

## 1. COURSE DETAILS

Programme: CE/ME/EE/IE/PL/CH/DE	Semester: III
Course: Applied Mathematics	Group: C*
Course Code: AMT190013	Duration: 16 Weeks

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
3	-	-	1	4	3	70	20	10	70	25	-	-	125

## 3. COURSE OBJECTIVE:

This Course is being introduced to provide mathematical background needed for any Diploma engineer. It intends to enable the students to apply basic facts, concepts and principles of Differential Equation, Application of derivatives, Probability Distribution and Definite integral with application as a tool to analyze engineering problems.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain the following industry identified

Competency through various teaching learning experiences:

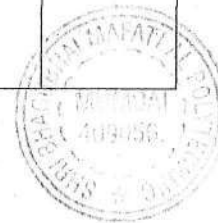
- Solve application-based Engineering problems using the Advanced Knowledge of mathematics

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

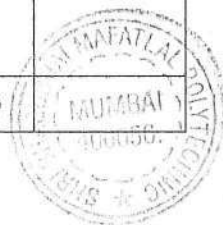
CO No.	COURSE OUTCOME	Bloom's LEVEL
1	Understand the concepts of differential calculus and definite integral and apply to solve engineering related problems.	U,A
2	Study the Concept of differential equation and apply it to solve engineering problems	R, U, A
3	Solve the Problem based on Numerical Method.	U,A
4	Define Laplace transform, study properties of it and apply it to solve numerical	R,U, A

## 6. COURSE CONTENTS

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	<b>Application of Derivatives</b> 1.1 Tangent and normal line 1.2 Velocity and Acceleration 1.3 Maxima and minima 1.4 Radius of curvature	04	07	CO1



2	<b>Differential Equation</b> 2.1 Introduction and definition 2.2 Concept of order, degree of Differential equation 2.3 Formation of Differential Equation 2.4 Differential Equation of first order and first degree <ul style="list-style-type: none"> <li>• Method of variable separable</li> <li>• Equation reducible to method of variable separable</li> <li>• Homogeneous Differential equation</li> <li>• Exact Differential equation</li> <li>• Linear Differential equation</li> </ul> 2.5 Application of Differential Equation <ul style="list-style-type: none"> <li>• Geometrical</li> <li>• Growth and Decay</li> <li>• Newton's law of cooling</li> <li>• Electrical circuit</li> </ul>	14	19	CO2
3	<b>Numerical Method</b> 3.1 Solution of equation of one variable using <ul style="list-style-type: none"> <li>• Bisection method</li> <li>• Regular falsi method</li> <li>• Newton Raphson method</li> </ul> 3.2 Solving simultaneous equation with 2 and 3 variables using <ul style="list-style-type: none"> <li>• Gauss elimination method,</li> <li>• Iterative methods –Gauss Seidal and Jacobi's methods</li> </ul>	06	09	CO3
4	<b>Integration</b> Method of integration 4.1 By Substitution – Various Types of Integration 4.2 By Parts 4.3 Mixed Problems	07	10	CO1
5	<b>Definite Integral &amp; its Applications</b> 5.1 Definition of Definite Integral 5.2 Properties of Definite Integral 5.3 Reduction Formula 5.4 Area under the curve & Area between curve 5.5 Volume of Solid 5.6 Mean Value, RMS Value 5.7 Centre of Gravity	05	08	CO1
6	<b>Laplace Transform</b> 6.1 Introduction 6.2 Definition and Basic Formula 6.3 Properties of Laplace transform' <ul style="list-style-type: none"> <li>• Linearity property</li> <li>• First shifting</li> <li>• Change of Scale</li> <li>• Multiplication by <math>t^n</math></li> <li>• Division by <math>t</math></li> </ul> 6.4 Inverse of Laplace Transform 6.5 Properties of Inverse of Laplace Transform 6.6 Methods of Inverse of Laplace Transform <ul style="list-style-type: none"> <li>• By Partial Fraction</li> </ul>	12	17	CO4
	<b>TOTAL</b>	<b>48</b>	<b>70</b>	



## 7. LIST OF ASSIGNMENTS/TUTORIALS

Term Work consists of Journal containing minimum no of 08 tutorials.

Sr. No.	Title of Tutorial	Approx.Hrs required	Cos
1	Assignment on Application of derivatives	2	1
2	Assignment on Differential equation.	3	2
3	Assignment on application of Differential equation	1	2
4	Assignment on Numerical Method.	2	3
5	Assignment on Integration	2	1
6	Assignment on definite integration & its Applications	2	1
7	Assignment on Laplace Transform	2	4
8	Assignment on Inverse Laplace Transform	2	4
	Total	16	

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan/Tutorials
2. Assignments
3. Home Work Assignment

## 9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	Calculus for Polytechnics	Shri. S.P.Deshpande	Pune Vidyarthi Graha Prakashan Pune-30
2.	Applied Mathematics	Shri. B.M. Patel, Shri J.M. Rawal	Nirali Prakashan Mumbai
3.	Higher Engineering Mathematics	Dr. B.S. Grewal	Khanna Publishers 2/B, Delhi-6
4	Applied Mathematics	G.V.Kumbhojkar	P.Jamnadas LLP

## 10. WEB REFERENCES.

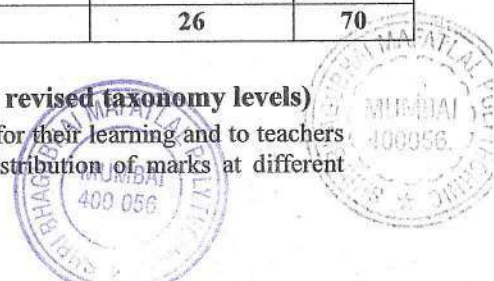
1. [www.mic-mathematics.com](http://www.mic-mathematics.com)
2. [www.math.com](http://www.math.com)
3. [www.lernerstv.com](http://www.lernerstv.com)
4. [www.onlinetutorials.com](http://www.onlinetutorials.com)
5. [www.archieves.math.utk.edu](http://www.archieves.math.utk.edu)

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

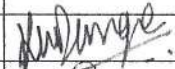

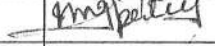

	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Application of Derivatives			7	07
2	Differential Equation	4	10	5	19
3	Numerical Method	2	5	2	09
4	Integration	6	2	2	10
5	Definite Integral & its Applications	2		6	08
6	Laplace Transform	3	10	4	17
	<b>TOTAL</b>	<b>17</b>	<b>27</b>	<b>26</b>	<b>70</b>

**R Remembering, U Understanding, A Applying and Above (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



# 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	MS.Kavita.K.Dange	
2	Internal	Mr.R.R.Ambade	
3	Internal	Mr.U.J.Patel	
4	External	Ms.Meena Gawas Organisation: Mithibai College Of Arts and Science	



## 1. COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: III</b>
<b>Course: Electrical Circuits and Networks</b>	<b>Group: C*</b>
<b>Course Code: ECN190306</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
		Hours	Marks										
04	02	--	--	06	03	70	20	10	70	25	50	--	175

## 3. COURSE OBJECTIVES

This Course deals with the Different circuit elements, Network Theorems, Analysis of two port network and practical's thereof. In order to understand electrical machines, power system, controls and measurements, knowledge of electrical circuit and network is very important. Study of electrical network lays the foundation to understand Courses of application level.

## 4. SKILL COMPETENCY

The study of this Course will facilitate student to understand concept and principles of circuits and circuit analysis. It also helps the students in fault finding and troubleshooting.

## 5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's Level
CO 1	Apply Theorems to various series/parallel electric circuits and Analyze the circuit performance with current and voltage sources.	R, U, A
CO 2	Study Graph theory and analyze networks.	R, U, A
CO 3	Explain transient behavior of RC circuit and RL circuit transients.	R, U, A
CO 4	Analysis of two port network circuits and study their various parameters.	R, U, A



## 6. COURSE CONTENTS

Sr. No.	Topic /Sub-Topics	Hours	Marks	COs
1	<b>Circuit Elements and Transformation Techniques.</b> 1.1 Classification of circuit elements, unilateral, bilateral, linear, non-linear, lumped, distributed passive & active circuit elements. 1.2 Types of sources, source transformation Technique. 1.3 Star delta transformation for resistance.	12	14	CO1
2	<b>Network Theorems.</b> 2.1 Mesh current analysis 2.2 Node analysis. 2.3 Superposition Theorem, 2.4 Thevenin's and Norton's Theorem 2.5 Maximum Power transfer Theorem 2.6 Reciprocity theorem	15	16	CO1
3	<b>Graph Theory and Network Equation.</b> 3.1 Graph of a network 3.2 Trees and Loops 3.3 Incidence Matrix 3.4 Cut-set of a network 3.5 Tie-set matrix and loop currents 3.6 Analysis of Networks 3.7 Duality Simple numerical only on above topics.	15	16	CO2
4	<b>D.C Transient Response.</b> 4.1 R-L transients. Expression for the rise and decay of current in simple RL series circuit. 4.2 Initial conditions, time constant. Expression for energy stored in inductance. 4.3 RC-transients. Expression for the rise and decay of charge and voltage in simple RC series circuit. 4.4 Initial conditions, time constant. Expression for energy stored by a capacitor.	11	12	CO3
5	<b>Two Port Network Analysis.</b> 5.1 Impedance, admittance, hybrid and ABCD parameters. 5.2 Reciprocity and symmetry conditions. 5.3 Calculation of these parameters for T Network.	11	12	CO4
	<b>Total</b>	<b>64</b>	<b>70</b>	



## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	Verification of Superposition theorem with DC Source.	4	CO1
2	Verification of Thevenin's theorem in DC Circuits.	4	CO1
3	Verification of Norton's theorem in DC Circuits.	4	CO1
4	Verification of Maximum power transfer theorem in DC Circuits.	4	CO1
5	Verification of Reciprocity theorem in DC Circuits.	4	CO1
6	To calculate and verify Z parameter of two port network	4	CO2
7	To calculate and verify Y parameter of two port network	2	CO2
8	To calculate and verify H parameter of two port network	2	CO2
9	Transient response of RC circuit	2	CO3
10	Study of graph theory and numericals	2	CO2
	<b>TOTAL</b>	32	

## 8. IMPLEMENTATION STRATEGY(PLANNING)

1. Teaching Plan.
2. Assignments.
4. Guest/Expert lectures.
5. Continuous assessment.
6. Slides.
7. Any other method adopted.

## 9. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	Electrical Technology. Volume-1	B.L. Thereja	S.Chand & Co.
2	Network Analysis and Synthesis	C.L. Wadhwa	New Age international
3	Network Analysis	Van Valkenburg	PHI Learning

## 10. WEB REFERENCES

- 1) [www.nptel.ac.in/courses/108105053/7](http://www.nptel.ac.in/courses/108105053/7)
- 2) [www.electricaltechnology.org](http://www.electricaltechnology.org)
- 3) [www.electrical4u.com](http://www.electrical4u.com)
- 4) <https://www.maplesoft.com/content/EngineeringFundamentals>



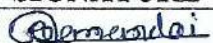
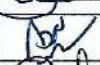
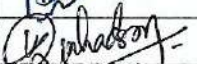

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	Topic	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Circuit Elements and Transformation Techniques	4	4	6	14
2	Network Theorems	3	3	10	16
3	Graph Theory and Network Equation.	4	4	8	16
4	D.C Transient Response	4	4	4	12
5	Two Port Network Analysis.	3	3	6	12
<b>TOTAL</b>		<b>18</b>	<b>18</b>	<b>34</b>	<b>70</b>

**R- Remembering, U - Understanding, A- Applying (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Dinesh G. Rajmandai	
2	Internal	Urvi H. Sawant	
3	Internal	Vivek Dhadam	
4	External	Deepak K. Kajrolkar, (Dy. Gen. Mgr.) Organisation: Adani Electricity Mumbai Ltd.	





## 1. COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: III</b>
<b>Course: Electrical Power Generation</b>	<b>Group: C*</b>
<b>Course Code: EPG190307</b>	<b>Duration: 16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs	Tutorial Hrs	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	-	2	-	6	3	70	20	10	70	50	-	-	150

## 3. COURSE OBJECTIVE

This is a core technology course. Electrical diploma pass outs should know the principle of generation of electricity, conventional methods of generation of electricity, their environmental impact and economics of power generation.

