of Materials,by .R.SKhurmi, S Chand and Co. Ltd.
7. Strength of Materials by R.K **Bansal,**Laxmi Publications
8. Fluid Mechanics by R.K Bansal, Laxmi Publications

SUGGESTED E-LEARNING REFERENCES

1. https://nptel.ac.in/courses/
2. https://en.wikipedia.org/wiki/Strength_of_materials
3. http://ndl.ethernet.edu.et/bitstream/

SUGGESTED STUDENT ACTIVITIES

1 Visit to nearby power plant station to identify different motors, pumps.
2 Visit nearby rice mill and identify different types of shafts used.
3. Study cut out models of IC Engines,.
4. Collect information on different lubricants used in Automobiles
5. Collect the information on different pumps used for various applications.

SUGGESTED LEARNING OUTCOMES

Upon completion of the course the student shall be able to

1 Simple Stresses & Strains

1.1. Define stress
1.2. Define strain
1.3. Mention the different types of stresses.
1.4. Mention the different types of strains.
1.5. State Hooke's law
1.6. Define Modulus of elasticity
1.7. Draw typical stress-strain curve for an M S Specimen under tension
1.8. Define factor of safety
1.9. Define Poisson's ratio
1.10. State the relationship between elastic constants.
1.11. Solve simple problems on Stress.
1.12. Solve simple problems on Strain.
1.13. Solve simple problems on Poisson's ratio.
1.14. Solve simple problems on calculation of the dimensional changes in the bodies of uniform cross section subjected to tensile and compressive forces.

2 Torsion in Shafts

2.1. State the function of shafts.
2.2. Classify shafts.
2.3. Specify the standard sizes of shafts.
2.4. Define Polar moment of inertia
2.5. Give the expression for Polar moment of inertia of solid shaft.

2.6. Give the expression for Polar moment of inertia of hollow shaft.
2.7. Explain the terms involved in simple torsion equation.
2.8. Maximum torque transmitted and power transmitted.
2.9. Design the size of solid shaft-Strength point of view and stiffness point of view
2.10. Simple problems.

3. I.C Engines

3.1. Define I.C. Engine.
3.2. Classify heat engines.
3.3. Mention types of I.C engines.
3.4. Explain the construction of I.C. Engines.
3.5. Identify the various parts of Diesel engine and Petrol engine.
3.6. Explain the principle of 4-stroke diesel engine.
3.7. Explain the principle of 4-stroke petrol engine.
3.8. Explain the principle of 2-stroke diesel engine.
3.9. Explain the principle of 2-stroke petrol engine.
3.10. Distinguish between 4-stroke cycle and 2-stroke cycles.
3.11. Distinguish between diesel engine and petrol engine.
3.12. State the function of carburettor.
3.13. State the functions of fuel pump.
3.14. State the functions of Governor.

4. Boilers

4.1. Explain the function of a boiler.
4.2. Classification of boilers.
4.3. Compare fire tube boiler with water tube boiler.
4.4. Explain construction and working principle of simple vertical boiler.
4.5. Describe construction and working principle of Cochran boiler.
4.6. Explain construction and working principle of Lancashire boiler.
4.7. Describe construction and working principle of Babcock and Wilcox boiler.
4.8. Explain construction and working principle of Benson boiler
4.9. Describe Lamont boiler with a neat sketch.
4.10. List different mountings of a boiler.
4.11. Mention the necessity of Water level indicator
4.12. Write the necessity of Pressure gauge.
4.13. State the necessity of Stop valve
4.14. Mention the necessity of Feed check valve.
4.15. Write the necessity of Safety valve.
4.16. State the necessity of Fusible plug.
4.17. Explain the working principle of Super heater.

5. Turbines

5.1. Define turbine.
5.2. Explain the principle of working of a steam turbine.
5.3. Classify the turbines based on action of steam.
5.4. Explain the working principle of steam impulse turbine
5.5. Explain the working principle of steam Reaction turbine
5.6. Compare impulse turbine with steam reaction turbine.
5.7. Describe the working principle of the De Level and Parson's reaction turbines.
5.8. Classify the water turbines based on action of water.
5.9. Explain the construction and working of Pelton wheel.
5.10. Explain the construction and working of Francis turbine
5.11. Explain the construction and working of Kaplan turbine
5.12. Compare Pelton wheel, Francis and Kaplan turbines

6 Pumps & Lubricants

6.1. Define Pump
6.2. Explain the principle of operation of reciprocating pump.
6.3. Explain the constructional details of reciprocating pump.
6.4. Explain the principle of operation of centrifugal pump.
6.5. Explain the construction details of centrifugal pump.
6.6. Differences between a centrifugal pump and a reciprocating pump
6.7. Describe working principle and construction of double stage reciprocating pump.
6.8. Explain the principle of jet pump and submersible pump.
6.9. State the purpose of lubrication.
6.10. State the properties of a lubricant
6.11. List the types of lubricants with examples.
6.12. Mention the application of lubricants.

