

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
I SEMESTER ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2008

Sr. No.	Subject	Subject Code	Scheme of Instructions and Periods per week					No. of papers duration and marks			Scheme of Examination						Gr	Scheme L/Pr/CR
			Lect	Pr	Dr	Tu	Cr	NP	Hrs	Mks	SSL	Paper	TW	Pract	OR	Total		
1-1	Communication Skill	SS-23	3	-	-	-	3	01	03	100	20	80	-	-	-	100	B*	303
1-2	Mathematics I	MA-15	3	-	-	1	4	01	03	100	20	80	-	-	-	100	B*	404
1-3	Physics	SC-17	4	4	-	-	8	01	03	100	20	80	25	50	-	175	B*	448
1-4	Fundamentals of computer & Networking system	CA-54	2	4	-	-	6	-	-	-	20	-	50	50	-	120	C*	246
1-5	Engineering drawing-1	ME-16	2	-	6	-	8	01	03	100	20	80	50	-	50	200	C*	268
1-6	Workshop technology	ME-26	-	5	-	-	5	-	-	-	-	-	50	-	50	100	C*	055
TOTAL			14	13	6	1	34	04 PAPERS			100	320	175	100		795		
TOTAL PERIODS = 34							TOTAL MARKS = 795											

* Compulsory

Award winning subject

** External only

Note:

- i) Sessional is to be accessed by internal examiner
- ii) Theory & practical is to be accessed by internal examiner & external examiner combined
- iii) Term work is to be accessed by internal examiner & external examiner as per the ratio
- iv) There will be three periodical test of 25 marks for each subject .best of two periodical test marks will be considered as a sessional of 20% weitage.
- v) Final term end examination will be of 100 marks having 80% weitage

L-Lecture period

P-Practical period

D- Drawing practice Period

NP-No of Papers

Mks- Marks

SSL –Sessional

T/W-Term work

Pract- Practical

Cr-Credit

TOTAL	22	6	2	1	31	06 PAPERS	120	480	175	200	975			
TOTAL PERIODS = 31							TOTAL MARKS = 15							

1st SEMESTER

(1) SUBJECT DETAILS :

Course : Electrical Engineering											Semester : I CODE:- SS-23			
Communication Skill COMPULSORY:B*														
Group : Basic (B*)							Compulsory							
Scheme of Instructions and Periods per Week				No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr	
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Th paper	T/W	Prac	Oral	Total	
3	-	-	-	3	1	3	100	20	80	-	-	-	100	303

(3) RATIONALE :

In take level of the students is S.S.C or is Equivalent. These students have studies English for minimum of 6 years. Expected level of heir Active Vocabulary is 2500 words from the Nagpur list of High Frequency words. However, in practice it was found that the students, particularly from the vernacular medium have only 1500 words at their command. They need to have course in English subject to offset this situation. Therefore, the first semester engineering course students need to study English.

Further, in this age of information, Communication Skill is essential to everyone. This is equally true in the case of Engineers. Engineers having sound knowledge of the technical subjects should be able to communicate the same to his superiors, peers and subordinates in their routine work environment.

Having a sound Communication Skill will enable the engineering students to learn and interprets the subject effectively. This saves time and money and enhances the effectiveness of the engineer's performance.

(4) OBJECTIVES :

(i) The student will increase his English vocabulary to a minimum of 2500 words (Nagpur List) through the prescribed text and grammar exercises by various techniques such as synonyms, Antonyms, One word substitutes, Prefixes & Suffixes and Comprehension of new words, Idioms and Prepositional Phrases. Students will be able to use principles to solve problems in Mathematics at Higher Semester level.

(ii) Students will understand the various uses of grammar items such as Voice in English sentences, Degrees of Comparison, Tenses, Direct and Indirect Speech in formation of various kind of sentences.

(iii) Students will master the important structures of English sentences to enhance their communication skill so that they can interact (orally and in writing) with people at different levels and in different situations with confidence.

(iv) This subject will enable the engineering students to understand the following:

- Effective Oral Communication
- Better Written Communication
- How to Improve Human Relations
- How to Overcome Barriers to Communication
- The need for Enhancing Personality

(5) DETAILED CONTENTS :

Chapter	Content	Marks	Hours
<u>SECTION – I</u>			
01	Five lessons as five units from the prescribed English Book as described in the section ‘Reference’ Below	20	08
02	Parts of Speech 2.1 Nouns, Pronouns & Adjectives 2.2 Verbs & Adverbs 2.3 Prepositons, Conjunctions, etc.	06	01
03	Sentences 3.1 Synthesis of Sentences 3.2 Tenses 3.3 Degree of Comparison 3.4 Transformation of four kinds of sentences- Assertive, Imperative, Interrogative and Exclamatory	10	02
04	Essay/Paragraph/Report Writing 4.1 Long Essay 4.2 Short Paragraph 4.3 Report Writing-Visits, Accidents, Trouble, Maintenance, Memo	16	05
05	Letters 5.1 Formal & Informal 5.2 Letters for Inquiry, Order, Complaint, Application for Job	16	05

SECTION – II

06	Dialogue Writing	06	01
07	Technical Description		
	7.1 Theory and Practice (Language)	08	02
08	Business Correspondence		
	8.1 Importance of Business Correspondence		
	Format of a Business Letter	24	08
	8.2 Types of Layout		
	8.3 Cardinal Qualities of Business Letter		
09	Notices and Instructions		
	9.1 Theory and Layout		
	9.2 Types of Notices	24	06
	9.3 Tender Notice (Theory and Specimen)		
10	Background of Industry		
	10.1 Definition of Terms-Industry, Industrialization, Etc.	10	02
	10.2 Factors of Production, Infrastructure		
	10.3 Industrial Estates Small Scale Industries, Trade Unions.		
		Total	(82) (24)

(6) IMPLEMENTATION STRATEGY (PLANNING):

- (i) Five units from the prescribed text book (English for Technical Students-T.T.T.I. Chandigarh), Lessons in the prescribed text book are used as guidelines for explaining the techniques of essay/dialogue writing.
- (ii) Teaching Plan
- (iii) Grammar items are covered along with the units of lessons
- (iv) Home assignments and class room participation

1. SUBJECT DETAILS :

Course: Electrical engineering	CODE:- MA-15
Subject: Mathematics-I	COMPULSORY:B*

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction and periods per week					No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
3	-	-	1	4	1	3	100	20	80	-	-	-	100	404

3. RATIONALE:

Algebra, Trigonometry and Coordinate Geometry are introduced as prerequisite for the topics to be studied later on to solve the engineering problems.

4. OBJECTIVES:

1. The students will be able to use the Mathematical Methods to solve the engineering problems.
2. Students will be able to use principles to solve problem in Mathematics at Higher Semester level

5. DETAILED CONTENTS:

Section-I

Chapter	Content	Marks	Hours
(01)	Trigonometry		
	1.1 Trigonometric ratio of any angle, Definition of Radian, Length of arc of sector $s = r\theta$,	08	02
	Area of Sector $A = \frac{1}{2}r^2\theta$	24	06
	1.2 Trigonometric ratios of allied, compound angles	12	04

and multiple angles	12	04
1.3 Inverse trigonometric functions	06	02
1.4 Properties and solution of triangle		
1.5 Solution of Trigonometric equation by graph		

(02)

Matrices

2.1 Definition of a matrix of order $m \times n$. type of matrices	02	01
2.2 Addition and subtraction of two matrices	04	01
2.3 Multiplication of a matrix by a scalar, multiplication of two matrices.	04	01
2.4 Singular and Non-singular matrices. Transpose of a matrix. Adjoint of matrix, Inverse of a matrix A by findings Adj. A solution of simultaneous equation by using a matrix.	10	03
	----	----
	(82)	(24)

SECTION-II

(03) Algebra

3.1 Determinant	18	05
3.2 Partial fractions	16	04
3.3 Binomial Theorem	24	08
3.4 Progression (A.P./G.P.)	16	04
3.5 Permutations and Combinations	08	03
	-----	-----
	(82)	(24)

Total

(6) IMPLEMENTATION STRATEGY (PLANNING)

Conducting lectures as per the teaching plan and conducting tutorials.

(7) REFERENCE BOOKS

Sr. No.	Author	Title	Year of Publication	Publishers & Address
(i)	S.P.Deshpande	Mathematics for Polytechnic Students-I & II	1998	Pune Vidyarthi Graha Prakashan Pune-30
(ii)	G.V. Kumbhojkar	Engineering Mathematics – I & II	1999	Jamnadas & Co.
(iii)	Patel/Rawal & others	Applied Mathematics-I	2002	Nirali Prakashan, Mumbai

1.SUBJECT DETAILS :

Course :Electrical Engineering	Semester : I
Subject : PHYSICS	Code : SC – 17
Group : Basic	compulsory:-B*
	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							Scheme	
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	T/W	Pract		Total
		Hrs	Np	Mks							
04	04	08	03	01	100	80	20	25	50	175	448

3. RATIONALE: The student has to attain a remarkable knowledge level regarding properties of materials and laws of Physics. This foundation is required at the First Year Diploma Level of various branches of Engineering and is laid by incorporating a Theory and Practical approach with due stress on practical application aspect of the subject. This is emphasized by widening scope for laboratory work, selecting such text and specialized reference books.

4. OBJECTIVES: After acquiring knowledge of Laws of Physics and co-relation of its Principles, the Student will:

- (i) Be able to understand Application (of theoretical principles) to work
- (ii) Appreciate the importance of precision involved in measurements.

5. DETAILED CONTENTS:

A. THEORY CONTENTS :

Unit: Introductory talk	Marks	Period
	-	02

To understand : Assertion of the statement which specifies relation between Engineering and Applied Physics.

Importance of implementing precision measurements.

Chapter: (i) Subject introduction with review of past work – `Science`, Physics`, Matter and its structure, forms; `Physics` as science of measurement; unit; systems- CGS, MKS etc. multiples and submultiples

- (ii) SI units and Standards- meter(m), kilogram (kg), second (s), degree Kelvin (K), candela (cd), ampere (A), mole

SECTION-I

Marks Hours

Unit- I General Physics

26

08

Chapter 1 : Elasticity

- 1.1 Elasticity, perfectly elastic, plastic, rigid body.
- 1.2 Stress, Strain, Hooke's law; Modulus of elasticity.
- 1.3 Young's modulus, Bulk modulus, Rigidity modulus; Poisson's ratio.
- 1.4 Young's modulus by Searle's apparatus, constant of elasticity. by Searle's method.
- 1.5 Elastic behavior of wire
- 1.6 Engineering applications.
- 1.7 Numerical problems.

Chapter 2: Viscosity

- 2.1 Viscosity, Streamline flow; critical Velocity.
- 2.2 Newton's Formula; Coefficient of viscosity; 'poise'.
- 2.3 Poiseuille's equation, Poiseuille's Method
- 2.4 Stokes' law; Stokes; formula; Stokes method.
- 2.5 Reynold's number.
- 2.6 Applications.
- 2.7 Numerical problems

Unit-II Heat and Thermodynamics

28

08

Chapter 3: Thermometry :

- 3.1 Zeroth law of thermodynamics.
- 3.2 Platinum resistance thermometer, Standard gas thermometer, Optical pyrometer

Chapter 4 Specific heats of gases – Cp and Cv

- 4.1 Specific heat at constant pressure and at constant volume- Molar, In terms of enthalpy
- 4.2 Relation between Cp and Cv
- 4.3 Numerical problems

Chapter 5 Concepts of Thermodynamics

- 5.1 Heat and energy; Joule's law; Mechanical equivalent of heat.
- 5.2 First law of thermodynamics
- 5.3 Isothermal and Adiabatic Processes
- 5.4 Thermodynamics processes- Reversible; Irreversible.
- 5.5 Cycle P-V diagram
- 5.6 Elementary ideas of heat engine
- 5.7 Concept of entropy

Chapter 6: Heat Transfer – Conduction

- 6.1 Heat conduction- idea of steady states; temperature gradient ; coefficient of thermal conductivity.
- 6.2 Thermal conductivity of a good conductor- Searle's method
- 6.3 Thermal conductivity of an insulator- lee's method.
- 6.4 Thermal conductivity of rubber tube by calorimetric
- 6.5 Temperature of interface
- 6.6 Numerical problems

28 08

Unit III Sound

Chapter 7 Simple Harmonic Motion (S.H.M.)

- 7.1 General equations of S.H.M.; Graphical representations; Characteristics of S.H.M.
- 7.2 Numerical problems

Chapter 8: Waves and Oscillations

- 8.1 Progressive waves(transverse and longitudinal)-equation.
- 8.2 Principle of superposition; Stationary waves.
- 8.3 Free oscillation and forced oscillations, resonance.
- 8.4 Vibrations of air column-velocity of sound by resonance tube closed at one end.
- 8.5 Vibrations in strings- frequency of A.C Supply by Sonometer
- 8.6 Numerical problems.

Chapter 9: Intensity of Sound

- 9.1 Loudness and phon, intensity, decibel, Logarithmic formula
- 9.2 Data for various sources of sound and their intensity in decibel.

Chapter 10 Acoustics and reverberation:

- 10.1 Reverberation, Sabine's formula Conditions for good acoustics, Noise reduction and sound insulation Numerical problems
- 10.2 Ultrasonic-production and Application; Sonic, Subsonic, Supersonic.

SECTION-II

24 06

Unit IV Optics

Chapter 11 Photoelectricity:

11.1 Photoelectric effect- Planck`s hypothesis Einstein`s equation;
Characteristics

11.2 Photocell- photo emissive; photo conductive; photovoltaic
Applications Numerical problems

Chapter 12 Elementary ideas of Interference, Diffraction and Polarization

12.1 Interference Conditions for steady interference pattern, Thin films, Newton`s rings, optical flatness, Applications

12.2 Diffraction, Grating, Applications

12.3 Polarization, Polarimeter; Photoelasticity, Applications

30 10

Unit V Electricity and Magnetism

Chapter 13 Static electricity

13.1 Coulomb`s law; Electric field; Intensity, Electric line of force
Flux density, Numerical problems, Potential;

13.2 Capacitance; `farad` ;Principle of capacitor, Capacitor; Parallel plate capacitor; Combinations: Capacitors “ In Series ”, “ In Parallel; Energy of capacity; Numerical problems.

Chapter 14 Current Electricity

14.1 Specific resistance; Ohm`s law as applied to complete circuit- e.m.f. and p.d.

14.2 Wheatstone`s network and Wheatstone`s bridge (W.B.) (metre bridge) Post Office Box (P.O.B.)

14.3 Potentiometer

14.4 Application

14.5 Numerical Problems.

Chapter 15 Electromagnetism

15.1 Current carrying conductor in the magnetic field, 'ampere' the SI Unit of current.

15.2 Rectangular coil carrying current placed in uniform magnetic field, Galvanometer-Moving coil 'Mirror', Current Sensitivity.

15.3 Principle of Shunt, Ammeter, Voltmeter.

Chapter 16 Magnetism

16.1 Magnetic materials; Dia, Para and Ferromagnetism; Modern concept of magnetism.

16.2 Susceptibility, Magnetic hysteresis; Magnetic shielding.

16.3 Applications.

Chapter 17 Thermoelectricity

17.1 Thermocouple, Seebeck and Peltier effect; thermo e.m.f vs temperature relation.

17.2 Thermocouple as thermometer

28

10

Unit VI: Modern Physics:

Chapter 18 Bohr's Theory for hydrogen atom

18.1 Bohr's postulates

18.2 Radii of orbits and energies; Rydberg constant; Bohr model-Energy level diagram for hydrogen atom and spectral series.

Chapter 19 Crystal Structure

19.1 Crystalline and Amorphous solids, , Unit cell space-lattice cubic crystal structures- simple cubic(S.C), Body centred cubic (B.C.C), Face centred cubic (F.C.C), Atomic radius Co-ordination number, Number of atoms per unit cell; Atomic radius, Packing density..

19.2 Atomic planes and spacing, Miller indices.

Chapter 20 Elementary ideas of Lasers and Masers

20.1 Introduction related to acronym Spontaneous and stimulated (Induced) emission, Essential requirements of laser- Active medium, Resonant cavity, Pumping.

20.2 Ammonia maser, Ruby Laser; Helium –Neon Laser.

20.3 Energy and momentum of laser photon, Properties and applications.

20.4 Holography .

Chapter 21 Band theory of solids ; Semiconductors

21.1 Energy bands in solids and classification of materials in to conductors, semiconductors and insulators.

21.2, semiconductors Intrinsic ; Extrinsic – P Type and N Type; P-N junction.

Chapter 22 Elementary ideas of Fibre optics and Superconductivity

22.1 Total internal reflection and critical angle; wave guide for light, Optical fibre- Step index, Graded index ; Applications.

22.2 Principle of Superconductivity –Zero ohmic resistance; critical field; Meissner effect; Super conducting state, materials, properties and applications

LIST OF EXPERIMENTS

Experiments to be performed :

Section-I (ANY 09)

1	Use of Measuring Instruments – Vernier Callipers, Micrometer Screw Gauge, Spherometer
2	Elastic Constants by Searle's Method
3	Young's Modulus by Searle's Apparatus
4	Surface Tension by Capillary Rise Method <u>OR</u> Viscosity by Poiseuille's Method <u>OR</u> Viscosity by Stokes' Method.
5	Thermal Conductivity of a Good Conductor by Searle's Apparatus
6	Ratio of Specific Heats C_p/C_v by Clement and Desorme's Apparatus
7	Thermal Conductivity of Rubber Tube by Calorimetric Method.
8	Thermal Conductivity of an Insulator by Lee's Method

9	Velocity of Sound by Resonance.
10	Velocity of Sound by C.R.O
11	Frequency of A.C. Supply by Sonometer and Verification by C.R.O.

Section – II (ANY 08)

12	Study of Spectrometer (Minimum Deviation and Refractive Index and Angle of Prism
13	Wavelength of Laser Beam (He-Ne) by Diffraction Grating.
14	Specific Rotation by Polarimeter
15	J' by Electrical Method and Specific Heat of Oil by Electrical Heating.
16	Use of Wheatstone's Bridge and Post Office Box (Resistance, Specific Resistance and Temp.Coefficient of Resistance).
17	Use of Potentiometer (Principle, Comparison of e.m.f.s of Cells, Internal Resistance of Cell and Calibration of Voltmeter with the Principle COMPULSORY and ANY ONE of the Other Three).
18	Wavelength of Light by Diffraction Grating
19	Determination of Rydberg Constant.
20	Study of Crystal Structure.

Demonstration Experiments : (ANY 07)

(i)	e.m.f. of a Thermocouple
(ii)	Spectra of Ionised Gases
(iii)	Poisson's Ratio for Rubber Tube
(iv)	Study of Photocell
(v)	Temperature of Flame (Optical Pyrometer)
(vi)	Hysteresis by C.R.O.
(vii)	Study of Newton's Rings
(viii)	Study of Para and Diamagnetism by Electromagnet
(ix)	Study of Ultrasonics
(x)	Study of Photoelastic Bench
(xi)	Optical Principles of O.H.P
(xii)	Use of Precision Measuring Instruments (Dial Vernier, Dial Micrometer, Travelling Microscope etc.)

Term-Work :

Compulsory term-work on the list of experiments written in a journal and carrying 50 marks on timely submission basis specified at the index sheet of Physics Journal.

Scheme of Practical Examination :

1	Each candidate will be examined in one experiment from among those prescribed in the syllabus. The duration of the experiment will be two hours
2	Each candidate will be asked to draw by lots any two experiments (one from section-I and the other from section-II). Out of the experiments so drawn by him/her, he/she will be asked to prefer

	any one experiment which he/she will be able to perform with confidence.
	Change of experiment shall be discouraged and if absolutely necessary, 05 marks will be deducted for the same after due verification of the laboratory records of the candidate.
3	The performance of the candidate in the practical examination will be assessed out of 50 Marks as shown in the following scheme

Scheme of assessment :

- (a) Connections, adjustment and Observations 20 Marks
- (b) Circuit diagram, figures and tabulation10 Marks
- (c) Formula, calculations and graphs if any10 Marks
- (d) Oral 5 Marks
- (e) Correct answer or appropriate result 5 Marks

Total : 50 Marks

4	Each candidate will be jointly examined by both external and internal examiners
5	Certain demonstration experiments are coupled with certain conventional experiments during the examination. Marks allotted for demonstration experiments are 15 and marks for conventional experiments are 35. The conventional experiment is assessed out of 50 as mentioned under 4 in the above scheme and then converted out of 35. Assessment of a demonstration experiment is judged by answers (Oral or Written) given by candidate in front of the relevant demonstration set up.
6	If any candidate is unable to draw a correct circuit diagram, the same may be given by the examiner on request so that the candidate may continue the experiment. However, five marks will be deducted for the same
7	While assessing, the overall performance and the ability of the candidate to handle the apparatus independently, will be considered.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Theory- Lesson Plan
2. Practical – Scheme of marking for T/W; Scheme of assessment for Pract. Exam.

7. (a) TEXT BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	R.K.Gaur and	Engineering Physics	Any	181-96	Dhanpat Rai

	S.L. Gupta			2001 Reprint 2004	& Sons.
2.	M.R. Shrinivasan	Physics for Engineers	Any	1976	New Age International
3.	P.G. Kshirsagar and M. N. Avadhunulu	A Text Book of Engineering Physics	Any	1992 Reprint 93, till 05	S. Chand and Co. Ltd
4.	Gambhir, Durgapal and Banerjee	Introductory Physics, Vols. 1, 2 and 3	Any	1972	Wiley Eastern

(b) REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Resnik and Halliday	Physics, Vols. 1 and 2	Any	1986	Wiley Eastern.
2.	B.L. Theraja.	Engineering Physics	Any	1062 Reprint 74- 87 1975, 76,78,79,80, 81,82,83	S. Chand & Co. Ltd
3.	B.L. Theraja.	Modern Physics	Any	1062 Reprint 74- 87 1975, 76,78,79,80, 81,82,83	S. Chand & Co. Ltd

1. Subject Details

Course: Electrical Engineering	Semester I
Subject: FUNDAMENTALS COMPUTER AND NETWORKING SYSTEM	
CODE: CA-54	
Compulsory :-C*	

2. Teaching and Examination Scheme

Teaching Scheme			Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Wk.	Pract Hrs per wk	Tut Hrs per wk		Paper			TH Reduced to	Sessional Marks	T/W	Pract	Total
			Hrs	N/P	Mks						
2	4	-	6	-	-	-	-	20	50	50	120

3. RATIONALE:

This subject envisages to make the students know the fundamentals of computer systems and its organization. It will enable the students to comprehend the organization and working of various units of personal computer system for storing and processing information. It will also help the students to have hands on experience of operating systems and different application software used for office automation, day to day problems sharing in particular for creating business documents, data analysis graphical representations and business presentations. It also deals with basics of Internet technology available services internet connectivity and accessing information on internet. The student will also familiarize themselves with case study on Linux o.s., its design architecture, command structures, utilities and Linux.