This course shall provide the basis for further studies in transmission, distribution and power system operations.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain following competency through various teaching-learning experiences:

**Suggest the appropriate method of power generation for given application.**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO 1	Compare various sources of Electrical power generation.	R, U
CO 2	Suggest appropriate type of conventional power plant for given conditions.	R, U, A
CO 3	Suggest appropriate renewable method of power generation for given conditions.	R, U, A
CO 4	Calculate basic factors affecting cost of generation.	R, U, A



## 6. COURSE CONTENTS

Ch. No.	Name of the topic	Hours	Marks	CO
1.	<b>Introduction to Electricity generation and its resources:</b> 1.1 Energy resources for generating electricity 1.2 Advantages of Electrical energy over other forms of energy 1.3 Conventional, Non-conventional and Renewable, Non-renewable sources, their comparison	04	05	CO 1
2.	<b>Thermal Power Stations:</b> 2.1 Thermal Energy Conversion 2.2 Merits and demerits 2.3 Thermal power stations in the state with their capacities 2.4 Selection of site for thermal power stations 2.5 Types of coal 2.6 Main parts, block diagram of thermal power stations 2.7 Environmental impact	09	10	CO 2
3.	<b>Hydro Power Stations</b> 3.1 Selection of site 3.2 Merits and demerits 3.3 Layout of hydro Power stations, Elements of power plant and their functions 3.4 Classification of hydro power plant on the basis head, regulation and type of load supplied 3.5 Types of Turbines and their selection of turbine according to availability of water head and Capacity 3.6 Hydro Power stations with their capacities in the state	07	07	CO 2
4.	<b>Diesel Power Stations</b> 4.1 Applications of diesel power stations 4.2 Merits and demerits 4.3 Diesel electric plant- Main components (Block Diagram)	06	06	CO 2
5.	<b>Nuclear Power Stations</b> 5.1 Need of Nuclear Energy and its comparison with fossil fuels 5.2 Merits and demerits 5.3 Fuels used in Nuclear Power Station 5.4 Selection of site 5.5 Block diagram and working of Nuclear Power Station 5.6 Construction and working of Nuclear Reactor 5.7 Types of Reactors (only introduction) 5.8 Radioactivity, Environmental impact 5.9 Nuclear power stations in state & county with capacities.	08	09	CO 2
6.	<b>Renewable energy sources</b> 6.1 <b>Solar Energy:</b> Potential of Solar energy, Merits and demerits, Direct conversion method (Photovoltaic cell) - Construction, working, material, efficiency	20	21	CO 3



	<p>6.2 <b>Wind Energy:</b> Selection of sites for Wind Mills, Merits and demerits, Block diagram and working of Wind energy plant</p> <p>6.3 <b>Ocean Energy:</b> Forms of ocean energy available for power generation, Merits and demerits</p> <p>6.4 <b>Geothermal energy:</b> Resources available for power generation, Merits and demerits,</p> <p>6.5 <b>Biomass energy:</b> Various Bio-fuels, Merits and demerits, Types of biomass generation</p> <p>6.6 <b>Fuel cell:</b> Working, applications, Merits and demerits</p> <p>6.7 <b>Small hydro power plants:</b> Classification, Merits and demerits</p>			
	<b>Economics Of Power Generation</b>			
7.	<p>7.1 Terms commonly used in system operation: connected load, firm power, cold reserve, hot reserve, spinning reserve, Load-curve, Base load &amp; peak load</p> <p>7.2 Factors affecting the cost of Generation: Average demand, Maximum demand, plant capacity factor and plant use factor, Diversity factor and load factor, significance of high load factor</p> <p>7.3 Simple numerical</p>	10	12	CO 4
	<b>TOTAL</b>	64	70	

#### 7. LIST OF PRACTICALS /ASSIGNMENTS/ EXERCISES/ TUTORIALS/ DRAWINGS:

Term Work consists of drawing book with approx.no of hours required and corresponding CO attained should be specified here.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs. required	COs
1.	Comparison chart of all sources	2	CO 1
2.	Drawing of Thermal Power station	8	CO 2
3.	Drawing of Hydro Power station	6	CO 2
4.	Drawing of Nuclear Power station	6	CO 2
5.	Drawing of Diesel Power station	2	CO 2
6.	Construction of Photovoltaic cell	4	CO 3
7.	Drawing of Wind Power station	2	CO 3
8.	Other renewable energy sources	2	CO 3
	<b>TOTAL</b>	32	



## 8. IMPLEMENTATION STRATEGY(PLANNING)

- i. Teaching Plan/Tutorials
- ii. Minimum no of practical/assignments/drawings etc.
- iii. Industry visit
- iv. Guest/Expert lectures
- v. Demonstrations/Simulations
- vi. Slides
- vii. Group discussions
- viii. Seminar
- ix. Case Study
- x. Self-Learning Online Resources
- xi. Any other method adopted

## 9. LEARNING RESOURCES:

### 1. Books:

Sr. No.	Author	Title	Publisher
1	J. B. Gupta	A course in Electrical Power	S. K. Kataria & Sons
2	G. S. Sawhney	Non-conventional energy sources	PHI
3	Dr. S. L. Uppal	Electrical Power	Khanna Publishers.
4	Soni – Gupta - Bhatnagar	A course in Electrical Power	Dhanpatrai & Sons
5	Prof. Arrora and Dr. V. M. Domkundwar	A course in Power Plant Engineering	Dhanpatrai & Sons
6	Paul Hersch and Kenneth Zweibel	Basic Photovoltaic Principles and Methods	Technical Information Office

### 2. Journals:

Electrical India - Journal for recent trends & development in Electrical Engineering  
Electronics for you

## 10. WEBSITE:

1. [www.tatapower.com](http://www.tatapower.com)
2. [www.ntpc.co.in](http://www.ntpc.co.in)
3. [www.nhpcindia.com](http://www.nhpcindia.com)
4. [www.powergridindia.com](http://www.powergridindia.com)
5. [www.npcil.nic.in](http://www.npcil.nic.in)
6. [www.indiaenergy.gov.in](http://www.indiaenergy.gov.in)




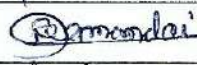
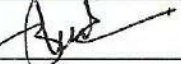

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Introduction to Electricity generation and its resources	5	-	-	05
2	Thermal Power Stations	4	3	3	10
3	Hydro Power Stations	2	2	3	07
4	Diesel Power Stations	3	3	-	06
5	Nuclear Power Stations	3	3	3	09
6	Renewable energy sources	9	6	6	21
7	Economics Of Power Generation	3	3	6	12
		29	20	21	70

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Urvi Sawant	
2	Internal	Dinesh G. Rajmandai	
3	Internal	N D Adate	
4	External	Sheja Nair	
		Organisation : D.J Sanghi college of Engg	



### 1. COURSE DETAILS:

<b>Programme: Electrical Engineering</b>	<b>Semester: III</b>
<b>Course: Electrical Transmission and Distribution</b>	<b>Group: C*</b>
<b>Course Code: ETD190308</b>	<b>Duration:16 Weeks</b>

### 2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
04	-	02	-	06	03	70	20	10	70	50	-	25	175

### 3.OBJECTIVE:

Electrical diploma pass out should know system for electrical transmission & distribution. They also will be able to identify various components & their functions. They will be able to measure system performance. They will use this knowledge in studying switchgear and protection. On completing the study of generation, transmission, & distribution & switch gear & protection, students will be able to work as technician/supervisor in power industry, manufacturing industries and public utilities.

### 4. SKILL COMPETENCY

The aim of this course is to give knowledge of performance, types of transmission and distribution systems, their components, underground cables, their types, faults and tests, different voltage regulators used in power system which will help the students to work as technician/supervisor in power industry.

### 5. COURSE OUTCOMES (COs) At the end of the semester student will be able to :-

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO 1	Classify various types of transmission and distribution systems	Remember, Understand, Apply
CO 2	Identify various components & Know their functions and application.	Remember, Understand
CO 3	Calculate various parameters of transmission line	Understand and Apply
CO 4	Explain underground cables their faults and tests	Understand and Apply
CO 5	Tell different types of Substation, equipment of substation,	Understand and Apply



**6. Detailed Contents:**

Ch. No	Name of the topic	Hours	Marks	CO
01	<b>Introduction to Transmission systems</b> 1.1 Introduction to transmission. 1.2 Necessity of transmission of electricity 1.3 Classification & comparison of different Transmission system. 1.4 Introduction to line components. 1.5 Types of conductors-copper, Aluminium & state Their trade names. solid, stranded & bundled conductors 1.6 Line supports- requirements, types, and field, Applications. 1.7 Line insulators-requirements, types, and field, Applications. 1.8 Failure of insulator and reasons for Failure. 1.9 Distribution of potential over a string of Suspension insulators. 1.10 Concept of string efficiency, methods of Improving string efficiency. 1.11 Corona-corona formation, advantages & disadvantages, factors affecting corona, Important terms related to corona. 1.12 Spacing between conductors. 1.13 calculation of span length & sag calculation ( numerical based on 1.9 , 1.13 )	14	16	CO1,CO2
02	<b>Performance of Transmission line.</b> <b>2.1Transmission Line Parameters</b> 2.1.1 R,L & C of 1-ph & 3-ph transmission line & their Effects on line. 2.1.2 Skin effect, Proximity effect & Ferranti effect. 2.2 Classification of transmission lines. 2.3 Losses, efficiency & regulation of line. 2.4 Performance of single phase short transmission Line (Approximate-numerical based on it) 2.5 Effect of load power factor on performance 2.6 Medium transmission Lines-End condenser, Nominal T & nominal $\pi$ Network with vector Diagram. 2.7 General circuit & Generalised circuit constants (A, B, C, D).	15	16	CO2,CO3
03	<b>Extra High Voltage Transmission.</b> 4.1 Introduction and Requirement. 4.2 EHAVC Transmission. 4.3 Reasons for adoption & limitations. 4.4 HVDC Transmission-Advantages, Limitations.	03	04	CO1



<b>04</b>	<b>Components of Distribution System</b> 4.1 Introduction, Classification of distribution system. 4.2 A.C distribution. 4.3 connection scheme of distribution system. 4.4 Requirement of distribution system. 4.5 Design consideration. 4.6 A.C distribution calculations. 4.7 Methods of solving A.C-1 phase & 3 $\phi$ -phase 4.8 Connected (balanced) distribution system. (Numerical based on 1-ph & 3-ph balanced Distribution system)	12	14	CO1,CO2
<b>05</b>	<b>Underground cables.</b> 5.1 Introduction & requirement. 5.2 Classification of cables. 5.3 cable conductors. 5.4 Cable construction. 5.5 cable insulation, Metallic sheathing & mechanical, Protection. 5.6 Comparison with overhead lines. 5.7 Cable laying, cable faults, cable failure, loop test, Cause & remedies, Test for open circuit.	10	10	CO4
<b>06</b>	<b>Substations.</b> 6.1 Introduction. 6.2 Classification of indoor & outdoor substations. 6.3 Advantages & Disadvantages. 6.4 selection & location of site. 6.5 Main connection schemes. 6.6 Equipment and circuit elements of substations. In coming & outgoing lines, Transformers, CT & PT, Bus bar Relays, Circuit Breaker, fuses, Isolators, Batteries, lightning arresters, Insulators. (only symbols and function) 6.7 Connection diagram and layout of substations.	10	10	CO5
	<b>TOTAL</b>	<b>64</b>	<b>70</b>	

7. **Laboratory Practice:** Term Work consists of minimum no of Six Drawing Sheets and Assignments from the following.

Sr. No.	Title of Drawing Sheet	Approx.Hrs required	COs
1	Introduction to Transmission systems	6	CO 1, CO 2
2	Types of Insulators and Supports	6	CO 1, CO 2
3	Performance of Transmission line.	6	CO 3
4	Components of Distribution System	6	CO 1, CO 2
5	Underground cables.	4	CO 4
6	Substations,	4	CO 5
	<b>TOTAL</b>	<b>32</b>	





	Assignments- 1. Introduction to Transmission systems 2. Performance of Transmission line 3. Components of Distribution System		CO 1, CO 2 CO 3 CO 1, CO 2

### 8. IMPLEMENTATION STRATEGY:

In depth study and understanding of the subject will be implemented by adopting following strategy.

1. Teaching Plan/Tutorials
2. Minimum no of drawings.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations/Simulations
6. Slides
7. Group discussions
8. Seminar
9. Self Learning Online Resources
10. Any other method adopted

### 9. LEARNING RESOURCES:

#### A) REFERENCE BOOKS:

SR.NO	AUTHOR	TITLE	PUBLISHER & ADDRESS
1	V.K Mehta	Power system	s.chand publication
2	S.L Uppal	Electrical Power	Khanna publication
3	Soni, Gupta & Bhatnagar	Electrical Power	Dhanpatrai & sons
4	J.B.Gupta	Electrical Power	Khanna Publication

#### 10 WEBSITE:

1. [www.tatapowerindia.com](http://www.tatapowerindia.com)
2. [www.mahagenco.com](http://www.mahagenco.com)
3. [www.relance.com](http://www.relance.com)
4. [www.electrical-technologies.com/](http://www.electrical-technologies.com/)
5. [www.electrical4u.com](http://www.electrical4u.com).




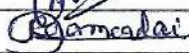


## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Introduction to Transmission system	4	8	4	16
2.	Performance of Transmission line.	8	6	2	16
3.	Extra High Voltage Transmission.	-	4	-	4
4.	Components of Distribution System	4	6	4	14
5.	Underground cables	2	4	4	10
6.	Substations.	5	5		10
<b>TOTAL</b>		<b>23</b>	<b>33</b>	<b>14</b>	<b>70</b>

R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs Ajayshree n. Kinhekar	
2	Internal	Mr. Dinesh G. Rajmandai	
3	Internal	Mr.N.D.Adate	
4	External	Shri A K Dhulshette Organisation: G P Mumbai	



## 1.0 COURSE DETAILS:

<b>PROGRAMME:</b> Electrical Engineering	<b>Semester:</b> III
<b>COURSE:</b> Transformer and Induction Motors	<b>Group:</b> C*
<b>Code:</b> TIM190309	<b>Duration:</b> 16 Weeks

## 2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
04	02	-	-	06	03	70	20	10	70	25	50	-	175

## 3. OBJECTIVE:

This subject deals with transformer and induction motor, their concept, principle and operation. Transformer is a very vital link in power system and induction motor is cheapest motor available in general-purpose motors. The knowledge and skill obtained by the student will be useful to him as a supervisor or technician in discharging the technical function.