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	
CO1	3	1	-	-	2	-	3	1,2,5,7
CO2	2	2	-	-	3	-	3	1,2,5,7
CO3	2	-	-	-	2	-	3	1,5,7
CO4	2	-	-	-	2	-	3	1,5,7
CO5	2	-	-	-	2	-	3	1,5,7
CO6	2	-	-	-	3	-	3	1,5,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING,TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER MID SEMESTER-I EXAMINATION

Corse Code: ME-416 **Duration:1 hour**
Course Name: Basic Mechanical Engineering **Max.Marks:20**

PART-A

Answer **all** questions, Each Question carries one mark **4x1 = 4 Marks**

1. State Hooke's law
2. Define Poisson's ratio
3. State the function of shafts
4. Give the expression for Polar moment of inertia of solid shaft

PART-B

Answer **two** questions. Each question carries three marks **2x 3 = 6 Marks**

5. a) Define factor of safety

OR

b) Define Modulus of elasticity

6. a) Classify shafts.

OR

b) Give the expression for Polar moment of inertia of hollow shaft.

PART-C

Answer two questions. Each question carries five marks **2x 5 = 10 Marks**

7. a) State the relationship between elastic constants

OR

b) Draw typical stress-strain curve for an M S Specimen under tension.

8. a) Explain the terms involved in simple torsion equation.

OR

b) Design the size of solid shaft from strength point of view.

State Board of Technical Education and Training, Telangana
Model Question paper
DEEE IV semester Mid Semester-II Examination

Corse Code:ME-416 **Duration:1 hour**
Course Name: Basic Mechanical Engineering **Max.Marks:20**

PART-A

Answer **all** questions, Each Question carries one mark **4x1 = 4 Marks**

1. Define I.C. Engine
2. State the functions of fuel pump in an IC engine
3. State the necessity of boiler water level indicator
4. State the function of superheater

PART-B

Answer **two** questions. Each question carries three marks **2x 3 = 6 Marks**

5. a) Classify heat engine

OR

b) State the functions of carburetor in an IC engine

6. a) Classify boilers.

OR

b) Compare fire tube boilers and water tube boilers in any three aspects.

PART-C

Answer **two** questions. Each question carries five marks **2x 5 = 10 Marks**

7. a) Explain the construction of I.C. Engines

OR

b) Distinguish between diesel engine and petrol engine in any five aspects.

8. a) Explain the operation of Lamont boiler with a neat sketch.

OR

b) Explain the operation of Benson boiler with a neat sketch.

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE IV SEMESTER
SEMESTER END EXAMINATION

Corse Code: ME-416 **Duration:2 hours**
Course Name: Basic Mechanical Engineering **Max.Marks:40Marks**

PART-A

Answer **all** questions 8**x1 =8 Marks**

1) State Hooke's law
2) State the function of economizer
3) State the purpose of lubrication
4) Define IC engine
5) Classify turbines based on action of steam
6) Classify water turbines
7) State the desirable properties of lubricants
8) List the types of lubricants

PART-B

Answer **four** questions **4 x 3 = 12 Marks**

9) a) Mention different types of stresses

OR

b) Compare impulse turbine and reaction turbine in any three aspects.

10 a) State the function of speed governor in an IC engine.

OR

b) List the applications of lubricants.

11 a) Compare impulse turbine and reaction turbine in any three aspects.

OR

b) State the working principle of steam turbine.

12 a) Classify hydraulic turbines.

OR

b) Compare centrifugal pump and reciprocating pump in any three aspects.

PART - C

Instructions: (1) Answer the following questions
(2) Each question carries **five** marks. **Marks: 4 X 5 = 20**

13 a) Draw typical stress-strain curve for an M S Specimen under tension

OR

b) Explain the working of Parson's reaction turbine with a neat sketch.

14 a) Explain the working of four stroke diesel engine with a neat sketch.

OR

b) Explain the principle of operation of centrifugal pump.

15 a) Explain the working principle of Pelton wheel

OR

b) Explain the working principle of Kaplan turbine

16 a) Explain the principle of operation of jet pump.

OR

b) Distinguish between a centrifugal pump and a reciprocating pump in any five aspects.

EE-407 -ELECTRICAL INSTALLATION LAB

Course Title	**: Electrical Installation Lab**	**Course Code**	**: EE-407**
Semester	**: IV**	**Course Group**	**: Practical**
Teaching Scheme in Periods(L:T:P)	**:15:0:30**	**Credits**	**: 1.25**
Methodology	**: Lecture + Practical**	**Total Contact /Periods**	**:45**
CIE	**: 60 Marks**	**SEE**	**: 40 Marks**
(Continuous Internal Evaluation)		**(Semester End Examination)**	

Prerequisites

This course requires the skills of handling electrical tools, accessories and performing wiring connections

Course Outcome

CO1 :	Select necessary material and perform electrical wiring for circuits
CO2 :	Perform Earthing and measure earth resistance
CO3 :	Make use of smart control for home electrical appliances.
CO4 :	Make use of solar panels for lighting purpose.