4. OBJECTIVES:

The student will be able to:

1. Get familiarized with computerization.
2. Utilize computers in engineering /technical field.
3. Use computer concepts for Microsoft applications
4. Promote Computer Literacy and Programming Skills.
5. Made to expose towards computer area.
6. Learn networking concepts
7. Operate Internet/e-mail facility
8. Study of Linux as Operating System and Shell Programming.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
1	1.0 Fundamentals of Computer concepts 1.0 To acquaint with computer Hardware and Software, To get familiar with various operating system (DOS); 1.2 To use DOS internal commands ;To familiarise with DOS	20	06

	<p>external commands;</p> <p>1.3 To study of computer specifications PC,PC-XT, PC-AT, Pentium and its applications,</p> <p>1.4 General architecture of computers; Computer peripherals (I/O Device),CD player , Storage units , floppy diskette , printers and output peripherals;</p> <p>1.5 General computer terms, computer software, applications software, operating systems, utilities packages, languages, advantages of software and application packages.</p> <p>Practice: 1. Study of Computer hardware and peripherals</p>		
2.	<p>2.0 Introduction to Windows:</p> <p>2.1 Structure of a Window, Basic techniques for working in Windows.</p> <p>2.2 Using Menus</p> <p>2.3 Working with A dialogue box, Type of Options</p> <p>2.4 Starting Windows , Task Bar, Start Menu</p> <p>Practice: 1. Study of DOS Internal and External Commands</p> <p>2. Getting started with Windows by using different menus and working with dialogue box</p> <p>3. Study of Control panel , Screen saver and Help commands using Windows</p>	10	05
3.	<p>3.0 Introduction to WORD package</p> <p>3.1 Starting Word; The Word Screen; Getting to Word Document:</p> <p>3.2 Typing and Editing : Editing text, Copying and Moving, Typing Special Characters (Symbols);</p> <p>3.3 Some common features: Changing the case of text, Moving & copying text with drag and drop, Justifying text.</p> <p>3.4 Creating bulleted & numbered lists, Arranging and moving between open documents.</p> <p>3.5 Finding and replacing, formatting.</p> <p>3.6 Using the spell checker, Checking grammar.</p> <p>Practice: 1. Creating, Editing and Saving a document , Table using Word package creating</p> <p>2. Document with Table ,editing using special characters & saving.</p> <p>3. Study of tool bar menus like Standard , Formatting , Tables and Borders</p> <p>4. Study of spell check , find , replace , go to , page setup , print preview and print commands.</p>	15	02
4	<p>4.0 Concepts of POWER POINT</p> <p>4.1 What is Business graphics : Types of Business Graphics, How to make an effective presentation,</p> <p>4.2 Physical aspects of presentation; A Presentation Graphics package ;</p>	15	02

	<p>4.3 Creating a presentation : creating a Title slide, Creating a Graph, Creating Tables, Make Organization Chart, To Save and close presentation; Working with Tools: Create , Edit, Move, Delete , Resize , Format text object, Working with Graphics tools;</p> <p>4.4 Slide show</p> <p>Practice: 1. Creating a new presentation and getting acquainted with various menus like FILE, EDIT, VIEW, INSERT, FORMAT, TOOLS, SLIDESHOW</p> <p>2 Choosing Auto Layout and working with tools and to prepare a slide show</p> <p>3. To study special effects using one slide show demonstration</p>		
5	<p>5.0 Fundamentals of EXCEL</p> <p>5.1 Starting EXCEL: What is a spreadsheet creating & editing spreadsheet, modifying the sheet.</p> <p>5.2 Study of Toolbars, Formula bar and Status bar.</p> <p>5.3 Inserting Header and footer, cells, rows, columns, worksheet.</p> <p>5.4 Formatting individual cells row, column, sheet, manipulating data by using Sort.</p> <p>5.5 Saving and Retrieving saved worksheet.</p> <p>Practice: 1.Creating Spread Sheet for various combination of computational tables.</p>	15	02
	SECTION-II		
6	<p>6.0 Linux Fundamentals</p> <p>6.1 Linux Fundamentals:- Basics of Unix and Linux.</p> <p>6.2 Multi-User and Multitasking capacities of Linux, change of password, the file types, structure of file system, important directories of the file system.</p> <p>Practice: 1.Linux basic commands.</p> <p>2.Linux Advanced commands</p>	25	06
7	<p>7.0 Introduction to Shell Programming :</p> <p>7.1 What is Shell</p> <p>7.2 Tools for working with Linux and Shell programming, Function of Shell</p> <p>7.3 Access permission of file in Linux, editing files with V1, important commands related to V1 editor.</p> <p>7.4 Introduction to Bash Shell Basics, Shell Bash variables, basics scripts element (input/output).</p> <p>7.5 Simple Shell Programs.</p> <p>Practice: 1.CREATING FILE USING V1 editor, editing, saving file and quit from V1 editor.</p> <p>2. Study of different run levels.</p> <p>3. Shell programming-I</p> <p>4. Shell programming-II.</p> <p>5. Study of KDE environment</p>	24	05

8	8.0 Networking and LAN commands 8.1 Network Concept and classification; 8.2 Local Area Network(LAN) : LAN Topology, LAN Software/ Operating System. 8.3 LAN commands and elementary Administrative commands like ATTACH, BROADCAST CAPTURE, LOGIN, LOGOUT, MAP, REVOKE, RIGHTS, SYSCON, SYSTIME. Practice: 1. Networking concepts and LAN commands. 2.Introduction to administrative command like Create Users, Mapping , Assigning , etc.	20	02
9	9.0 Introduction to INTERNET : 9.1 What is INTERNET, Application of INTERNET 9.2 E-mail, TELNET, WWW, Study of various search engine using LYNX, LOGIN PROCEDURE. 9.3 Study of INTERNET EXPLORER, Creating mailing account, Difference between SHELL and TCP/IP account. 9.4 Surfing using WORLD WIDE WEB information relating to employment, education, alumni. Practice: 1. Internet terms , Use of Shell account and study of mailing , Software to send & receive mail on Hard Disk. 2. To study internet explorer package & retrieve education related information from TCP/IP account and downloading procedure.	20	02

Note:- Minimum of twelve experiments must be performed /completed in journal for approval of term work acceptance other than the 75% requirement of attendance.

Sr. No.	Main Topics	No. of Contact Hrs.	Marks	Weightage %	# M / E / D
1.	Fundamentals of Computer concepts	06	20	12	E
2.	Introduction to Windows	05	10	07	E
3.	Introduction to WORD package	02	15	09	M
4.	Concepts of POWER POINT	02	15	09	M
5.	Fundamentals of EXCEL	02	15	09	M
6.	Linux Fundamentals	06	25	16	M
7.	Introduction to Shell Programming	05	24	14	M
8.	Networking and LAN commands	02	20	12	M
9.	Introduction to INTERNET	05	26	16	E
Total		32	164	100%	#

(# M=Most Essential, E=Essential, D=Desirable)

6. IMPLEMENTATION STRATEGY (Planning)

- i) Teaching Plan
- ii) Lesson Plan
- iii) Assignments

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & address
1	Hunt & Shelly.	Computer and Common sense			
2	V. Rajaraman	Computer Fundamentals			(Prentice hall)
3		PC Guide for Windows			(ITC Publication / Galgotia publication)
4	Galgotia.	Learning Word 6.0 for Windows step-by-step			
5	Preilerson	Linux: The computer reference – 5/E			
6		Unleashed Linux			
7		Mastering MS Office			BPP Publication
8	U.D. Black	Data Communications and Distributed Networks			Prentice-Hall

1. SUBJECT DETAILS:

Course: Electrical Engineering	Semester : I
	Code : ME-16
Subject: Engineering Drawing – I	Compulsory:-C*
Group : Core	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Week	Practical Hrs per Week		Paper			TH	Sessional	T/ W	Oral	Total
			Hrs	NP	Mks					
02	06	08	3	01	100	80	20	50	50	200

3. RATIONALE:

Engineering drawing is a language of engineers. It is classified as engineering science subject. It describes scientific facts, principles and technique of drawing in order to visualize and express the ideas and to convey the instructions through drawings without ambiguity. In engineering drawing – I, student will study concept of orthographic projections, isometric projection, isometric view, ideas of two dimensional and three dimensional objects, oblique, projections, curves etc.

4. OBJECTIVES:

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
<u>SECTION-I</u>			
01	1.0 Introduction :		02
	1.1 Importance of Engineering Drawing for the study of technical courses		
	1.2 Drawing instruments, types of lines and dimensioning (lettering and numbering for term work or assignment)		03
	Practice :		09
	1. A2 size sheet to be drawn containing four problems on letter lines and dimensioning techniques.		
	2. Home Assignments: One sheet containing four problems		

02	2.0 Principle, Planes and Quadrants: 2.1 Concept of principle planes and quadrants 2.2 I and III angle method of projections	-	02
03	3.0 Orthographic Views : 3.1 Projections of various objects having flat and curved surfaces using 1 st and 3 rd angle projection method. Practice: 1. One sheet on orthographic projection for objects with linear features 2. Home Assignments: One sheet containing four problems	-	02
04	4.0 Conversion of Pictorial View : 4.1 Conversion of pictorial views in to non-sectional orthographic views. The objects may have slots, holes cavities etc. Practice: 1. One sheet with non sectional orthographic views for the objects with curvilinear features. 2. Home Assignments: One sheet containing four problems	20	05
05	5.0 Oblique Projections : 5.1 Oblique projections of curvilinear feature on non oblique plane only. Practice: 1. One sheet having four problems of oblique projection for the curvilinear features on non oblique plane. 2. Home Assignments: One sheet containing four problems	30	04
06	6.0 Engineering curves : 6.1 Cycloidal curves: Cycloid, epicycloids, hypocycloid (Simple cases) 6.2 Involute of circle and polygon (simple cases) 6.3 Helix on cylinder (not on cone) Practice: 1. One sheet with four Problems containing cycloid, epicycloids, hypocycloid , Involute and Helix. 2. Home Assignments: One sheet containing four problems	30	04
SECTION-II			
07	7.0 Conversion of Pictorial View in Sectional Orthographic: 7.1 Conversion of pictorial views with cutting plane into sectional orthographic projection (full section only) Practice: 1. Four problems on sheet(full section plane) 2. Home Assignments: One sheet containing four problems	20	04
			12

1. SUBJECT DETAILS :

Course: Electrical engineering	Semester: I
Subject: Workshop Technology	CODE:ME-26
Compulsory:-C*	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods / Week					No. of Papers, Duration & Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Practical	Oral	Total	
-	5	-	-	5	-	-	-	-	-	50	-	50	100	55

3. RATIONALE :

Production is a value adding activity, where raw material is converted into finished goods, by using different resources like man, machine, material, method, etc. Handling of different tools & equipments is a part of production system. So student should be aware of method of handling of different tools, its applications, precautions, handling procedures, etc.

4. OBJECTIVES :

- 1) The student will be able to understand workshop activities.
- 2) They will be able to select right tools and right manufacturing processes for performing the job correctly.
- 3) They will be able to use different fitting tools like Files, hacksaw, hammers, try square, chisel (cross cut chisel), center punch, etc and carpentry tools like cross cut saw, jack plate, firemen chisel, rasp file, marking gauge, mallet, scriber etc.
- 4) They will be able to read dimensions and able to do marking required for making the job.
- 5) Practical
5 periods per week (two times)

Sr.No.	Title	Hours
01.	Demonstration of carpentry tool & one carpentry joints.	25
02.	One pattern	25
03.	Demonstration of fitting tools & one job of drilling and trapping.	15
04.	One job of keyway Sawing/filing.	15
	Total	80

5. Assignment

1. Notebook containing the procedure and diagram of above jobs.
2. Notebook containing write up from workshop practices TTTI Bhopal book on above hand tools.

6. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	S.K. Hajra Choudhury, A.K. Hajra Choudhury	Elements of workshop technology (vol.I)	9 th	1997	Media promoters and publishers Pvt. Ltd., New Delhi
2.	B.S. Rghuwanshi	A course in workshop technology (vol.I)	9 th	1997	Dhanpatrai & sons, New Delhi
3.	W.A.J. Chapman	Workshop technology Vol-1, 2, 3	3 rd	1998	Viva books (P) Ltd.

**Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
II SEMESTER ELECTRICAL ENGINEERING**

w.e.f Batch admitted in June, 2008

Sr. No.	Subject	Subject Code	Scheme of Instructions and Periods per week					No. of papers duration and marks			Scheme of Examination						Gr	Scheme L/Pr/CR
			Lec t	Pr	Dr	Tu	C r	NP	Hrs	Mks	SSL	Paper	T W	Pra ct	OR	Total		
2-1	Development of generic Skill	DG-1	2	-	-	1	3	01	03	100	20	80	-	-	-	100	B*	303
2-2	Mathematics II	MA-25	3	-	-	1	4	01	03	100	20	80	-	-	-	100	B*	404
2-3	Chemistry	SC-27	4	4	-	-	8	01	03	100	20	80	25	50	-	175	B*	448
2-4	Engineering Drawing II	ME-36	2	-	6	-	8	01	03	100	20	80	50	-	50	200	C*	268
2-5	Fabrication Technology	ME-46	2	4	-	-	6	01	03	100	20	80	25	50	50	175	C*	246
2-6	Applied Mechanics	AM-16	3	2	-	-	5	01	03	100	20	80	25	-	-	125	C*	325
TOTAL			16	10	6	2	34	06 PAPERS			120	480	125	150		875		
TOTAL PERIODS = 34										TOTAL MARKS = 875								

* Compulsory

Award winning subject

** External only

Note:

- i) Sessional is to be accessed by internal examiner
- ii) Theory & practical is to be accessed by internal examiner & external examiner combined
- iii) Term work is to be accessed by internal examiner & external examiner as per the ratio
- iv) There will be three periodical test of 25 marks for each subject .best of two periodical test marks will be considered as a sessional of 20% weitage.
- v) Final term end examination will be of 100 marks having 80% weitage

L-Lecture period

P-Practical period

D- Drawing practice Period

NP-No of Papers

Mks- Marks

SSL –Sessional

T/W-Term work

Pract- Practical

Cr-Credit

TOTAL	22	6	2	1	31	06 PAPERS	120	480	175	200	975		
TOTAL PERIODS = 31							TOTAL MARKS = 15						

2ND SEMESTER

1. Subject Details

Course: Electrical Engineering	Semester: II
Subject: Development of Generic Skills	Code :DG-1
Compulsory:-B*	

2. Teaching and Examination Scheme

Subject	Scheme of Instructions & Periods per Week			No of Papers , Duration & Marks	Scheme of Examination					Detailed Syllabus Ref. No.	Scheme L.Pr./Cr.
	Lecture	Prac. Or Drg.	Tutorial		Sessional Work	Paper	Term Work	P r a c t . E x a m	Total		
Development of Generic Skill	2			1.3 Hrs, 100 Marks	20	80			100		303

3. RATIONALE

The skills of Project Management have become important in all types of business and at all levels of work hierarchy. The purpose of development of Generic Skills is to develop the necessary skills, which will make students confident and competent in managing and executing engineering projects.

4. GENERAL OBJECTIVES

Over a period of time it has been observed that effectively of polytechnic students, their utility at work place can be enhanced by imparting generic skills right from entry in the polytechnic. The generic skills are life skills, they are lifelong skills, whose edge needs to be sharpened every moment.

The content is divided into 4 logical units:

1. Information
2. Communication Skills
3. Self Development
4. Task Management

It is designed by keeping self in focus with a clear objective of developing Generic Skills, to enhance the capabilities in the field of searching, assimilating and using information on job. Developing self and managing given tasks, finally to present himself as a technomenger.

It is an effort to develop student that enables him to be successful in finding a practical and reaction solution to any problem he comes across. It covers more or less all aspects of life skills. The development of subject is progressively ascending parallel to development of study in polytechnic.

5. Theory Contents:

1. Information Sources (Periods:2hrs; Mks-10)

Introduction, Types of Information sources, Print Media, Documentary Sources, Non-Documentary Sources, Non-Print Media, Electronic Media, Conclusion.

2. Information Centre (Periods:2hrs; Mks-10)

Introduction, Classification, Services, Conclusion.

3. Procedure for Information Search (Periods:4hrs; Mks-20)

Introduction, Need of Approach, Types of Approach, Steps for Information Search, Preparation of Biographic Card, Preparation of Index Card, Conclusion.

4. Learning (Periods: 4hrs; Mks-20)

Introduction, Concept of Learning, Basic Model of Learning, Principles of Learning, Conclusion.

5. Memory & Cognition (Periods: 4hrs; Mks-20)

Introduction, Basic Concepts, Dual Store Model of Memory, Sensor register Characteristics, Attention, Factors affecting attention, Figure Ground Rule, Working memory(WM); Characteristics of WM, Control Processes in WM, Long Term Memory in LTM: Characteristics of LTM, Control Processes in LTM, Organization of knowledge, Conclusion.

6. Meta Cognition & Study Strategies (Periods:4hrs; Mks-20)

Introduction, Meta Cognitive Knowledge, Self Regulated Learning, Effective Learning and Study Strategies(Covert): Selective attention, Maintain Rehearsal, Meaning learning Reflection, Internal Organization, Elaboration-----** Visualization, Effective learning strategies: Effective reading, Effective listening, Notes Taking, Conclusion.

7. Learning on Job (Periods: 4hrs; Mks-20)

Introduction, Definition, Identify General and Specific Skills, Workplace as a System, Types of System, Conclusion.

8. Learning Practical Skills (Periods: 2hrs; Mks-10)

Introduction, Process of Performing the job, Domains of Learning Job, Conclusion.

9. Testing of Acquired Skills (Periods:2hrs; Mks-10)

Introduction, Objectives, Process for Skill Analysis, Conclusion.

UNIT II COMMUNICATION SKILLS**10. Basis of Communication (Periods:2hrs; Mks-10)**

Definition, Concept of Communication, Communication Cycle, Communication, Conclusion.

11. Techniques of Communication (Periods: 2hrs; Mks-10)

Introduction, Oral Communication, Written Communication, Body Language, Conclusion.

S. No.	Main Topics	No of Contact Hrs	Marks	Weightage %	#M/E/D
1	Information sources	2	10	7	E
2	Information Centre	2	10	7	E
3	Process For Information Search	4	20	11	M
4	Learning	4	20	11	M
5	Memory and Cognition	4	20	12	M

6	Meta Cognition & Study Strategies	4	20	12	D
7	Learning on Job	4	20	12	E
8	Learning Practical Skills	2	10	7	E
9	Testing of Acquired Skills	2	10	7	D
10	Basic of Communication	2	10	7	E
11	Techniques of Communication	2	14	7	E

Total 32 164 100% #

Section I

1. Information Sources
2. Information Centre
3. Procedure for Information Search
4. Learning
5. Memory & Cognition

Section II

6. Meta Cognition and Study Stratifies
7. Learning on Job
8. Learning Practical Skills
9. Testing of Acquired Skills
10. Basic of Communication
11. Techniques of Communications

Total Theory Hours : 32 Hrs.

Reference Books:

Learning to learn by Kenneth A. Kiewra
 Independent Study techniques by P.D. Kulkarni & B.B. Sharma

Additional References:

101 ways to better communication by Elizabeth Hienny.

1. SUBJECT DETAILS:

Course: Electrical Engineering	Semester: II
	CODE:-MA-25
Subject: Mathematics – II	Compulsory:-B*
Group: Basic (B *)	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instruction and Periods per week					No of papers, duration and Marks			Scheme of Examination						Scheme L/Pr.Cr.
L	P	D	T	Cr	Np	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
3	-	-	1	4	1	3	100	20	80	-	-	-	100	404

3. RATIONALE:

1. Creating aptitude for Mathematics of Higher Semesters
2. Focusing attention of problem solving in liberal sense. This aspect should take care of
 - (a) Intelligent combination of techniques.
 - (b) Mathematization or mathematical modeling of problems involved in various branches of knowledge.
3. Nurturing the higher order mental process of logical reasoning with rigor and precision.

4. OBJECTIVES:

These topics are introduced as

1. Prerequisite for many topics such as integral calculus, differential equations, Fourier series etc. to be studied later.
2. To introduce the applications commonly required.

5. DETAILED CONTENTS:

SECTION – I

Chapter	Content	Marks	Hours
01	Co-ordinate Geometry		
	1.1 Straight line: Slope of a line; X and Y intercepts of a line, point of Intersection of two straight lines, Acute angle between intersecting lines, Perpendicular distance of a point from the line, distance between two parallel lines.	12	40
	1.2 Circle: Centre-Radius form of an equation of a circle, General equation of a circle.	10	32
	1.3 Equation of a chord, tangent and normal to any circle.	02	10
		(24)	(82)

SECTION – II

02.	Complex Number		
	2.1 Definition of a complex number	02	06
	2.2 Elementary Operations	02	06
	2.3 Polar form of a complex number, exponential form of a complex number	04	14
	2.4 Argand diagram	02	06
3.	Vector Algebra		
	3.1 Scalars and Vectors	01	04
	3.2 Addition of Vectors.	01	04
	3.3 Dot product and cross product	01	04
	3.4 Scalar triple product	01	04
	3.5 Application: work done by a force, moment of a force about a point. Area of a parallelogram Area of a triangle .Volume of the parallelepiped	04	08

04. **Function**

4.1 Values of a function, type of functions

02 10

4.2 Limits

04 16

(24) (82)

6. IMPLEMENTATION STRATEGY (PLANNING):

Conducting lectures as per the teaching plan and conduction tutorials.

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Year of Publication	Publishers & Address
1.	S. P. Deshpande	Mathematics for Polytechnic Students – I & II	1998	Pune Vidyarthi Graha Prakashan, Pune-30
2.	G. V. Kumbhojkar	Engineering Mathematics-I & II	1999	Jamnadas & Co
3.	Patel /Rawal & others	Applied Mathematics-I	2002	Nirali Prakashan, Mumbai

1. SUBJECT DETAILS:

Course: Electrical Engineering

Semester: II
Code: SC – 27

Subject: Chemistry

compulsory:-B*

Group: Basic

Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction and periods per week					No. of papers, duration and marks			Scheme of examination						Scheme L/Pr/Cr
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	T/W	Pract	Oral	Total	
4	4	-	-	8	1	3	100	20	80	25	50	-	175	4 4 8

3. RATIONALE :

This subject is classified under the category of Basic Sciences. It intends to develop the understanding of fundamental principles of chemistry and also impart knowledge of various engineering material. This will form the base for the better understanding of the other core technology and technological subjects of different branches.

4. OBJECTIVES :

After studying the subject the student will be able to

1. Understand basic principles of chemistry.
2. Apply the principles to other subject.
3. Identify different engineering materials.
4. Compare the properties of different engineering materials and select engineering materials for various purposes.
5. Apply his knowledge on day to day basis.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Atomic Structure: 1.1 Bohr's Theory of an atom 1.2 Quantum numbers	16	07

- 1.3 Orbits and orbitals, shape of s and p orbitals
- 1.4 Pauli's exclusion principle
- 1.5 Hund's rule
- 1.6 Aufbau principle
- 1.7 Electronic configuration of first twenty elements
- 1.8 Study of inert gases
- 1.9 Nuclear stability mass defect and binding energy
- 1.10 Bonding electrovalency and covalency.

Applications

Civil engineering

To understand the behavior of any material

Mechanical engineering

Material sciences , behavior of material for various applications

Electrical engineering

Fundamental of electricity like conductivity, resistivity, selection of materials

Electronics

To understand semiconductors, diodes, transistors

Plastic engineering

Polymerization , bonding

Chemical engineering

Reaction of different types, bonding ,unit operations, chemical process technology

Practice :

- i) Volumetric analysis
- ii) Qualitative analysis

2. **2.0 Electrochemistry :** 10 05

- 2.1 Atom, ion
- 2.2 Arrhenius theory, degree of ionization
- 2.3 Mechanism of electrolysis
- 2.4 Numerical problems based on its applications industrial 2.5
- Applications of electrolysis

Applications

Civil engineering

Corrosion control

Mechanical engineering

Electroplating of various materials, in foundry for making patterns and moulds ,material science

Electrical engineering

Electrochemical reactions , batteries, electrochemical cells

Electronics

Manufacture of PCB

Plastic engineering

Electroplating of different plastic materials

Chemical engineering

Electroplating, different electrolysis process, unit operations, chemical process technology, distillation and filtration

3.	3.0 pH –	04	02
	3.1 Concept of pH		
	3.2 pH scale applications of pH in industry		
	3.3 Examples based on hydrogen ion and hydroxyl ion concentration		
	Applications		
	Civil engineering		
	Concreting and quality of water		
	Mechanical engineering		
	Selection of water fir cooling towers, other air-conditioning and refrigeration purposes, boilers , lube oils		
	Electrical engineering		
	Transformer oils and other instruments		
	Electronics		
	Manufacture of PCB		
	Plastic engineering		
	Reactions conditions, ABS plastic and alloys		
	Chemical engineering		
	Reaction conditions instrumentation, plant utility, chemical reaction engineering and pollution.		
4.	4.0 Metallurgy :	16	07
	4.1 Types of metals & properties		
	4.2 General metallurgical processes		
	4.3 Metallurgy of iron- extraction of iron by blast furnace 4.4		
	Classification of steel – Based on its carbon content and its applications. Properties of cast iron, wrought iron and steel. Effects of elements on properties of steel		
	4.5 Heat treatment of steel – Hardening tempering, annealing and normalizing		
	4.6 Metallurgy of aluminum by Hall’s process.		
	Applications		
	Civil engineering		
	Engineering material		
	Mechanical engineering		
	Manufacturing of engineering tools and machine parts		

Electrical engineering

Electrical engineering materials

Electronics

PCB and parts of machines

Plastic engineering

Machines and reinforced plastics

Chemical engineering

Metals for construction of plant utilities

5. **5.0 Alloys :** 09 02

5.1 Definition and purposes of alloying

5.2 Methods of preparation of alloys

5.3 Properties, composition and application of certain non ferrous alloys.

- | | | |
|---------------|------------------|-------------------|
| (i) Duralumin | (ii) Magnalium | (iii) Monel metal |
| (iv) Alnico | (v) Babbit metal | (vi) Gun metal |
| (vii) Brass | (viii) Bronze | |

Applications

Civil engineering

Engineering material

Mechanical engineering

Material sciences

Electrical engineering

Soldering and welding

Electronics

Thermocouple and soldering

Plastic engineering

Alloys and moulds

Chemical engineering

Petrochemicals , material of construction, chemical process technology

6. **6.0 Corrosion :** 18 07

6.1 Definition and types of Corrosion

6.2 Mechanism of corrosion

6.3 Factors affecting corrosion

6.4 Methods of prevention of corrosion.

- (i) Applying protective coatings on the surface of metal by hot dipping – galvanizing and tinning.
- (ii) Metal cladding.
- (iii) Electroplating.
- (iv) Spraying.
- (v) Sherardizing.

Applications

Civil engineering

Building repair and maintenance, concreting

Mechanical engineering

Selection of materials and prevention against corrosion

Electrical engineering

Dam conditions, maintenance of appliances, transmission of cables

Electronics

Machine parts and machine frames

Plastic engineering

Fiber reinforced plastics, bridges

Chemical engineering

Chemical process technology, pollution, material of construction

7. **7.0 Protective Coatings :** 09 02
- 7.1 Paints
 - 7.2 Characteristics of good paint
 - 7.3 Constituents of paints and their applications
 - 7.4 Varnishes
 - 7.5 Types & characteristics of varnishes
 - 7.6 Applications

Applications

Civil engineering

Engineering materials

Mechanical engineering

Material sciences

Electrical engineering

Electrical instruments & materials

Electronics

PCB making

Plastic engineering

Galvanizing , electroplating & plastics paints

Chemical engineering

Chemical process technology, pollution, material of construction

SECTION – II

8. **8.0 Water :** 22 09
- 8.1 Impurities in natural water, physical and chemical characteristics of drinking water.

- 8.2 Hard water - Expression and estimation of hardness of water
- 8.3 Examples on the removal of hardness of water
- 8.4 Disadvantages of hard water in domestic industrial applications. Boiler feed water – Disadvantages due to hard water in the boiler
- 8.5 Methods of softening hard water.
 - (i) Deionization process.
 - (ii) Calgon process.
 - (iii) Soda ash process.
 - (iv) Permutite – Zeolite process disadvantages of hard water in domestic and industrial applications.
- 8.6 Sterilization of water – chlorination + ozonisation
- 8.7 Sewage – disadvantages & treatment

Applications

Civil Engineering

Concreting

Mechanical Engineering

Hydraulics, Boilers and Engines

Electrical Engineering

Maintenance of machines, Batteries and Inverters

Electronics

Water Base Indicators

Plastic Engineering

Estimation and Manufacture of Resins

Chemical Engineering

Plant Utility, Heat Transfer Operations, Pollution and Pollution Control

Practice :

- i) Determination of hardness of water
- ii) Determination of chloride content of water

9. **9.0 Fuels :**

18

08

- 9.1 Definition and classification of fuels
- 9.2 Calorific value of fuel units and definition
- 9.3 Coal types and analysis of coal.
 - i) proximate ii) Ultimate analysis
- 9.4 Characteristics of a good fuel
- 9.5 Crude petroleum – catalytic cruding fractional distillation of crude petroleum.
 - Knocking of petrol in internal combustion engine and octane number.