## 4. SKILL COMPENTANCE:

The aim of this course is to help the students to attain the following industry identified competency through the teaching learning experiences

- Use induction motors and transformers
- Select the proper size of transformer and induction motor for various industrial applications

## 5. COURSE OUTCOMES (CO) at the end of the semester students will be able to:

CO No	COURSE OUTCOMES	Blooms Level
CO 1	Know the constructional details and working principle of transformer and induction motors	R/U
CO 2	Evaluate the performance of transformers and Induction motors.	U/A
CO 3	Tell necessity of starters and different methods for speed control of induction motors	A
CO 4	Perform load test on transformers and induction motors	U/A
CO 5	Select the suitability of transformers and induction motors for specific applications	R/U/A



## 6. COURSE CONTENTS:

Ch.No	CONTENT	Hours	Marks	CO's
1.0	<b>Single Phase Transformers</b> 1.1 Basic construction and working principle 1.2 Theory of ideal transformer& E.M.F. Equation 1.3 Classifications of transformer, 1.4 Comparison between Core type and Shell type 1.5 Transformation ratio and rating. 1.6 Operation at No- load with vector diagram 1.7 transformer on load 1.8 Equivalent circuit of a Transformer on open circuit. 1.9 Vector diagram of actual transformer on load at different power factor i.e; unity, lagging, leading. (Simple Numericals )	09	10	CO 1       CO 3  CO 4
2.0	<b>2. Regulation and Efficiency of 1-Phase Transformers</b> 2.1 Transformer losses. 2.2 Open circuit test and short circuit test. 2.3 Determination of the equivalent parameters from a OC/SC test. 2.4 Equivalent circuits referred to any side (HV & LV side) 2.5 Voltage regulation of a transformer. 2.6 Computation of regulation from equivalent circuit. 2.7 Efficiency of a transformer& condition for maximum efficiency 2.8 Per unit impedance, per unit reactance, per unit resistance. 2.9 All day efficiency. (Numerical based on above )	09	10	CO 2  CO 4  CO 4  CO 4
3.	<b>Three Phase Transformers</b> 3.1 Construction of three phase transformer. 3.2 Bank of Three single phase Transformers. 3.3 Single unit of three phase Transformer 3.4 Distribution and power Transformer 3.5 Three transformer connections and vector group 3.6 Three phase to two phase conversion (Scott Connection) 3.7 Cooling methods three phase transformer connections as per IS 2026 (Part IV) -1977. <b>3.8 Concept of Autotransformer.</b> 3.9 comparison with 2 winding transformer & potential divider 3.10 Copper saving. 3.11 Advantages and disadvantages of auto – transformer, Uses. 3.12 Selection of Transformers as per IS 10028 (Part I) -1985, Criterion for selection of distribution transformer, and power Transformer, 3.13 Amorphous core type Distribution Transformer 3.14 Specifications of three phase distribution Transformer as per IS 1180 (Part I) 1989	14	15	CO 1    CO 2   CO 3  CO 4
4.0	<b>Three Phase Induction Motor: (10/16)</b> 4.1 Construction and principle of three phase induction motor 4.2 Types of three phase Induction motor. 4.3 Concept of slip &Equation for rotor current , rotor e.m.f 4.4 Effect of slip on rotor current, frequency. 4.5 Torque equation, Condition for maximum torque. 4.6 Torque – speed, Torque – slip curve. 4.7 Full load torque and starting torque and maximum torque. 4.8 Effect of change in rotor circuit resistance and supply voltage on torque-slip 4.9 Power stages of three phase Induction Motor. 4.10 Relation between rotor input. Rotor copper loss and gross mechanical power.	14	15	CO 1   CO 2  CO 3



	4.11 Equivalent circuit of a induction motor 4.12 No- load and block rotor test. 4.13 Construction of circle diagram 4.14 Computation of performance characteristics for circle diagram. (numerical based on above )			<b>CO 4</b>
<b>5.0</b>	<b>Starting and Speed Control of Induction Motors (4/6)</b> 5.1 Necessity of starter for an induction motor 5.2 Starter for induction motor – Types, selection, comparison 5.3 Stator resistance type, rotor resistance type, 5.4 auto transformer type, starts delta type starters. 5.5 Power wiring diagram and control circuit diagrams of 5.5.1 Direct online starters. Starter using contactors – 5.5.2 Reverse - forward starter 5.6 Automatic and semi –automatic star – delta starters, interlocks. 5.7 <b>Speed Control Methods:</b> 5.7.1 Rotor rheostat control, 5.7.2 pole changing method, 5.7.3 Frequency changers and stator voltage.	<b>09</b>	<b>10</b>	<b>CO 1</b>  <b>CO 5</b>  <b>CO 2</b>
<b>6.0</b>	<b>Special Purpose Motors</b> 6.1 Single Phase Induction Motors 6.2 Double Field revolving theory and cross field theory 6.3 Construction, working principle and applications of 6.3.1 Resistance start induction run 6.3.2 Capacitor start induction run motor 6.3.3 Capacitor start and capacitor run motor, 6.4 Shaded pole motors, 6.5 Universal motor 6.6 Servo motors 6.7 Stepper motors 6.8 Hysteresis motor	<b>09</b>	<b>10</b>	<b>CO 1</b>  <b>CO 2</b>  <b>CO 5</b>
	<b>Total</b>	<b>64</b>	<b>70</b>	

## 7. LIST OF PRACTICALS /ASSIGNMENTS:

Term Work consist of Journals containing minimum 10 No of Experiments and Assignments from the following:

Sr.No	Title of Experiments/Assignments	Approx Hours required	CO's
1.	Open circuit test on single phase transformer	02	CO 4
2.	Short circuit test on single phase transformer	02	CO 4
3.	Regulation and efficiency of single phase transformer	04	CO 2
4.	Three phase connection of single phase transformer (Star-star, delta-delta and star-delta)	04	CO 1
5.	Scott connection of transformer	02	CO 2
6.	Load test on three phase induction motor	04	CO 4
7.	No load test & blocked rotor test on three phase Induction Motor & predetermination of efficiency full load torque, full load slip by Circle diagram	04	CO 4
8.	Study of different types of starters for three-phase induction motor.	04	CO 3
9.	Load test on single phase induction motor	02	CO 4
10.	Study of special purpose motors	04	CO 5
	<b>TOTAL</b>	<b>32</b>	



## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Lab Plan
- 2 Visit to medium scale industries.
- 3 Use of Power Point presentations and ICT
- 4 Guest Lecture/Expert Lectures
5. Any other Method Adopted

## 9. LEARNING RESOURCES

Sr. No.	Title	Author	Publisher & address
1	Theory and Performance of Electrical Machines	J.B Gupta	Dhanpatrai& sons
2	Electrical Technology Vol – II	TherajaB.L Theraja AK	S.ChandCo. New Delhi ISBN 10:8121924375
3	Electrical Machines	S.K.Bhattacharya	Tata McGraw Hill, New Delhi ISBN 9780075415396
4	Electrical Machines	Ashfaqe Hussain	Khanna Publications
5	Special Purpose Electrical Machines	Sen S.K	Khanna Publications, New Delhi, ISBN:9788174091529
6	Electrical Machines	Kothari D.P and NAgrath I .J.	Tata McGraw Hill, New Delhi ISBN 978-9352606405

## 10. WEB Reference:

- [www.nptel.iitm.ac.in](http://www.nptel.iitm.ac.in)  
[www.howstubsworks.com](http://www.howstubsworks.com)  
[www.electrical4u](http://www.electrical4u).  
[www.electricalnotesandarticles.co.in](http://www.electricalnotesandarticles.co.in)  
[www.electricalportal.com](http://www.electricalportal.com).

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN:

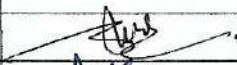
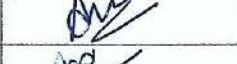

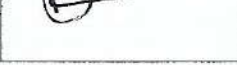
Sr. No.	TOPIC	Distribution of Theory			
		Marks	R Level	U Level	A Level
1.	Single Phase Transformers	4	4	2	10
2.	Regulation and Efficiency of 1-Phase Transformers	2	4	4	10
3.	Three Phase Transformers	3	6	6	15
4.	Three Phase Induction Motor	4	4	7	15
5.	Starting and Speed Control of Induction Motors	4	2	4	10
6.	Special Purpose Motors	2	4	4	10
<b>TOTAL</b>		<b>19</b>	<b>24</b>	<b>27</b>	<b>70</b>

R- Remembering, U - Understanding, A- Applying (Bloom's revised taxonomy levels)



**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

**12. COURSE EXPERT COMMITTEE MEMBERS**

Sr. No.		NAME	SIGNATURE
1	Internal	Shri N D Adate	
2	Internal	Mrs. A N Kinkekar	
3	Internal	Ms. Urvi Sawant	
4	External	Shri A K Dhulshette Organisation: G P Mumbai	



## 1. COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: III</b>
<b>Course: Digital Electronics</b>	<b>Group: A</b>
<b>Course Code: DEX190310</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	-	-	6	3	70	20	10	70	25	25	-	150

### 3. COURSE OBJECTIVE:

This Course will help students to learn fundamental concepts of digital electronics, which will help in designing sequential and combinational circuits.

### 4. SKILL COMPETENCY:

The aim of this course is to help the students to attain the following identified competency through various teaching learning experiences.

1) Apply logic techniques to solve basic digital electronics problem.

2) Design combinational and sequential circuits

### 5. COURSE OUTCOMES(COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Recognize number systems, simplify Boolean expression using basic Boolean laws, rules of Boolean algebra, Logic gates.	Remember, Understand
CO2	Realize combinational logic circuits using Boolean algebra, K maps, MSI circuits	Apply
CO3	Analyze characteristics, compare logic families and classify semiconductor memories.	Remember, Understand
CO4	Use sequential circuits- Flip Flops, Registers, Counters.	Apply





## 6. COURSE CONTENTS:

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	<b>Number systems and Codes</b> 1.1. Introduction to number systems 1.2. Binary No. Systems 1.2.1 binary arithmetic (addition, subtraction, multiplication, division) 1.2.2 1's complement & 2's complement 1.3. Octal No. System, Hexadecimal System, 1.4. Codes: 1.4.1 Excess – 3 1.4.2 Conversion of binary to Gray and Gray to binary 1.4.3 ASCII code, 1.4.4 BCD 1.4.5 BCD addition – 9's and 10's complement	8	8	CO1
2	<b>Logic Gates And Boolean Algebra</b> 2.1 Boolean laws, De Morgan's theorem. 2.2 Simplification of Boolean expression 2.3 Logic Gates and Families: 2.3.1 Logical symbol, logical expression and truth table of AND, OR, NOT, NAND, NOR, EX-OR and EX-NOR gates. 2.3.2 Universal gates –Realization of all gates using Universal Gates.	9	10	CO1
3	<b>Combinational Logic Design / Circuits</b> 3.1 Compare combinational and sequential circuit. 3.2 Construction of logical circuits from Boolean expressions 3.3 Boolean expressions using SOP, POS 3.3.1 Min, Max term representation of logical functions 3.3.2 K-map representations of logical functions 3.3.3 Minimization using K-map for 2, 3, 4 variables, Don't care conditions, various problems. 3.4 Binary half & full adder, Binary Half & Full subtractor	10	12	CO2
4	<b>Logic Families</b> 4.1 Introduction to digital ICs, 4.1.1 Classification of Digital IC 4.2 Characteristics of digital ICs 4.2.1 Voltage and current parameter 4.2.2 Noise margin 4.2.3 Fan-out and Fan-in 4.2.4 Speed, power dissipation, Figure of Merit 4.3 TTL and CMOS 4.3.1 Working principle of TTL and CMOS NAND gate 4.3.2 Comparison of TTL and CMOS	4	6	CO3
5	<b>MSI Circuits</b> 5.1 Block diagram, Truth table, Logical expression and logic diagram 5.1.1 Multiplexers (4:1 and 8:1, 16:1) 5.1.2 Demultiplexers (1:4; 1:8; 1:16) 5.1.3 74 series Multiplexers and Demultiplexer IC's, 5.2 Multiplexer tree (4:1 using 2:1 mux, 8:1 Mux using 2:1, 4:1 Mux) Multiplexer/ Demultiplexer Application 5.3 Encoder 5.3.1 Decimal to BCD encoder (IC 74147) 5.3.2 Decoders - BCD to seven segment decoder (IC 7447)	9	10	CO2