Suggested Learning Outcomes

Upon completion of the course the student shall be able to

C01 - Identify and select necessary materials and perform electrical wiring for circuits

1.1 Connect three essential points through an inverter to which supply should be available all the time.

1.2 Prepare a board which supports the following devices and also connect the devices

a) The connection of 600VA UPS through which CPU and Monitor of a Computer System would be connected.

b) Connect a Printer also.

1.3 Connect and test the given Public Address System

1.4 Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.

C02 - Perform Earthing and measure earth resistance

2.1 Demonstrate Pipe Earthing.

2.2 Demonstrate Plate Earthing.

2.3 Demonstrate the method to measure the value of Earth Resistance.

C03 - Make use of smart control for home electrical appliances.

3.1 Make use of Motion sensing switch to switch on a lamp

3.2 Remote controlled switching of Fan

C04 - Make use of solar panels for lighting purpose

4.1Understand Solar Panels types, Specifications, Companies, Prices

4.2 Make use of Solar panels for charging the battery through inverter.

4.3 Understand the Pay back Calculation by using a Solar Scheme for any Installation.

CO – PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	3	1	-	3	1	1	1	1,2,4,5,6,7
CO2	3	1	2	1	2	1	1	1,2,3,4,5,6,7
CO3	-	-	1	2	2	1	1	3,4,5,6,7
CO4	1	-	3	2	3	1	1	1,3,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
MID SEMESTER-I EXAMINATION

Course Code: EE-407 **Duration: 1 Hour**
Course Name: Electrical Installations Lab **Max.Marks: 20**

Note: ***Answer allotted Question.***

1. Connect three essential points through an inverter to which supply should be available all the time
2. Connect a CPU and Printer.
3. Connect a PA system.
4. Calculate D.G set rating for E.M Lab

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
MID SEMESTER-II EXAMINATION

Course Code: EE-407 **Duration: 1 Hour**
Course Name: Electrical Installations Lab **Max.Marks: 20**

Note: ***Answer allotted Question.***

1. Demonstrate Pipe Earthing
2. Demonstrate Plate Earthing
3. Conduct the Earth Resistance

STATE BOARD OF TECHNICAL EDUCATION AND TRAINING, TELANGANA
MODEL QUESTION PAPER
DEEE V SEMESTER
SEMESTER END EXAMINATION

Course Code: EE-407 **Duration: 2 Hour**
Course Name: Electrical Installations Lab **Max. Marks: 40**

Note: ***Answer allotted Question.***

1. Demonstrate Pipe Earthing
2. Demonstrate Plate Earthing
3. Connect three essential points through an inverter to which supply should be available all the time
4. Connect a CPU and Printer.
5. Study and calculate the rating of Diesel Generator set for providing backup power supply for Electrical Machines lab.
6. Make use of Motion sensing switch to switch on a lamp
7. Remote controlled switching of Fan
8. Understand Solar Panels types, Specifications, Companies, Prices
9. Make use of Solar panels for charging the battery through inverter.
10. Understand the Pay back Calculation by using a Solar Scheme for any Installation.

EE-408 AC MACHINES LAB

Course Title:	**AC Machines Lab**	Course Code	**EE-408**
Semester	**IV Semester**	Course Group	**: Practical**
Teaching Scheme in Periods (L:T:P)	**15:0:30**	Credits	**1.25**
Methodology	**Lecture + Practical**	Total Contact Periods	**45**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires the knowledge of AC machines Transformers and Alternators.

Course Outcomes

CO1 :	Evaluate the performance of single phase transformer by conducting suitable tests.
CO2 :	Determine the relationship between Voltages and Currents of different types of Transformers
CO3 :	Determine the dielectric strength of transformer oil
CO4 :	Evaluate regulation of an Alternator by conducting suitable tests and Synchronise the given Alternator with Supply Mains

Reference Books

1. B.L. Theraja-Electrical Technology - Vol -II S.Chand& Co.
2. M.G Say -AC machines
3. P.S. Bhimbra -Electrical machines - Khanna Publishers
4. A.E. Fritzgerald, C. Kingsley and S. Umans Electrical machinery-McGraw Hill
5. MV Deshpande-Electric machines - Wheeler publishing.
6. BR Gupta and VandanaSinghal - Fundamentals of Electric machines

Suggested E-learning references

1. https://www.siemens.com/content/dam/internet/siemens-com/global/products-services
2. https://electrical4u.com/www.nptel.ac.in

Suggested Learning Outcomes

Upon completion of the Course, the student shall be able to

CO1 - Evaluate the performance of single phase transformer by conducting suitable tests

1.1 Identify the terminals on 1-phase transformer.
1.2 Conduct turns ratio test on given single phase transformer.
1.3 Conduct O.C. and S.C. tests on 1-phase Transformer and from the result
  a) Draw the equivalent circuit.
  b) Calculate efficiency at various loads and power factors.
  c) Find the load at which maximum efficiency occurs.
1.4 Obtain efficiency of 1-phase Transformer by conducting load test.
1.5 Obtain regulation of 1-phase Transformer by conducting load test.
1.6 Obtain the efficiency and regulation of two similar 1-phase transformers by conducting Sumpner's test.