9.6 Gaseous fuel – Calorific value, composition and applications of i) water gas ii) LPG iii) Coal gas iv) Producer gas v) Natural gas

Applications

Civil Engineering

Manufacturing of bricks and Preparation of Concrete mixtures

Mechanical Engineering

Thermodynamics, thermal engines, Power Engines

Electrical Engineering

Power generating stations

Electronics

Preparation of spare parts of machines

Plastic Engineering

Soldering and Welding

Chemical Engineering

Plant Utility, Petrochemicals

10. **10.0 Lubricants :**

18

08

10.1 Definition and types of lubricants

10.2 Types of lubrication fluid film lubrication

Boundary lubrication, extreme pressure lubrication

10.3 Properties of lubricants.

i) Degree of acidity ii) Saponification number iii)

Viscosity iv) Viscosity index v) Flash and fire point

vi) Pour point + Cloud point.

Working of Penskey Martin's apparatus to determine flash and fire point. Working of redwood viscometer to determine viscosity.

Applications

Civil Engineering

Selection of lubrication for civil work and small machines

Mechanical Engineering

I.C. Engines, other types of Engines, Machines

Electrical Engineering

Maintenance and working of machines

Electronics

Maintenance of machines and its parts

Plastic Engineering

Silicon release and mould release agents

Chemical Engineering

Chemical Process Technology, Plant Utility, Petrochemicals and unit operations.

10.4 Functions and Engineering applications of lubricants

Practice :

Demonstration of following experiments :

- i) Abel flashmeter
- ii) Redwood viscometer
- iii) Penskey Marteins apparatus

11. **11.0 Polymer Chemistry :** 10 04

- 11.1 Plastics – Definition – types of plastics
- 11.2 Properties of plastics
- 11.3 engineering application of plastics
- 11.4 Rubber – natural and synthetic rubber properties – elasticity, abrasion resistance Tack industrial
- 11.5 Applications of rubber.

Applications

Civil Engineering

Preparation of Plumbing machines parts, taps, washers etc.

Mechanical Engineering

Manufacturing Processes

Electrical Engineering

Preparations of Electric wires and cables

Electronics

Preparations of PCB and wires of machines.

Plastic Engineering

Plastic Technology, Packaging, Co-polymer of Plastics and Additives.

Chemical Engineering

Chemical Process Technology, Petrochemicals

12. **12.0 Environmental Chemistry :** 14 03

- 12.1 Causes of pollution – air pollution types of air pollutants.
Gases – sulphur dioxide, sulphur trioxide carbon monoxide, nitrogen dioxide, carbon dioxide, control of air pollution.
- 12.2 Water pollution :
Sources of water pollution, methods of preventing water pollution.
- 12.3 Radioactive pollution
- 12.4 Noise pollution
- 12.5 Disadvantages of pollution
- 12.6 Control of Pollution

Applications

Civil Engineering

Drainage and Water Supply, Sewage Treatment

Mechanical Engineering

Thermodynamics and I.C. Engines

Electrical Engineering

Recycling of Electrical Goods

Electronics

Recycling of Electronic Goods

Plastic Engineering

Recycling of Plastics, Pollution control, Chlorofluoro Carbons and Decrease of carbons in Atmosphere

Chemical Engineering

Pollution Control and Waste Disposal, Plant Utility

And Petrochemicals.

Total Number of Marks=82; Theory Hours= 32; Practical Hours= 64

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Theory topics and practice experiments should be done simultaneously. This will help the students to understand the topics.
2. Question papers for the periodical test should cover the topics which have been taught. To test the understanding.

7. REFERENCE :

Sr.No.	Author	Title	Publishers & Address
1.	Jain and Jain	Chemistry of Engineering Materials	Dhanpat Rai Publishing Co. New Delhi
2.	Narkhede & Thatte	Engineering Chemistry	-
3.	Mahadeokar & Dr. U.P. Kodgire	Chemistry for Engineering students	Everest Publishing House, Pune
4.	B.S. Godbole	Applied Chemistry	Satya Prakashan, New Delhi

1. SUBJECT DETAILS :

Course: ElectricalEngineering	Semester : II
	Code : ME-36
Subject: Engineering Drawing – II	compulsory:-C*
Group :Core	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme			Examination Scheme							
Theory Hrs Per Week	Practical Hrs per Week	Credits	Hrs	NP	Mks	Th	Sess	T/W	Prac	Total
02	06	08	04	01	100	80	20	50	50	200

3. RATIONALE:

Engineering drawing is a language of engineers. It is classified as engineering science subject. It describes scientific facts, principles and technique of drawing in order to visualize and express the ideas and to convey the instructions through drawings without ambiguity. In engineering drawing – II students will study interpretation of give orthographic views to find out the missing views/sectional, no-sectional or orthographic views. It also gives concept for straight lines, planes and solids in space. They are introduced to various machine drawing by screw fastness keys and couplings.

4. OBJECTIVES :

Engineering drawing helps in understanding design of parts, assembly, structure etc. used in engineering field. It supports technology and technical subjects. By achieving visualization and drawing skills, the student will successfully discharge his role on shop floor, design department and inspection department etc.

5. DETAILED CONTENTS :

Chapter	Content	Marks	Hours
	<u>SECTION-I</u>		
01	1.0: Missing Views : 1.1 Given two views (f.v. – t.v. or f.v.s.v.) deriving the third view-non sectional or sectional. 1.2 Full section	30	07

	1.3 Half section		
	1.4 Offset section concept.		
	Practice:		24
	1. Two sheets with four problems each.		
	2. Home Assignments: Two sheet containing four problems		
02	2.0 Projection of Straight Lines :	20	04
	2.1 Projections of lines inclined to both the reference planes (no traces)		
	Practice: 1. One sheet with four problems		12
	2. Home Assignments: One sheet containing four problems		
03	3.0 Projection of Planes :	30	06
	3.1 Projection of planes – regular polygons and circle. inclined to both the reference planes.		
	Practice: 1. One sheet with four problems	-	12
	2. Home Assignments: One sheet containing four problems		

SECTION – II

04	4.0 Projections of Solids :	30	05
	4.1 Projection of solids like prisms, pyramids, cylinders and cones with axis inclined to both the reference planes.		
	Practice: 1. One sheet with four problems	-	12
	2. Home Assignments: One sheet containing four problems		
05	5.0 Thread Profiles and Screw Fasteners :	20	05
	5.1 Different profiles of threads		
	5.2 Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads.		
	5.3 Different types of nuts.		
	5.4 Different types of bolts.		
	5.5 Lock nuts (Castle, slotted nut, simond's nut etc) use of plane and spring washers.		
	Practice: 1. One sheet with Problems on various screw fastners to be sketched by free hand.	-	15
	2. Home Assignments: One sheet containing four problems		
06	6.0 Keys and Couplings :	30	05
	6.1 Detail and assembly drawing of different keys and couplings i.e. flange, oldhalm, flexible, universal etc.		
	Practice:		12
	1. One sheet with problems of keys and coupling to be sketched by free hand and problem on drawing of assembly of a coupling.		09

2. A problem of a coupling to draw the details from the assembly.
3. Home Assignments: One sheet containing four problems

6. IMPLEMENTATION STRATEGY (PLANNING) :

In depth study and understanding of the subject will be implemented by adoption of the following strategy :

6. Theory Teaching Plan
7. Term Work Plan for practical giving problems to draw in the class.
8. Home assignment to practice at home
9. Conduct of three periodical test
10. Use of OHP models and charge during theory class and practical periods

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	N.D.Bhatt and Panchal	Geometrical and Machine drawing	14 th	2000	Rupalee Pub.Opp. Amul Dairy, Court Rd, Anand
2.	R.K. Dhawan	Engineering drawing	2 nd	2001	S.Chand & Co.Ltd., Ram Nagar New Delhi-110 055
3.	R.K. Dhawan	Machine drawing	2 nd	2001	S.Chand & Co. Ltd ,Ram Nagar New Delhi-110 055
4.	M.L. Dabhade	Engineering Graphics	4 th	1995	Mrs.VA.Velhankar 1030, Model Colony, B-12,Akash Ganga Pune-411 016

1. SUBJECT DETAILS :

Course: Electrical engineering	Semester: II
Subject: Fabrication Technology	Code: ME – 46
	Compulsory:-C*

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credit	Examination Scheme and Maximum Marks						
Theory Hrs. per week	Practical Hrs. per week		Papers		TH	Sessional	T/W	Practical	Total
			Hrs	Paper No.	Marks	Marks	Marks	Marks	Marks
02	04	07	03	01	80	20	25	50	175

3. RATIONALE :

Fabrication technology is a subject of engineering which deals with sheet metal works. Practical applications of sheet metals, press tools terminology. Applications of press tools. Various fabrications process like welding, brazing, soldering and its practical application in day to day life.

4. OBJECTIVES :

It develops understanding of properties of sheet metal. This helps to understand working & maintenance of welding equipments. Knowledge of welding Brazing & Soldering processes & cold & hot working processes.

5. DETAILED CONTENTS :

SECTION – I

Chapters	Contents	Marks	Hours	
			Th	Pr
1.	Sheet Metal Works :	20	05	
	Ferrous & Non ferrous materials require for making sheets, sheet metal tools. Properties of sheet metal, sheet metal gauges. Sheet metal joints: types of Hems & seams.			

2.	Introduction to Press Tools :	40	06	
	Concept of shearing & punching. Principles & Methods of shearing. Definition of Blanking & Punching. Types of dies like progressive, compound & combine die. Terminology used in dies.			
3.	Mechanical cold working of Metals:	22	05	
	Terminology used for Bending & Rolling. Definition of rolling & bending. Different types of cold working processes like drawing, deep working, forming, pinning, extrusion, ring & core rolling & bending.			
Total		82	16	

SECTION – II

4.	Mechanical Hot working of Metals:	18	03	
	Meaning of Hot working, Recrystallization temperature, Different types of Hot working processes.			
5.	Welding:	18	05	
	Principle of welding, weldability, welding Representation, various welding joints. Different types of Gas welding processes & detail of Oxy-acetylene process. Different type's arc welding processes like carbon, Twin carbon, Shielded metal, Submerged, TIG, MIG, and Plasma arc welding.			
6.	Brazing:	10	03	
	Definition. Material used for brazing, flux used in brazing, flux materials, Brazing process.			
7.	Soldering:	10	02	
	Definition. Material used for soldering, flux used in brazing, flux materials, soldering process.			
8.	Bolted Joints:	14	03	
	Thread terminology. Left hand & Right hand threads. Types of bolts, nuts locking arrangements for nuts.			
Total		82	16	

Teaching Plane	Use of Overhead Projector, charts & Caulk Board.
-----------------------	--

TERM WORK :

Sr.No.	JOBS	Hours
01.	Job of arc welding.	10 Hrs.
02.	Demonstration of gas welding.	10 Hrs.
03.	One job of sheet metal working including bending and shearing (Involved riveting also).	20 Hrs.
04.	One simple job involving soldering/brazing.	20 Hrs.
05.	One job of preparing nut and bolts using dies and taps.	20 Hrs.
		<hr/> 80 Hrs.

6. IMPLEMENTATION STRATEGY (PLANNING) :

1. Lesson Planning
2. Use of Transparencies (OHP)
3. Practical jobs/demonstration
4. Use of hand tools and machine tools

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	S.K. Hajara Choudhury, A.K. Hajara Choudhury	Elements of workshop technology (vol.I)	9 th	1997	Media promoters and publishers Pvt. Ltd.
3.	F.J.M. Smith	Basic Fabrication and welding Engg.	3 rd	1984	Longman Craft student series Engg.

1. SUBJECT DETAILS:

Course : Electrical Engineering	Semester: II
Subject : Applied Mechanics AM-16	Code :
Compulsory:-C*	

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Week	Practical Hrs Per Week		Paper			Theory Marks Reduced To	Sessional Marks Reduced To	Term Work	Practical /Orals	Total
		Hrs	N/P	Mks						
3	2	4	3	1	100	80	20	25	-	125

3. RATIONALE:

Applied Mechanics is the study of Forces and their effect on moving or stationary bodies. Also the concept of Mechanics will be useful to understand the further subjects materials & structures, analysis of structures and design.

4. OBJECTIVES:

Students will be able to:

- (1) Understand the force / force system and their effect on a body.
- (2) Apply the concept of mechanics to the real situation.
- (3) Build the pre-requisite of higher semester subject related to designs.

5. DETAILED CONTENTS:

SECTION I

Chapte r	Topics	Periods	Mark s
1	Introduction to Mechanics, 1.1 Mechanics definition, classification, Statics & Dynamics, Kinematics, kinetics 1.2 Fundamental units of measurements (FPS, MKS, SI), derived	02	06

	Units, Conversion of units, Scalars & Vectors with examples		
	1.3 Definition of particle, body and rigid body, mass & weight.		
2	Resolution Of Forces	04	14
	2.1 Concept of force, definition, unit, graphical representation of force		
	2.2 Concept of system of forces, non-coplanar, coplanar, concurrent, Parallel, non-concurrent & non-parallel forces.		
	2.3 Resolution of a force into two components along any directions. 2.4 Resolution of a force into two components at right angles to each Other by analytical method.(Applications levers, chain & links, connected bodies like trains etc.)		
3	Composition Of Forces	04	14
	3.1 Composition, Resultant of force		
	3.2 Law of parallelogram of forces,		
	3.3 Moment of force, couples lever arm,		
	3.4 Varignon's theorem		
	3.5 Resultant of coplanar concurrent, parallel, and non-concurrent, non parallel forces (Applications in shafts, crane, joints of trusses, etc)		
4	Equilibrium	06	20
	4.1 Definition of equilibrant., relation between Resultant and Equilibrant, Conditions of Equilibrium, Types of Equilibrium Stable, Unstable and Neutral equilibrium		
	4.2 Equilibrium of coplanar concurrent forces, Lami's theorem.		
	4.3 Equilibrium of coplanar parallel forces & coplanar Non- concurrent Forces.		
	4.4 Analytical conditions of equilibrium for coplanar concurrent & Non-concurrent Forces. (Applications of crane stability, link mechanisms, inclined plane, wedges, anchor blocks for water pipe lines, balance, levers, pulley & pulley blocks)		
	Practicals: (a) Simple roof truss. (b) Bell crank lever. (c) Levers of different types. (d) Extension of Springs. (e) Compression of springs		
5	Beam Reactions	04	14
	5.1 Types of supports (constraints), simple, roller, hinged & fixed. 5.2 Types of Beams, simply supported, hinged & roller supported, Cantilever, Over hang Beams		
	5.3 Types of Loads, Point(Concentrated) Load, Uniformly Distributed Load(U D L), Uniformly Varying Load(U V L)*		

	<p>5.4 Problems on above combination of loads (Application like bearings of shafts, guy, rocker and roller supports of railway bridges,) * no problems on UVL</p>	04	14
6	<p>Centre of gravity 6.1 Center of gravity of solids, centroid of plane laminas, definition, 6.2 concept of parallel forces applied to find c,g, and centroid , centroidal/c.g. axes of a body/lamina, c.g. / centroid of basic regular Shapes. 6.3 Applications like floating bodies, dams & retaining wall sections, beams columns sections (rolled steel), simple and built up sections (Applications like floating bodies, dams, retaining walls, columns etc.) Practical: (a) Centroid of Plane Laminas</p>	04	14
	SECTION II		
7	<p>Friction 7.1 Definition, types of friction, Static friction, dynamic friction 7.2 Fundamental laws of static friction. Coefficient of friction. Cone of friction. Angle of friction, Angle of repose, Rolling friction 7.3 Study of inclined plane, wedge and block system, ladder friction. (Application in clutches, Brakes, stator & Rotor in electric motors, Bearings.) Practicals: (a) Friction between wooden surfaces (b) Friction between wooden surfaces and glass, metal surfaces</p>	04	14
8	<p>Rectilinear Motion 8.1 Definition of kinematics, rectilinear motion, displacement, speed, Velocity, acceleration. 8.2 Equation of rectilinear motion with uniform acceleration. 8.3 Velocity – Time diagrams, motion under gravity. (Application to velocity of connecting rod, piston crank etc., V-T diagram for electric traction)</p>	04	14
9	<p>Force, mass and acceleration. 9.1 Newton’s laws of motion , relation between force , mass and acceleration 9.2 Applications like motion of train on slopes etc.</p>	03	10

	<p>9.3 Concept of momentum & impulse, conservation of momentum. (Application like centrifugal devices, motion of train on slopes etc.power hammer, pile driving, Fly presses etc.)</p>		
10	<p>Work, energy and power. 10.1 Work done by a body , definition, application. 10.2 Energy definition and types, Potential energy and Kinetic energy, conservation of energy Applications like: Energy stored in flywheel, water reservoir etc. 10.3 Power definition, Applications to rated power of machine (motors) & efficiency calculations. (Application like: energy stored in a fly wheel, water reservoir, power requirements of machines, efficiency calculation in machine.)</p>	04	14
11	<p>Simple Lifting Machines (Application topic) 11.1 Definition : Mechanical Advantage, Velocity Ratio, Efficiency, Relation between them, Friction in machine in terms of load & Effort. 11.2 Law of Machine, Maximum M.A., Maximum efficiency, Condition for reversibility of a machine 11.3 Study of machines – Simple and Differential Axle & Wheel Weston differential pulley block, Simple screw jack, Worm & Worm Wheel, Single & Double purchase crab winch, system Of pulleys.</p>	04	14
12	<p>Graphics Statics 12.1 Space diagram, Bows notation. 12.2 Law of Triangle of forces, Polygon of forces, Force/Vector diagram 12.3 Resultant and equilibrium of concurrent forces 12.4 Polar diagram, Funicular polygon 12.5 Resultant and equilibrium of non –concurrent and non-parallel Forces 12.6 Applications in finding reactions of beams Stresses in simple frames</p>	05	16
	Total	48	164

6. PRACTICALS:

Term Work consists of Journal containing minimum 10 experiments performed of the following in the Laboratory.

- 1) Extension / Compression of the spring.
- 2) Bell Crank Lever.
- 3) Two/Three Sheave Pulley Block.
- 4) Simple Screw Jack.
- 5) Single / Double Purchase Crab Winch
- 6) Differential Axle & Wheel.
- 7) Centroid Of Plane Lamina
- 8) Sheer Leg & Derrick Crane.
- 9) Resultant of Non Concurrent Non Parallel Forces.
- 10) Friction.
- 11) Jib Crane,
- 12) Graphic Statics.
- 13) Moment Of Inertia of Fly Wheel.

7. Reference Books:

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Dhade & Jamdar	Applied Mechanics	2 nd	2002	Central Techno Publishers, Nagpur
2.	R. S. Khurmi	Applied Mechanics	19 th	2001	S. Chand & Company Ram Nagar, New Delhi – 110 055.
3.	A. K. Tayal	Engineering Mechanics Statics & Dynamics	9 th	1998	Umesh Publications
4	Sunil M Deo	Applied Mechanics Vol. I & II	7th	2004	Nirali / Pragati Publications Mumbai
5	M D Dayal	Applied Mechanics	1 st	2000	Nandu Publishers. Chembur, Mumbai-71.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
III SEMESTER ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2008

Sr. No.	Subject	Subject Code	Scheme of Instructions and Periods per week					No. of papers duration and marks			Scheme of Examination						Gr	Scheme L/Pr/CR	
			Lect	Pr	Dr	Tu	Cr	NP	Hrs	Mks	SSL	Paper	TW	Pract	OR	Total			
3-1	Mathematics-III	MA-35	3	-	-	1	4	01	03	100	20	80	-	-	-	100	C*	404	
3-2	Electrical Engineering fundamentals	EE-36	4	2	-	-	6	01	03	100	20	80	50	50	-	200	C*	426	
3-3	Electrical Engineering Materials	EE-37	3	-	-	-	3	01	03	100	20	80	-	-	-	100	C	303	
3-4	Electrical Drawings & Workshop	EE-56	-	2	3	-	5	-	-	-	-	-	50	-	50	100	C	055	
3-5	Basic electronics	IE-36	4	2	-	-	6	01	03	100	20	80	50	50	-	200	C*	426	
3-6	General Mechanical Engineering	ME-31	4	2	-	-	6	01	03	100	20	80	50	50	-	200	C*	426	
TOTAL			18	08	03	1	30	05 PAPERS			100	400	200	150	50	900			
TOTAL PERIODS = 30											TOTAL MARKS = 900								

* Compulsory

Award winning subject

** External only

Note:

- i) Sessional is to be accessed by internal examiner
- ii) Theory & practical is to be accessed by internal examiner & external examiner combined
- iii) Term work is to be accessed by internal examiner & external examiner as per the ratio
- iv) There will be three periodical test of 25 marks for each subject .best of two periodical test marks will be considered as a sessional of 20% weitage.
- v) Final term end examination will be of 100 marks having 80% weitage

L-Lecture period

P-Practical period

D- Drawing practice Period

NP-No of Papers

Mks- Marks

SSL –Sessional

T/W-Term work

Pract- Practical

Cr-Credit

3rd semester

1. SUBJECT DETAILS :

Course: Electrical engineering	SEMESTER: III
Subject: Mathematics III	Code : MA-35
Group: C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Tutorial Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
		Hrs	NP	Mks						
03	01	04	03	01	100	80	20	-	-	100

3. RATIONALE :

1. Create an aptitude for Mathematics for higher studies and creative work in Sciences and Technology.
2. Focusing attention of problem solving in liberal sense. This aspect should take care of
 - a) Intelligent combination of techniques
 - b) Mathematization or mathematical modeling of problems involved in various branches of knowledge.
3. Nurturing the higher order mental process of logical reasoning with rigor and precision.
4. Developing conceptual clarify habit of abstracting a given concrete situation and to put it in precise language the ingredients of the problems on hand.

4. OBJECTIVES:

Differential calculus is introduced as

1. Prerequisite for many topics such as integral calculus, differential equations, fourier series etc. to be studied later.
2. To introduce the applications commonly required

5. DETAILED CONTENTS:

Chapter	Content	Marks	Hours
---------	---------	-------	-------

SECTION – I

1	5.0 Differentiation 5.1 Definition	57	22
---	---------------------------------------	----	----

- 5.2 Derivatives by first principle
- 5.3 List of derivatives of standard functions
- 5.4 Methods of differentiation
- 5.5 Derivatives of explicit and implicit functions
- 5.6 Derivatives of parametric functions
- 5.7 Derivative of Inverse function
- 5.8 Derivative of one function with respect to another function
- 5.9 Successive Differentiation.
- 5.10 n^{th} derivative of function
- 5.11 Leibnitz theorem.

5.12 Application of derivative

25 10

- (i) Geometric meaning of derivative
- (ii) equations of tangent, normal to given curve
- (iii) Derivative as a rate measure-velocity, Acceleration, Related Rate
- (iv) Maxima / Minima of functions
- (v) Radius of curvature.

SECTION II

1.0 Integral Calculus:

82 32

- 1.1 Integration as inverse of differentiation
- 1.2 Methods of integration; substitution by parts, partial fractions.
- 1.3 Definite integral and their properties reduction Formulae (No proofs)
- 1.4 Application: Mean value and R.M.S value

6. IMPLEMENTATION STRATEGY (PLANNING) :

Lectures are conducted as per teaching plan and tutorials in the class.

7. REFERENCE BOOKS:

Sr No	Author	Title	Edition	Year of Publication	Publishers & Address
1	S. P. Deshpande	Mathematics for Polytechnic Students –II	1 st	1998	Pune Vidyarthi Griha Prakashan, Pune
2.	Dr. B. S. Grewal	Higher Engineering Mathematics	35 th	2000	Khanna Publishers 2B, Delhi
3.	J. N. Wartikar P. N. Wartikar	Applied Mathematics	7 th	1989	Pune Vidyarthi Griha Prakashan, Pune
4.	B. M. Patel, J. M. Rawal, P. B. Bahatkar, K. R. Ansari, D. M. Hadke, A. S. Singh	Applied Mathematics	7 th	2002	Nirali Prakashan, Mumbai

1. SUBJECT DETAILS :

Course: Electrical Engineering.	SEMESTER: III
Subject: Electrical Engineering Fundamentals.	Code: EE-36
Group: C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Practical Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
			Hrs	NP	Mks					
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE:

This subject deals with three basic parameters resistance, capacitance and inductance. It introduces the relationship of these parameters with geometrical dimensions and their characteristics in respect of energy. It clears the concept of magnetic circuit, supply system like ac (single and three phase) and dc system fundamentals.

4. OBJECTIVES:

Students will learn about

1. Three basic parameters of Electrical Engineering i.e; resistance, capacitance and inductance and their units.
2. Magnetism and Electrostatics.
3. Production of dc and ac voltage and current.
4. Power and line parameters

5. DETAILED CONTENTS:

Section-I

Chapte r	Contents	Mark s	Hours
1	1.0 Resistance Parameter 1.1 Concepts of electrical potential, free electrons, electric current through solids 1.2 Ohm's Law, unit of resistance and resistivity, conductance and conductivity. 1.3 Dependence of resistance on temperature, temperature co-efficient of resistance, dependence of resistance	25	10

temperature co-efficient on temperature, related numerical problems

- 1.4 Kirchoff's Law, series and parallel connections of resistance, expression for total resistance, division of voltage in series and division of current in parallel with formulae's, expressions for total conductance.
- 1.5 Work, power and energy. Conversion between joules, KWH and calories etc.