6	<b>Flip –Flops</b> 6.1. A 1-bit memory cell, clock signal 6.2 Types of FLIP FLOP 6.2.1 JK, D, T- Block diagram, Truth table, Logic diagram using NAND 6.2.2 Race around condition in JK FF, Timing diagram 6.2.3 Master slave JK FF - Truth table, Logic diagram, working, Timing diagram 6.3 Application of Flip Flop	10	12	CO4
7	<b>Registers and Counters</b> 7.1. Introduction to Registers. 7.2 Shift registers 7.2.1 Classification- SISO, SIPO, PISO, PIPO -circuit diagram, TT and working. 7.3 Application of shift registers. 7.4 Counters: basic concept of counters 7.4.1 Classification -Synchronous and Asynchronous counters, Up/down counters. 7.4.2 Ring counter, Johnson counter.	7	6	CO4
8	<b>Semiconductor Memories</b> 8.1. Introduction, Memory organization and operation 8.2. Classification of memories 8.2.1 ROM, PROM, EPROM, E2PROM, RAM (static & dynamic)	7	6	CO3
<b>Total</b>		<b>64</b>	<b>70</b>	

#### 7. LIST OF PRACTICALS:

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	Realize truth table of all Logic gates using IC	2	CO1
2	Verify Demorgan's theorem	2	CO1
3	Realize NAND as Universal Gate	4	CO1
4	Realize NOR as Universal Gate	4	CO1
5	Design Half Adder and Full Adder	2	CO2
6	Design Half Subtractor and full Subtractor	2	CO2
7	Design Combinational Circuit	2	CO2
8	Verify truth table of Multiplexer IC74151,IC74157	2	CO2
9	Verify BCD to seven segment decoder	2	CO2
10	Implement decoder using IC 7442	2	CO2
11	Implement D FlipFlop using IC7474	2	CO4
12	Implement MS JK Flip Flop	2	CO4
13	Assignment 1- Logic Families	2	CO3
14	Assignment 1- Semiconductor memories	2	CO3
<b>TOTAL</b>		<b>32</b>	



## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan
2. Minimum no of practical/assignments.
3. Video lectures
4. Guest/Expert lectures
5. Demonstrations and Simulations

## 9. LEARNING RESOURCES:

Sr. No	Title of Book	Author	Publication
1	Modern Digital Electronics	R. P Jain	Tata McGraw Hills
2	Digital Electronics	G. K Kharate	OXFORD
3	Fundamentals of Digital Circuits	A. Anand Kumar	PHI
4	Digital Electronics	Anil K. Maini	Wiley

## 10. WEB REFERENCES:

1. <https://www.geeksforgeeks.org/digital-logic-logic-gates/>
2. <http://www.learnabout-electronics.org/index.php>
3. <http://www.electrical4u.com/digital-electronics/>

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN:

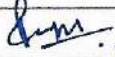
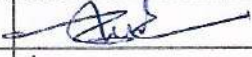
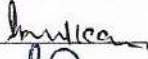

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Number systems and Codes	4	4	-	08
2	Logic Gates And Boolean Algebra	6	4	-	10
3	Combinational Logic Design / Circuits	2	4	6	12
4	Logic Families	4	2	-	06
5	MSICircuits	2	4	4	10
6	Flip –Flops	-	4	8	12
7	Registers and counters	-	-	6	06
8	Semiconductor Memories	2	4	-	06
	TOTAL	20	26	24	70

**R Remember, U Understand, A Apply and above, (Bloom's revised taxonomy levels)**

NOTE: This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



**12. COURSE EXPERT COMMITTEE MEMBERS:**

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs PJ Nikhade	
2	Internal	Mr N D Adate	
3	Internal	Mrs A A Kulkarni	
4	External	Shri A K Dhulshette	
		Organisation: G P Mumbai	



## 1. COURSE DETAILS

<b>Programme: IE/DE/EE</b>	<b>Semester: I/I/III</b>
<b>Course: C Programming</b>	<b>Group: C*/C</b>
<b>Course Code: CPR 190019</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
2	4	-	-	6	-	-	-	-	-	50	50	-	100

## 3. COURSE OBJECTIVE

Automation Industry needs to build Microcontroller based application which are being developed using 'C'. This course deals with concepts of programming to enhance programming skill of diploma students. This course will enable the students to inculcate programming concepts and methodology to solve engineering problems.

## 4. SKILL COMPETENCY

The aim of this course is to help the students to attain the following industry identified competency through various teaching learning experience:

Develop 'C' programs to solve broad based electronic engineering related problems.

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to :-

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Compare various types of programming languages and describe C fundamentals.	U
CO2	Draw Flowchart & Develop algorithm in Programming language.	U, A
CO3	Use of control flow statements in C.	R
CO4	Study of C Pre-processor & String handling	R
CO5	Build C Programs with the help of Function, Array, Pointer, Structure and Union	U, A



## 6. COURSE CONTENTS

Sr.	TOPIC/ Sub Topic	Hours	COs
1	<b>Introduction to Programming</b> Introduction 1.1 Why Programming? 1.2 What is Programming? 1.3 Why so many Programming language? 1.4 Introduction Flow chart & Algorithm	2	CO 1 CO 2
2	<b>Getting started with C</b> 2.1 What is C? 2.2 Constant, Variable & Keywords 2.3 Compilation and Execution 2.4 Console IO Operations: printf, scanf 2.5 C Instruction 2.5.1 Type Declaration Instruction 2.5.2 Arithmetic Instruction 2.5.3 Control Instruction	4	CO 1
3	<b>Control Flow Statement</b> 3.1 If statement 3.2 If-else Statement 3.3 Switch Statement 3.4 Unconditional Branching using goto statement 3.5 While Loop 3.6 Do While Loop 3.7 For Loop 3.8 Break and Continue	8	CO 3
4	<b>Function</b> 4.1 Introduction 4.2 Function declaration and Prototype 4.3 Scope of variable and storage classes 4.4 Pass by value & reference 4.5 Recursion	4	CO 5
5	<b>Array</b> 5.1 Introduction 5.2 Arrays Declaration and Initialization 5.3 One dimensional arrays 5.4 Two dimensional arrays. 5.5 Introduction to character arrays 5.6 Arrays as Function Parameters	3	CO 5
6	<b>Pointers</b> 6.1 Introduction 6.2 Pointer Declarations, passing pointer to function 6.3 Dynamic memory allocation 6.4 Operations on pointers	3	CO 5



7	<b>String Handling</b> 7.1 Introduction to Strings 7.2 Sample Program 7.3 Standard String Library Functions 7.4 Array of String	3	CO 4
8	<b>Structures and Unions</b> 8.1 Declaring and Instantiating Structures 8.2 Structure as Parameter and Pointer to Structure 8.3 Array of Structure 8.4 Union	3	CO 5
9	<b>The C Preprocessor</b> 9.1 Features 9.2 Macro Expansion 9.3 File Inclusion 9.4 Conditional Compilation 9.5 #if and #elseif Directives	2	CO 4
<b>TOTAL</b>		<b>32</b>	

#### 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of Journal containing minimum no of 24 programs/mini project with approx.no of hours required and corresponding COs:

Sr. No.	Title of Programs	Approx.Hrs required	COs
1	Introduction to C	2	1,2
2	To implement printf and scanf functions for user input -output	2	1
3	To implement the working of identifier, constant and variables.	4	1
4	To implement the working of arithmetic operators.	2	1
5	To implement the working of relational & logical operators.	2	1
6	To implement Implicit & Explicit type casting	4	1
7	To implement the concept of if, if... else, conditional statements(two problems each)	4	2,3
8	To implement the concept of nested if, & else if... ladder conditional statements(two problems each)	4	2,3
9	To implement the concept of switch...case statement(two problems each)	4	2,3
10	To implement the concept of goto, break & continue statement	4	2,3
11	To implement the concept of Loops i.e. while, for & do-while(two problems each)	4	2,3
12	To implement the concept of one dimensional arrays(two problems each)	4	2,5
13	To implement the concept of two dimensional arrays(two problems each)	4	2,5
14	To implement the concept of string & it's various operations	2	4
15	To implement the concept of user defined functions.	2	2,5
16	To implement the concept of user defined functions with recursion	2	2,5



17	To implement the concept of structures i.e. Arrays within structure & Arrays of structures	4	2,5
18	To implement the concept of pointers	4	2,5
19	To implement the concept of nesting of functions	2	2,5
20	Mini project using all C concepts.	4	2,3,5
	TOTAL	64	

### 8. IMPLEMENTATION STRATEGY(PLANNING)

1. Teaching Plan/Tutorials
2. Minimum no of practical/assignments/drawings etc.
3. Guest/Expert lectures
4. Demonstrations/Simulations

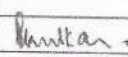


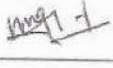
### 9. LEARNING RESOURCES

Sr. No.	Title Of Book	Author	Publication
1.	C Programming	Balaguru Swami	Tata McGrew Hill
2.	Let Us C	Yashavant Kanetkar	BPB Publication
3.	Programming with C	Byron Gottfried	Tata McGrew Hill, SCHAUM's series
4	Head First C	David Griffiths	O'Reilly

### 10. WEB REFERENCES

1. <http://www.tutorialspoint.com/cprogramming/>
2. <http://www.cs.cf.ac.uk/Dave/C/CE.html>
3. <http://www.technoexam.com/>
4. <http://www.thestudymaterial.com/c-c-programs.html>

### 11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs. A.A.Kulkarni	
2	Internal	Mr. S.S.Rokade	
3	Internal	Mr. J.S. Kulkarni	
4	External	Umang Patel Organisation K.J. Somaiya College of Engg.	





### 1. COURSE DETAILS:

<b>Program : Electrical Engineering</b>	<b>Semester : IV</b>
<b>Course : ELECTRICAL AND ELECTRONICS MEASUREMENTS</b>	<b>Group :C*</b>
<b>Course Code :EEM 190311</b>	<b>Duration : 16 Weeks</b>

### 2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods per week					No. of Papers, Duration & Marks			Scheme of Examination						
Theory Hrs L	Practical Hrs P	Drawing Hrs. D	Tutorial Hrs T	Credits (L+P+D+T)	NP	Hrs	Mks	SSL	TA	TH	TW	PR	OR	Total
04	02	-	-	06	01	03	70	20	10	70	25	25	--	150

### 3. OBJECTIVE:

The said course is classified as a core domain as an electrical engineering working with the industry will be in position to function as a Supervisor need to be familiarized with various techniques of measurements and also should be in a position to measure various electrical and parameters like voltage, current, resistance, inductance etc. with electrical and electronics instruments

### 4. SKILL COMPETANCY:

The aim of this course is to help the students to attain the following industry identified competency through various teaching-learning experiences:

- Use relevant measuring instruments in different electrical and electronic applications

### 5. COURSE OUTCOMES (CO's) at the end of course students will be able to: -

CO.No	COURSE UTCOMES	Bloom's Level
CO1	Use appropriate method to measure vital electrical parameters such as voltage, current, power, energy, resistance, inductance, and capacitance.	R,U,A
CO2	Know the working principle of indicating, recording and integrating types of instruments.	R,U
CO3	Describe the constructional details and applications of analogue and digital instruments	R,U
CO4	Appreciate the use of CT and PT in measurements	R,U,A
CO5	Select proper instruments for measurement and calibration purpose	R,U,A



## 6. COURSE CONTENTS:

Sr.No.	Topic/Sub-Topics	Hours	Marks	COs
1	<b>1.0 Fundamentals of Measurements.</b> 1.1 Importance of Measurement 1.2 System of units, standards and dimensions 1.3 Types of standards, Primary & Secondary standards for voltage, current and resistance. 1.4 Absolute measurement of current & resistance.	04	04	CO 1
2.	<b>2.0 Measuring Instruments.</b> 2.1 Classification of Analog instruments 2.2 General Features of Indicating, recording & integrating instruments. 2.3 Torque acting on the moving system of indicating instruments. 2.4 Method of damping & damping curve 2.5 Principle of operation, Equation for deflecting torque, Usual scale distribution & its modifications , Sources of errors, remedies for errors & common usage of the following type of instruments (a) Permanent magnet moving coil instruments (b) Moving iron instruments (c) Electrodynamics or dynamometer type instruments (d) Induction instruments (e) Rectifier instruments. 2.6 Series register, shunts, universal shunts, multiplying power of a multiplier. Simple Numerical	12	12	CO 3
3.	<b>3.0 Instrument Transformer.</b> 3.1 Construction of Current transformers and potential transformers 3.2 Types of CT with specifications 3.3 Advantages of instrument Transformers over Shunts and Multipliers 3.4 Phasor diagram, phase angle ,phase angle error, ratio error 3.5 Methods to minimize it. Simple Numerical	06	06	CO 4
4.	<b>4.0 Resistance Measurements.</b> 4.1 Classification of resistance as low, medium & high resistance 4.1.1 Voltmeter & ammeter method , 4.1.2 Substitution method, Potentiometer method 4.2 Bridge method –Wheatstone’s bridge 4.2.1 Limitations of Wheatstone’s bridge, 4.2.2 Kelvin double bridge for low resistance. 4.3 Measurements of high resistance.(Insulation Resistance) 4.3.1 Surface leakage & 4.3.2 Guard ckt. 4.4 Measurements of high resistance by loss of charge method. 4.5 Ohm –meters, series type shunt type and Megger 4.6 Mega ohm bridge Simple Numerical	10	12	CO 1            CO 5