CO2 – Determine the relationship between Voltages and Currents of different types of Transformers

2.1 Connect two identical 1-ph transformers in parallel and analyze the load sharing
2.2 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.

2.3 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology.
2.4 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
2.5 Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.

Note: Three single phase transformers may be used instead of a three phase transformer.

CO3 - Determine the dielectric strength of transformer oil

3.1 Obtain the Dielectric Strength of transformer oil using oil testing kit.

CO4 - Determine regulation of an Alternator by conducting suitable tests and Synchronise the given Alternator with Supply Mains

4.1 Obtain voltage regulation by conducting (direct) load test on Alternator.
4.2 Obtain the regulation of Alternator by using synchronous impedance method.

4.3 Synchronise the given Alternator with supply mains by using bright lamp method
4.4 Synchronise the given Alternator with supply mains by using dark lamp method

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\ PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	2	2	-	3	2	1	1	1,2,4,5,6,7
CO2	2	2	-	3	2	1	1	1,2,4,5,6,7
CO3	2	2	2	3	2	1	1	1,2,3,4,5,6,7
CO4	2	2	2	3	2	1	1	1,2,3,4,5,6,7

STATE BOARD OF TECHNICAL EDUCATION &TRAINING ,TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM - I

Course Code: EE-408 **Duration: 1 hours**

Course Name: AC Machines Lab **Max.Marks:20**

Note: ***Answer allotted Question.***

Instructions to the Candidate:

(i)Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the terminals on 1-phase transformer and determine the turn ratio on transformer
2. Conduct O.C. and S.C. tests on 1-phase Transformer and from the result
   a) Draw the equivalent circuit.
   b) Calculate efficiency at various loads and power factors.
   c) Find the load at which maximum efficiency occurs.
3. Obtain efficiency of 1-phase Transformer by conducting load test.
4. Obtain regulation of 1-phase Transformer by conducting load test.
5. Obtain the efficiency and regulation of two similar 1-phase transformers by conducting Sumpner's test.

STATE BOARD OF TECHNICAL EDUCATION &TRAINING ,TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
MID SEM - II

Corse Code: EE-408 **Duration:1 hours**

Course Name: AC Machines Lab **Max.Marks:20**

Note: ***Answer allotted Question.***

Instructions to the Candidate:

(i)Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Connect two identical 1-ph transformers in parallel and analyze the load sharing.
2. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
3. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology.
4. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
5. Asses the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.

STATE BOARD OF TECHNICAL EDUCATION &TRAINING, TELANGANA
DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.
SEMESTER END EXAMINATION

Course Code: EE-408 **Duration:2 hours**

Course Name: AC Machines Lab **Max.Marks:40**

Note: ***Answer allotted Question.***

Instructions to the Candidate:

(i)Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Identify the terminals on 1-phase transformer and determine the turn ratio on transformer
2. Conduct O.C. and S.C. tests on 1-phase Transformer and from the result
   a) Draw the equivalent circuit.
   b) Calculate efficiency at various loads and power factors.
   c) Find the load at which maximum efficiency occurs.
3. Obtain efficiency of 1-phase Transformer by conducting load test.
4. Obtain regulation of 1-phase Transformer by conducting load test.
5. Obtain the efficiency and regulation of two similar 1-phase transformers by conducting Sumpner's test.
6. Connect two identical 1-ph transformers in parallel and analyze the load sharing.
7. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y-Y topology.
8. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Y- Δ topology
9. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ -Y topology.
10. Verify the relation between (i) Phase Voltage & Line Voltage (ii) Phase current & Line Current of three phase transformer in Δ - Δ topology.
11. Obtain the Dielectric Strength of transformer oil using oil testing kit.
12. Obtain voltage regulation by conducting (direct) load test on Alternator.
13. Obtain the regulation of Alternator by using synchronous impedance method.
14. Synchronise the given Alternator with supply mains by using bright lamp method
15. Obtain the Dielectric Strength of transformer oil using oil testing kit.

EE-409 CADLAB

Course Title:	**CAD Lab**	Course Code	**EE-409**
Semester	**IV Semester**	Course Group	**: Practical**
Teaching Scheme in Periods (L:T:P)	**15:0:30**	Credits	**1.25**
Methodology	**Lecture + Practical**	Total Contact Periods	**45**
CIE	**60 Marks**	SEE	**40 Marks**

Pre requisites

This course requires the knowledge of basic geometric shapes and Electrical Symbols

Course Outcomes

Upon completion of the course, the student shall be able to:

CO1 :	Make use of basic concepts of CAD to draw simple 2D geometric figures.
CO2 :	Draw different Layouts of Electrical wiring using various tools in CAD.
CO3 :	Apply the LAYER command to organize the objects as per requirement
CO4 :	Draw diagrams of various schematics related to Electrical power systems.

Course Contents

UNIT -1 Introduction to CAD Duration: 15 periods (L: 5 + P:10)

1.1 The Computer Aided Drafting and its software

Definition of Computer Aided Drafting, the Advantages and importance of CAD software LIKE Auto CAD, Intelli-Cad, ProG-CAD etc., the features of Graphic Work station, CAD Environment: Screen, Various tool bars and menus.