Practice:

A report of the following experiments performed in the laboratory.

1. Measurement of low resistance
2. Measurement of medium resistance and calculation of temperature rise.
3. Verification of Kirchoff's laws

2

2.0 Magnetic circuits.

25

10

- 2.1 Magnets, magnetic lines of force, properties of lines of force, electromagnetism.
- 2.2 Flux around a current carrying conductor, Cork's screw rule, right hand rule.
- 2.3 Faraday's laws of induction, Lenz's law.
- 2.4 Fleming's left and right hand rule, Solenoid and its field, Flux density, variation of flux density within a solenoid.
- 2.5 Behavior of ferromagnetic materials, B-H curve, permeability its variation.
- 2.6 Hysterisis loop, loss, its calculation from graph, empirical formula for Hysterisis loss.
- 2.7 Eddy current loss, its empirical formulae.
- 2.8 Comparison of electric circuit with a magnetic circuit.
- 2.9 Calculation of ampere turn for series , parallel and series-parallel type magnetic circuit. Flux density inside and outside a conductor.
Force between two magnetized surface, lifting power of a magnet.

Practice:

A report of the following experiments performed in the laboratory.

	1. Hysteresis loop.		
3	3.0 Inductance parameter.	15	06
	3.1 Definition of self and mutual inductance, definition of their units, calculation of self inductance of coil.		
	3.2 Calculation of mutual inductance between two coils, relation between self and mutual inductances of two coupled coil.		
	3.3 Inductance in series and parallel considering the effect of mutual inductance, dot convention.		
4	4.0 Capacitance parameter.	15	06
	4.1 Charge, its field, flux density, permittivity of medium, parallel plate capacitor and its capacitance.		
	4.2 Dielectric strength, intensity of field and voltage gradient fringing flux, guard ring and guard wire circuits.		
	4.3 Expression for capacitance of a composite dielectric capacitor.		
	4.4 Capacitance in series and parallel.		
	<u>Section –II</u>		
5	5.0 Sine wave.	25	10
	5.1 Alternating quantities and different waveforms		
	5.2 Sinusoidal wave, production of sine wave from a rotating phasor		
	5.3 Instantaneous, average, maximum (peak) and r.m.s values. amplitude, cycle , frequency & period of a wave.		
	5.4 Concept of leading and lagging phasors.		
	5.5 Representation of phasor in rectangular , polar and exponential forms and conversion of one form into another.		
	5.6 Addition , subtraction, multiplication, division, raising of a phasor to some power using the different phasor representation. Conjugate phasor.		
	Practice: A report of the following experiments performed in the laboratory.		
	1. Three voltmeter method.		
	2. Three ammeter method.		
6	6.0 Single phase circuit	35	12
	6.1 Behavior of pure elements connected to ac source, waveforms, phasor relations of voltage and current in each element.		

6.2 Concept of reactance, Series combination of RL and RC circuits.

Concept of impedance, representation of impedance by a triangle.

Concept of admittance, admittance triangle.

6.3 Series and parallel, series, parallel circuits. Use of impedance as well as admittance for solution of circuits.

6.4. Energy and power in pure elements and in series ckts.

Concept of

active, reactive and apparent power. Power factor and power triangle,

power calculation using phasor.

6.5 Series and parallel resonance, resonance frequency, resonance curve, quality factor, selectivity, half power points, bandwidth, expression for half power frequency.

6.6 Resonance by variation of frequency, inductance and Capacitance

Practice:

A report of the following experiments performed in the laboratory.

1. RLC in series
2. RLC in parallel
3. Dependence of impedance on frequency.
4. Series resonance.
5. Parallel resonance.

7 **7.0 Three phase circuit.**

20

10

7.1 Three phase voltage, phase sequence, balance and unbalanced load.

7.2 Relation between line and phase voltage and current for star and delta connection.

7.3 Expression for total powers (true, apparent, reactive) in terms of line voltage and line current for star as well as delta connection.

7.4 Treatment of unbalanced load connected in star-delta.

7.5 Neutral shift, Millman's theorem for neutral shift.

Practice:

A report of the following experiments performed in the laboratory.

1. Relation between line and phase quantities for star and delta connection
2. Verification of neutral shift and its measurement

6. IMPLEMENTATION STRATEGY (PLANNING) :

- 1) As per the lesson plan.
- 2) Taking appropriate experiments time to time.
- 3) Giving assignments etc.

7. REFERENCE BOOKS.

Sr. No.	<i>Author</i>	Title	Publisher & address
1	B.L.Theraja	Electrical Technology Vol-I & II	S.CHAND Publication
2	J.B.Gupta	Electrical Engineering	Dhanpatrai & sons

1. SUBJECT DETAILS :

Course: Electrical Engineering.	SEMESTER: III
Subject: Electrical Engineering Materials	Code: EE-37
Group: C	Optional

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Tutorial Hrs. Per WK		Paper			TH	Sessional	T/ W	Pract Oral	Total
			Hrs.	Np	Mks					
03	-	03	03	01	100	80	20	-	-	100

3. RATIONALE:

Any Engineering branch needs to handle various materials and in particular Electrical Engineering is a branch of engineering providing essential services like supply system, wiring, driving power by motors, generators, & transformers. The objective of the subject is to provide information and knowledge of various material used for manufacturing of machines & supply system.

4. OBJECTIVES:

The student will learn a vast variety of materials, their identification, selection & use for Electrical Engineering projects. In manufacture of different machines selection of proper quality and size of the material ensures safety and stability of machines. Proper selection of sizes of wire and cables, switches etc ensures stability of supply systems. Working knowledge of these materials will enable students to supervise and maintain supply systems.

Section-I

Sr.No	Topics	Marks	Hours
1	<p>1.0 Engineering materials</p> <p>1.1 General classification</p> <p>a)Metals-ferrous materials like cast iron, steel and alloys,</p> <p>b)Non ferrous materials like copper, aluminum, brass, bronze, platinum, silver, gold, constantan, mercury, tungsten, magnesium, nichrome & kanthal.</p> <p>c) Non metals- wood, polymer(plastic and rubber), ceramics(glass, clay, refractory ,porcelain)</p> <p>1.2 Brief overview about their mechanical properties like ductility, malleability, resilience, toughness, hardness, brittleness, creep behavior, tensile & flutural properties.</p> <p>1.3 Electrical properties- conductivity, insulation, resistance, surface & volume resistivity, dielectric strength and breakdown voltage.</p> <p>1.4 Thermal properties: Heat resistance, thermal conductivity, thermal expansion.</p> <p>1.5 Chemical properties: Hygroscopic nature, chemical resistance and weathering & environmental properties.</p>	30	10
2	<p>2.0 Conductor Material</p> <p>1.1 Properties and specifications of wire and cable materials particularly of aluminium and copper and their alloys.</p>	25	08

- 1.2 Temperature effect on resistance of different materials.
- 1.3 Carbon and Graphite for brushes.
- 1.4 Arc lamps and electric furnaces.
- 1.5 Metal and alloys for fuses.
- 1.6 Materials for lamp filaments, contact material for circuit breaker contacts.

Practice

- 1 Collection of minimum five conducting materials

3 **3. Magnetic Materials** 25 06

- 2.1 Terms and Definitions.
- 2.2 Principal Ferromagnetic elements and their alloys for magnetic uses.
- 2.3 Common magnetic materials, iron and silicon alloys, nickel-iron alloys, permanent magnetic materials.
- 2.4 Magnetically soft steel materials and non-magnetic alloys, losses in magnetic materials. Ferrites.

Practice

- 1 Collection of minimum three magnetic materials.

SECTION-II

4 **4.0 Semi-conductor Material** 20 06

- 4.1 Silicon and Germanium.
- 4.2 Intrinsic and Extrinsic semi-conductor materials, impurities to be added to form P type and N-type materials, doping processes.

5 **5.0 Dielectric Materials** 20 06

- 5.1 Different methods of polarizations, polar and non-polar dielectric, loss angle.
- 5.2 Capacitors, ceramic capacitors, paper, mica, SF6 gas.

Practice

- 1 Study of three dielectric materials.

6 **6.0 Insulating Materials** 25 06

- 6.1 General properties of insulating materials, their classifications.
- 6.2 Inorganic insulating materials, such as mica, asbestos, glass, porcelain, marble slate, white clay.
- 6.3 Organic insulating materials such as rubber, fibre, paper, wood, pitch, plastic, resins, varnish.

Practice

- 1 Collection of minimum ten insulating materials.

7 **7.0 Polymers** 15 06

- 7.1 Definition: Special characteristics of plastics, rubber & fibres.
- 7.2 Classification of plastic : thermoplastic and thermosets.
- 7.3 Advantage and limitation: Thermosets like phenol formaldehyde, amino plastics (urea & melamine formaldehyde).
- 7.4 Epoxy and unsaturated polyester: Their important properties and applications
- 7.5 Thermoplastics like- high density polyethylene (HDPE), Polyvinyl chloride (PVC), Polyamides (Nylons), saturated polyesters (PET & PBT), acrylics (PMMA), polycarbonate (PC), polystyrene (PS), ABS, HIPS, silicon, FRP and other polymeric composite and alloys & polymer concrete.

6. IMPLEMENTATION STRATEGY (PLANNING):

- 1. The syllabus is completed by adopting lesson plan, charts collecting different samples of electrical materials.

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher & address
1	C.S. Indulkar	Electrical Engineering Materials	S. Chand & Company.
2	A.J. Dekker	Electrical Engineering Materials	Prentice Hall of India, New Delhi
3	O.P.Khanna	Engineering Materials	Khanna publishers

1. SUBJECT DETAILS:

Course: Electrical Engineering.	SEMESTER: III
Subject: Electrical Workshop & Drawing.	Code:EE-56
Group: C	Optional

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme			Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Pract Hrs. Per WK	Draw Hrs Per Wk		Paper			TH	Sessional	T/W	Pract Oral	Total
			Hrs	NP	Mks						
-	02	03	05	-	-	-	-	50	50	-	100

3. RATIONALE:

This subject deals with some commonly used household appliances. This gives the idea about working principle, constructional details, possible faults and their remedies associated with the appliances.

4. OBJECTIVES:

Students will be able to understand

1. Lay out of domestic and industrial wiring circuits.
2. The procedures to be followed to repair particular appliances.
3. Various low tension switch gear and protections used in domestic and industrial applications.

A) EXERCISE:

- 1) Understanding construction, working of low voltage power distribution network:
 - a) Industrial electrical components:
Push button, Control Switches, Timers, Signals- audio, visual
 - b) Switching: Power switch, Isolators, SDF's (Switch Disconnecter Fuse)
 - c) Protection:
Fault sensing: Over current: Thermal relay, magnetic relay
Ground: CBCT
Single phasing: Thermal relay
Difference between relay and release
Tripping: Contactors, Starters, Circuit breakers: MCB, ELCB, MCCB, ACB.
- 2) Dismantling, assembly, trouble shooting of domestic electrical appliances:
Mixers, geysers, irons, toasters, heaters, table fans, washing machines, microwave oven.

B) Drawing sheets:

- 1) ISI/ IEC symbols
- 2) Wiring circuits
- 3) Details and assembly: Irons, Mixers, Table fan Contactor

5. IMPLEMENTATION STRATEGY:

1. As per the lesson plan
2. Dismantling, conducting various test like series test, short circuit test, open circuit test and earth test and reassembling the same.

1. SUBJECT DETAILS:

Course: Electrical Engineering.	SEMESTER: III
Subject: Basic Electronics	Code: IE-36
Group: C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Practical Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
		Hrs	NP	Mks						
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE :

Students will understand (i) different devices (2) their working w.r.t. change in voltage, frequency (iii) their applications

4. OBJECTIVES :

After studying the subject the student will be able to

1. Know the basic concept of electronics
2. Understand simple P-N junctions and transistor's amplifying action
3. Different transistor configuration
4. Work with FET, Photo devices
5. Controlling of transistors for power applications

5. DETAILED CONTENTS :

		SECTION - I	
Chapter	Content	Marks	Hours
1.	<p>1.0 Semiconductor Physics:</p> <p>1.1 Structure of atoms</p> <p>1.2 Intrinsic Semiconductors Fermilevel. Charge carriers.</p> <p>1.3 Extrinsic semiconductors, doping, level of doping and conductivity P-N junction.</p> <p>1.4 Semiconductor diodes- types of different diodes, their characteristics and uses.</p> <p>1.5 Half wave rectifiers</p> <p>1.6 Full wave rectifiers</p> <p>1.7 Bridge rectifier</p> <p>Practice:</p> <p>1. P-N junction diode characteristics</p> <p>2. Zener diode characteristics</p> <p>3. Zener diode as voltage regulator</p> <p>4. Half wave, full wave rectifier</p>	20	10
2.	2.0 Transistors :	32	12

- 2.1 P-N-P and N-P-N transistors.
- 2.2 Forward and reverse biasing.
- 2.3 Static characteristics.
- 2.4 Cut-off, active and saturation regions.
- 2.5 Manufacture of different types of transistors such as grown junction transistors, diffused junction transistors etc.
- 2.6 Cut-off frequency for transistors.
- 2.7 Low frequency and high frequency equivalent circuits.
- 2.8 Hybrid parameters for different configurations.
- 2.9 Different types of transistors such as general purpose, switching transistor, power transistors, inunction transistor, their characteristics and uses.
- 2.10 Different methods of transistor biasing

Practice:

1. C.E.Configuration
2. Frequency response of CE amplifier
3. UJT relaxation oscillator

3	<p>3.0 Field Effect Transistors:</p> <p>3.1 Field effect, pinching effect</p> <p>3.2 Different types such as JFET, MOS FET etc.</p> <p>3.3 Their characteristics</p> <p>3.4 Equivalent circuits and uses</p> <p>Practice:</p> <p>1. FET characteristics</p> <p>2. FET amplifier</p>	30	10
---	---	----	----

SECTION-II

4.	<p>4.0 Photo Devices:</p> <p>4.1 Construction, characteristics and uses of different photo devices – such as photo transistors, LEDs, LCDs, photo multipliers.</p>	20	10
5.	<p>5.0 Thyristors:</p> <p>5.1 Basic principle of conduction</p> <p>5.2 Two transistor for analogy</p> <p>5.3 Static characteristics, thermal characteristics of DIAC, TRIAC, S.C.R.</p> <p>5.4 Simple applications of these devices</p> <p>Practice:</p> <p>1. SCR characteristics</p> <p>2. DIAC characteristics</p> <p>3. TRIAC characteristics</p>	22	10
6.	<p>6.0 Amplifiers:</p> <p>6.1 Basic amplifier concept</p> <p>6.2 Different configurations of amplifiers</p> <p>6.3 Expressions for gain of a two stage amplifiers</p> <p>6.4 Computation of the gain of a two stage amplifier</p> <p>6.5 Different classes of operation such as class A, Class B, Class AB etc.</p> <p>6.6 Bootstrap circuit Amplifiers with feed back, different feed back techniques</p> <p>Practice:</p> <p>1. Two stage R-C coupled amplifier</p>	40	12

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching plan
2. Minimum 12 practicals

7. REFERENCE BOOKS:

	Author	Title	Edition	Year of Publication	Publishers & Address
1	Millman and Halkias	Integrated electronics	1991	1991	McGraw Hill International Edition
2	Millman and Halkias	Electronic devices and	1993	1993	McGraw Hill

		circuits			
3	Robert Boylestad	Electronic devices and circuits theory	24 th Indian Reprint	Eastern Economy Edition	PHI, New Delhi
4	Allen Mottershead	Electronic devices and circuits	26 th Indian Reprint	July,2002	PHI, New Delhi
5	Bhargava	Basic electronics and linear circuits	2001	2001	TTTI, Chandigadh TMH, New Delhi
6	M.M. Shah	Design of electronic circuits & computer aided design	I reprint	September, 1993	Wiley Easten Mumbai
7	P.H. Thakkar Sunil Shah	Design of basic electronic circuits	1994 Edition	1994	Jeevandeep Prakashan

1. SUBJECT DETAILS:

Course: Electrical Engineering.	SEMESTER: III
Subject: GENERAL MECHANICAL ENGG.	Code : ME-31
Group: B*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Practical Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
			Hrs	NP	Mks					
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE:

This subject is classified under the category of Basic Sciences. It intends to develop the understanding of fundamental principles of chemistry and also impart knowledge of various engineering material. This will form the base for the better understanding of the other core technology and technological subjects of different branches.

4. OBJECTIVES:

After studying the subject the student will be able to

1. Understand basic principles of chemistry.
2. Apply the principles to other subject.
3. Identify different engineering materials.
4. Compare the properties of different engineering materials and select engineering materials for various purposes.
5. Apply his knowledge on day to day basis.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Power Plants: 1.1 Conventional power plants like steam, gas turbine, hydraulic and nuclear power plant. 1.2 Non conventional power plants like Geothermal, solar, tidal, wind, and biogas power plant.	12	08
2.	2.0 Steam Boiler : 2.1 Introduction 2.2 Classification and applications 2.3 Comparison of fire tube and water tube boiler 2.4 General description and principles of working of low pressure boilers like simple vertical boiler, cochron boiler, locomotive boiler, Lancashire boiler and Babcock and Wilcox boiler 2.5 Study of modern high pressure boiler like lamont boiler 2.6 Boiler mountings like water level indicator, pressure gauge, safety valves, steam stop valve, fusible plug, blow off cock valveetc. 2.7 Boiler accessories like Economiser, Air pre-heater and superheater.	15	10

	Practice:		
	1. Study of low pressure boilers		
	2. Study of boiler accessories and mountings		
3.	3.0 Steam condenser	08	02
	3.1 Types of condenser		
	3.2 Working		
4.	4.0 Steam Turbine :	15	04
	4.1 Introduction		
	4.2 Classification and applications		
	4.3 Constructional details and working of simple impulse turbine		
	4.4 Compounding of impulse turbine		
	4.5 Governing of steam turbine		
	Practice:		
	1. Study of simple impulse turbine.		
5	5.0 Steam Engine:	15	05
	5.1. Introduction		
	5.2. Classification and applications		
	5.3. Constructional details of steam engine		
	5.4. Working of simple double acting steam engine		
	5.5. Comparison of steam engine with steam turbine		
	Practice:		
	1. Study of simple double acting steam engine		
6	6.0 Gas Turbine :	15	03
	6.1 Introduction		
	6.2 Classification and applications		
	6.3 Constant pressure gas turbine		
	6.4 Constant volume gas turbine		
	6.5 Regeneration, re-heating and intercooling		
	6.6 Comparison of gas turbine with steam turbine		

SECTION II

7	7.0 Mechanical Drives:	10	06
	7.1 Introduction		
	7.2 Classification and applications		
	7.3 Mechanical Drives like belt drive, chain drive, gear drive, Cam drive and Geneva drive		
	Practice:		
	1. Study of mechanical drives		
8	10.0 Coupling :	10	04
	10.1 Introduction		
	10.2 Classification and applications		
	10.3 Muff coupling, flange coupling, Oldhamp coupling and Universal coupling		
	Practice:		
	1. Study of couplings		
9	9.0 Brakes and Clutches:	10	04
	9.1 Introduction		
	9.2 Classification and applications of brakes		
	9.3 Mechanical brakes like shoe brake, band brake, band and block brake and internal expanding shoe brake		
	9.4 Friction clutches like single plate, multiplate, cone and centrifuge clutch.		

	Practice:		
	1. Study of mechanical brakes		
	2. Study of friction clutches		
10	10.0 Internal Combustion Engine:	30	10
	10.1 Introduction		
	10.2 Classification and applications		
	10.3 Constructional details of I.C. Engine		
	10.4 Two stroke and four stroke engine		
	10.5 Comparison of two stroke and four stroke engine		
	10.6 S.I. & C.I. engine		
	10.7 Comparison of S.I & C.I. Engine		
	10.8 Simple carburetor		
	10.9 Cooling and lubricating system		
	Practice:		
	1. Study of I.C. Engines		
	2. Study of Cooling and lubricating system		
11	11.0 Refrigeration:	10	04
	11.1 Introduction		
	11.2 Applications		
	11.3 COP and TON of refrigeration		
	11.4 Vapour compression refrigeration system		
	11.5 Vapour absorption refrigeration system		
	11.6 Comparison of vapour compression refrigeration system and vapour absorption refrigeration system		
	Practice:		
	1. Study of refrigeration system		
12	12.0 Air Conditioning:	10	04
	12.1 Introduction		
	12.2 Applications		
	12.3 Window type room air conditioner		
	12.4 Central Air conditioning plant		

6. IMPLEMENTATION STRATEGY (PLANNING):

Use of models to understand construction and working of various prime movers and mechanical drives. Use of teaching plan and making of charts/models.

7. REFERENCE BOOKS:

Sr. No	Author	Title	Edition	Year of Publication	Publishers & Address
1.	R.C.Patel & C.J. Karamchandani	Elements of Heat Engines Vol-I	16 th	1997	Acharya Publication Vadodara
2.	R.C.Patel & C.J. Karamchandani	Elements of Heat Engines Vol-II	16 th	1997	Acharya Publication Vadodara
3.	R.C.Patel & C.J. Karamchandani	Elements of Heat Engines Vol-III	16 th	1997	Acharya Publication Vadodara
4.	Ananthanarayanan	Basic Refrigeration & Air Conditioning	2 nd	1996	Tata Mcgraw Hill, New Delhi

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
IV SEMESTER ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2008

Sr. No.	Subject	Subject Code	Scheme of Instructions and Periods per week					No. of papers duration and marks			Scheme of Examination						Gr	Scheme L/Pr/CR
			Le ct	Pr	Dr	Tu	Cr	NP	Hrs	Mks	SS L	Paper	T W	Prac t	OR	Tota l		
4-1	Industrial management-1	ME-01	3	-	-	-	3	01	03	100	20	80	-	-	-	100	M*	303
4-2	Advanced Mathematics	MA-45	3	-	-	1	4	01	03	100	20	80	-	-	-	100	A	404
4-3	# Electrical power	EE-15	4	-	2	-	6	01	03	100	20	80	25	-	50	175	C*	426
4-4	Electrical Machines-I	EE-46	4	2	-	-	6	01	03	100	20	80	50	50	-	200	C*	426
4-5	Electrical Machines-II	EE-47	4	2	-	-	6	01	03	100	20	80	50	50	-	200	C*	426
4-6	# Electrical circuits & Networks	EE-48	4	2	-	-	6	01	03	100	20	80	50	50	-	200	C*	426
TOTAL			22	6	2	1	31	06 PAPERS			120	480	175	200	50	975		
TOTAL PERIODS = 31										TOTAL MARKS = 975								

* Compulsory

Award winning subject

** External only

L-Lecture period

P-Practical period

D- Drawing practice Period

NP-No of Papers

Mks- Marks

SSL –Sessional

T/W-Term work

Pract- Practical

Cr-Credit

Note:

- i) Sessional is to be accessed by internal examiner
- ii) Theory & practical is to be accessed by internal examiner & external examiner combined
- iii) Term work is to be accessed by internal examiner & external examiner as per the ratio
- iv) There will be three periodical test of 25 marks for each subject .best of two periodical test marks will be considered as a sessional of 20% weightage.
- v) Final term end examination will be of 100 marks having 80% weightage

TOTAL	22	6	2	1	31	06 PAPERS	120	480	175	200	975			
TOTAL PERIODS = 31							TOTAL MARKS = 15							

SUBJECT DETAILS :

Course :ELECTRICAL	Semester : IV
	Duration :16 Weeks
Subject : Industrial Management - I	Code : ME-01
Group : M *	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	Sessional	T/W	Pract.	Total
			Hrs.	Np	Mks					
03	-	03	03	01	100	80	20	-	-	100

3. RATIONALE :

Management is the process of getting work done through work force to achieve the objectives of the organization. This subject “Industrial Management-I” covers the fundamentals principles, objectives, process and various processes and activities of management.

Along with attaining the necessary technical knowledge, the technical students also require some inputs in management areas so as to enable them to carry out their work effectively and efficiently.

This subject will enable the students to understand various processes and activities in an industrial organization.

4. OBJECTIVES :

6. To understand the process of formation and promotion of Industry/Organization.
7. To understand the necessary Management/ Supervisory skills required by the technical students.
8. To know the basic principles of Supervision.
9. To understand the Basics of Quality Management, Maintenance & Industrial Safety.
10. To understand the principles and practices in Human Resources Management.

1. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Marks	Hours
1.	Introduction to Indian Industry 1.10 Meaning - Definition 1.11 Classification of Industry 1.12 Location of Industry 1.13 Importance of Industry 1.14 Resources for Industry	15	06
2.	Types of Ownership of Industry 2.1 Proprietorship 2.2 Partnership 2.3 Private Ltd Company 2.4 Public Ltd Company 2.5 Co-operative Enterprises 2.6 Public Sector Enterprises	17	04
3.	Supervisor & Supervision 3.1 Introduction 3.2 Role of Supervisor in an organization 3.3 Responsibilities of supervisor 3.4 Quality of Supervisor 3.5 Skills of Supervisor 3.6 Functions of Supervisor	20	06
4.	Leadership 4.1 Meaning and Nature 4.2 Qualities of good leaders 4.3 Types of leadership 4.4 Supervisors role as leader	15	04

5.	Motivation	15	04
	5.1 Meaning		
	5.2 Needs and expectations Workmen		
	5.3 Types of Motives: Primary & Secondary Motives		
	5.4 Affiliation motive, power motive and achievement motive.		
	5.5 Role of supervisor in motivating the workmen		

SECTION – II

6.	Industrial Training	16	04
	14.1 Need and Importance of training.		
	14.2 Methods and Techniques of training.		
	14.3 Training and Development of manpower.		
	14.4 Supervisor as a Trainer.		
7.	Maintenance	16	04
	7.1 Need for Maintenance of Machinery.		
	7.2 Types of Maintenance.		
	7.3 Maintenance and Productivity.		
	7.4 Role of Supervisor in shopfloor maintenance.		
8.	Quality Management	16	04
	8.1 Meaning, Purpose.		
	8.2 Areas of application and scope.		
	8.3 T.Q.M.		
	8.4 ISO and its application.		
9.	Industrial Safety	16	06
	9.1 Meaning and Importance.		
	9.2 Accidents – Causes of Accidents.		
	9.3 Effects of Accidents.		
	9.4 Prevention of Accidents.		
	9.5 Safety devices and system.		
10.	Industrial Relations	18	06
	10.1 Meaning and Importance.		
	10.2 Types of Industrial Relations.		
	10.3 Industrial disputes – Causes.		
	10.4 Methods and machinery for resolving industrial disputes.		
	10.5 Trade union – Its role in maintaining industrial peace.		

REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	T.R. Banga S.C. Sharma	Industrial Organisation & Management			Khanna Publication
2.	O.P. Khanna	Industrial Management			Dhanpat Rai & Sons
3.	L.R. Bittal	What Every Supervisor should Know?			Tata Mc. Graw Hill

4TH SEMESTER

1. SUBJECT DETAILS :

Course: Electrical Engineering	SEMESTER: IV
Subject: Advanced Mathematics	Code : MA-45
Group: A	Optional

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Tutorial Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
			Hrs	NP	Mks					
03	01	04	03	01	100	80	20	-	-	100

3. RATIONALE:

Advanced Mathematics is classified as Basic Science Subject which intends to teach students the facts concepts and principles of Mathematics those can be applied to solve problem in Electrical.

4. OBJECTIVES :

1. The student will be able to evaluate integrals with the help of definition, formulae, methods and theorems.
2. The student will evaluate problems with the help of definition and properties of definite integrals and reduction formulae.
3. The student will be able to represent complex no. as Argands Diagram. Using algebra of vectors student will be able to find work done by a force, moment of a force about a point. Area of triangle. Volume of parallelopiped.
4. Student will solve simultaneous equations by using matrices.
- 5.

5. DETAILED CONTENTS:

Chapter.	Content	Hours	Marks
1.	1.0Application to definite integrals 1.1 Length of arc 1.2 Areas 1.3 Volumes 1.4 Center of gravity 1.5 Moment of inertia	16	42
2	2. 0Complex numbers 2.1 De Movires theorem, 2.2 Roots of a complex number.	16	42

- 2.3 Circular and hyperbolic functions of complex numbers
relation between them.
- 2.4 Separation of real and imaginary part of a complex number.

SECTION –II

1	3.0 Laplace Transformation	12	24
	3.1 Introduction, Definitions		
	3.2 Laplace Transforms of elementary functions $1, t^n, e^{at}, \sin(at), \cos(at)$		
	3.3 Properties of Laplace transform		
	3.4 Inverse Laplace transform		
	3.5 Transform of derivatives & Integrals		
5	Differential Equations	20	60
	4.1 Formation of differential equation		
	4.2 Differential equations of first order & first degree		
	4.3 Linear differential equations of higher order with constant coefficients such as $f(D)y=X$, Where $X= e^{ax}, \sin(ax+b), \cos(ax+b), x^m, e^{ax}V$, Where V is a function of x		
	4.4 Applications of differential equations		

6. IMPLEMENTATION STRATEGY (PLANNING) :

Lectures are conducted as per teaching plan and tutorials in the class.

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	S. P. Deshpande	Calculus for Polytechnics	1 st	1998	Pune Vidyarthi Griha Prakashan, Pune
2.	Dr. B. S. Grewal	Higher Engineering Mathematics	35 th	2000	Khanna Publishers 2B, Delhi
3.	J. N. Wartikar P. N. Wartikar	Applied Mathematics	7 th	1989	Pune Vidyarthi Griha Prakashan, Pune
4.	B. M. Patel J. M. Rawal	Applied Mathematics	7 th	2002	Nirali Prakashan, Mumbai

1. SUBJECT DETAILS

Course : Electrical Engineering	Semester : IV
Subject : # ELECRITICALPOWER	Code : EE-15
Group :CORE	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Practical Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
			Hrs	NP	Mks					
04	02	06	03	01	100	80	20	25	50	175

3. RATIONALE:

This subject deals with the basic power system, generation and transmission of power. Knowledge of D.C and A.C machines is a pre-requisite to this subject. This subject is divided into two parts, generation and transmission of electrical power.

In generation it covers different types of energy sources and power stations. It also deals with the economics of generation and utilization of electrical power.

In transmission it deals with transmission of power by overhead lines and underground cables. It also deals with overhead lines, their regulation, corona, etc. This subject also deals with the problems associated with underground cables, methods of fault finding etc.

4. OBJECTIVES:

Students will gain basic knowledge of

1. Power generation and various generating station, its working and factors.
2. Cost of Electrical energy.
3. Generation and transmission line parameters, different types of cables and application.

5. DETAILED CONTENTS:

SECTION – I

Chapter.	Content	Hours	Marks
1.	1.0 Sources of energy	18	45
	1.1 Different types of generating stations,		
	1.2 Choice of site, layout, general equipments of		
	1.2.1 Thermal stations		
	1.2.2 Hydro-electric plants		
	1.2.3 Nuclear plants		
	1.2.4 Diesel stations,		
	1.2.5 MHD generation,		
	1.2.6 Wind power,		
	1.2.7 Tidal power,		

- 1.2.8 Solar power.
- 1.3 Economics of generation
 - 1.3.1 Load curve, load duration curve, load factor, average and maximum demand, diversity factor plant capacity factor, plant use factor, demand factor, connected load.
 - 1.3.2 Fixed cost, capital cost, running and operating Cost.
 - 1.3.3 Tariffs, flat rate tariffs, block rate tariffs, two part tariffs.
 - 1.3.4 Economical comparison of two alternative schemes.
 - 1.3.5 Parallel operation of generating stations, base load, and peak load stations, load dispatch and grid working.

Practice:

Drawing sheets of full imperial size depicting the constructional details, scheme details of Substation layout and equipment of all Power Plants.

2	2.0 Transmission	6	15
	2.1 Effect of voltage and power factor on transmission efficiency.		
	2.2 Transmission voltages.		
	2.3 Comparison of overhead lines and underground Cables.		
	2.4 Economical conductor, Kelvin's law Limitations of Kelvin's law.		
3	3.0 Overhead lines:	8	20
	3.1 Mechanical supports, different types of poles and towers, sag and tension.		
	3.2 Sag Calculation under normal and abnormal weather conditions.		
	3.3 Insulators, types of insulators		
	3.4 Voltage distribution across a string of suspension Insulators.		
	3.5 String efficiency, methods to improve string Efficiency covered by SPJ line parameters		
	3.6 Resistance, inductance and capacitance		
	3.7 Long, medium, and short transmission lines		
	3.8 Voltage regulation,		
	3.9 nominal T and nominal π method		
	3.10 A, B, C and D parameters of transmission lines.		
	3.11 Corona		
	3.11.1 Formation of corona		
	3.11.2 Factors affecting corona		
	3.11.3 Power loss		
	3.11.4 Advantages and disadvantages of corona		

Practice:

Drawing sheets of full imperial size depicting the constructional details of

1. Conductors, overhead supports, towers.
2. Insulators of different types.

SECTION –II

1	4.0 Distribution	10	30
	4.1 Primary and secondary distribution,		
	4.2 Distribution voltages,		
	4.3 Different supply systems available,		
	4.4 Copper efficiency of supply system,		
	4.5 D.C distribution calculation of voltage drop,		
	4.6 Singly fed, doubly fed and ring distributors,		

	4.7 Calculations of point of min potential,		
	4.8 Concentrated and distributed load,		
	4.9 Uniformly loaded distributor, mixed loads,		
	4.10 A.C distribution, voltage drop, voltage regulation.		
	4.11 Receiving stations and sub-stations,		
	4.12 Types of sub-stations,		
	4.13 Sub-station equipments.		
5	5.0 Underground cables-	6	15
	5.1 Construction of different types of underground cables and their advantages		
	5.2 Single core, and multi core cables		
	5.3 Resistance, inductance and capacitance of cables		
	5.4 Thermal resistance and insulation resistance of a cable. Heating of a cable.		
	Practice:		
	Drawing sheets of full imperial size depicting the constructional details of Cables and cables accessories		
6	6.0 Cable Faults	6	15
	6.1 Cable failure, void formation,		
	6.2 Disintegration of cables,		
	6.3 Causes & remedies.		
	6.3 Testing of cables, acceptance test.		
	6.4 Cable faults,		
	6.5 Method of locating cable faults,		
	6.6 Different loop tests, test for open circuit.		
	6.7 Cable joints and cable termination		
	Practice:		
	Drawing sheets of full imperial size depicting the constructional details of Cable jointing		
7	7.0 Voltage regulation	10	20
	7.1 Different types of regulators		
	7.2 Tap changing transformers		
	7.3 On load and off load tap changing		
	7.4 Moving coil voltage regulators		
	7.5 Boosting transformers		
	7.6 Induction regulators		
	7.7 Single phase and three phase induction regulators, twin induction regulators.		
	Practice:		
	Drawing sheets of full imperial size depicting the constructional details of Lighting arrestors.		

6. IMPLEMENTATION STRATEGY (PLANNING) :

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

- 1) Lesson plan
- 2) Visit to various power plants
- 3) Showing charts etc.

7. 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

1. SUBJECT DETAILS :

Course : Electrical Engineering	Semester : IV
Subject : Electrical Machine -I	Code : EE-46
Group : C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory hrs. per week	Practical hrs. per week		Paper			TH	Sessional	TW	Prac oral	Total
		Hrs.	Np	Mks						
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE:

This subject deals with dc machines and synchronous machines. DC machines have a historical importance and even today dc motors are used in different applications. It deals with construction, basic theory, operating, steady state characteristics of dc machines and method to control them. Similarly it deals with the synchronous machines. Synchronous generators are the main source of producing power in power stations. The subject also deals with Synchronous motors and its applications.

4. OBJECTIVES:

Students will be able to

1. Explain the construction of the dc machines, Synchronous machines etc.
2. Draw and explain the characteristics of any generator and motor.
3. Differentiate between salient pole and non –salient pole.
4. Make computation of regulation and alternator by a given method.
5. Explain the process of Synchronization and parallel operation of alternators
6. Study the use of synchronous condenser for power factor improvement.
7. Understand the application of various machines.

4. DETAILED CONTENTS:

		<u>SECTION-I</u>	
Chapter	Contents	Hours	Marks
1	1.0 DC Machines	04	10
	1.1 Elementary dc generator, and elementary dc motors		
	1.2 Principle of operation, & construction of dc machines,		
	1.3 Emf equation and torque equation.		
	1.4 Counter Torque acting on the armature of a loaded generator, & and motor back emf.		
	1.5 Armature windings – lap and wave with examples		
2	2.0 D.C generator characteristics	10	25
	2.1 Type of DC generators		
	2.2 DC generators characteristics		

	2.2.1 Open circuit characteristics		
	2.2.2 External characteristics		
	2.2.3 Internal characteristics		
	2.3 Building up process of dc shunt generator.		
	2.4 Critical field resistance, critical speed		
	2.5 Comparative study of these characteristics.		
	2.6 Cumulative compound and differential compound generator-load characteristics.		
	2.7 Examples associated with above topics.		
	Practice		
	1) Load characteristics of a dc shunt and separately excited generator		
	2) Load characteristics and magnetization curve of a dc series generator.		
	3) Load characteristics of cumulative and differential		
	4) Magnetization curve of a dc generator and determination of critical field resistance.		
	5) Determination of critical speed for a dc shunt generator.		
3	3.0 D.C Motors	10	25
	3.1 Principle of motor, back emf & torque equation		
	3.2 Type of dc motor		
	3.3 Characteristics of dc motors		
	3.3.1 Speed – armature current		
	3.3.2 Torque-armature current		
	3.3.2 Speed – Torque		
	3.4 Method of speed control of dc shunt and series motors.		
	3.5 Ward Leonard method of speed control.		
	3.6 Starting of dc motors. 3 terminal dc shunt motor starter.		
	3.7 Applications		
	3.8 Problems associate with above topics.		
	Practice		
	1) Speed load curve of a dc shunt motor.		
	2) Speed load curve of a compound motor		
	3) Magnetization curve of a dc generator and determination of critical field resistance.		
4	4.0 Armature reaction in dc machines	4	10
	4.1 Concept of armature reaction		
	4.2 Armature reaction in dc generator		
	4.3 Armature reaction in dc motor		
	4.4 Cross magnetizing and demagnetizing armature turns		
	4.5 Effect of armature reaction on performance of dc generators and dc motors.		
5	5.0 Losses & efficiency in dc machines	4	10
	5.1 Power losses in dc machines		
	5.2 Factors influencing the losses.		
	5.3 Power flow analysis		
	5.4 Efficiency of dc generators and dc motors		
	5.5 Condition for maximum efficiency of dc machines.		

SECTION –II

6	6.0 Synchronous machines	8	25
	6.1 Construction. & Working principle of Synchronous m/c.		
	6.2 Synchronous speed.		
	6.3 Salient pole & non-salient pole type field structure.		
	6.4 Classification of stator armature winding.		
	6.5 Winding turns & winding factor		
	6.5.1 Pitch factor		
	6.5.2 Distribution factor		
	6.6 Emf equation of synchronous machines.		
	6.7 Armature reaction of single phase synchronous generator for different load power factor.		
	6.8 Synchronous Impedance		
	6.9 Phasor diagrams of alternator on load.		
7	7.0 Regulation of an alternator.	8	20
	7.1 Synchronous Impedance and its determination by open and short circuit test.		
	7.2 Regulation of an alternator.		
	7.2.1. Regulation by synchronous impedance method		
	7.2.2. Regulation by mmf method		
	Practice		
	<u>1) Regulation of a alternator by synchronous Impedance method</u>		
8	8.0 Rotating magnetic field	2	5
	8.1 The Ferraris principle		
	8.2 Production of rotating magnetic flux.		
9	9.0 Synchronous motor	12	25
	9.1 Principle and operation of Synchronous motor		
	9.2 Effect of load on synchronous motor with constant excitation		
	9.3 Behavior of synchronous motors With constant load and variable excitation		
	9.4 Synchronizing power		
	9.5 Starting methods of synchronous motor		
	9.6 V- curves		
	9.7 Synchronous Condenser		
	9.8 Use of synchronous motor for improving power factor and numerical examples		
	9.9 Applications		
	Practice		
	1) V- curve of a synchronous motor		
10	10.0 Parallel operation of alternators	2	5
	10.1 Necessity for parallel operation		
	10.2 Conditions for proper synchronizing		
	10.3 Synchronizing of three phase alternators		
	10.3.1 Three dark lamp method		
	10.3.2 Two bright lamp one dark lamp method		

6. IMPLEMENTATION STRATEGY (PLANNING) :

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

- 1) Orientation of teaching and laboratory staff towards curriculum objectives.
- 2) Lesson planning.
- 3) Arranging industrial expert's lectures.
- 4) Visit to medium scale industry,

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher & address
1	B.L.Theraja	Electrical Technology Vol-II	S.Chand
2	J.B.Gupta	Theory and Performance of Electrical machines	Dhanpatrai & sons
3	S.K.Bhattacharya	Electrical machines	Tata McGraw-hill

1 SUBJECT DETAILS :

Course : Electrical Engineering	Semester : IV
Subject : Electrical Machine - II	Code : EE-47
Group : C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory hrs. per week	Practical hrs. Per week		Paper			TH	Sessional	TW	Pract Oral	Total
			Hrs.	Np	Mks					
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE:

This subject deals with transformer and induction motor, their concept, principle, operation and maintenance. 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. OBJECTIVES:

Students will be able to

1. Explain fundamentals of transformer, ideal transformer, transformer on load, regulation efficiency. Etc.
2. state advantage and disadvantages of an auto transformer and to compute its saving in power transform and power conducted.
3. Understand three phase transformer and different connection.
4. Understand working and construction of three phase induction motor and explain torque slip etc.
5. To conduct various tests on an induction motor.
6. To justify need for a starter and explain which starter is to be used.

5. DETAILED CONTENTS:

SECTION-I

Sr.No	Topic	Hours	Marks
1	1.0 Transformer		
	1.1 Two winding single phase transformer, Core type and Shell type	4	8
	1.2 Basic construction and working principle		
	1.3 Theory of ideal transformer		
	1.4 E.M.F. Equation		
	1.5 Transformation ratio – current ratio and voltage ratio		
	1.6 No- load vector diagram		
2	2.0 Transformer on load	5	10
	2.1 Ideal transformer on load		
	2.2 Resistance and leakage reactance.		
	2.3 Equivalent circuit of a Transformer on open circuit.		
	2.4 Vector diagram of actual transformer on load at different power factor i.e; unity, lagging, leading.		

3	3.0 Equivalent circuit of a single phase transformer	06	20
	3.1 Equivalent resistance and reactance.		
	3.2 Equivalent circuit of a single phase transformer		
	3.3 Approximate equivalent circuit.		
	3.4 Equivalent impedance referred to any side (high tension or low tension side).		
	3.5 Open circuit test and short circuit test.		
	3.6 Determination of the parameters from above test results.		
	3.7 Parallel operation single phase transformer		
	Practice		
	1) Open circuit test on single phase transformer		
	2) Short circuit test on single phase transformer		
4	4.0 Efficiency and Voltage regulation	8	15
	4.1 Voltage regulation of a transformer.		
	4.2 Computation of regulation from equivalent circuit.		
	4.3 Transformer losses.		
	4.4 Relation between copper loss and KVA rating.		
	4.5 Efficiency of a transformer.		
	4.6 Condition for maximum efficiency of a transformer.		
	4.7 Per unit impedance, per unit reactance, per unit resistance.		
	4.8 All day efficiency.		
	Practice		
	1) Regulation and efficiency of single phase transformer		
5	5.0 Auto – Transformer	2	5
	5.1 Concept of Autotransformer.		
	5.2 Copper saving.		
	5.3 Advantages and disadvantages of auto – transformer.		
	5.4 Uses.		
6	6.0 Three phase transformer	3	15
	6.1 Construction of three phase transformer.		
	6.2 Types transformer.		
	6.3 Three phase transformer connections.		
	6.4 Vector group.		
	6.5 Tertiary winding and its use.		
7	7.0 Phase conversion	4	7
	7.1 Three phase to two phase conversion. Scott connection.		
	7.2 Load analysis.		
	7.3 Phasor diagram for balanced load and unbalanced load.		
	Practice		
	1) Three phase connection of single phase transformer (Star-star, delta-delta and star-delta)		
	2) Scott connection of transformer		

SECTION –II

8	8.0 Three phase Induction Motor	12	30
	8.1 Definition of induction motor		
	8.2 Construction and principle of three phase induction motor		
	8.3 Types of three phase Induction motor.		
	8.4 Production of rotating magnetic field.		
	8.5 Concept of slip.		

	8.6	Equation for rotor current , rotor e.m.f		
	8.7	Effect of slip on rotor current, frequency.		
	8.8	Torque equation.		
	8.9	Condition for maximum torque.		
	8.10	Torque – speed, Torque – slip curve. Full load torque and starting torque.		
	8.11	. Full load torque and maximum torque.		
	8.12	Starting torque and maximum torque		
	8.13	. Torque in Synchronous watts		
	8.14	Power stages of three phase Induction Motor.		
	8.15	Relation between rotor input. Rotor copper loss and gross mechanical power.		
	8.16	Double cage rotor.		
	8.17	Application.		
		Practice		
		1) Load test on three phase induction motor		
9		9.0 Equivalent circuit and circle diagram	06	20
	9.1	Equivalent circuit of a induction motor		
	9.2	Approximate equivalent circuit.		
	9.3	No- load on balance rotor test.		
	9.4	Determination of the parameter of dc equivalent circuit for no – load test and blocked rotor test.		
	9.5	Locus of rotor and stator current based on approximate equivalent circuit.		
	9.6	Construction of circle diagram		
	9.7	Computation of performance characteristics for circle diagram.		
		Practice		
		1) No load test & blocked rotor test on three phase Induction Motor & .predetermination of efficiency full load torque , full load slip by Circle diagram.		
		2) Study of different types of starters for three-phase induction motor.		
10		10.0 Starting of Induction Motor	6	15
	10.1	Necessity of starter for an induction motor		
	10.2	Starter for induction motor – Types, selection, comparison. Stator resistance type, rotor resistance type, auto transformer type , start delta type starters. Direct online starters. Starter using contactors – direct online forward reverse automatic and semi –automatic star – delta starters.		
	10.3	Power wiring diagram and control circuit diagrams, circuit diagram interlocks.		
11		11.0 Speed control of induction motor	4	8
	11.1	Speed control, different methods of speed control, rotor rheostat control, pole changing method, frequency changers, etc.		
	11.2	Schrage motor and its characteristics, construction, use.		
		Practice 1) Study of Schrage motor		
12		12.0 Single phase induction motor	4	7
	12.1	Introduction		
	12.2	Types of single-phase motor.		
	12.3	Single-phase induction motor.		
	12.4	Double field revolving theory.		
	12.5	Cross field theory.		
	12.6	Making Single-phase induction motor self-starting.		
	12.7	Starting method and types of Single-phase induction motor. Capacitor start and capacitor run motor, shaded pole motors.		
	12.8	Universal motor – ac series motor.		
		Practice 1) Load test on single phase induction motor		

6. IMPLEMENTATION STRATEGY

Subject shall be taught by

- 1 Adopting lesson plan
- 2 Visit to medium scale industries.
- 3 Use of transparencies, charts etc
- 4 Co-relating with industrial application.

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher & address
	J.B Gupta	Theory and Performance of Electrical Machines	Dhanpatrai & sons
	B.L.Theraja	Electrical Technology Vol – II	S.Chand
	S.K.Bhattacharya	Electrical Machines	Tata McGraw Hill

1 SUBJECT DETAILS :

Course : Electrical Engineering	Semester : IV
Subject : Electrical Circuits & Networks	Code :EE-48
Group : C*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory hrs. per week	Practical hrs. week		Paper			TH	Sessional	TW	Pract Oral	Total
			Hrs.	Np	Mks					
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE:

This subject deals with network analysis techniques applied to dc circuits. It introduces concepts of transients related to dc circuits, storage batteries and their construction, capacities, etc. Topics like two port network, harmonics, symmetrical components are of theoretical importance.

4. OBJECTIVES:

Students will learn about

1. Basic Network theorem which are applied to Electrical circuits practically.
2. Transient phases of electrical parameters with respect to time.
3. Harmonics of waves and component of three phase unbalanced current and voltage.
4. Line parameters and cells and batteries.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Contents	Hours	Marks
1	1.0 Network Analysis. 1.1 Classification of circuit elements, unilateral, bilateral, linear, non-linear, lumped, distributed passive & active circuit elements. 1.2 Sources of energy 1.3 Types, source shift, transformation, star delta transformation for resistance, Mesh current analysis, Node analysis. 1.4 Superposition Theorem, Thevenin's and Norton's Theorem, Maximum Power transfer Theorem, Reciprocity theorem and Millman's Theorem Practice: A report of the following experiments performed in the laboratory. 1. Star-Delta transformation. 2. Maximum power transfer theorem. 3. Superposition theorem and effect of inductance. 4. Thevenin's theorem	14	35

5. Norton's theorem.
6. Reciprocity theorem.
7. Millman's theorem

2	2.0 DC Transient. 2.1 R-L transients. Expression for the rise and decay of current in simple RL series circuit. 2.2 Initial conditions, time constant. Expression for energy stored in inductance. 2.3 RC-transients. Expression for the rise and decay of charge and voltage in simple RC series circuit. 2.4 Initial conditions, time constant. Expression for energy stored by a capacitor. 2.5 Connecting a charged capacitor to another charged or uncharged capacitor. Practice: A report of the following experiments performed in the laboratory. 1. Measurements of high resistance by loss of charge method, time constant	14	35
3	3.0 Harmonics. 3.1 Introduction to harmonics, 3.2 Types of harmonics and its effect	4	10

SECTION –II

4	4.0 Symmetrical components: 4.1 Definition of operator 'a'. 4.2 Calculation of Symmetrical components from a set of three unbalanced voltage or current. 4.3 Calculation of unbalanced voltage & current from given symmetrical components. 4.4 Graphical method for determination of Symmetrical component.	12	30
5	5.0 Two-port network. 5.1 Impedance, admittance, hybrid and ABCD parameters. 5.2 Calculation of these parameters for T and Pi networks. 5.3 Relation between A, B, C, D parameter for a passive linear bilateral network. 5.4 Transformation of parameters from one form to other.	12	30
6	6.0 Storage batteries. 6.1 Construction, 6.2 Principle of working and taking care of lead acid accumulators, nickel alkaline cells solar cells. 6.3 Ampere-hour rating, Ampere-hour efficiency.	8	20

6. IMPLEMENTATION STRATEGY (PLANNING):

- 1) As per the lesson plan.
- 2) Taking appropriate experiments time to time.
- 3) Giving assignments etc.