5.	<b>5.0 A.C Bridges.</b> 5.1 General theory of A.C Bridges 5.2 Different sources and detectors used for bridge circuits. 5.3 Different bridge networks, their balance equations & phasor diagrams under balanced conditions of 1 ) Maxwell's bridge ,2) Wein bridge, 3) Schering bridge – low voltage & high voltage bridge	06	06	CO 1  CO 5
6.	<b>6.0 Measurement of Energy.</b> 6.1 Measurement of energy 6.1.1.Principle of operation, 6.1.2 Equation for torque , 6.2 Different adjustment in ac energy meter. 6.3 Construction and working principle of Electronic energy meter 6.4 Introduction to polyphase energy meter. 6.5 Calibration of single phase energy-meter with various types of loads by direct loading. Simple Numerical	08	10	CO 2  CO 5
7	<b>7.0 Measurement of Power.</b> 7.1 Power measurement using (a) Electrodynamics type and (b) Induction type wattmeter 7.2 Measurement of three phase power (a) One wattmeter method (b) Two-wattmeter method for balance and unbalanced loads and star and delta connection. 7.3 Variation of the ratio of the wattmeter reading against the power factor of the load. 7.4 Measurement of reactive power for balanced load. 7.5 Polyphase wattmeter. Simple Numerical	10	12	CO 2  CO 3  CO 5
8	<b>8.0 Electronic Instruments.</b> 8.1 Electronic voltmeter, multimeter, wattmeter & energy meter. 8.2 Time, Frequency & phase angle measurements using CRO 8.3 L-C-R Meter. 8.4 Digital counter, frequency meter 8.5 Storage oscilloscope. 8.6 Introduction to Power Analyzer	08	08	CO 2  CO 3
<b>TOTAL</b>		<b>64</b>	<b>70</b>	



## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISE/TUTORIALS/DRAWINGS

The term work consists of journals consisting of minimum 8-10 experiments and 3-4 assignments with approx number of hours required with corresponding CO's

Sr.NO	Title of Experiments	Approx Hrs. Required	CO's
1	Measurement of Resistance using Wheatstone bridge method	02	CO 1
2	Calibration of dc analog energy-meter.	02	CO 5
3	Calibration of ac single-phase electronic energy meter by direct loading.	02	CO 5
4	Measurement of three phase power by one wattmeter method	02	CO 1
5	Measurement of three-phase power by two-wattmeter method.	02	CO 1
6	Appreciate the variation of the ratio of two-wattmeter reading against power factor	04	CO 3
7	Measurement of reactive power	04	CO 3
8	Measurement of Insulation resistance using Loss of Charge method	02	CO 2
9	Study of Electronic energy meter	02	CO 3
10	Study of Power Analyzer	02	CO 3
11	Study of CT construction working and applications	04	CO4
12	Study of PT construction working and applications	04	CO4
	TOTAL HOURS	32	

## 8. IMPLEMENTATION STRATEGY: (Planning)

1. Adopting teaching plan
2. Minimum no of Practical's/Assignments
3. Guest/Expert Lectures
4. Continuous assessment for lab works
5. Any other method adopted

## 9. REFERENCE BOOKS:

Sr.No.	Title of Book	Author	Publisher & address
1	Electrical measurements and Instrumentation	A.K.Shawney	Dhanpatrai & sons, New Delhi ISBN:9780000279744
2.	Electrical Measurements & Measuring Instruments	N.V Suryanarayana	S Chand & Co, New Delhi ISBN: 8121928116
3	Electrical Measurements	C.T.Baldwin	Lyall book Dept. Delhi
4.	Electrical Measurements & Measuring instruments	E.W Golding	A.H.Wheeler & Co.
5.	Modern Electronic Instrumentation and Measurement Techniques.	Helfrick and Cooper	Prentice-Hall of India, Reprint 1988
6	Electrical and Electronics Measurements & Instrumentation	R K Rajput	S Chand & Co, New Delhi ISBN: 9789385676017



10. WEBSITES: www.automaticalelectrical.com  
 www.adtrontechnologies.com  
 www.nptel.com  
 www.test-meter.co.uk/




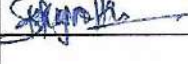
11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN:

Sr.No	Topics	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Fundamentals of Measurements	4	-	-	04
2.	Measuring Instruments	4	4	4	12
3.	Instrument Transformers	2	4	-	06
4.	Resistance Measurements	2	4	6	12
5.	A.C Bridges	2	4	-	06
6.	Measurement of Energy	2	4	4	10
7.	Measurement of Power	2	4	6	12
8.	Electronic Instruments:	2	-	6	08
<b>TOTAL</b>		<b>20</b>	<b>24</b>	<b>26</b>	<b>70</b>

**R- Remembering, U - Understanding, A- Applying (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

12. COURSE EXPERT COMMITTEE MEMBERS:

Sr.NO		Name	Signature
1.	Internal	Shri N D Adate	
2.	Internal	Ms. Urvi Sawant	
3.	Internal	Ms. Ajayshree Kinhekar	
4.	External	Deepak K. Kajrolkar (Dy. Gen. Mgr.) Adani Electricity Mumbai Ltd.	



## 1. COURSE DETAILS

**Programme: Electrical Engineering**

**Semester: IV**

**Course: DC And Synchronous Machines**

**Group: C\***

**Course Code: DSM 190312**

**Duration:16 Weeks**

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
04	02	--	--	06	03	70	20	10	70	25	25	--	150

## 3. COURSE OBJECTIVE

This Course deals with the study of DC Machines, Alternator, and Synchronous Motor practical's thereof. The knowledge gained by the students will be useful for studying technological subject such as Industry Electrical Systems, switchgear & protection, testing and maintenance of electrical equipment's and Modern electric traction.

## 4. SKILL COMPETENCY

The skills acquired after studying this Course will be helpful to use relevant D.C and Synchronous Machines for different electrical engineering applications and to operate & control the machines and also to find various operating parameters of machines.

## 5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's Level
CO1	Know the various types and constructional details of D.C machines.	R, U, A
CO2	Calculate losses and efficiency of DC Machines.	R, U, A
CO3	Use the relevant three phase alternator for different load conditions.	R, U, A
CO4	Use suitable Synchronous motors in different applications.	R, U, A



## 6 COURSE CONTENTS

Sr. No.	Topic / Sub-Topics	Hours	Marks	COs
1	<b>D.C generator</b> 1.1 D.C Machines 1.2 Principle of operation & construction of Generator. 1.3 Armature winding( Only Basics) 1.4 E.M.F equation of D.C Generator.(Simple Numericals) 1.5 Type of DC generators 1.6 DC generators characteristics 1.6.1 Open circuit characteristics 1.6.2 External characteristics 1.6.3 Internal characteristics 1.7 Building up process of dc shunt generator. Critical field resistance, critical speed.	14	15	CO1
2	<b>D.C Motor</b> 2.1 Principle of operation and Construction of D.C motor. 2.2 Back emf & torque equation of dc Motor 2.3 Type of dc motors. 2.4 Characteristics and Applications of dc motors 2.5 Method of speed control of dc shunt and series motors. 2.6 Starting of dc motors. Three Point and Four point dc shunt motor starter. 2.7 Simple Numericals associated with above topics. 2.8 Construction and working of Brushless DC Motor	15	16	CO1
3	<b>Losses &amp; efficiency in dc machines</b> 3.1 Power losses in dc machines 3.2 Power flow analysis 3.3 Efficiency of dc generators and dc motors 3.4 Condition for maximum efficiency of dc machines. 3.5 Simple Numericals associated with above topics.	06	08	CO2
4	<b>Three phase alternators.</b> 4.1 Construction. & Working principle. 4.2 Synchronous speed. 4.3 Salient pole & non-salient pole type field structure. 4.4 Classification of stator armature winding. Single and Double layer. 4.5 Emf equation of Alternator with numerical by considering Short pitch factor and Distribution factor. 4.6 Phasor diagrams of alternator on load. 4.7 Synchronous Impedance and its determination by open and short circuit test. 4.8 Voltage regulation of an alternator by direct loading and synchronous impedance method. 4.9 Necessity of Parallel operation of three phase alternators. 4.10 Conditions for parallel operation. 4.11 Methods of parallel operation	15	16	CO3



<b>5</b>	<b>Synchronous motors</b> 5.1 Principle and operation of Synchronous motor. 5.2 Starting torque, running torque, pull in torque, pull out torque 5.3 Effect of load on synchronous motor with constant excitation 5.4 Behavior of synchronous motors with constant load and variable excitation 5.5 Synchronizing power and Synchronizing torque 5.6 Hunting and phase swinging. 5.7 Starting methods of synchronous motor. 5.8 V- curves and Inverted V- curves. 5.9 Applications.	<b>14</b>	<b>15</b>	<b>CO4</b>
	<b>Total</b>	<b>64</b>	<b>70</b>	

## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

The term work consists of journal consisting of minimum 8-10 experiments with approximate number of hours required with corresponding CO's

<b>Sr. No.</b>	<b>Title of Experiment/Assignment/Exercise/Tutorial/Drawings</b>	<b>Approx.Hrs required</b>	<b>COs</b>
1	Load characteristics of a dc shunt generator.	3	CO1
2	Load characteristics and magnetization curve of a dc series generator.	3	CO1
3	Magnetization curve of a dc generator and determination of critical field resistance.	3	CO1
4	Speed load curve of a dc shunt motor.	3	CO1
5	Speed Control of DC shunt Motor	4	CO1
6	Open circuit Characteristics of an Alternator	3	CO3
7	Short Circuit Characteristics of an Alternator	3	CO3
8	Determination of regulation & efficiency of an alternator from open circuit & short circuit.	4	CO3,CO2
9	V- curve of a synchronous motor	3	CO4
10	Study of Brushless D.C Motor	3	CO1
	<b>Total</b>	<b>32</b>	





## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Teaching Plan.
2. Assignments.
3. Industrial visit.
4. Guest/Expert lectures.
5. Continuous assessment.
6. Slides.
7. Any other method adopted.

## 9. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1.	Electrical Technology Volume – II	B.L. Theraja	S.Chand and Co. New Delhi.
2.	Electrical Machines	S.K. Bhattacharya	Tata McGraw Hill Pub Co.Ltd. New Delhi.
3	Electrical Machinery	P.S. Bhimra	Khanna Publishers

## 10. WEB REFERENCES

- 1) <http://www.nptel.ac.in/courses/108105017>
- 2) [www.electricaltechnology.org](http://www.electricaltechnology.org)
- 3) [www.electrical4u.com](http://www.electrical4u.com)
- 4) <http://www.electricaleasy.com>
- 5) <http://www.youtube.com/watch?v=D4RFFnzRdkk>

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

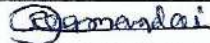

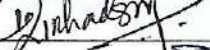

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	D.C generator	6	6	3	15
2	D.C Motor	6	6	4	16
3	Losses & efficiency in dc machines	4	4	-	08
4	Three phase Alternators	6	6	4	16
5	Synchronous motors	5	5	5	15
TOTAL		27	27	16	70

R- Remembering, U - Understanding, A- Applying (Bloom's revised taxonomy levels)



**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

**12. COURSE EXPERT COMMITTEE MEMBERS**

Sr. No.		NAME	SIGNATURE
1	Internal	Dinesh G.Rajmandai	
2	Internal	N.D.Adate	
3	Internal	Vivek Dhadam	
4	External	A. K. Dhulshette Organisation: G.P. Mumbai	



## 1. COURSE DETAILS:

<b>PROGRAM : Electrical Engineering</b>	<b>Semester : IV</b>
<b>COURSE : #Switchgear and Protection</b>	<b>Group: A*</b>
<b>Code: SGP190313</b>	<b>Duration-16weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions and Periods per					Examination Scheme and Maximum Marks									
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL	
					Hours	Marks								
04	-	02	-	06	03	70	20	10	70	50	-	50	200	

## 3. OBJECTIVE:

Technician must be aware of continuous need of electric supply, as nobody in this era can tolerate interruption even for small duration of time, this is made possible by called a device "Switchgear" which ensure continuity of supply and prevent damage of costly equipment in factories. Thus arises need of remote sensing of fault & hence various relay systems & protection scheme are suggested in subject, which takes care of protection of generator, transformer, transmission lines & receiving station.

## 4. SKILL COMPETENCY

The aim of this course is to give knowledge of various switchgear, Faults occur in power system, protection scheme of power system which will help the students to work as technician/supervisor in Electrical power industry.