1.2 Selection of commands

Commands using toolbars, menus, command bar. Repeating a command, Nesting a command and modifying a command, Use of prompt history window and scripts, mouse shortcuts.Creating the drawing. Opening existing and, saving drawing, setting up a drawing limits and units. Setting and changing the grid and snapping alignment, and the Entity snaps.

1.3 Use of viewing tools of CAD

Use of mouse, Scroll bar to move around within drawing, changing of magnification of drawing. PAN and ZOOM commands.

1.4 Creating simple 2 D Objects

Lines, circles, arcs, rectangles, Polygon and simple 2D objects

UNIT -2 Modifying Tools Duration: 15 periods (T: 5 + P:10)

2.1 Use the Modifying tools to modify the properties of objects

Object selection and de selection methods, Deletion of objects. Copying of objects within a drawing, between drawings, parallel copies Mirroring objects and arraying objects. Rearranging objects by Moving, Rotating and Reordering. Resizing objects by Stretching, Scaling, Extending, Trimming, and editing the length. Breaking and joining of objects. Chamfering and Filleting of objects.

2.2 Creating complex objects and symbols

Drawing of shapes like polylines, Splines, donuts, and adding of hatch pattern to object.

UNIT -3 Annotation & Layer Tools Duration: 06 periods (L:2 + 4P)

3.1 Use the Text tool to create and format the various types of text Fonts and its styles

The creating, naming and modifying the text fonts, the Creation of line text, paragraph text, setting of line text style and its alignment.Setting of Paragraph text style and its alignment, and modifying the text.

3.2 Use Dimensioning concepts to create, Edit ,Control dimension styles & variables and Adding geometric tolerances

Creating linear, Angular, Diametric, Radial, Ordinate dimensions. creating leaders and annotations, making dimensions oblique.

3.3 Organize the objects in Drawing

Setting a current layer, layers color, line type, line weight, print style locking and unlocking of layers, the layer visibility and layer printing. Setting current line type. Loading additional line types,

UNIT – 4 Electrical Schematics Duration: 09 periods (L:3 + P:6)

Draw Electrical symbols i) Transformer ii) Circuit Breaker iii) Lightning arrestor iv) Relay v) Isolator vi) Battery.

Single Line diagram of 33/11 KV Substation-220 KV Double circuit Tower-Plate and Pipe Earthing.

Reference Books

1. AutoCAD 2024 –C dartifex, Sandeep Dogra& John Wills
2. AutoCAD –Linkan Sagar BPB Publications
3. Computer Aided Electrical Drawing- YOGESH, NAGARAJA, NANDAN PHI Publication
4. Electrical Drafting - S.F. DEVALAPUR EEPB
5. Electrical Drawing - K.L. NARANG
6. Electrical Engineering Drawing – S. K. BHATTACHARYA

Suggested E-learning references

1. http://www.faveodesign.co.uk/CAD_Drawings.html
2. http://cad.about.com/od/Learn_CAD/a/The-Fundamentals-Of-Drafting.htm
3 http://transport.itu.edu.tr/PDF/iml332e/Fundamentals%20of%20CAD
4. https://www.youtube.com

Suggested Learning Outcomes

Upon completion of the course, the student shall be able to

CO1: Make use of basic concepts of CAD to draw simple 2D geometric figures.

1.0 Define Computer Aided Drafting
1.1 List the Advantages of CAD and also various CAD softwares
1.2 Explain the importance of CAD software
1.3 Explain the features of Graphic Work station
1.4 Explain CAD Screen, components, Various tool bars and menus
1.5 Explain the benefits of Templates.
1.6 Identify various CAD software's and their features.
1.7 Work with commands using toolbars, menus, command bar
1.8 Use commands: repeating , Nesting and modifying to draw 2D objects.
1.9 Use prompt history window and scripts
1.10 Work with mouse for zooming and pan
1.11 Create, save the drawing with .drawing extension and Open an existing drawing
1.12 Work with setting up a drawing area using limits command and drawing units
1.13 Use Ortho mode, grid and snapping alignment to draw the objects
1.14 Use the object snap feature to precisely locate the points in the drawing
1.15 Use Scroll bar, pan command and rotating view to move around within drawing
1.16 Draw simple 2D geometric shapes like lines, Circles, Rectangle, Arc & Polygon
1.17 Draw Simple 2D Drawings.

CO2: Draw different Layouts of Electrical wiring using various tools in CAD.

2.1 Use various methods of object selection like window, cross window, fence, last and previous methods and de-selection method
2.2 Draw geometries like Polylines, Splines, donuts
2.3 Add hatch to Objects with required pattern and adjusting line angle and line space.
2.4 Work with Deletion, breaking and trimming of objects
2.5 Usethe copy command to Copyobjects within a drawing &between drawings.
2.6 Create Chamfering and Filleting of objects.
2.7 Create concentric circles, parallel lines and parallel curves using appropriate command
2.8 Create a Mirrored copy of the object suing appropriate command
2.9 Create anRectangular and Polar array using appropriate commands.
2.10 Rearrange objects by using Moving, Rotating and Re-ordering commands.
2.11 Resize objects by using Stretching, Scaling, and Extending commands
2.12 Explode 2D object using appropriate command.
2.13 Draw wiring layout of single bedroom house.
2.14 Draw a simplewiring layout of workshop.