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher & address
1	B.L.Theraja	Electrical Technology Vol-I & II	S.Chand & company
2	J.B.Gupta	Electrical Engineering	Dhanpatrai & Sons
3	V.K.Mehta	Basic Electrical Engineering	S.Chand & company

w.e.f.-Batch admitted June,2008 (Progressively)

Shri Vile Parle Kelavani Mandal`s
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
ELECTRICAL ENGINEERING
SCHEME FOR INPLANT TRAINING

V SEMESTER

Sr No	Subject Duration	Credit		Weekly Report	Quiz Test Marks	Dissertation (Report)	Oral/Viva	Total
5.1	26 Weeks	15	Maximum Marks	50	50	50	50	200
			Minimum Marks	20	20	20	20	80

Shri Vile Parle Kelavani Mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
VI SEMESTER ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2008

Sr. No.	Subject	Subject Code	Scheme of Instructions and Periods per week					No. of papers duration and marks			Scheme of Examination						Gr	Scheme L/Pr/CR
			Lect	Pr	D r	Tu	Cr	NP	Hrs	Mks	SS L	Pape r	T W	Pract	OR	Total		
6-1	Applied Electronics	IE-37	04	02	-	-	06	01	03	100	20	80	25	50	-	175	A*	426
6-2	Electrical measurements	EE-86	04	02	-	-	06	01	03	100	20	80	50	50	-	200	A*	426
6-3	# Switch Gear & Protection	EE-66	04	-	03	-	07	01	03	100	20	80	50	-	50	200	A*	437
6-4	Utilization of electrical energy	EE-67	04	02	-	-	06	01	03	100	20	80	25	-	50	175	A	426
6-5	Elect estimation & costing	EE-76	04	03	-	-	07	01	03	100	20	80	25	-	25	150	C	437
6-6	Elect m/c design	EE-77	04	-	03	-	07	01	03	100	20	80	25	-	25	150	C	437
TOTAL			24	09	06	-	39	06 PAPERS			120	480	200	100	150	1050		
TOTAL PERIODS =39											TOTAL MARKS =1050							

* Compulsory

Award winning subject

** External only

Note:

- i) Sessional is to be accessed by internal examiner
- ii) Theory & practical is to be accessed by internal examiner & external examiner combined
- iii) Term work is to be accessed by internal examiner & external examiner as per the ratio
- iv) There will be three periodical test of 25 marks for each subject .best of two periodical test marks will be considered as a sessional of 20% weitage.
- v) Final term end examination will be of 100 marks having 80% weitage

L-Lecture period

P-Practical period

D- Drawing practice Period

NP-No of Papers

Mks- Marks

SSL –Sessional

T/W-Term work

Pract- Practical

Cr-Credit

6TH SEMESTER

1. Subject Details.

Course: Electrical Engineering	Semester :VI
	<i>Duration: 16 weeks</i>
Subject: Applied Electronics	Code: IE 37
Group: A*	C: Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory hrs per week	Practical hrs. per week		Paper			TH	Sessional	TW	Prac oral	Total
			Hrs.	Np	Mks					
04	02	04	03	01	100	80	20	25	50	175

3. RATIONALE:

To become a perfect technician in electrical engineering, knowledge and application of electronic power devices, inverters, AC-DC motor control circuits and microprocessors is essential

4. OBJECTIVE:

Students will be able to

- 1) Understand types of oscillators
- 2) Draw circuits of invertors and analyze
- 3) Draw and analyze different types of AC-DC motor control circuits
- 4) Perform the experiments on magnetic amplifier circuits and
- 5) Understand digital circuits and microprocessors applications.

SECTION I

Chapter	Content	Marks	Hours
1	Oscillators	25	10
	1.1 Regenerative feedback in oscillators 1.2 conditions for sustained oscillations and frequency of oscillations for tuned LC oscillators, 1.3 RC oscillators. Principle of operations of transistors, 1.4. Hartley and Colpitt's oscillators 1.5 Transistor crystal oscillator. <b style="color: blue;">Practice <b style="color: blue;">1. Study of RC-phase shift oscillators <b style="color: blue;">2. Study of LC oscillators		

	3. Study of astable, monostable and Biastable multivibrators		
2	Invertors	25	10
	<p>2.1 Principles of operation of different inverter circuits using transistors, waveforms.</p> <p>2.2 Inverters using thyristors</p> <p>2.3 Principles of operation of different inverter circuits for single phase and three phase operations,</p> <p>2.4 Waveforms, control of frequency,</p> <p>2.5 Applications of such inverters.</p> <p>Practice</p> <ol style="list-style-type: none"> 1) Demonstration of series invertors 2) Demonstration of parallel invertors 3) Class C computation 		
3	Motor control circuits	32	12
	<p>3.1 Principles of operation of different motor control circuits for DC motors.</p> <p>3.2 Principles of operation of different motor control circuits for AC motors,</p> <p>3.3 V/f control, constant speed, constant HP drive, phase control etc.</p> <p>Practice</p> <ol style="list-style-type: none"> 1) Study of SCR-UJT light dimmer <p>Reversible DC motor drive</p>		
SECTION II			
4	Control rectifiers	25	10
	<p>4.1 uncontrol rectifiers with and without free wheelling diode,</p> <p>4.2 half control rectifiers with and without free wheelling diode</p> <p>4.3 Full control rectifiers</p> <p>A- Single phase</p> <p>B- threephase</p> <p>Practice</p> <p>Speed control of dc motor using Full control rectifiers</p>		
5	Ultrasonic	15	06
	<p>5.1 Ultrasonic generators, detection</p> <p>5.2 applications</p> <p>Practice</p> <ol style="list-style-type: none"> 1) Ultrasonic distance measurements 		
6	Digital circuits and microprocessor	22	08
	<p>6.1 Principle of operation and circuit configuration of a few logic gates as AND, OR, NOT, NAND</p> <p>6.2 Astable, bistable and monostable multivibrators</p> <p>6.3 Different flip flops like JK, RS, T master slave</p> <p>6.4 Counting circuits and counters.</p> <p>6.5 Elements of microprocessors, interfaces, programming a microprocessor</p> <p>Practice</p> <ol style="list-style-type: none"> 1) Study of AND, NAND, OR and NOT 		

	2) Study of counters 3) Study of astable, monostable and Biastable multivibrators. 4) Basic programs like addition, subtraction on 8085		
7	P-L-C	20	08
	7.1Introduction to plc 7.2Block diagram to plc 7.3plc ladder diagram concept 7.4application to plc		

6. IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by adopting following strategy. (Teaching Plan). Example

1. Lesson Plan
2. Visit to small industry.

7. REREFERENCE BOOKS:

Sr. No	Author	Title	Publishers & address
1.	Ramamurthy	Thyristors control and applications	
2.	Chute and chute	Electronics in industry	Tata-Mcgraw hill New delhi
3	Cage	Industrial electronics	Tata-Mcgraw hill New delhi
4	Zbar	Industrial electronics lab manual	Tata-Mcgraw hill New delhi
5	Sameer datta	Industrial electronics	PHI publication New delhi
6	Gaonkar	Microprocessor architecture and programming	Tata-Mcgraw hill New delhi

1. SUBJECT DETAILS :

COURSE: ELECTRICAL MEASUREMENT	SEMESTER:VI
SUBJECT: ELECTRICAL MEASUREMENT	CODE-86

GROUP: A*

COMPULSORY

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme	Credits	Examination Scheme and Maximum Marks								
		Paper			Theory	Sessional	Tw	Practical	Total	
		Hrs.	Np	Mks						
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE :

Electrical quantities are abstract in nature and their measurement becomes very important. There are alternative methods available with different accuracy, advantages and disadvantages. Selection of a proper methods to measure a given quantities becomes very important from the viewpoint of accuracy and time required for measurement. Various measuring instruments are available which use different effects for their operation. The power consumption of an instrument also becomes important. This subject deals with such topics and provides opportunities to use a few such methods in laboratory. Periodical calibration of instruments is very essential and there are few experiments in this subject indicating different calibration methods. It also covers methods to extent range of different instruments. This subjects also deals with different types of standards to be used in measurement.

4. OBJECTIVES:

Students will be able to.

1. Measure different quantities like voltage, current, power and energy.
2. Measure circuit constants like R, L, and C.
3. Use the different meters to measure different quantities.

5. DETAILED CONTENTS:

SECTION-I

Sr.no.	Content	Hours	Marks
1	1.0 Units and Standards of Measurement	6	15
	1.1 Primary & Secondary standards, Dimensions 1.2 General requirements of standards. Standard of voltage, current & resistance. 1.3 Descriptive study of one standard of 1) low resistance 2) medium resistance 3) inductance 4) capacitance. Absolute measurement of current & resistance. Current balance.		
2	2..0 D.C Potentiometers	6	10
	2.1 Construction & principle of simple slide wire type 2.2 Potentiometers, 2.2.1 any one type Potentiometer 2.2.2 standardization of Potentiometers. 2.2.3 Range of Potentiometers, 2.2.4 Measurement of voltage, current, power & resistance. 2.3 Calibration of voltmeter, ammeter & calibration of wattmeter. Practice		

	1. Calibration of voltmeter, ammeter and wattmeter using a dc potentiometer.		
3	3.0 Measurements	8	25
	1.1 Resistance: 1.2 Classification of resistance as low, medium & high resistance 1.2.1 Voltmeter & ammeter method 1.2.2 Substitution method 1.3 Bridge method –Wheatstone’s bridge, 3.3.1 Limitations of Wheatstone’s bridge, 3.3.2 Kelvin double bridge for low resistance. 1.4 Measurements of high resistance. 1.4.1 Surface leakage 1.4.2 Guard ckt. 1.4.3 Mega ohm bridge 1.5 Measurements of high resistance by loss of charge method. 1.6 Ohm –meters, series & shunt type 1.7 Megger . 1.8 II) Inductance & capacitance: three voltmeter & three-ammeter method. <p style="text-align: center;">Practice</p> 1) Measurement of resistance by Wheatstone’s bridge		
4	4.0 A.C Bridges	6	16
	4.1 General theory, 4.2 Different detectors used, screening & guard ckts. 4.3 Different bridge ckts. 4.4 Different bridge networks, their balance equations & phasor diagrams under balanced conditions of 4.4.1 1) Maxwell’s bridge 4.4.2 2) Wein bridge, 4.4.3 3) Anderson’s bridge 4.4.4 4) Schering bridge – low voltage & high voltage bridge 4.4.5 5) De saulty bridge Practice 1) A.C Bridge network.		
5	5.0 Measurement of energy	6	16
	5.1 Measurement of energy 5.1.1: Principle of operation, 5.1.2 Equation for torque , 5.2 Recording mechanism of dc and ac energy meter. 5.3 Different adjustment in ac energy meter, 5.4 Calibration of single phase energymeter with resistive load and without using a phase shifting transformer. 5.5 Electronic energy meter (single phase) <p style="text-align: center;"><u>Practice</u></p> 1) Calibration of dc energymeter. 2) Calibration of ac single-phase energy meter.		

SECTION II

6	6.0 Measuring Instruments	10	28
---	----------------------------------	----	----

	<p>6.1 Classification of instruments 6.2 Indicating, recording & integrating instruments. 6.3 Some common features of, indicating instruments. 6.4 Torque acting on the moving system of indicating instruments. 6.5 Method of damping & damping curve 6.6 ii) Principle of operation, 6.6.1 Equation for deflecting torque 6.6.2 Usual scale distribution & its modifications 6.7 Sources of errors, remedies for errors & common usage of the following type of instruments 6.8 (a) Permanent magnet moving coil instruments (b) moving iron instruments (c) electrodynamic or dynamometer type instruments (d) induction instruments (e) rectifier instruments.</p> <p>Practice</p> <p>1) Measurement of three phase power by one wattmeter method 2) Measurement of three-phase power by two-wattmeter method.</p>		
7	7.0 Extension of the range of instruments	6	16
	<p>7.1 Series register, shunts, universal shunts, multiplying power of a multiplier. 7.2 Potential and current transformers, their phasor diagram, phase angle and ratio errors. Methods to minimize these errors. Effect of secondary burden on these errors.</p>		
8	8.0 Measurement of power	10	22
	<p>8.1 Principle of operation, 8.1.1 equation of deflecting torque. 8.1.2 Sources of errors, remedies for errors, 8.2 Usual scale distribution of the following types of wattmeters 8.2.1 (a) Electrodynamic type and 8.2.2 (b) Induction type wattmeter. 8.3 Measurement of three phase power 8.3.1 (a) One wattmeter method 8.3.2 (b) Two-wattmeter method for balance and unbalanced loads and star and delta connection. 8.4 Variation of the ratio of the wattmeter reading against the power factor of the load. 8.5 Measurement of reactive power for balanced load. 8.6 Polyphase wattmeter.</p> <p>Practice</p> <p>1) Variation of the ratio of two-wattmeter reading against power factor. 2) Measurement of reactive power.</p>		
9	9.0 Miscellaneous Instrument	6	16
	<p>9.1 Power factor meter of electrodynamic and moving iron type. 9.2 Single phase and polyphase power factor meter. 9.3 Frequency meter of vibrating reed type, Moving iron type, etc. 9.4 Synchroscope.</p>		

6. IMPLEMENTATION STRATEGY (PLANNING) :

The subject shall be taught using proper sketches of instruments .The principles & laws shall be explained. Application of each measuring instruments shall be explained to the students.

7. REFERENCE BOOKS.

Sr. No.	Author	Title	Publisher & address
1	C.T.Baldwin	Electrical Measurements	Lyall book Dept. Delhi
2	A.K.Shawney	Electrical measurements and instrumentation	Dhanpatrai & sons

1. SUBJECT DETAILS :

COURSE: ELECTRICAL Engineering	SEMESTER:VI
SUBJECT: Switchgear & Protection	CODE:EE-66
GROUP: A*	COMPULSORY

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory hrs per week	Practical hrs. per week		Paper			TH	Sessional	TW	Prac oral	Total
			Hrs.	Np	Mks					
04	02	04	03	01	100	80	20	25	50	175

3. RATIONALE:

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 & prevent damage to 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. OBJECTIVES:

Students will be able to

1. Know about different types of switches and fuses.
2. Protective instruments like circuit breakers, its rating application, relays, its application and rating.
3. Protective scheme.

4. DETAILED CONTENTS:

SECTION I

Chapter	Contents	Hours	Marks
1	1.0 Switches:	4	7
	1.1 Isolator- types of isolators- rating of isolators. 1.2 Busbar arrangement, switchgear in generating stations. 1.3 Main switchgear and auxiliary switchgear.		
2	2.0 Fuses	4	10
	2.1 Requirements of fuse, Different types of fuses-rewireable, 2.2 H.R.C, expulsion type, draw-out fuses. 2.3 Characteristics and different ratings of fuses.		
3	3.0 Relays	10	30
	3.1 Protective type functions 3.2 Classification of relays 3.3 Construction and principle of operation of 3.3.1 Thermal 3.3.2 Buchholz’s relay 3.3.3 Electromagnetic 3.3.4 Induction type 3.4 Induction type		

	3.4.1 Over current relay 3.4.2 Reverse power relay 3.4.3 Directional over current relay 3.4.4 Impedance relay (distance relay) 3.4.5 Static relay. Practice: Drawing sheets of full imperial size depicting the constructional details, scheme details of different types of relays.		
4	4.0 Circuit Breaker	14	35
	4.1 Requirement of circuit breaker. 4.2 Difference in fuse and a circuit breaker. 4.3 Theory of arc extinction in direct current and in alternating current circuits. 4.4 Recovery of voltage. restriking voltage, rate of rise of restriking voltage. 4.5 Construction, principle of operation, operating mechanisms of Air break, Oil, minimum oil content (small oil volume SOV) circuit breakers and vacuum circuit breakers, SF6 circuit breaker. 4.6 Making, breaking capacities, contact materials. 4.7 L.T circuit breakers (ACB), Miniature circuit breakers(MCB), Moulded case circuit breakers(MCCB), Earth Leakage circuit breakers(ELCB or RLCB), Comparison of Fuse and MCCB Practice: 1) Drawing sheets of full imperial size depicting the constructional details, scheme details of 2) Different types of circuit breakers, their components, assembly, etc.		

SECTION II

5	5.0 Over Voltage Protection	9	20
	5.1 Construction and principle of operation of different types of lightning arrestors such as 1) horn gap. 2) Electrolytic, 3) Thyrite type. 5.2 Surge absorbers		
6	6.0 Fault Calculation	9	20
	6.1 Symmetrical and asymmetrical fault currents. 6.2 Short circuit (symmetrical) KVA calculations for different busbar arrangements, transformers, feeders, etc. 6.3 Use of current limiting reactors and their arrangements.		
7	7.0 Protection Systems	12	32
	7.1 Power Systems protection, back-up protection, main and auxiliary protection, protection schemes for Generators: 1) Merz price protection, 2) Earth fault protection 7.1.2 Transformers: 1) Over current and earth fault protection 2) Percentage differential protection. 7.1.3 Motors: 1) over current protection, 2) Earth fault Protection 7.1.4 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.		

	7.1.5 SCADA Introduction Practice: Drawing sheets of full imperial size depicting the constructional details, scheme details of Different protection schemes and protection devices.		
8	8.0 Neutral Grounding	2	10
	8.1 Necessity, Different methods of neutral grounding, 8.2 Their advantages and disadvantages.		

6. IMPLEMENTATION STRATEGY (PLANNING) :

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

- 1) Lesson plan
- 2) Visit to small welding shops, Electrical workshop, installation work etc.
- 3) Drawing sheets for various applications.
- 4) Visit to indoor/outdoor substations.
- 5) Use of ISS codes.

7. REFERENCE BOOKS

Sr. No.	Author	Title	Publisher & address
1	S. S. Rao	Switchgear & protection	Khanna Publications
2	V. K. Mehta	Power System	S. Chand & Co.
3	V. L. Uppal	Electrical Power	Khanna Publications

1. SUBJECT DETAILS :

Course: ELECTRICAL ENGINEERING	SEMISTER: VI
Subject: Utilization of Electrical energy	Code:EE-67
Group: A	Optional

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Practical Hrs. Per WK		Paper			TH	Sessional	T/ W	Pract Oral	Total
			Hrs.	Np	Mks					
04	02	06	03	01	100	80	20	25	50	175

3. RATIONALE:

Electrical Engineering diploma holders are appointed in industries in the supervisory cadre. Their main job functions are to supervise the operation and control of various electrical drives, electrical furnaces, electrical welding equipments, refrigeration, air-conditioning systems. The factory illumination scheme is also to be maintained by them. Therefore the knowledge of operation and control of these machines and equipments is vital for every diploma holder.

4. OBJECTIVES:

The students will be able to:

- 1) Explain the importance of good illumination.
- 2) Compare different methods of electric heating and welding.
- 3) Select electric drive for specific applications.
- 4) Apply various measures for economic aspects of utilizing electric energy.

SECTION I

Sr.No	Topics	Marks	Hours
1	1.0 Illumination	25	12
	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 (MHPC), mean spherical power (MSPC), mean hemispherical candle power (MHSPC), Reduction factor, lamp efficiency, specific consumption, glare, specific height ratio, utilization factor, maintenance factor, depreciation factor, waste light factor, absorption factor, reflection factor, solid angle. 1.2 Law of illumination: Law of inverse squares Lambert's cosine law. (no numerical) 1.3 Sources of light: Construction, working and application of following lamps -Incandescent lamp, halogen lamp, low pressure mercury vapor lamps, High pressure mercury vapor lamps, sodium vapor lamps, compact fluorescent lamps (CLF), metal halide lamps, led lamps, neon signs.		

	<p>Basic principles of light control</p> <p>1.4 Factory lighting -general requirements</p> <p>Types of installation: General lighting, local lighting, emergency lighting</p> <p>1.5 Lumen or light functions of lighting calculation (simple numerical)</p> <p>1.6 Flood lighting Flood lighting purpose. Classification of projectors, locations and mounting of projectors (simple numerical).</p>		
2	2.0 Electric Heating & Welding	40	12
	<p>2.1 Electrical heating</p> <p>1) advantage of electrical heating</p> <p>2) models of transfer of heating Conduction, convection and radiation</p> <p>3) classification of electrical heating method</p> <p>4) resistance heating (construction and operation) Direct resistance heating: salt bath furnace Indirect resistance heating: resistance ovens, requirements of heating element material, causes of failure of heating elements, methods of temperature control, application of resistance heating.</p> <p>5) induction heating (construction and operation) Core type induction furnace, Ajax Wyatt Furnace, coreless induction furnace, application of induction heating (simple numerical problems).</p> <p>6) Dielectric heating Principle of Dielectric heating, advantage of Dielectric heating, lamination of Dielectric heating, application of Dielectric heating (simple numerical of Dielectric heating)</p> <p>2.2 Electric Welding :</p> <p>1) Methods of electric welding</p> <p>2) Electric arc welding: formation and characteristics of electric arc, Effect of arc length, arc blow.</p> <p>3) Arc welding machines : dc welding machine-MG set, AC rectified welding, unit. ac welding machines- welding transformer</p>		
3	3.0 Elevators	17	7
	<p>3.1 Types of electric elevators</p> <p>3.2 Size and shape of elevators cars.</p> <p>3.3 Speed of elevators</p> <p>3.4 Location of elevators</p> <p>3.5 Types of elevators machine, elevators motors</p> <p>3.6 Power transmission gears braking</p> <p>3.7 Safety in elevators</p> <p>3.8 Bombay lift act</p>		

SECTION II

4	4.0 Electric Drive	30	14
----------	---------------------------	-----------	-----------

	<p>4.1 Introduction: What is drive? Mechanical drives and electric drives.</p> <p>4.2 Advantages and Disadvantages of electric drives.</p> <p>4.3 Factors governing selection of electric motors.</p> <p>4.4 Nature of electric supply 3-phase & 1-phase AC and DC Types of drive: group drive and individual drive</p> <p>4.5 Nature of load: nature of mechanical load, matching of the speed torque Characteristics of the motor with that of the load & starting condition of load</p> <p>4.6 Electrical characteristics (Only DC series 3-phase and 1-phase are to be dealt) Running characteristics – inverse, constant speed and dropping Starting characteristics: starting torque only (no starters) Speed control: suitability to economic and efficient speed control method (Above and below normal speed) Braking characteristics: Plugging rheostat, braking and regenerative braking as applied to DC series and 3-phase induction motor</p> <p>4.7 Mechanical features: Types of enclosure as per I.S Types of bearing Types of transmission for drive Noise level</p> <p>4.8 Size of motor: Load condition – continuous load, short time loads, intermittent loads, continuous operation with intermittent loads Duty cycle Standard ratings for motors as per ISS</p> <p>4.9 estimation of rating of a motor (simple numerical on estimating sizes of continuously rated motor) Load equalization (no calculation)</p> <p>4.10 Cost Capital cost Running cost(losses ,PF, maintenance)</p>		
5	5.0 Electric Traction	38	18
	<p>5.1 Requirements of an ideal traction system</p> <p>5.2 traction system Non electric traction system Electric traction system: Straight electric traction, it's advantage Disadvantage diesel electrical traction It's advantage & disadvantage</p> <p>5.3 System of track electrification: dc system, composite system, single phase To 3 phase system, & single phase ac to dc system (KANDO SYSTEM) Advantage & disadvantage of 1 phase 25kv ac system over dc system</p> <p>5.4 Traction mechanics : Unit used in traction mechanics. Types of services Simplified speed time curve (no derivation) Average speed time & schedule speed Tractive effort Specific energy consumption Factors affecting specific energy consumption Coefficient of adhesion (simple numerical on simplified speed time curve & specific energy consumption.)</p> <p>5.5 Traction motors Desirable characteristics of traction motor, special features of traction Motor Suitability of DC series motor for traction</p>		

	<p>Suitability of 3-phase induction motor for traction</p> <p>5.6 Traction motor control Requirements Traction control of DC locomotive and EMU's: Series parallel control combined with rheostatic control , transition from Series to parallel combination ,energy efficiency and limitation of series Parallel cum rheostatic control</p> <p>5.7 Braking Requirements of braking system Mechanical braking: vacuum braking , compressed air braking , hand Brake for parking Electric braking :rheostatic braking & regenerative(no derivation and no numerical) Sequence of braking Dead man's handle</p>		
6	6.0 Economic aspects of utilizing electrical energy.	14	09
	<p>6.1 Economic aspects of utilizing electrical energy.</p> <p>6.2 Costing of electrical energy: fixed charge, Semi fixed charge & running Charge.</p> <p>6.3 Formulation of electrical energy.</p> <p>6.4 Various types of tariff: tariffs in force for domestic, commercial & Industrial consumers.</p> <p>6.5 Power factor improvement : causes of low power factor, disadvantage of Low power factor, power factor improvement by using static capacitor, Location of capacitor for power factor improvement, most economical Power factor , automatic power factor controller (derivation & simple numerical)</p> <p>6.6 Energy conversion: importance & need of energy conversion, measure for Energy conversion in 1)Electric drives 2) Electric traction 3) Electric Heating 4) Refrigeration & air-conditioning 5) illumination</p>		

5. REFERANCE BOOKS:

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

6.PRACTICALS:

Students have to make a study project on any one of the following:

- Electric Heating
- Electric Welding
- Electric Traction
- Electric Drives
- Economics of utilization of electric energy

Minimum Two visits to any factory related to syllabus

1 SUBJECT DETAILS :

Course: Electrical Engg.	SEMESTER: VI
Subject: Electrical estimation & costing	Code:EE-76
Group: A	Optional

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Th Hrs Per Wk	Practical Hrs. Per WK		Paper			TH	Sessional	T/W	Pract Oral	Total
			Hrs.	Np	Mks					
04	03	07	03	01	100	80	20	25	25	150

Rationale:

This subject is classified under Technology subject. 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.

Knowledge of electrical engineering drawing, IE rules, NEC, different types of electrical Installation their design considerations equips the students with the capability to design and prepare working drawing of different Installation projects.