## 5. COURSE OUTCOMES:

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Describe various switchgear equipment.	Remember, Understand, Apply
CO2	Explain protection schemes for various power system components	Remember, Understand, Apply
CO3	Protect power system against over voltages.	Remember, Understand, Apply
CO4	Sketch various switchgear equipment	Understand



## 6. COURSE CONTENTS:

Sr.NO.	Topic/Sub-Topic	Hours	Marks	CO
1.0	<b>Basics of protection</b> 1.1 Necessity, functions of protective system. 1.2 Normal and abnormal conditions. 1.3 Types of faults and their causes. 1.4 Protection zones and backup protection 1.5 Need of current limiting reactors and their arrangements.	04	06	CO2
2.0	<b>Switches:</b> 2.1 Isolator- types of isolators- rating of isolators. 2.2 Bus bar arrangement, 2.3 switchgear in generating stations. Main switchgear and auxiliary switchgear. 2.4 Requirements of fuse, 2.5 Different types of fuses-Rewireable, H.R.C, Expulsion type, Draw-out fuses. 2.6 Characteristics and different ratings of fuses.	08	10	CO1, CO4
3.0	<b>Relays</b> 3.1 Introduction, Quality requirements of relay, important terms related to relay 3.2 Types-Electromagnetic Relay, Induction Relay, overcurrent Relay, power Relay, directional overcurrent Relay, Distance Relay, Static Relay (block diagram)., 3.3 Introduction to Numerical relay.	12	12	CO1, CO4
4.0	<b>Circuit Breakers</b> 4.1 Requirement of circuit breaker. Difference in fuse and circuit breaker. 4.2 Theory of arc extinction in direct current and in alternating current circuits. 4.3 Recovery of voltage, Restriking voltage, rate of rise of restriking voltage. 4.4 Types-Construction, principle of operation, operating mechanisms of Bulk Oil Circuit Breaker (BOCB) Minimum oil content (small oil volume SOV) circuit breakers vacuum circuit breakers (VCB) SF6 circuit breaker (Single Pressure and Double Pressure type) 4.5 Making, breaking capacities, contact materials. 4.6 L.T Circuit breakers 1. Air Circuit Breaker (ACB), 2. Miniature circuit breakers (MCB), 3. Moulded case circuit breakers (MCCB), 4. Earth Leakage circuit breakers (ELCB or RLCB), 5. Comparison of Fuse and MCCB	14	14	CO1, CO4



5.0	<b>Protection systems</b> 5.1 Power Systems protection, back-up protection, main and auxiliary protection, protection schemes for Generators: 1) Merz price protection, 2) Earth fault protection 5.2 Transformers: 1) Over current and earth fault protection 2) Percentage differential protection. 5.3 Motors: 1) over current protection, 2) Earth fault Protection 5.4 Bus bars, feeders and transmission lines: 1) Differential protection 2) Directional over current protection, 3) Definite distance relay protection, 4) Inverse time over current protection, 5) Time distance relay protection. 5.5 Introduction to SCADA	14	14	CO2
6.0	<b>Overvoltage Protection</b> 6.1 Causes of over voltages. 6.2 Lightning phenomena and over voltage due to lightning. 6.3 Protection of transmission line and substation from direct stroke. 6.4 Construction and principle of operation of different types of lightning arrestors such as Rod gap, horn gap. Expulsion and Thyrite type 6.5 Surge absorbers (Definition, construction and working of different types)	06	08	CO3
7.0	<b>Neutral Grounding</b> 7.1 Introduction 7.2 Necessity, Arching Ground Phenomena 7.3 Different methods of neutral grounding, Their advantages and disadvantages. 7.4 Comparison between earthing & neutral grounding	06	06	CO2
	<b>TOTAL</b>	<b>64</b>	<b>70</b>	

## 7. LIST OF DRAWING SHEETS:

Term Work consists of Drawing sheets and Assignments on the following.

Sr No.	Title of Drawing Sheet	Approx. HRS required	COs
1.	Types of Isolators, Bus-Bar Arrangements and Fuses	6	CO1, CO4
2.	The constructional details, scheme details of different types of relays.	6	CO1, CO4
3.	The constructional details, scheme details of different types of Circuit Breaker	8	CO1, CO4
4.	Constructional details, scheme details of Different protection schemes for Transformer, Induction Motor, Alternator and protection devices. (2Sheets)	8	CO2, CO4
5.	Devices used for overvoltage protections	4	CO3, CO4
	Total	32	



Assignments- 1. Describe different types of Relays 2. Describe different types of Circuit breaker 3. Describe different protection scheme for Transformer, Induction Motor, Alternator	H.W.	CO1 CO4 CO2
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### 8. IMPLEMENTATION STRATEGY:

In depth study and understanding of the subject will be implemented by adopting following strategy.

1. Teaching Plan/Tutorials
2. Minimum no of drawings.
3. Industry visit
4. Guest/Expert lectures
5. Demonstrations/Simulations
6. Slides
7. Group discussions
8. Seminar
9. Self-Learning Online Resources

### 9. LEARNING RESOURCES:

#### REFERENCE BOOKS:

SR.NO	AUTHOR	TITLE	PUBLISHER & ADDRESS
1	S. S. Rao	Switchgear & protection	Khanna Publications
2.	V. L. Uppal Electrical	Electrical Power	Khanna Publication
2	V. K. Mehta Power System	Power System	Chand & Co
3	Soni, Gupta & Bhatnagar	Electrical Power	Dhanpatrai & sons
4	J.B.Gupta	Electrical Power	Khanna Publication

### 10. WEB REFERENCES:

1. [www.tatapowerindia.com](http://www.tatapowerindia.com)
2. [www.mahagenco.com](http://www.mahagenco.com)
3. [www.relance.com](http://www.relance.com)
4. [www.Electrical4U](http://www.Electrical4U)
5. [www.Electrical powerinfo.com](http://www.Electrical powerinfo.com)





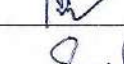
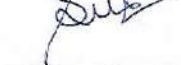
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr.No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Basics of protection	-	4	2	06
2.	Switches	-	6	4	10
3.	Relays	2	5	5	12
4.	Circuit Breakers	2	4	8	14
5.	Protection systems	4	4	6	14
6.	Overvoltage Protection	-	4	4	08
7.	Neutral Grounding	-	2	4	06
TOTAL		8	29	33	70

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs Ajayshree N. Kinhekar	
2	Internal	Mr. N.D.Adate	
3	Internal	Ms. Urvi Sawant	
4	External Name and Organization	Sheela Nair D.T Sanghvi College of Engg.	



### 1. COURSE DETAILS:

<b>Programme: Electrical Engineering</b>	<b>Semester: IV</b>
<b>Course: #Electrical Estimation and Costing</b>	<b>Group: A*</b>
<b>Course Code: EEC190314</b>	<b>Duration:16 Weeks</b>

### 2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs.	Practical Hrs.	Drawing Hrs.	Tutorial Hrs.	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
L	P	D	T		Hours	Marks							
04	-	02	-	06	03	70	20	10	70	50	-	50	200

### 3. OBJECTIVE:

Electrical Diploma holders have to work as Technicians & Supervisors for Electrical Installations of various companies, commercial and Industrial electrification schemes and prepare estimates for these schemes. They also work as Independent electrical contractors and execute illumination and electrification schemes. This subject will help them to prepare detailed estimates.

### 4. SKILL COMPETENCY

The aim of this course is to give knowledge of different types of wiring rules for Service connection, Residential Electrical Installation, Commercial and Industrial Electrical Installations so that students can prepare detail estimation and costing of it. Also The aim of this course is to give knowledge for preparing contracts and Tenders which helps the students to work as Independent electrical contractors and execute illumination and electrification schemes.

### 5. COURSE OUTCOMES (COs) At the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1.	Define different types of Electrical Installation.	Remember, Understand, Apply
CO2.	Interpret the Electrical Engineering Drawing.	Understand and Apply
CO3.	State and describe the basic terms, general rules, circuit design procedure, wiring design and design considerations of Service connection Residential Electrical Installation, Commercial and Industrial Electrical Installations	Understand and Apply
CO4.	Prepare detail estimate and costing of Residential, Commercial and Industrial Electrical Installations	Understand and Apply
CO5	Understand the concept of Contracts, Tenders	Understand and Apply





## 6. COURSE CONTENTS:

Sr.NO.	Topic/Sub-Topic	Hours	Marks	COs
01	<b>Drawing and IE rules:</b> 1.1 Classification of Electrical Installation. 1.2 General requirement of Electrical installation. 1.3 Reading and Interpretation of Electrical Engineering Drawings. 1.4 Various diagrams, plans and layout. 1.5 Important definitions related to Installation. 1.6 IE rules related to Electrical Installation & Testing.	08	10	CO1,CO2
02	<b>Service Connection</b> 2.1 Concept of service connection. 2.2 Types of service connection & their features. 2.3 Methods of Installation of service connection. 2.4 Estimates of underground & overhead service connections.	08	10	CO2,CO3
03	<b>Residential Building Electrification</b> 3.1 General rules guidelines for wiring of Residential Installation and positioning of equipment. 3.2 Principles of circuit design in lighting and power circuits. 3.3 Procedures for designing the circuits and deciding the number of circuits. 3.4 Method of drawing single line diagram. 3.5 Selection of type of wiring and rating of wires & cables. 3.6 Load calculations and selection of size of conductor. 3.7 Selection of rating of main switch, distributions board, protective switchgear ELCB and MCB and wiring accessories. 3.8 Earthing of Residential Installation. 3.9 Sequence to be followed for preparing Estimate. 3.10 Preparation of detailed estimates and costing of Residential Installation	14	16	CO3,CO4
04	<b>Electrification of commercial Installation:</b> 4.1 Concept of commercial Installation. 4.2 Differentiate between electrification of Residential and commercial Installation. 4.3 Fundamental considerations for planning of an electrical Installation system for commercial building. 4.4 Design considerations of electrical Installation system for commercial building. 4.5 Load calculations & selection of size of service connection and nature of supply. 4.6 Deciding the size of cables, bus bar and bus bar chambers. 4.7 Mounting arrangements and positioning of Switchboards, distribution boards main switch etc. 4.8 Earthing of the electrical Installation 4.9 Selection of type wire, wiring system & layout. 4.10 Sequence to be followed to prepare estimate. 4.11 Preparation of detailed estimate and costing of commercial Installation. ( Simple Numerical )	12	12	CO3,CO4



<b>05</b>	<b>Electrification of factory unit Installation:</b> 5.1 Concept of Industrial load. 5.2 Concept of Motor wiring circuit and single line diagram. 5.3 Important guidelines about power wiring and Motor wiring. 5.4 Design consideration of Electrical Installation in small Industry/Factory/workshop. 5.5 Motor current calculations. 5.6 Selection and rating of wire, cable size & conduct. 5.7 Deciding fuse rating, starter, distribution boards main switch etc. 5.8 Deciding the cable route, determination of length of wire, cable, conduit, earth wire, and earthing. 5.9 Sequence to be followed to prepare estimate. 5.10 Preparations of detailed estimate and costing of small factory unit/ workshop. (Simple Numerical)	12	12	CO3,CO4
<b>06</b>	<b>Contracts, Tenders and Execution:</b> 6.1 Concept of contracts and Tenders. 6.2 Contracts, types of contracts, contractors. 6.3 Valid Contracts, Contract documents. 6.4 Tender and tender notices. 6.5 Procedure for submission and opening tenders. 6.6 Comparative statements, criteria for selecting contractors, General conditions in order form. 6.7 Principles of Execution of works. 6.8 Administrative approval, Technical sanctions. 6.9 Billing of executed work	10	10	CO5
	<b>TOTAL</b>	<b>64</b>	<b>70</b>	

**7. LIST OF DRAWING SHEETS:** Term Work consists of minimum no of Six Drawing Sheets and Assignments from the following.

<b>Sr. No.</b>	<b>Title of Drawing Sheet</b>	<b>Approx.Hrs required</b>	<b>COs</b>
1.	Types of Wiring	4	CO1
2.	Electrical Installation scheme for Service Connection	4	CO2
3.	Electrical Installation scheme for single flat, independent bungalow and small house. Draw wiring diagram and prepare detailed estimate and its costing	8	CO2, CO3, CO4
4.	Electrical Installation scheme for commercial buildings. Draw wiring diagram and prepare detailed estimate and its costing.	8	CO2, CO3, CO4
5.	Electrical Installation scheme for small factory unit. Draw single line layout and prepare detailed estimate and its costing 1) Small factory unit 2) Workshop 3) Agriculture pump and flour mills	8	CO2, CO3, CO4
	Total	32	



	Assignments- 1. Draw different types of wiring diagram 2. Explain in detail Contracts and Tenders	H.W.	CO2 CO5
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### 8. IMPLEMENTATION STRATEGY:

In depth study and understanding of the subject will be implemented by adopting following strategy.

1. Teaching Plan/Tutorials
2. Minimum no of drawings.
3. Industry visit
4. Guest/Expert lectures
5. Slides
6. Group discussions
7. Self Learning Online Resources

### 9. LEARNING RESOURCES:

#### REFERENCE BOOKS:

SR.NO	AUTHOR	TITLE	PUBLISHER & ADDRESS
1	K.B. Raina	Electrical Design Estimating and costing	New Age International
2	Surjit Singh	Electrical Design Estimating and costing	Dhanpat Rai & Sons
3	N Alagappan Electrical Design Estimating and costing	Electrical Design Estimating and costing	Tata McGraw Hill, New Delhi
4	S.L.Uppal	Electrical Design Estimating and costing	Khanna Publication
5	B.D.Arora	Electrical Design Estimating and costing	R.B Publication

### 10 WEB REFERENCES:

1. [www.electricalinstallation.com](http://www.electricalinstallation.com)
2. [www.totalestimating.com](http://www.totalestimating.com)
3. [www.electriciantalk.com](http://www.electriciantalk.com)
4. [www.electriciansforums.net](http://www.electriciansforums.net)
5. [www.electrical4u.com](http://www.electrical4u.com).