CO3: Apply the LAYER command to organize the objects as per requirement.

3.1 Practice naming and modifying text fonts.
3.2 Create line text, paragraph text
3.3 Work with Setting of line text style and its alignment
3.4 Work with Setting of Paragraph text style and its alignment
3.5 Work with Changing of line text and Paragraph text
3.6 Create linear, Angular, Diametric, Radial, Ordinate dimensions
3.7 Create leaders and annotations.
3.8 Practice making dimensions oblique
3.9 Discuss the need and importance of Layers
3.10 Creating new layer, naming the layer and assigning properties like Layer colour Line type and line weight and setting the current layers
3.11 Manage layers by locking and unlocking layers
3.12 Manage layers Practice Freezing and thawing layers
3.13 Manage layers visibility and layer printing
3.14 Access loaded additional line types.
3.15 Change the line weight in drawing

CO4: Draw diagrams of various schematics related to Electrical power systems.

4.1 Draw Electrical symbols i) Transformer ii) Circuit Breaker iii) Lightning arrestor iv) Relay v) Isolator vi) Battery.
4.2 Draw a single line diagram of 33kV / 11kV substation.
4.3 Draw a Sketch of 220 KV Double circuit tower
4.4 Draw a Dimensioned sketch of Pipe Earthing
4.5 Draw a Dimensioned sketch of Plate earthing

CO-PO Mapping Matrix

	Basic and Discipline Specific knowledge	Problem Analysis	Design/Development of Solutions	Engineering Tools, Experimentation & Testing	Engineering practices for society, sustainability and environment	Project Management	Lifelong learning	Linked PO
CO\PO	PO 1	PO 2	PO 3	PO 4	PO 5	PO6	PO7	
CO1	1			3	1		1	1,4,5,7
CO2	2			3	1		1	1,4,5,7
CO3				3	1		1	4,5,7
CO4	3			3	1		1	1,4,5,7

STATE BOARD OF TECHNICAL EDUCATION &TRAINING , TELANGANA

DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

MID SEM - I

Corse Code: EE-409 **Duration: 1 hour**

Course Name: CAD Lab **Max.Marks:20**

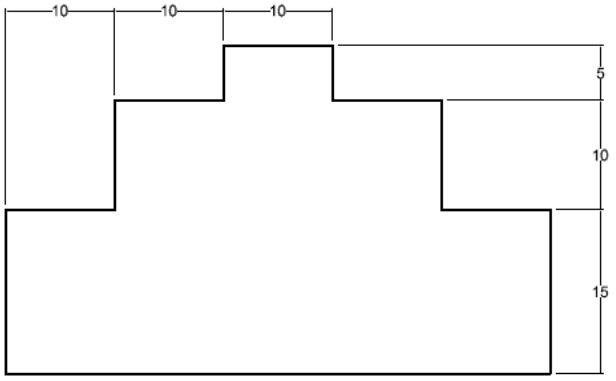
Note: ***Answer allotted Question.***

Instructions to the Candidate:

(i)Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

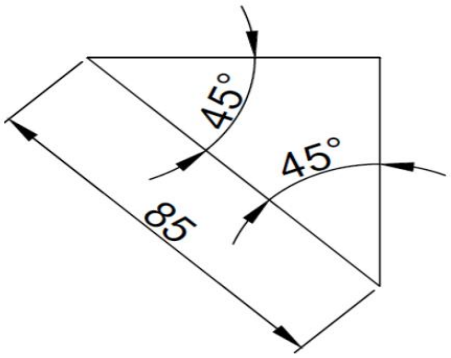
1 Draw circle using 2P method and 3 P method
2 Draw a Rectangle given the area as 200 $mm^2$with length as 20 mm
3 Draw 3 concentric circles with Diameters as 40mm, 60mm and 80 mm .
4 Draw an arc with radius 25 mm using 3 different options
5 Draw the following 2D object



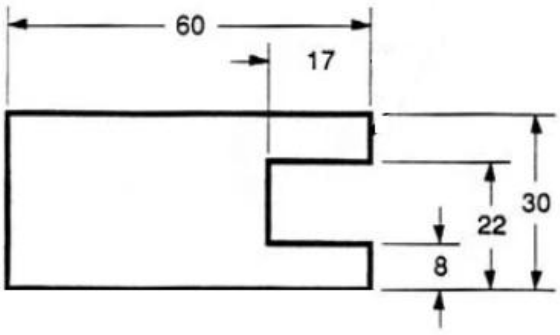
.