Contents:

Chapter	Section 1	Hours	Marks
01	<i>Drawing and IE rules</i> 1.1 Classification of Electrical Installation. 1.2 General requirement of Electrical Installation. 1.3 Reading and Interpretation of Electrical Engineering Drawings. 1.3.1. Various diagrams, plans and layout 1.3.2. Important definitions related to Installation 1.4 IE rules related to Electrical Installation & Testing.	05	14
02	<i>Service Connection</i> 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 under ground & overhead service connections.	06	14
03	<i>Residential Building Electrification</i> 3.1 General rules guidelines for wiring of Residential Installation and positioning of equipments. 3.2 Principles of circuit design in lighting and power circuits. 3.3 Procedures for designing the circuits and deciding the	16	42

Chapter	Section 1	Hours	Marks
	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.		
04	<i>Testing of Installation</i> <i>Testing of wiring Installation for verification of current; earthing, insulation resistance and continuity as per IS</i>	05	12
Section 2			
05	Electrification of factory unit Installation 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. 5.4.1. Motor current calculations. 5.4.2. Selection and rating of wire, cable size & conduct. 5.4.3 Deciding fuse rating, starter, distribution boards main switch etc. 5.4.4. Deciding the cable route, determination of length of wire, cable, conduit, earth wire, and earthing. 5.5 Sequence to be followed to prepare estimate. 5.6 Preparations of detailed estimate and costing of small factory unit/ workshop.	10	35
06	Electrification of commercial Installation 6.1 Concept of commercial Installation. 6.2 Differentiate between electrification of Residential and commercial Installation. 6.3 Fundamental considerations for planning of an electrical Installation system for commercial building. 6.4 Design considerations of electrical Installation system for commercial building. 6.4.1 Load calculations & selection of size of service connection and nature of supply.	14	32

Chapter	Section 1	Hours	Marks
	6.4.2 Deciding the size of cables, busbar and busbar chambers. 6.4.3 Mounting arrangements and positioning of switchboards, distribution boards main switch etc. 6.4.4 Earthing of the electrical Installation 6.5 Selection of type wire, wiring system & layout. 6.6 Sequence to be followed to prepare estimate. 6.7 Preparation of detailed estimate and costing of commercial Installation.		
07	<i>Contracts, Tenders and Execution</i> 7.1 Concept of contracts and Tenders 7.1.1 Contracts, types of contracts, contractors. 7.1.2 Valid Contracts, Contract documents. 7.1.3 Tender and tender notices. 7.1.4 Procedure for submission and opening tenders. 7.1.5 Comparative statements, criteria for selecting contractors, General conditions in order form. 7.2 Principles of Execution of works 7.3.1 Administrative approval, Technical sanctions. 7.3.2. Billing of executed work.	08	15
<i>Total</i>		64	164

Practicals:

Report on any one:

1. Electrical Installation scheme for single flat, independent bungalow and small house. Draw wiring diagram and prepare detailed estimate and its costing
2. Electrical Installation scheme for commercial buildings. Draw wiring diagram and prepare detailed estimate and its costing.
3. 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 floor mills etc.

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publisher & Address
1.	K.B. Raina S.K. Bhattacharya	Electrical Design; Estimating and costing	New Age International (p) Limited, New Delhi
2.	Surjit Singh	Electrical Estimating and costing	Dhanpat Rai and company, New Delhi
3.	N. Alagappan S. Ekambaram	Electrical Estimating and costing	Tata Mc Graw Hill Publication, New Delhi
4.	S.L. Uappal	Electrical wiring	Khanna Publication.

		Estimating and costing	
5.	B.D.Arora	Electrical wiring, Estimating and costing	R.B. Publication, New Delhi

2. IS/International Codes : IS- 5909, 7733, 2174, 732,4648

1. SUBJECT DETAILS :

Course : Diploma in Electrical Engineering	SEMESTER : VI
16 Weeks	Duration :
Subject : Electrical M/c Design & Estimation	Code : EE-77

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	Sessional	TW	Pract Oral	Total
			Hrs.	Np	Mks					
04	02	05	03	01	100	50	50	25	50	175

3. RATIONAL:

This subject is introduced for the students of final semester. For manufacturing of electrical machines. & Equipment many materials are required .The correct material has to be selected for satisfactory operation & long life. Knowing the properties of conducting, insulating & constructional materials will help the students in future to be a good technician.

4. OBJECTIVES:

Students will be able to decide the materials required for the manufacture of equipments, motors, transformer, starters, lighting, wiring scheme etc.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Contents	Marks	Hours
1	1.0 Design of field coils	15	06
	1.1 Circular and rectangular cross-sections of field coils. 1.2 Number of turns, heating and heat dissipation of coil, cross section of conductor. 1.3 Space factor, numerical examples. Practice: Design of field coil/ lifting magnet		
2	2.0 DC Shunt motor starter	25	10
	2.1 Maximum and minimum. currents during starting, number of steps, calculations of step resistances. 2.2 Modifications of starter, numerical examples, graphical method of calculation of step resistances. 2.3 Design of a series motor starter, analytical method and graphical method. 2.4 Numerical examples. Practice: 1) Design of DC shunt motor starter/ induction motor starter		

3	3.0 Induction Motor	12	06
	3.1 Design of induction motor rotor resistance starter. 3.2 Calculations of resistances of different steps. 3.3 Selection of number of steps. 3.4 Selection of conductor.		
4	4.0 Domestic installation	30	10
	4.1 Estimation of load in a residential flat. 4.1.1 Estimation of load of the entire building having residential flats. 4.1.2 Preparation of scheme of domestic wiring for each flat and for that building. 4.1.2 Estimation of material required. 4.2 Preparation of schedule of material and schedule of cost. 4.3 Indian electricity rules for domestic installations. 4.4 Estimation of schedule of material for overhead and underground service mains. 4.4.1 Schedule of cost Practice: 1) Service mains. 2) Wiring residential flats./ building/ workshop lighting. 3) Estimation of wiring installation of overhead crane/ hoist.		

SECTION II

5	5.0 Design of transformer	35	14
	5.1 Output equation of single phase and three-phase transformer. 5.2 Specific electric loading and specific magnetic loading. 5.3 Main dimensions of single phase and three phase core type transformer. 5.4 Main dimensions of single phase and three phase shell type transformers. 5.5 Design of low and high voltage windings. Selection of type of coil and choice of conductor, 5.6 Calculation of winding resistances, leakage reactance's, efficiency and regulation on full load. Practice: 1) Design of three-phase core type transformer. 2) Design of single-phase shell type transformer		
6	6.0 Cooling:	12	04
	6.1 Estimation of losses and quantity of oil required for cooling, 6.2 Dimensions of cooling time with or without tubes. Calculation of cooling tubes.		
7	7.0 Illumination project	35	14
	7.1 Estimation of required illumination level for {A} Work shop, {B} Drawing office, {C} Administrative office, {D} Commercial office including show windows, E} a theatre or auditorium. 7.2 Estimation of the no. of lamps with or without fixtures and their dispositions. 7.3 Scheme of wiring for such a project. 7.3.1 Schedule of material. 7.4 Flood lighting of (A) outer wall, (B) a monument (C) shop window etc. 7.5 [2] Estimation of the required illumination level, 7.5.1 No. of lamps and the disposition for a small a small street or a lane or a colony road.		

	7.5.2 Preparation of schedule of material.		
--	--	--	--

6. IMPLEMENTATION STRATEGY (PLANNING) :

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

- 1) Lesson plan
- 2) Visit to small industry.
- 3) Giving the case study of a typical industrial application. Etc.

7. REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher & address
1	Raina Bhattacharya	Electrical Estimation and Design	New Age International (P) Ltd
2	Balbir Singh	Electrical Machine Design	Khanna publication
3	Sawhney	Electrical Machine Design	Dhanpatrai & sons

Shri Vile Parle Kelavani Mandal's

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
VII SEMESTER ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2008

Sr. No.	Subject	Subject Code	Scheme of Instructions and Periods per week					No. of papers duration and marks			Scheme of Examination						Gr	Scheme L/Pr/CR
			Lect	Pr	Dr	Tu	Cr	NP	Hrs	Mks	SSL	Paper	TW	Pract	OR	Total		
4-1	# Industrial management-II	ME-02	03	-	-	-	3	01	03	100	20	80	-	-	-	100	M*	303
4-2	# Project work	EE-78	01	08	-	-	9	-	-	-	-	-	50	-	50	100	A*	189
4-3	# Electrical instrumentation	EE-79	03	02	-	-	5	01	03	100	20	80	50	50	-	200	A*	325
4-4	# Testing & maintainance	EE-05	04	02	-	-	6	01	03	100	20	80	50	50	-	200	A*	426
4-5	#Elective 1 1) Electric traction 2) Power quality 3) H.V.D.C	EE-95 EE-96 EE-97	04	02	-	-	6	01	03	100	20	80	50	-	50	200	A*	426
4-6	#Elective 2 1) Industrial automation 2) Illumination engg 3) Energy audit & conservation	EE-06 EE-07 EE-08	04	02	-	-	6	01	03	100	20	80	50	-	50	200	A*	426
TOTAL			19	16	-	-	35	05 PAPERS			100	400	250	100	150	1000		
TOTAL PERIODS =35											TOTAL MARKS = 1100							

* Compulsory

Award winning subject

** External only

Note:

- vi) Sessional is to be accessed by internal examiner
- vii) Theory & practical is to be accessed by internal examiner & external examiner combined
- viii) Term work is to be accessed by internal examiner & external examiner as per the ratio
- ix) There will be three periodical test of 25 marks for each subject .best of two periodical test marks will be considered as a sessional of 20% weitage.

X) Final term end examination will be of 100 marks having 80% weitage

L-Lecture period

P-Practical period

D- Drawing practice Period

NP-No of Papers

Mks- Marks

SSL –Sessional

T/W-Term work

Pract- Practical

Cr-Credit

1. SUBJECT DETAIL'S:

COURSE: ALL DECIPLINES	SEMESTER: VIITH
SUBJECT: INDUSTRIAL MANAGEMENT – II	CODE:ME-02
COUMPULSORY:-M*	

2. TEACHING & EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme & Maximum Mark's							
Theory Hrs Per Wk	Practical Hrs. Per Wk		Paper			TH	Sessional Marks	T/W	Pract	Total
			Hrs	N/P	Mks					
03	-	03	03	01	100	80	20	-	-	100

3. RATIONALE:

Management is the process of getting work done through work force to achieve the objectives of the organization. This subject “Industrial Management” covers the fundamentals principles, objectives, process and the various activities of the management. Along with attaining the necessary technical knowledge, the technical students also require some inputs in management areas so as to enable them to carry out their work effectively and efficiently. This subject will enable us to understand various process and activities in an industrial organization.

- 4. OBJECTIVES:**
1. To know the process of management
 2. To understand the organizational structure and its importance
 3. To know the various functional areas of an organization
 4. To understand the basics of costing and finance
 5. To understand the various functions of marketing
 6. To enable the students applying basic principles of management in their work life

5. DETAILED CONTENT:

SECTION-I

CHAP TER	CONTENT	MARK S	HOUR S
01	MANAGEMENT 1.0 Introduction to management 1.1 Meaning, definition & importance 1.2 Relevance of management to engineers 1.3 Principles of management	12	05
02	FUNCTIONS OF MANAGEMENT 2.0 Functions of management 2.1 Planning organizing 2.2 Directing, communicating	15	04

	2.3 Motivating & co-ordinating 2.4 Controlling		
03	ORGANIZATIONAL STRUCTURE 3.0 Meaning, types & factors determining structure 3.1 Line organization 3.2 Functional organization 3.3 Line & staff organization 3.4 Project based organization	15	05
04	PROCUREMENT 4.0 Purchase procedures 4.1 Types of purchase 4.2 Principles of purchase 4.3 inventory & inventory control 4.4 Duties of store keeper	15	04
05	HUMAN RESOURCE MANAGEMENT 5.0 Importance of human resource to industry 5.1 Recruitment, selection & placement of man power 5.2 Employee welfare measures in industry 5.3 Training & development 5.4 Self management 5.5 Time management	25	06

SECTION-II

CHAPTER	CONTENT	MARKS	HOURS
06	MARKETING 6.0 Importance of marketing 6.1 Sales & marketing – Difference 6.2 Product life cycles & marketing strategies 6.3 Channels of distribution 6.4 Packaging & advertising 6.5 Export marketing	15	05
07	FINANCE 7.0 Sources of finance 7.1 Working capital & fixed capital 7.2 Financial statements of the company 7.3 Financial ratios 7.4 Budgets & budgetary control	20	06
08	COST & COST CALCULATION 8.0 Objectives of cost calculation 8.1 Classification of costs – bases 8.2 variable & fixed cost 8.3 Direct & indirect cost 8.4 Functional costs	25	06

	8.5 Cost control & cost reduction 8.6 Overheads & types of overheads 8.7 Cost calculation of a product 8.8 Break even analysis		
09	DEPRECIATION 9.0 Meaning & importance 9.1 Causes of depreciation 9.2 Methods of calculation of depreciation 9.3 Machine replacement – factors to be considered	10	03
10	TIME VALUE OF MONEY 10.0 Equivalence 10.1 Simple & compound interest 10.2 Present worth method 10.3 Future worth method 10.4 Sinking fund method 10.5 Capital recovery method	12	04

BOOKS RECOMMENDED:

AUTHOR	TITLE	PUBLISHER
1. T.R.Banga & S.C.sharma	Industrial organization & engineering economics	Khanna publication
2. O.P.Khanna	Industrial management	Ganpat rai
3. K.C.Jain & Agarwal	Production planning & Industrial management	Khanna publication

Course : Electrical Engineering

Semester: VIIIth

Duration : 16 Weeks

Subject : Project

Code : EE-78

Group : A*

Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Wk.	Practical Hrs. Per Wk.		Paper			TH	Sessional Marks	T/W	Oral	Total
		Hrs	N/P	Mks						
01	08	03	-	-	-	-	-	50	50	100

3. RATIONALE :

This subject is introduced for the final year students in order to give them the scope to utilize their theoretical knowledge that is fundamental of electrical and electronics engineering, group projects and individual projects also make them to understand the importance of team work, Leadership and time management. In order build up self confidence and experiencing themselves before the audience are have introduce the presentation of the project is planned at the end of the term.

4. OBJECTIVE :

Student

- (1) Select most contemporary subject for their project
- (2) Improve their practical skill.
- (3) Develop team work and leadership.
- (4) Complete the project in the given frame work of time.

TERM WORK:

The term-work shall comprise of one electrical or inter diciplinary group project(maximum 5 students) Those who have TERM GRANTED for all award winning subjects up to 6^h semester is allowed to register the subject.

SUBJECT DETAILS :

Course : Diploma in Electrical Engineering	SEMESTER : VII
	Duration : 16 Weeks
Subject : Instrumentation	Code : EE- 79
Group : A*	Compulsory

2. TEACHING AND EXAMINATION SCHEME :

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	Sessional	TW	Pract Oral	Total
			Hrs.	Np	Mks					
03	02	04	03	01	100	80	20	50	50	200

3. RATIONALE:

Rationale: In industries, there are many requirements of measuring non – electrical quantities like pressure, strain, temperature etc. this subject provides an introduction to the students of electrical engineering , regarding the measurement of such quantities. This subject introduces different transducers, some schemes involving such transducers and it also deals with qualities of measurement like precision, reliability, and sensitivity etc. this subject also deals with indicating and recording techniques and it also gives some introduction to telemetering.

4. OBJECTIVES:

Students will be able to

- 1) Understand and use the terms of instrumentation like accuracy, sensitivity etc.
- 2) To explain with sketches any type of temperature measuring devices.
- 3) To select suitable type of recording / indicating instrument for a given application.
- 4) To select and use proper pressure measuring device.
- 5) To use P-H meter
- 6) To understand proper flow measuring devices and use them.

Section I

Chapters	Contents	Hours	Marks
1	1.0 Instrumentation fundamentals 1.1 Instrumentation terminology. 1.2 Error accuracy, precision, sensitivity, reliability. 1.3 Sources of error in instruments.	3	17
2	2.0 Transducers 2.1 Basic types of transducers 2.2 Needs for a transducers requirements and classification	9	25

	2.3 Electric transducer, Electric potentiometer, inductive and capacitive transducers.		
3	3.0 Temperature	9	25
	3.1 Electrical and non-electrical methods. 3.2 Different transducers used Liquid filled thermometers, Mercury thermometers, 3.3 Vapor pressure thermometers, Gas thermometers, Bi-metal thermometers, Resistance thermometers, Thermocouples 3.4 Optical pyrometer, radiation pyrometer. 3.5 Errors of temperature measurements and remedies Practice 1) Experiments on Thermistor 2) Experiment on Thermocouple 3) Experiment on RTD		
4	4.0 Indicating and recording devices	3	15
	4.1 Analog indicators Oscillographs, 4.2 Magnetic tape recorder 4.3 Galvanometers etc.		

SECTION II

5	5.0 Pressure	9	30
	5.1 Measurements using mechanical methods- 5.1.1 u-tube manometer 5.1.2 Well type manometer, 5.1.3 Limp diaphragm, 5.1.4 metal diaphragms or bellows. 5.1.5 Bourdon tubes-spiral or helical tubes. 5.2 Electric transducers. 5.3 The pirani gauges, strain gauges. 5.3 Linear variable differential transducers. 5.4 Variable capacitance gauges 5.5 Electro pneumatic transducers. Piezo electrical transducers. Practice 1) Experiment on LVDT 2) Experiment on Strain gauge		
6	6.0 Flow	9	30
	6.1 Mechanical transducers, 6.2 Elbow flow meters, 6.3 Variable area meters, 6.4 Pilot tube, 6.5 Flow construction head meters, 6.6 Electrical transducers, 6.7 Magnetic flow meter, 6.8 Differential transformer transducers, 6.9 Turbine meters.		
7	7.0 P-H measurements	2	10
	7.1 Electrodes. 7.2 Principles of P-H meters		

	Practice 1) Study of P-H meter		
8	8.0 Telemetry	4	12
	8.1 Incremental current design. 8.2 Wheatstones bridge telemetering, 8.3 Ratio telemetering. 8.4 Alternating current systems Selsyns 8.5 Pulse type telemetering Practice 1) Experiment on photo sensor		

6. IMPLEMENTATION STRATEGY (PLANNING) :

Subject shall be taught by adopting lesson plan, emphasizing relevant principles & industrial applications on various processes. Industrial visits shall be arranged.

7. REFERENCE BOOKS :

Sr. No.	Author	Title	Publisher & address
1	A.K.Sawhney	Electrical measurements and instruments	Dhanpatrai & sons
2	S.K.Singh	Industrial Instrumentation control	Tata McGraw-hill
3	Rangan & Sharma	Instrumentation	Tata McGraw-hill

1. SUBJECT DETAILS

Course: Diploma in Electrical Engineering	Semester: VII
	Duration: 16 weeks
Subject: Testing Maintenance	Code: EE-05
Group : A*	COMPULSORY

2. TEACHING SCHEME 2. TEACHING AND EXAMINATION SCHEME

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory Hrs Per Wk.	Tutorial Hrs. Per Wk.		Paper			TH Reduced to	Sessional Marks	T/W	Practical Oral	Total
			Hrs	N/P	Mks					
3	2	4	3	1	100	80	20	50	50	200

3. RATIONALE:

This subject deals with various tests that are carried out on various machines to find the losses and efficiency. Syllabus also deals with maintenance of various machines according to ISS. Classification of insulation as per ISS is also studied.

4. OBJECTIVE:

Students will be able to :

1. Go through all types of tests carried out on various machines.
2. Understand all ISS standards.

SECTION-I

Chapter	Contents	HOURS	MARKS
1	1.0 D.C. Machines	10	30
	1.1 Commutation, 1.1.1 Methods of commutation, 1.1.2 Troubles and remedies. 1.2 Parallel operation of DC series, shunt and compound generators. 1.3 Load sharing between different generators in parallel. 1.4 DC three wire system. 1.5 Rotary balancer, use of shunt and compound machines in the balance set. 1.6 Load on each machine balance and unbalance in load. 1.7 Testing for common trouble.		

	<p>1.8 Routine maintenance of generators.</p> <p>1.9 Separation of various losses in DC machines, direct, indirect, regenerative methods of testing.</p> <p>1.10 Routine and type test. Study of I.S.S 4889-1968.</p> <p>Practice</p> <ol style="list-style-type: none"> 1) Swine burn's test on a D.C machine. 2) Hopkinson's test on two D.C shunts machines. 3) Parallel operation of two D.C shunts generators. 4) Retardation test. 5) Separation of losses In a D.C machines. 		
2	<p>2.0 Transformers:</p> <p>2.1 Polarity and phasing out,</p> <p>2.2 DC resistance of windings.</p> <p>2.3 Measurement of voltage ratio</p> <ol style="list-style-type: none"> 2.3.1 Magnetizing current 2.3.2 Core loss 2.3.3 Leakage impedance 2.3.4 Copper loss 2.3.5 Efficiency. 2.3.6 Temperature rise, its permissible limits. <p>2.4 Determination of temperature rise by back-to-back test.</p> <p>2.5 Insulation test and impulse test.</p> <p>2.6 Parallel operation of 2 single-phase transformers,</p> <p>2.7 necessary and sufficient conditions of parallel operation, load sharing and power factor of each transformer.</p> <p>2.8 Notes and phasor diagrams of phase grouping of poly phase transformers such as star /star, star/delta, star/zig-zag etc.</p> <p>2.9 Notes on parallel operation of transformers.</p> <p>2.10 Preventive and routine maintenance for distribution transformers.</p> <p>2.11 Test before commissioning ISS 2026-1962, ISS 1886-1967.</p> <p>Practice</p> <ol style="list-style-type: none"> 1) Open and short circuit tests on a single phase transformer as per ISS 2026-1962 (a) measurement of winding resistance, ratio measurement, phase relationship and check of polarity, measurement of impedance voltage. 2) Parallel operation of two single-phase transformers. 3) Back to back test on a single-phase transformer and determination of efficiency. 	10	40
3	<p>3.0 Installation</p> <p>3.1 Testing of HT installation checking phase sequence, Megger test of insulation, earth resistance test.</p>	4	12

SECTION II

4	4.0 Synchronous Machines:	9	25
	<p>Synchronous Machines: 4.1: Parallel operation of three phase alternators. 4.2 Conditions for parallel operation. 4.3 Different methods of synchronizing. 4.4 Alternator on infinite bus bars, load sharing and control of power factor. 4.5 Maintenance of synchronous machines as per ISS 4889-1968.</p> <p>Practice</p> <p>1) Different methods of synchronizing. 2) Synchronizing of Alternator</p>		
5	5.0 Induction motor	10	40
	<p>5.1 Behaviour of induction motor under abnormal conditions of 5.1.1 increasing or decreasing voltage 5.1.2 Change in frequency.</p> <p>5.2 Phenomenon of noise production, methods to reduce noise. 5.3 Type and routine tests as per ISS 325-1970. 5.4 Preventive and routine maintenance as per ISS 900-1965. 5.5 Testing of single-phase induction motors as per ISS 996-1964.</p> <p>Practice</p> <p>1) Type test of Induction Motor.</p>		
6	6.0 Insulation tests	05	17
	<p>6.1 classification of insulation as per ISS 1271-1958. 6.2 Insulation resistance, effect of temperature on insulation, revarnishing of insulation. 6.3 Vacuum impregnation. Care of electrical equipment during periods of inactivity.</p>		

6. IMPLEMENTATION STRATEGY (PLANNING) :

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

- 1) Orientation of teaching and laboratory staff towards curriculum objectives.
- 2) Lesson planning.
- 3) Arranging industrial expert's lectures.
- 4) Visit to medium scale industry,

7. REFERENCE BOOKS:

Sr. No.	<i>Author</i>	Title	Publisher & address
1	B.L.Theraja	Electrical Technology Vol-II	S.Chand
2	J.B.Gupta	Theory and Performance of Electrical machines	Dhanpatrai & sons
3	S.K.Bhattacharya	Electrical machines	Tata McGraw-hill

ELECTIVE 1

1. SUBJECT DETAILS

COURSE : ELECTRICAL ENGINEERING	SEMESTER : VIITH
SUBJECT : ELECTRIC TRACTION 95	CODE :EE-
GRADE : A*	ELECTIVE

2. TEACHING & EXAMINATION SCHEME

TEACHING SCHEME		CREDITS	EXAMINATION SCHEME & MAXIMUM MARKS							
THEORY HRS. PER WEEK	PRACTICAL HRS. PER WEEK		PAPER			TH	TEST	TW	PRACT. ORAL	TOTAL
			HRS.	NP	MKS.					
04	02	06	03	01	100	80	20	50	50	200

Rationale:

Electric traction means a locomotion in which the driving force is obtained from electric motors. One of the practical applications of electricity, which enters into the everyday life of many of us, is its use in service of mass transport – the electric propulsions of vehicles – electric trains, trolley buses, tram cars and in the latest developments such as metro and sky bus.

In view of the growing importance and technological developments, which have come about in this area in the recent past, for Electrical Engineering students it is desirable to study the course dealing with electric traction. This subject belongs to technology area.

Objectives:

The students will be able to:

1. Identify and explain use of components of the power supply arrangements for electric traction.
2. Maintain different overhead equipments.
3. Differentiate the various types of current collecting systems and current collecting gears based on utility.
4. Explain the different types of signals and track circuits.
5. Explain supervisory control used in electric traction.
6. Explain special requirements of train lighting and various systems of train lighting.