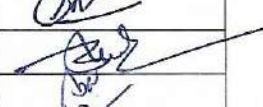
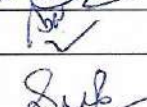
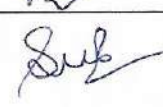
## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1.	Drawing and IE rules	2	4	4	10
2.	Service Connection	-	6	4	10
3.	Residential Building Electrification	-	8	8	16
4.	Electrification of commercial Installation		4	8	12
5.	Electrification of factory unit Installation:		4	8	12
6.	Contracts, Tenders and Execution		5	5	10
TOTAL		2	31	37	70

### R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.

## 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Mrs Ajayshree N. Kinhekar	
2	Internal	Mr.N.D.Adate	
3	Internal	Ms. Urvi Sawant	
4	External Name	Shejia Nais	
	Organization	D.T Sanghvi college of Engg	



## 1 COURSE DETAILS

<b>Programme: Electrical Engineering</b>	<b>Semester: IV</b>
<b>Course: Utilization of Electrical Energy</b>	<b>Group: A*</b>
<b>Course Code: UEE 190315</b>	<b>Duration: 16 Weeks</b>

## 2 TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
4	2	-	-	6	3	70	20	10	70	50	-	50	200

## 3 COURSE OBJECTIVE

This is a core technology course. Electrical diploma pass outs should know the principle of generation of electricity, conventional methods of generation of electricity, their environmental impact and economics of power generation.

This course shall provide the basis for further studies in transmission, distribution and power system operations.

## 4 SKILL COMPETENCY

The aim of this course is to help the student to attain following competency through various teaching-learning experiences:

**Suggest the appropriate method/scheme for illumination, heating, welding and techniques for conserving energy while utilizing electrical energy for various applications.**

## 5 COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's Level
CO1	Select appropriate type, rating, number of light source and lighting scheme as per given specifications/requirement.	R, U, A
CO2	Suggest suitable method of electric heating and welding for various applications.	R, U, A
CO3	Justify the need of energy conservation and hence energy audit.	R, U
CO4	Suggest appropriate energy conservation techniques and devices in motors, transformers, illumination and transmission distribution.	R, U, A
CO5	Estimate tariff, its applicable tariff and methods to reduce the same.	R, U, A



## 6 COURSE CONTENTS

Sr. No.	Topic /Sub-Topics	Hours	Marks	COs
1	<p><b>Illumination:</b></p> <p>1.1 Definitions of terms used in illuminations. Light, Luminous flux, luminous intensity, Lumen, Candle power, illumination, lux or meter candle, mean horizontal candle power (MHCP), means spherical candle power (MSCP), means hemispherical candle power (MHSCP), Reduction factor, lamp efficiency, specific consumption, glare, space to height ratio, utilization factor, maintenance factor, depreciation factor, waste light factor, absorption factor, reflection factor, plane angle, solid angle.</p> <p>1.2 Laws of illumination 1.2.1 Law of inverse squares. 1.2.2 Lambert's cosine law</p> <p>1.3 Sources of light Construction, working and application of following lamps: Incandescent lamps, halogen lamp, mercury vapour lamps, sodium vapour lamps, fluorescent Tube, compact fluorescent lamps (CFL), LED lamps, neon signs.</p> <p>1.4 Types of lighting schemes</p> <p>1.5 Design of lighting schemes 1.5.1 Objectives of lighting scheme 1.5.2 Factors to be considered while designing the lighting scheme</p> <p>1.6 Lighting calculations (simple numerical)</p>	12	13	CO1
2	<p><b>Electrical heating:</b></p> <p>2.1 Concept of Electric Heating, Classification of electric heating, Advantages and disadvantages, Modes of heat transfer</p> <p>2.2 Resistance heating: Direct and indirect resistance heating, their working principle and construction, Properties of heating element material, Causes of failure of heating element, methods of temperature control, application of resistance heating, Advantages and disadvantages (No numerical)</p> <p>2.3 Arc heating: Direct arc heating, indirect arc heating, applications of arc heating, Advantages and disadvantages</p> <p>2.4 Induction heating. Core type induction furnaces- Ajax Wyatt furnace, coreless induction furnace, Application of induction heating, Advantages and disadvantages</p> <p>2.5 Dielectric heating- Principle, application of dielectric heating, Advantages and disadvantages</p>	10	11	CO2
3	<p><b>Electric Welding:</b></p> <p>3.1 Electric welding, Advantages, Classifications</p> <p>3.2 Resistance welding 3.2.1 Principle of resistance welding, Advantages and disadvantages 3.2.2 Types of resistance welding and their applications</p> <p>3.3 Arc welding Machines: Principle and operation, Metal arc welding, Carbon arc welding, Advantages of coated electrodes, Supply (AC/DC), applications, Arc Welding Machines, AC Welding Machines – Welding Transformer.</p>	09	10	CO2



4	<b>Energy Audit</b> 4.1 Preset energy scenario. 4.2 Energy Conservation: Definition, Importance of energy conservation 4.3 Energy Conservation Act – 2003. 4.4 Impact on environment and economy 4.5 Role of renewable Energy in energy Conservation 4.6 Bureau of Energy Efficiency and its functions	06	07	CO3
5	<b>Energy conservation techniques in electric systems:</b> 5.1 Electrical Motors: Types, Energy Efficient Motors 5.2 Factors affecting efficiency of motors 5.3 Energy Efficient Transformer 5.4 Energy Efficient Lighting and Control 5.5 Losses in Transmission And Distribution System And Its Minimization 5.6 Reactive Power Compensation 5.7 Demand Side Management System 5.8 Voltage Optimization and phase current balancing 5.9 Energy Conservation By improving Load Factor 5.10 Maximum Demand Controller 5.11 Automatic Power Factor Controllers, Variable Speed Drives, Soft Starters, KVAR Controller	15	16	CO4
6	<b>Economic aspects of utilizing electrical energy</b> 6.1 Costing of electrical energy: fixed charge, Semi fixed charge & running Charge. 6.2 Various types of tariff: Simple tariff, Flat rate tariff, Block rate tariff, two part tariff, Maximum demand tariff and Power factor tariff. 6.3 Types of consumers and their Tariffs: Domestic, Commercial, Agricultural and Industrial consumers. (Simple numerical on Tariffs ) 6.4 Power factor improvement: causes of low power factor, disadvantage of Low power factor, Methods of power factor improvement 6.5 Most economical power factor (Derivation and simple numerical )	12	13	CO5
<b>TOTAL</b>		<b>64</b>	<b>70</b>	

#### 7 LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

The term work consists of journal consisting of minimum 5 assignments and mini project/study project/industry visit with approx number of hours required with corresponding CO's

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	Assignment on Illumination laws and numerical	3	CO1
2	Assignment on Electric Heating, welding and numerical	2	CO2
3	Assignment on Energy conservation and numerical	2	CO3
4	Assignment on Energy conservation equipment and devices with numerical	2	CO4
5	Assignment on Economic aspects of utilizing electrical energy and numerical	3	CO5
6	Mini project/Study project/Project based on Industry visit	20	CO1/CO2/ CO3/CO4/ CO5
<b>Total Hours</b>		<b>32</b>	



## 8 IMPLEMENTATION STRATEGY(PLANNING)

1. Teaching Plan.
2. Assignments.
3. Industrial visit.
4. Guest/Expert lectures.
5. Continuous assessment.
6. Slides.
7. Any other method adopted.

## 9 LEARNING RESOURCES

Sr no	Author	Title	Publisher
01	H Partab	Art & science of utilization of electric energy	Dhanpat rai & sons
02	J.B Gupta	Utilization of electric power & electric traction	S.K kataria & sons
03	G.C Garg	Utilization of electric power & electric traction	Khanna Publishers
04	J Upadhyay S.N Mahendra	Electric traction	Allied Publisher limited
05	G.K Dubey	Fundamentals of Electric drives	Narosa Publishing house
06	CL Wadhwa,	Generation, Distribution and Utilization if Electrical	Wiley Eastern Ltd. New Delhi.

## 10 WEB REFERENCES

1. [www.wikipedia.com](http://www.wikipedia.com)
2. [www.techeduhry.nii](http://www.techeduhry.nii)
3. [www.aast.edu](http://www.aast.edu)

## 11 SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Illumination	3	4	6	13
2	Electrical heating	3	3	5	11
3	Electric welding	3	3	4	10
4	Energy Audit	3	4	-	07
5	Energy conservation techniques in electric systems	4	4	8	16
6	Economic aspects of utilizing electrical energy	3	4	6	13
		19	22	29	70


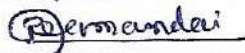
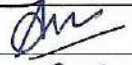

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.





## 12 COURSE EXPERT COMMITTEE MEMBERS

SR.NO.		NAME	SIGNATURE
1	Internal	Urvi H. Sawant	
2	Internal	Dinesh G. Rajmandai	
3	Internal	Ajayshree N. Kinhekar	
4	External	Sheja Nair	
	Organization	D.T. Sanghvi College of Engg	



## 1. COURSE DETAILS

<b>Program: Electrical Engineering</b>	<b>Semester : IV</b>
<b>Course : Renewable Energy Sources</b>	<b>Group: A*</b>
<b>Code: RES190316</b>	<b>Duration: 16 weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hou rs	Mar ks							
4	2		-	6	3	70	20	10	70	50	-	50	200

## 3. COURSE OBJECTIVE

This is a core technology subject. Electrical diploma pass outs should know the principle of generation of electricity using renewable energy sources, their environmental impact and recent trends in power generation, combined operation and interconnected systems.

This subject will provide the basis for further studies in transmission, distribution and power system operation.

## 4. SKILL COMPETENCY

The aim of this course is to help the student to attain following competency through various teaching-learning experiences:

**Suggest the appropriate method of power generation for given application.**

## 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to: -

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Justify the use of renewables considering adverse environmental effects due to non-renewable energy sources.	R
CO2	Suggest the methods of utilizing solar energy for power generation.	R, U, A
CO3	Select site and type of the plant suitable for harvesting Geothermal, Biomass and Ocean energy.	R, U, A
CO4	Select site and type of the plant suitable for harvesting Wind and energy.	R, U, A
CO5	Suggest the use of recent trends, Energy storage systems, Fuel cell and Hydrogen energy for specific application.	R, U, A



## 6. DETAILED CONTENT

Sr No	Name of the Topic/Subtopic	Hours	Marks	CO
1.	<b>Environmental Impact</b> 1.1. Review of conventional and non-conventional energy sources 1.2. Environmental Impact of non-renewable sources 1.3. Green House effect, Acid rain, Pollution, Smog, Nuclear Radiation 1.4. Kyoto Protocol 1.5. Carbon credits	3	4	CO1
2.	<b>Solar Energy</b> 2.1 Potential of Solar energy 2.2 Merits and demerits 2.3 Solar Thermal Energy Conversion 2.4 Collectors- Flat plate, Focusing 2.5 Photovoltaic effect 2.6 Solar cell: Construction, working, material characteristic 2.7 Module, Panel and Array 2.8 Working and application of Solar energy	15	16	CO2
3.	<b>Other renewable energy sources</b> 3.1 <b>Geothermal Energy:</b> Geothermal Energy Resources, Electricity Generation using Geothermal Energy, Merits and demerits 3.2 <b>Ocean Energy:</b> <ul style="list-style-type: none"> <li>• Ocean Thermal Electric conversion- Working, Merits and Demerits,</li> <li>• Operation of Tidal Power Plant, Advantages, Limitations, Site requirements, Environmental Impact, Potential sites in India</li> </ul> 3.3 <b>Bio-mass &amp; Bio-gas energy:</b> Bio-fuels, Biomass resources, Biomass conversion techniques, Merits and demerits, Energy Plantation, Biomass Energy Program in India	15	16	CO3
4.	<b>Wind Energy</b> 4.1 Principle of Electricity Generation with the help of Wind Energy 4.2 Selection of sites for Wind Mills and Environmental Impact 4.3 Types of Wind mills: Horizontal Axis Wind Turbine and Vertical Axis Wind Turbine 4.4 Block diagram and working of Wind energy plant 4.5 Recent development: Yaw control, Pitch control, Variable speed drive 4.6 Status of Wind Energy in India	12	13	CO4



5.	<b>Recent Trends in Electricity Generation (only concept and advantages)</b>	19	21	CO5
	5.1 <b>Fuel Cell:</b> Construction and working, Applications, Merits and Demerits			
	5.2 <b>Hydrogen Energy:</b> Properties of Hydrogen, Production methods, Safety issues, Energy conversion of Hydrogen, Application			
	5.3 Combined Cycle Power Plant			
	5.4 Cogeneration			
	5.5 Distributed Generation			
	5.6 Combined operation of power stations			
	5.7 Comparison of various types of power plants			
	5.8 Inter connection of power stations, National Grid in India			
	5.9 Energy storage system and types			
<b>Total</b>		<b>64</b>	<b>70</b>	

### 7. LIST OF PRACTICALS /ASSIGNMENTS/ EXERCISES/ TUTORIALS/ DRAWINGS

Term Work consists of Journal and drawing book with approx. no. of hours required and corresponding CO attained should be specified here.