6. Draw a triangle whoseside is 30 mm

7. Redraw the following figure using CAD Software without Dimensioning.



8. Redraw the following figure .



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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

MID SEM - II

Corse Code: EE-409 **Duration:1 hour**

Course Name: CAD Lab **Max.Marks:20**

Note: ***Answer allotted Question.***

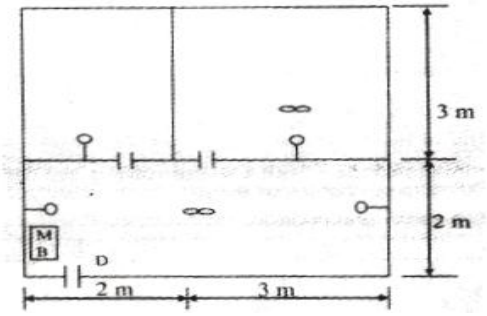
Instructions to the Candidate:

(i)Record the results on a graph sheet if required, and conclude your observation of the experiment

(ii) Draw the circuit diagram for illustration; choose appropriate values when not mentioned in the question

1. Draw the Electrical symbols i)Transformer ii) Circuit Breaker iii) Lightning arrestor
2. Draw the Electrical symbols i) Relay ii) Isolator iii) Battery

3. Draw the following wiring layout



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DIPLOMA IN ELECTRICAL & ELECTRONICS ENGG.

SEMESTER END EXAMINATION

Corse Code: EE-409 **Duration:2 hours**

Course Name: CAD Lab **Max.Marks:40**

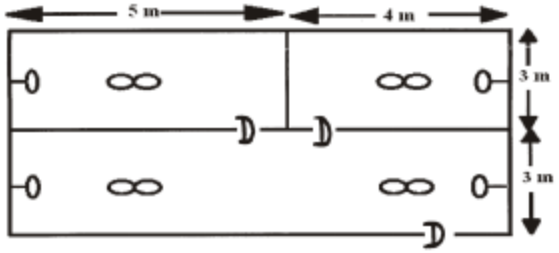
Note: ***Answer allotted Question.***

Instructions to the Candidate:

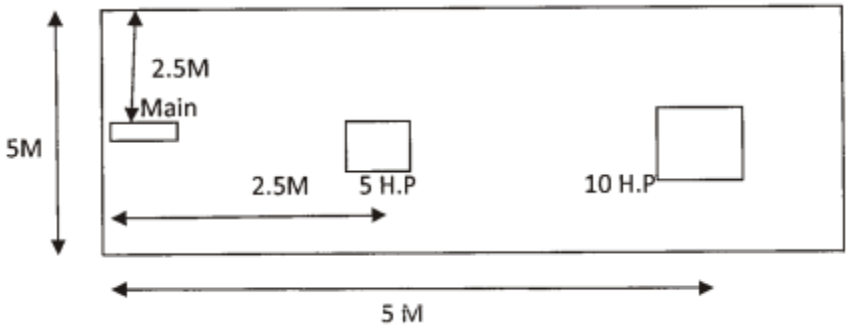
(i) Choose appropriate values when not mentioned in the question

1. Draw the Electrical symbols i)Transformer ii) Circuit Breaker iii) Lightning arrestor
2. Draw the Electrical symbols i) Relay ii) Isolator iii) Battery

3. Draw the wiring layout for a given Single bedroom house.



4. Draw the wiring layout of workshop



5. Draw the sketch of 220 KV steel towers of double circuit.
6. Draw the dimensioned sketch of Plate earthing.
7. Draw the dimensioned sketch of Pipe earthing

HU- 410 EMPLOYABILITY SKILLS LAB

Course Title	**Employability Skills Lab**	**Course Code**	**HU-410**
Semester	**IV**	**Course Group**	**Practical**
Teaching Scheme in periods (L:T:P)	**15:0:30**	**Credits**	**1.25**
Methodology	**Lecture + Practical**	**Total Contact Hours**	**45 (3 periods per week)**
CIE	**60 Marks**	**SEE**	**40 Marks**

Rationale:

The course is designed to impart employability skills to make the students of diploma get the initial employment, maintain the employment and get better employment, if they wish.

Prerequisites:

The course requires the basic knowledge of vocabulary, grammar, four language learning skills, viz. listening, speaking, reading and writing and life skills.

Course Contents

Module 1: Presentation Skills: **Duration: 9 Periods (L 3 P 6)**

a) Significance of presentation

b) What makes a good presentation?

i. Understand, Collect, Organize, Use presentational aids and Practice

c) Tips for an effective presentation.

ii. Good Beginning – Greeting, Confidence, Body Language, Opening Ideas (Funny Videos, Ridicule. Asking Questions, Quote someone/Proverb or telling a story/referring an historical event)

iii. Unveiling – Develop systematically, usage of appropriate linkers or discourse markers. Eye contact and Effective usage of PPTs

iv. Conclusion – Summarize - Giving time to the audience for queries and Time management

d) Guidelines for PPTs

Module 2: JAM **Duration: 6 Periods (L 2 P 4)**

a) What is JAM?
b) Significance of JAM
c) Enhancing Speaking skills, fluency, usage, coherence, spontaneity, voice modulation, eye contact, body language, Creativity, Sense of humor, Confidence and Time management.
d) Learn avoiding hesitation, deviation and repetition

Module 3: Group Discussion **Duration: 9 Periods (L 3 P 6)**

a) Purpose of Group Discussion
b) Types of Group Discussion
c) Different expressions and phases and their effective usage
d) Dos and Don'ts of a Group Discussion
e) Practice.