SECTION-1

Chapter	Topics	Hours	Marks
01	<p>Power Supply Arrangements:</p> <p>1.1 – Introduction</p> <p>1.2 – High Voltage Supply.</p> <p>1.3 – Constituents of Supply System. Substations. Feeding Posts. Feeding and Sectioning Arrangements. Sectioning and Paralleling Post. Sub sectioning and Paralleling Post. Sub sectioning Post. Elementary Section. Miscellaneous Equipments at Control Post or Switching Stations.</p> <p>1.4 – Major Equipments at Substation. Transformer. Circuit Breaker. Interrupter. Protective System for AC Traction – Transformer Protection and 25 KV Catenary Protection</p> <p>1.5 – Location and Spacing of Substations.</p>	10	25
02	<p>Overhead Equipments:</p> <p>Overhead Equipments (OHE).</p> <p>Principles of Design of OHE: Composition of OHE. Height of Contact Wire. Contact Wire Gradient. Encumbrances. Span Length.</p> <p>Automatic Weight Tension and Temp. compensation.</p> <p>Insulated Overlaps.</p> <p>Insulated Overlaps.</p> <p>Neutral Section.</p> <p>Section Insulator.</p> <p>Insulator.</p> <p>Polygonal OHE: Single Catenary Construction. Compound Catenary Construction. Stitched Catenary Construction. Modified Y Compound Catenary.</p>	12	32

	<p>Effect of Speed on OHE. OHE Supporting Structure. Different types of signal boards of OHE. Maintenance of OHE: - OHE Maintenance Schedule. (No Derivation and No Numerical)</p>		
03	<p><i>Current Collecting Equipments:</i> 3.1 – Introduction. 3.2 – Systems of Supplying Power in Electric Traction: Third Rail or Conductor Rail System. Overhead System. 3.3 – Current Collectors for Overhead System: - Trolley Collector or Pole Collector, Bow Collector, Pentograph Collector. 3.4 – Types of Pentographs: Diamond Pentograph and Faiveley Type. 3.5 – Construction of Faiveley Type Pantograph. 3.6 – Methods of Raising and Lowering of Pentograph. 3.7 – Maintenance of Pentograph.</p>	10	25
04	<p style="text-align: center;">SECTION-II</p> <p>Signalling and Supervisory Control: 4.1 – Requirements of Signalling System 4.2 – Types of Signals. 4.3 – Colour Light Signals. 4.4 – Three and Four Aspects of Colour Light Signals. 4.5 – Track Circuits. 4.6 – DC Track Circuit. 4.7 – AC Track Circuit. 4.8 – Supervisory Control: Introduction. Advantages of Remote Control. Systems of Remote Control: DC versus Voice Frequency (VF) Signalling. Remote Control System Equipment and Network. Mimic Diagram. Control Desk for TPC. Remote Control Switching Equipments. The F.M.V.F.T. Power Supply.</p>	10	25

	Controlled Station Equipments.		
05	<p>Train Lighting:</p> <p>5.1 – Systems of Train Lighting. 5.2 – Special Requirements of Train Lighting. 5.3 – Method of obtaining Unidirectional Polarity. 5.4 – Method of obtaining Constant Output. 5.5 – Single Battery System. 5.6 – Double Battery Parallel Block System. 5.7 – Failure of Under frame Generating Equipments. 5.8 – End on Generation. 5.9 – Railway Coach Air Conditioning: - Requirements. - Types of Installations. - Air Conditioned Rolling Stock. 5.10 – Air Conditioning Equipments on Coaches.</p>	10	22
06	<p>Control of on board Equipments</p> <p>6.1- Introduction- Need for such control in different vehicles such as Locomotive, EMU, Trolleys, Monorails etc Power electronic devices. 6.2- Conventional control ,control voltage (Typical 110volt D.C Why ?) Storage batteries, Electro pneumatic, Electromagnetic relays and their interlocks. 6.3- Governors, Transducers,different measuring instruments based on specific principles. (speed, oil level,temp., voltage,current etc.) 6.4- Digital control and driver’s display system. Typical arrangement of driver’s dusk. Indications, Gauges,safety interlocking and equipments. 6.5- Identification of standard symbols used for electrical equipments (relays,contactors,interlocks N.O/N.C etc) in power/control circuits.</p>	12	35

TERM WORK:

Term work consist of a study report (By Group of maximum five students) on any of the above mentioned topics.

IMLEMENTATION STRATEGY

1 Lesson Plan

2 Visit to Indian Railways

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
01	H. Partab	Modern Electric Traction	Dhanpat Rai & Sons
02	J. Upadhyay S. N. Mahendra	Electric Traction	Allied Publishers Ltd.
03	Om Prakash Kesari	Viddut Engine Parichay (In Hindi)	S. P. Graphics, Nashik.

SUBJECT DETAILS:

COURSE: Diploma in electrical engineering
SUBJECT: Power quality
GROUP: A*

SEMESTER – VII
CODE:EE-96
ELECTIVE

Teaching and Examination Scheme

TEACHING SCHEME			EXAMINATION SCHEME							
TH	TU	PR	CREDITS	PAPER HOURS	TH	TEST	PR	OR	TW	TOTAL
04	-	02	06	03	80	20	-	50	50	200

Rationale

This is an introductory course on Power quality covering voltage quality, disturbances, waveform distortion. No derivation or analytical treatment is expected in this course.

This subject is divided into two parts i.e. overview of power quality and harmonics. Overview of non-linear loads in power system and later regarding reactive power compensation. Second part i.e Harmonics deals with harmonic generation, effect of harmonic mitigation.

Objective

Students will gain knowledge about

1. Problems occurring in power system due to various non-linear loads
2. Effect of harmonics in power system
3. Removal of harmonics by using various filters

Section I

Chapter	Content	Hours	Marks
1	1 Introduction to power quality 1.1 Overview of power quality 1.2 Voltage quality 1.3 Classification of power quality phenomena 1.4 Disturbances 1.5 Waveform distortion 1.6 Voltage unbalance 1.7 Voltage fluctuation & flicker	08	25
2	2 Nonlinear loads in power system 2.1 CFL Lamps 2.2 Static Var compensator (SVC) 2.3 Thyristor controlled series compensator	14	35

	2.4 Static compensator (STATCOM) 2.5 Static synchronous series compensator (SSSC) 2.6 Unified power flow controller (UPFC) 2.7 Distributed Generators		
3	3 Reactive power compensation 3.1 Introduction of reactive power compensation 3.2 Reactive power compensation using static power capacitors 3.3 Switching power capacitors by circuit-breaker, circuit switches 3.4 Back to back phase control of a thyristor –control reactor (TCR) 3.5 Back to back thyristor switch capacitor (TSC) 3.6 Saturable Reactor in parallel with a capacitor Bank 3.7 Reactive Power compensation using rotating machinery a) Synchronous motor b) Synchronous Condenser	10	22

Section II

Chapter	Content	Hours	Marks
4	4 Harmonics Generation 4.1 Introduction of Harmonics 4.2 Introduction to Fourier analysis of repetitive waveform 4.3 Line current distortion, power distortion, power factor distortion 4.4 Converters 4.5 Arc furnaces 4.6 Static VAR Compensator 4.7 Inverters for Dispersed Generators 4.8 Electronic power control 4.9 Cycloconverter Harmonics 4.10 Switch mode power supplies	14	35
5	5 Effect of Harmonics 5.1 Rotating machines (Motors & Generators) 5.2 Transformers 5.3 Power Cables 5.4 Capacitors 5.5 Electronic equipment 5.6 Metering & Instrumentation 5.7 Switchgear & Relaying 5.8 Telephone Interference	08	22
6	6 Harmonics Mitigation (An introductory treatment only) 6.1 Introduction for harmonics mitigation 6.2 Passive filters-Limitation of passive filters 6.3 Active filters-	10	25

	1) Shunt connections 2) Series connections 3)Hybrid connection		
--	--	--	--

TERM WORK: Term work consist of a study report (By Group of maximum five students) on any of the above mentioned topics.

IMLEMENTATION STRATEGY

- 1 Lesson Plan
- 1 Visit to Any relevant Industries

Reference Books
1) Power System Harmonics by Jos Arrillaga, Neville R Waston
2) Electric power Quality – G.T.Heydt
3) IEEE -519 Standard

SUBJECT DETAILS:

COURSE: Diploma in electrical engineering	SEMESTER – VII
SUBJECT: High Voltage DC Transmission	CODE:97
GROUP: A*	ELECTIVE

Teaching and Examination Scheme

TEACHING SCHEME			EXAMINATION SCHEME							
TH	TU	PR	CREDITS	PAPER HOURS	TH	TEST	PR	OR	TW	TOTAL
04	-	02	04	03	80	20	-	50	50	200

Rationale

This subject at introductory level gives an idea about why HVDC transmission preferred to HVAC transmission for long distance. No derivation or analytical treatment is expected in this course.

This subject is divided in two sections as mentioned in following table.

Objective

Students will gain knowledge about

Different Types Of HVDC System, Advantages And Disadvantages of HVDC transmission line

4. Layout Of Converter Station ,V-I Characteristics & Performance Equation
5. Converter Fault & Protection
6. Reactive Power Control, Commutation Of Converter ,Harmonics

Section: I

Chapter	Content	Hours	Marks
1	1.Introduction of power system 1.1 Introduction of power generation 1.2 Types of generating stations in brief 1.3 A.C power supply scheme(layout of A.C power supply scheme) 1.4 Different systems of power transmission in brief 1.5 Classification of overhead transmission lines 1.6 Introduction of Distribution system	06	15
2	2. Introduction Of HVDC Transmission System 2.1 Introduction of different transmission system(HVAC and HVDC) 2.2 Comparison of HVDC and HVAC transmission system 2.3 Disadvantages of HVDC transmission line 2.4 Application of HVDC transmission line 2.5 Types of HVDC system with diagram 2.6Different units of converter station (layout of converter station)	06	22
3	3. Introduction of rectifier 3.1 Types of rectifier	12	20

	<p>3.2 Single phase, two pulse line commutated converters for R-load at different angles</p> <p>3.3 Three phase ,half wave converter for R-load at different angles</p> <p>3.4 Three phase ,full wave converter for R-load at different angles</p> <p>3.5 Circuit diagram of</p> <p>(1)Diametric circuit of 6 pulse converter</p> <p>(2)Cascading of two, 3-pulse converter</p> <p>(3)Parallel connection of 3-pulse converter with inter phase transformer</p> <p>(4)Bridge converter(Graetz circuit)</p> <p>(5)Cascading of three,1-ϕ full wave converter</p>		
4	<p>4. Converter Theory & Performance Equation (An introductory treatment)</p> <p>4.1 An equivalent circuit of 6-pulse bridge converter (Graetz circuit)</p> <p>4.2 Analysis of converters with overlap angle(u)</p> <p>4.3 Analysis of direct current and voltages of converter with an extinction angle</p> <p>4.4 Equation of R_c for 6-pulse converter</p> <p>4.5 Characteristics of V_d-I_d with an overlap angle(u)</p>	08	25

Section: II

5	<p>5.characteristic of converters</p> <p>5.1 Types of supply</p> <p>5.2 Combined characteristic of converters</p> <p>5.3 Small disturbance in system(on rectifier and inverter side)</p>	05	15
6	<p>6.Control Of HVDC Systems</p> <p>6.1 Current controller for firing angle</p> <p>6.2 System control hierarchy</p> <p>6.3 Power control</p> <p>6.4 Auxiliary controller</p> <p>6.5Start and stop link controller</p>	08	25
7	<p>7. Converter Faults And Protection</p> <p>7.1Different faults of converter (1)arc back</p> <p>(2)commutation failure</p> <p>(3)arc through fault</p> <p>(4)misfire fault</p> <p>(5)current extinction faults</p> <p>(6) short circuit in bridge</p>	14	25

	<p style="text-align: right;">circuit</p> <p>7.2 Protection against over current 7.3 Protection against overvoltage 7.4 Smoothing reactors 7.5 Reactive power control 7.6 Sources of reactive power</p>		
8	<p>8. Commutation And Harmonics 8.1 Forced commutation 8.2 Harmonics</p>	05	17

TERM WORK: Term work consist of a study report (By Group of maximum five students) on any of the above mentioned topics.

IMPLEMENTATION STRATEGY

- 1 Lesson Plan
- 2 Visit to Any relevant Industries

<h3>3 Reference books</h3>
a) Padiyar K.R.-HVDC Transmission system, 1 st ED, Wiley Eastern Ltd. 1990.
b) Kimbark E.W.- HVDC Transmission system, 1 st ED, Wiley Eastern Ltd.1965

ELECTIVE 2

3. SUBJECT DETAILS

COURSE : ELECTRICAL ENGINEERING	SEMESTER : VIITH
SUBJECT :INDUSTRIAL AUTOMATION	CODE :EE-06
GRADE : A*	ELECTIVE

4. TEACHING & EXAMINATION SCHEME

TEACHING SCHEME		CREDITS	EXAMINATION SCHEME & MAXIMUM MARKS							
THEORY HRS. PER WEEK	PRACTICAL HRS. PER WEEK		PAPER			TH	TEST	TW	PRACT. ORAL	TOTAL
		HRS.	NP	MKS.						
04	02	06	03	01	100	80	20	50	50	200

5. Rationale:

This Subject Is classified As Under technology group intended to develop the technician to carry out responsibilities in the industries related to industrial automation. Pass out's from the course need to operate, test & maintain various activities which are automated.

Student can analyze different types of control systems used in industries. The knowledge gained by students is used in the operation of various control systems like PLC, SCADA, and DCS. This knowledge is used in supervising , controlling & maintaining the control systems.

6. Objectives:

Student will be able to

1. Explain applications of control system/automation
2. Read & design data for control systems
3. Explain the hydraulic/pneumatic systems
4. Describe & program PLC using ladder logic
5. Describe working of control components
6. Draw power & control circuit

SECTION I

Chapter	Contents	Hours	Marks
01	Automation 1.1 Need of automation 1.2 Advantages of automation 1.3 Requirements of automation	02	08
02	Control systems : 6.1 Concept of control system 6.2 Basic block diagram of control system 6.3 Transfer function 6.4 Different terms in control system 6.5 Types of control system 6.6 Application of control system 6.7 Development of block diagram for simple applications like level, temperature, flow control	06	14
03	Control System components : 3.1 Contacts-types, current capacity & load utilization categories 3.2 Solenoids-dc,ac 3.3 I/P devices-switches-push buttons, foot switches, selector switches, pilot switch, proximity, photoelectric, temperature actuated, level control, pressure sensing, overload sensing 3.4 Relays-electromechanical, reed 3.5 O/P devices-contactors, valves, pilot lamps 3.6 Symbols in power & control circuits 3.7 Developing control circuits-basic & thumb rule 3.8 Power & control circuits or different applications like hoist, crane, conveyer belt, induction motor	08	20

Chapter	Contents	Hours	Marks
04	<p>Electrical Actuators:</p> <p>4.1 Potentiometers- working & Use as error detector</p> <p>4.2 servo motors – ac & dc – working principles</p> <p>4.3 Synchros – transmitter, control transformer, use of as error detector</p> <p>4.4 Stepper motor – PM & variable reluctance – working principle</p> <p>4.5 Tacho – generator</p> <p>4.6 Application of above components as AC/DC control system</p>	08	20
05	<p>Controllers:</p> <p>5.1 Hydraulic- Advantages & disadvantages, hydraulic servo motor, types of pumps used, control valves, components like accumulators, filter, and seals.</p> <p>5.2 Pneumatic- resistance & capacitance of pressure systems, Pneumatic flapper- nozzle system, Pneumatic relays, actuating valves , cylinders, comparison between Pneumatic & hydraulic systems</p> <p>5.3 Electrical & electronic controller- brief over view of OP-amps, inverting, non-inverting, lead-lag</p> <p>5.4 Digital controllers- brief over view of micro processor & micro- controller to be worked as controller</p>	08	20

SECTION-II

06	Control Actions: 6.1 On-Off, P, I, P+I, P+D, P+I+D, Actions 6.2 P+I+D action using hydraulic , pneumatic electronic controller 6.3 tuning of P+I+D controller	08	16
07	Programmable Logic Controller: 7.1 Introduction 7.2 Advantages & disadvantages 7.3 PLC VS PC 7.4 Block diagram of PLC 7.5 Basic block like CPU, I/O modules , bus systems , power supplies & remote I/Os 7.6 different PLC's available in market	12	22
08	Programming Of PLC 8.1 Development of Ladder logic 8.2 Some simple programs such as I/o connection, starting of IM, stepper motor control (treatment to topic no. 8.2 should be given at the time of practical/ pp hours)	06	22
09	Introduction to special control systems: 9.1 Distributed Control System (DCS)- brief introduction to hardware & software used 9.2 SCADA- brief introduction to hardware & software used	06	22
Total		32	80

TERM WORK: Term work consist of a study report (By Group of maximum five students) on any of the above mentioned topics.

IMPLEMENTATION STRATEGY

- 1 Lesson Plan
- 2 Visit to Any relevant Industries
- 3 Learning Resources:

4 Books:

Sr. No.	Author	Title	Publisher & Address
1	Nagrath Gopal	Control System Engg.	Wiley Eastern
2	K.Ogata	Modern Control Engg.	Prentice Hall
3.	Jacob	Industrial Control Engg	Prentice Hall
4.	Andrew Parr	Hydraulics & Pneumatics	Jaico Publication
5.	Webb & Reis	Programmable Logic Controller: Principle applications	Wiley Eastern
6.	S.K. Bhattachrya Brijinder Singh	Control of Electrical Machines	New Age International Publishers

1. Subject Details.

Course: Electrical Engineering	Semester :VII
	Duration: 16 weeks
Subject: ILLUMINATION ENGINEERING	Code: EE-07
Group: A*	C: Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory hrs per week	Practical hrs. per week		Paper			TH	Sessional	TW	Prac oral	Total
			Hrs.	Np	Mks					
04	02	06	03	01	100	80	20	50	50	200

3. RATIONALE:

This subject is intended to teach the students various aspects of Illumination Engineering.

They will have the knowledge of various types of lighting, accessories and control circuits.

4. OBJECTIVE:

Students will be able to

- 6) Understand the level of illumination
- 7) Differentiate between various lamps
- 8) Design a control circuit for illumination

SECTION I

SR.NO	CONTENT	MARKS	HOURS
1	FUNDAMENTALS OF ILLUMINATION 1.1 principle of lighting criteria 1.2 lighting quantity 1.3 lighting quality 1.4 cost of lighting 1.5 lighting efficiency 1.6 light sources, daylight, incandescent, electric discharge, fluorescent, arc lamps and lasers	20	4

2	ILLUMINATION SYSTEM 2.1 Law of illumination- illumination from point, line and surface sources 2.2 Photometry and spectrophotometry; photocells 2.3 Different entities of illuminating systems 2.4Featuring of good illumination scheme 2.5 Advantages of good illumination scheme 2.6 Measurement of level of illumination	25	8
3	LAMPS AND LIGHTING ACCESSORIES	25	10
	2.1 Types of lamps-ARC lamps, HPMV lamps, SODIUM lamps, CFL lamps, Metal halides, LED lamps. 2.2 Neon sign tubes 2.3 Neon lamps 2.4 Halogen lamps 2.5 Special purpose lamps 2.6 Lighting accessories		
4	ILLUMINATION CONTROL AND CONTROL CIRCUITS	12	10
	3.1 Purpose of lighting control 3.2 Dimmer transformer and their types 3.3 Electronic Dimmer 3.4 Enhancing light control 3.5 Control circuits for lamps (specify)		

SECTION II

5	General illumination design -interior	25	12
	4.1 Standard for various situations of interior illumination 4.2 Design technique 4.3 Design consideration for interior location of residential, commercial,industrial premises 4.4 Design illumination scheme for different interior location of residential,commercial,industrial units. .		
6	ILLUMINATION FOR OUTDOOR APPLICATION	25	8
	6.1 factory lighting 6.2 street lighting 6.3 flood lighting 6.4 railway lighting		

	6.5 lightin for advertisement hoarding 6.6 sports lighting		
7	APPLICATION AND PROTECTION	32	12
	7.1 agriculture,health care,aquarium lighting 7.2 decorating purpose and stage lighting 7.3 Utility services for large building/office complex & layout of different meters and protection units, 7.4 Diferent type of loads and their individual protections. 7.5 Selection of cable/wire sizes; potential sources of fire hazards and precautions. Emergency supply – stand by & UPS.		

6. IMPLEMENTATION STRATEGY (PLANNING)

In depth study and understanding of the subject will be implemented by adopting following strategy. (Teaching Plan). Example

3. Lesson Plan
4. Visit to small industry.

7. REREFERENCE BOOKS:

Sr. No	Author	Title	Publishers & address
1.	Ramamurthy	Thyristors control and applications	
2.	Chute and chute	Electronics in industry	Tata-Mcgraw hill New delhi
3	Cage	Industrial electronics	Tata-Mcgraw hill New delhi
4	Zbar	Industrial electronics lab manual	Tata-Mcgraw hill New delhi
5	Sameer datta	Industrial electronics	PHI publication New delhi
6	Gaonkar	Microprocessor architecture and programming	Tata-Mcgraw hill New delhi

7. SUBJECT DETAILS

COURSE : ELECTRICAL ENGINEERING	SEMESTER : VIITH
SUBJECT :ENERGY AUDIT & CONSERVATION	CODE :EE-08
GRADE : A*	ELECTIVE

8. TEACHING & EXAMINATION SCHEME

TEACHING SCHEME		CREDITS	EXAMINATION SCHEME & MAXIMUM MARKS							
THEORY HRS. PER WEEK	PRACTICAL HRS. PER WEEK		PAPER			TH	TEST	TW	PRACT. ORAL	TOTAL
		HRS.	NP	MKS.						
04	02	06	03	01	100	80	20	50	50	200

Rationale:

This subject is categorized under technology subjects, Rapid Developments in the standard of living of countrymen results into increased energy consumption. But due to limited availability of conventional sources and difficulties in their tapping and uneconomical and insufficient R and D aspect of non conventional sources, energy conservation is the most important tool to some extent, to face the problem of the increased demand.

For monitoring effectiveness of the energy conservation methods and proper use of electrical energy, energy audit is must. To maintain the growth of development, electricity generation will be required to be increased by proper mix of conventional and non-conventional sources of energy but at the same time its conservation and audit should be done to increase the efficiency of electrical power system. Hence electrical engineers must have knowledge of various methods of energy conservation and concept of energy audit and its implementation.

Objectives:

The students will be able to:

1. List causes for limited growth of conventional energy sources and limitations of non-conventional sources of energy.
2. Suggest methods of energy conservation for different load conditions.
3. Select appropriate tariff system and methods for reducing electricity consumption and energy saving.
4. Apply Tools for energy audit and recommend measures for energy conservation.

SECTION- I

Chapter	Content	Hours	Marks
1	1. Energy Scenario 1.1 Introduction :Primary -Secondary Energy , Commercial, Non-Commercial Energy 1.2 Global Primary Energy Resources 1.3 Global Consumption, Energy Distribution 1.4 Energy Supply: Coal, Oil, Electricity, Nuclear, Hydro 1.5 Energy Sector Reforms 1.6 Energy Pricing In India 1.7 reforms In Coal ,Natural Gas ,Electricity	06	22
2	2. Energy Environment 2.1 Environment And Social Concerns Related To Energy Utilization. The Green House Effect, Global Warming And Its Effects, Pollution, Acid Rains, Global Energy And Environment Management	06	22
3	3. Energy Management And Audits 3.1 Definition, Objectives Of Energy Management ,Need For Energy Audit, Types Of Audit 3.2 Energy Management : Key Elements ,Perspective , Contents Organizing , Top Management Support , Role Of Energy Manager 3.3 Materials And Energy Balance , Detailed Energy Audit Methodology	10	22
4	4. Project And Finance Management 4.1 Investment Need , Financial Analysis 4.2 Scope Of Project , Implementation Plan For Top Management	10	16

SECTION: II

Chapter	Content	Hours	Marks
5	5. Energy Efficiency In Electrical Utility 5.1 Introduction To Electrical Power Supply System 5.2 Electrical Load Management 5.3 Electrical Motors: Types ,Energy Efficient Motors ,Factor Effecting Motor Efficiency 5.4 HVAC And Refrigeration System, Selection Of Suitable Refrigeration System 5.5 Lighting System, Choice Of Lighting ,Energy Efficient Lighting 5.6 Energy Saving Opportunity	12	25
6	6. Energy Efficient Technology In Electrical System 6.1 Maximum Demand Controller, Automatic Power Factor Controllers, Variable Speed Drives, Energy Efficient Transformer, Energy Efficient Lighting Control	08	22
7	7. Energy Conservation In Transmission And Distribution		

	Systems 7.1 Reactive Power Compensation ,Demand Side Management ,System Voltage Optimization And Phase Current Balancing , Losses In Transmission And Distribution System And Its Minimization	06	20
8	8. Tariff And Energy Conservation In Industries 8.1 Energy Cost And Recent MSEB Tariffs , Application Of Tariff System to Reduce Energy Bill, Energy Conservation By Improving Load Factor And Power Factor	06	15

TERM WORK: Term work consist of a study report (By Group of maximum five students) on any of the above mentioned topics.

IMLEMENTATION STRATEGY

1 Lesson Plan

2 Visit to Any relevant Industries

Books:

Sr. No.	Name Of Author	Name Of Book	Publication
01	Siemens	Power Factor Correction	New Age Vol.38 2005
02	T.Gonen	Electric Power Distribution System Engg.	Tata McGraw Hill
03	C.L. Wadhawa	Generation Distribution and Utilization of Electrical Energy	New Age 2004

Shri Vile Parle Kelavani Mandal`s
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

DISCIPLINE: ELECTRICAL ENGINEERING
w.e.f. batch admitted June,2008 (Progressively)

FULL TIME

SEMESTER: SEVENTH TEACHING & EXAMINATION SCHEMES
Effective from the Academic Term July/November,2008

VIII SEMESTER

Sr No	Subject Duration	Credit		Weekly Report	Quiz Test Marks	Dissertation (Report)	Oral/ Viva	Total
8.1	26 Weeks	15	Maximum Marks	50	50	50	50	200
			Minimum Marks	20	20	20	20	80

- **Maximum 100 marks of Inplant Training will be considered for Award of Diploma.**
- **The Examination shall be conducted for 200 marks and same marks will be converted in to 100 by the Examination Section.**