Experiments:

Sr. No.	Title of experiments	Approx. no. of hours required	CO
1	To study the solar panels and its components	4	CO2
2	To calculate the ratings of solar panels and its components for given capacity	4	CO2
3	To study the wind power plant and its components	4	CO4
4	To study various types of wind mills.	4	CO4
<b>Total</b>		<b>16</b>	

Drawings:

Sr. No.	Title of drawings	Approx. no. of hours required	CO
1	Comparison chart of all energy Sources	1	CO1
2	Solar energy	4	CO2
3	Geothermal Energy	2	CO3
4	Ocean Energy	2	CO3
5	Wind energy	2	CO4
6	Bio-gas plant	2	CO3
7	Fuel cell	2	CO5
8	National Grid in India	1	CO5
<b>Total</b>		<b>16</b>	



## 8. IMPLEMENTATION STRATEGY(PLANNING)

- i. Teaching Plan/Tutorials
- ii. Minimum no of practical/assignments/drawings etc.
- iii. Industry visit
- iv. Guest/Expert lectures
- v. Demonstrations/Simulations
- vi. Slides
- vii. Group discussions
- viii. Seminar
- ix. Case Study
- x. Self-Learning Online Resources
- xi. Any other method adopted

## 9. LEARNING RESOURCES

### 1. Books:

Sr. No.	Author	Title	Publisher
1	J. B. Gupta	A course in Electrical Power	S. K. Kataria & Sons
2	P. K. Nag	Power Plant Engineering	McGraw Hill Education (India)
3	Dr. S. L. Uppal	Electrical Power	Khanna Publishers.
4	Prof. G. D. Rai	Non-conventional Energy sources	Khanna, New Delhi
5	G. S. Sawhney	Non-conventional Energy sources	PHI Learning Pvt Ltd

### 2. Journals:

Electrical India - Journal for recent trends & development in Electrical Engineering  
Electronics for you

## 10. WEBSITE

1. <http://www.mnre.gov.in/11>
2. <http://ireeed.gov.in/>
3. <http://www.makeinindia.com/sector/renewable-energy>

## 11. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN


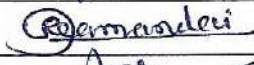
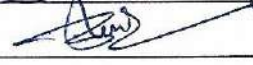

Sr. No.	TOPIC	Distribution of Theory Marks			
		R Level	U Level	A Level	Total Marks
1	Environmental Impact	4	-	-	04
2	Solar Energy	4	4	8	16
3	Other renewable energy sources	4	4	8	16
4	Wind Energy	4	4	5	13
5	Recent Trends in Electricity Generation	3	9	9	21
<b>Total</b>		<b>19</b>	<b>21</b>	<b>30</b>	<b>70</b>

**R Remembering, U Understanding, A Applying, (Bloom's revised taxonomy levels)**

**NOTE:** This specification table provides general guidelines to assist students for their learning and to teachers to teach and assess students with respect to attainment of COs. The actual distribution of marks at different taxonomy levels (R, U, A) in the question paper may vary from above table.



## 12. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Urvi Sawant	
2	Internal	Dinesh G. Rajmandai	
3	Internal	N. D. Adate	
4	External	Sheeja Nair	
	Organization	D.S. Sanghvi College of Engg	



## 1. COURSE DETAILS

<b>Programme: EE/IE/DE</b>	<b>Semester: IV</b>
<b>Course: Entrepreneurship Development</b>	<b>Group: M</b>
<b>Course Code: (EDP190017)</b>	<b>Duration:16 Weeks</b>

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum Marks								
Theory Hrs L	Practical Hrs P	Drawing Hrs	Tutorial Hrs	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
02	02	--	--	04	-	-	-	-	-	50	--	--	50

### 3. COURSE OBJECTIVE

- 1) Know the essential elements of entrepreneurship,
- 2) Understand the procedure to start an enterprise
- 3) Able to become Techno-pruners in their future career

### 4. SKILL COMPETENCY

The aim of this course is to help the students to attained the following industry identified competency through various teaching learning experiences

- Developed project proposal to launch the small scale enterprises

### 5. COURSE OUTCOMES (COs) at the end of the semester student will be able to:

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Identify your Entrepreneural traits	Remembering
CO2	Acquire entrepreneurial value and attitude	Understanding
CO3	Identify the business opportunity that suits you.	Understanding
CO4	Use the information to prepare project report for business venture	Remembering, Applying
CO5	Develop Comprehensive business plan	Applying
CO6	Prepare Plan to manage Enterprise Effectively	Applying



## 6. COURSE CONTENTS

Sr.No.	Topic/Sub-Topics	Hours	COs
1	<b>Venture Development</b> 1.1 Introduction of entrepreneurship 1.2 Small Scale industries 1.3 Business structure	4	CO3
2	<b>Finance For Enterprise &amp; Financial Statement</b> 2.1 Source of finance 2.2 Fixed capital & working capital 2.3 Short term and long term source 2.4 Balance sheet 2.5 Profit & Loss Account 2.5 Financial ratio	6	CO6
3	<b>Product/ service Development</b> 3.1 Selection of product /services 3.2 Innovation management 3.3 APQP( advanced product quality planning) 3.4 FMEA( Failure Mode effective analysis)	6	CO4, CO2
4	<b>Support System</b> 4.1. Support system – Government agencies: MCED, NI – MSME, 4.2 Support agencies for entrepreneurship guidance, Training, Registration, Technology and Quality control 4.3 Breakeven point, Return on Investment and return on sales.	8	CO2 CO6
5	<b>Marketing Strategy</b> 5.1 Importance of marketing 5.2 marketing management 5.3 soft skill	8	CO5 CO1 CO2
	<b>TOTAL</b>	32	





## 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

Term Work consists of following assignments/projects with approx. no. of hours required and corresponding CO attained should be specified here.

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx. Hrs required	COs
1	Introduction of Entrepreneurship Development	04	CO1 CO2
2	Study of MSME Project Report	04	CO3 CO4
3	Proprietorship Loan Procedure	04	CO5 CO6
4	Study of Balance Sheet	04	CO5
5	Selection of Product/ Services	08	CO1
6	Preparation of Project Report	08	CO1 CO6
	Total	32	

## 8. IMPLEMENTATION STRATEGY (PLANNING)

1. Minimum no of practical/assignments/drawings etc.
2. Industry visit
3. Guest/Expert lectures
4. Demonstrations/Simulations
5. Group discussions
6. Seminar
7. Case Study

## 9. LEARNING RESOURCES


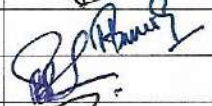


Sr. No.	Title Of Book	Author	Publication
1.	Dynamics of Entrepreneurial Development and Management	Shri Vasant Desai	Himalaya Publication Mumbai
2.	Entrepreneurship Development	Shri S S Khanna	S. Chand And Company
3.	Small Scale Industries and Entrepreneurship	Shri Vasant Desai	Himalaya Publication Mumbai
4.	Entrepreneurship	Shri J. Saboo	Himalaya Publication Mumbai



## 10. WEB REFERENCES

- i) <https://www.toppr.com/guides/business-studies/entrepreneurship-development/process-of-entrepreneurship-development/>
- ii) <https://my.msme.gov.in/MyMsmeMob/MsmeProjectProfile/Home.htm>
- iii) <https://www.ediindia.org/>

## 11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	Ashutosh S. Shukla	
2	Internal	Sachin Kamble	
3	Internal	Pratik P. Sawant	
4	External	SANJAY S. DESHMUKH Organisation: MPSTME, NMIMS UNIV	 23/04/21



## 1. COURSE DETAILS

Programme: CE/ME/EE/PE/CH

Course: Stress Management

Course Code: STM190012

Semester:II/II/IV/III/II

Group:M

Duration:16 Weeks

## 2. TEACHING AND EXAMINATION SCHEME

Scheme of Instructions and Periods per Week					Examination Scheme and Maximum								
Theory Hrs L	Practical Hrs P	Drawing Hrs D	Tutorial Hrs T	Credits (L+P+D+T)	Theory Paper Duration and marks(ESE)		SSL	TA	TH	TW	PR	OR	TOTAL
					Hours	Marks							
----	02	----	----	02	----	----	----	----	----	----	----	----	022

## 3. COURSE OBJECTIVE

Students will be able to

1. Gain knowledge about the basic technique and practice of yoga, including instruction in Breath control, meditation, and physical postures.
2. Develop physical competency and mental concentration.
3. Gain an intellectual and theoretical understanding of the principles embodied in the Yoga Sutras,
4. Increase efficiency, concentration, inner power and enhance the spiritual power for improving Learning Skill

## 4. SKILL COMPETENCY :

The aim of the course is to develop the various basic skills required for individuals to identify and manage various stresses in their academic and personal life.



5. **COURSE OUTCOMES(COs) At the end of the semester student will be able to: -**

CO No.	COURSE OUTCOME	Bloom's LEVEL
CO1	Understand the basic methods to manage the stress.	Understanding
CO2	Understand the social ethics	Understanding
CO3	Develop the positive attitude towards society	Applying
CO4	Reduce psychological, mental and emotional stress	Applying

6. **COURSE CONTENTS**

Sr. No.	TOPIC/Sub-topic	Hours	Marks	COs
1	HISTORICAL BACKGROUND AND YOGA LEARNING i) Yoga in Vedas ii) Yoga and its Principles iii) Consciousness iv) Yoga approach and Scientific view v) Pranayama: Breath Control, Breath and Postures, Rhythmic Breathing vi) Controlling the Body, Mechanism of Body: Kriyas and its high Therapeutic value. vii) Body as understood in its frame work systems and structure:.Asanas Cultural and Relaxation Asanas - viii) Muscles strength, Muscular coordination strength of Immune system ix) Relation and Reflection techniques Shavasana Shakshi Bhavanam. x)Bandhas and Mudras. xi) Depth of perception and expansion of awareness xii ) Gross level Muscular stretches xiii) Subtle level Respiration changes and normalizing breath.	10	---	CO1 CO2
2	MEDITATION AND ITS TECHNIQUES: Meditative postures and kinds of Meditation Bodily Benefits Lower Blood Pressure ,lowers the levels of blood lactate, improves the immune system, increases body vitality, controls insomnia and increases overall health of the body Violence Free Society Meditation develops happiness, contentment and calmness. When increasing number of people practice meditation, it has a calming effect on the environment. This is a potent way to achieve a violence free society. Mental Benefits Emotional stability, anxiety decreases, anger reduces, happiness increases, and intuition develops clarity and peace of mind, induces ability to focus, and reduces tension and fear. Value Based Society	10	----	CO3



3	ART OF LIVING 1. Sudarshan Kriya 2. Life Skills 3. Ancient Wisdom 4. Practical knowledge to deal with the daily challenges of life 5. Interactive exercises 6. Dealing with your emotions 7. Improving Communication skills and Relationship	08	----	CO3
4	STRESS MANAGEMENT FOR STUDENTS Stress management techniques: 1. Time management techniques 2. Organization techniques 3. Create a study environment 4. Memorization techniques 5. Be an Optimist 6. Sleep Well 7. Study Techniq	04	----	CO4
<b>TOTAL</b>		<b>32</b>	----	----

#### 7. LIST OF PRACTICALS/ASSIGNMENTS/EXERCISES/TUTORIALS/DRAWINGS

This is purely practice based subject where students will be doing exercises of asana and pranayama and dhyana under the guidance of external and internal experts

Sr. No.	Title of Experiment/Assignment/Exercise/Tutorial/Drawings	Approx.Hrs required	COs
1	HISTORICAL BACKGROUND AND YOGA LEARNING	04	CO1
2	MEDITATION AND ITS TECHNIQUES	08	CO3
3	ART OF LIVING	04	CO3
4	STRESS MANAGEMENT FOR STUDENTS	08	CO4

#### 8. IMPLEMENTATION STRATEGY (PLANNING)

1. The students will be performing practice sessions covering above topics.
2. Live demonstration along with content delivery sessions will be conducted.
3. The lecture room/ Hall separately will be assigned batchwise as per Time Table for Male (Boys) and Female(Girls) as where an applicable depending upon relevant topics.
4. The materials/ Items required example Yoga Matt/ Chatai/corresponding matt / towels / chadar are to be brought by students only for particular topics.



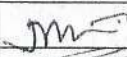

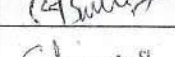
## 9. LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication
1	The Yoga Sutra of Patanjali	M.R. Yardi, Bhandarkar	-
2	Indian Philosophy	Dr. S. Radhakrishnan	-
3	Introduction to Indian Philosophy	Dutta & Hirianna Chatterji	-
4	Outlines of Indian Philosophy	Hirianna.	-

## 10. WEB REFERENCES

1. <http://www.artofliving.org>
2. <http://www.bkwsu.org>
3. <http://www.theyogainstitute.org>
4. <http://www.managingstress.com>
5. <http://3srb.org>

## 11. COURSE EXPERT COMMITTEE MEMBERS

Sr. No.		NAME	SIGNATURE
1	Internal	N.M.Pathak	
2	Internal	R.D. Shirogi	
3	Internal	S.A. Kambale	
4	External	Chirag Kachaliya M/s Mihir Industries pvt ltd	Chirag