Module 4: Interview Skills **Duration: 6 Periods (L 2 P 4)**

i. Importance of interview skills
ii. Types of interviews
    a) Face to Face / One to Many,
    b) Telephonic.
iii. Understanding the process of interview.
    a) Before the interview
    b) On the day of the interview
    c) After the interview
iv. FAQs, Common expressions of an interviewer and interviewee
v. Body language, Grooming and Attire.

Module 5: Workplace Awareness and Professional Ethics

Duration: 9 Periods (L 3 P 6)

a) Workplace etiquette
b) Knowledge, skills and attributes useful at workplace
c) Workplace Relationships
d) Gender sensitization
e) Professional Ethics

Module 6: Writing Skills at Workplace: **Duration: 6 Periods (L 2 P 4)**

a)Various writing formats useful at workplace

i) Emails

ii) Notice

iii) Agenda

iv) Minutes of meeting

v) Circular Memo

vi) Press release

Course Outcomes

CO1	Make effective presentation, develop public speaking skills and learn to make visually attractive PPTs.
CO2	Converse fluently and accurately accordingly in JAM sessions.
CO3	Group Discussions will enhance the willingness to take the Initiative, accept adaptability in turn developing leadership qualities and Communication Skills
CO4	Understand purpose and process of interview in turn knowing how to prepare and succeed in interview
CO5	Build strong workplace relationships by learning workplace etiquette, professional ethics and gender sensitization.
CO6	Learn various writing formats useful at workplace and to develop an ability to apply technical information in documentation.

CO-PO Matrix

CO	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	Mapping POs
CO1					2	2	2	5,6,7
CO2					2	2	3	5,6,7
CO3					1	3	2	5,6,7
CO4					2	2	3	5,6,7
CO5					2	2	3	5,6,7
CO6					2	3	3	5,6,7

References:

- Adair, John. *Effective Communication*. London: Pan Macmillan Ltd., 2003. Ajmani, J. C. *Good English: Getting it Right*. New Delhi: Rupa Publications, 2012.
- Amos, Julie-Ann. *Handling Tough Job Interviews*. Mumbai: Jaico Publishing, 2004. Collins, Patrick. *Speak with Power and Confidence*. New York: Sterling, 2009.
- Fensterheim, Herbert and Jean Baer. *Don't Say Yes When You Want To Say No*. New York: D Raman, Meenakshi & Sangeeta Sharma. *Technical Communication: Principles and Practice*. Second Edition. New Delhi: Oxford University Press, 2011.

E-Learning Resources:http://www.dailywritingtips.com/

- http://www.englishdaily626.com/c-errors.phphttp://www.owlnet.rice.edu/~cainproj/http://www.thehumorsource.com/
- http://www.indiabix.com/group-discussion/topics-with-answers/http://networketiquette.net/
- https://public.wsu.edu/~brians/errorshttp://www.bbc.co.uk/worldservice/learningenglish/radio/specials/15

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION – I

HU-410 EMPLOYABILITY SKILLS LAB

Time: One Hour **Total Marks: 20**

Part – A **10 marks**

Instruction: Answer any one of the following questions.

1. Write the guidelines of making a PPT?
2. What are some common mistakes which should be avoided during presentation?
3. How can you use audio -visual aids effectively to enhance your presentation?

Part – B **10 marks**

Instruction: Answer any one of the following questions.

1. What are the tips to be followed to start a JAM session?
2. What are the do's and don'ts of presenting JAM?
3. What is JAM? Write significance of JAM in communication skills.

BOARD DIPLOMA EXAMINATION (C-24)

MID SEMESTER EXAMINATION – II

HU-410 EMPLOYABILITY SKILLS LAB

Time: One Hour **Total Marks: 20**

Part – A **10 marks**

Instruction: Answer any one of the following questions.

1. List the abilities required by a person to succeed in a Group Discussion.
2. Explain how to initiate, continue and conclude a Group Discussion and mention some suitable phrases to be used in each step.
3. Mention the guidelines to be followed in a Group Discussion.

Part – B **10 marks**

Instruction: Answer any one of the following questions.

1. What precautions do you take for a telephonic interview?
2. How do you prepare for an interview?
3. Explain interview process and suitable attire for an interview?

BOARD DIPLOMA EXAMINATION (C-24)

SEMESTER END EXAMINATION

HU-410 EMPLOYABILITY SKILLS LAB

Time: Three Hours **Total Marks: 40**

Part – A **10 marks**

Instruction: Pick any one question from the given lot.

1. Write the guidelines involved in making a good presentation?
2. Describe the steps involved in JAM.
3. Mention different types phrases used in Group Discussion.
4. List few professional ethics useful at workplace.
5. Write a notice, agenda and minutes of meeting on any occasion.

Part – B **15 marks**

6. Interview / Group Discussion

Part – C **15 marks**

7. Viva Voce