

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
NATAKKAR RAM GANESH GADKARI MARG
VILE PARLE (WEST), MUMBAI-400056

CURRICULUM

Shri Bhagubhai Mafatlal Polytechnic started 03 year's Diploma courses and affiliated to the Board of Technical Examinations, Maharashtra State, in 1963. Since 1969, academic freedom was granted to the Polytechnic, which enabled it to evolve curriculum and examination scheme and to introduce inplant training, resulting into industry institute interaction. Thus 4 years' semester sandwich pattern came in existence. Since 1978-79 academic freedom was extended to all the full-time diploma courses. In 1989-90, full autonomy was granted to all seven full-time diploma courses. As a further development to the above, the Multi-Point Entry and Credit System (MPE&CS) was initiated in 1981 on the progressive basis. In the scheme students can regulate their pace of studies within the rules prescribed. From 1993-94, full academic autonomy was extended to all the courses.

(Full Time 04 Year Sandwich Pattern)

Diploma Course in ELECTRICAL ENGINEERING (Aided)

Electrical Engineering course is the core branch which covers the main Electrical subjects like Power Systems and utilization. This course covers the subject like Electrical Engineering mechanicals Estimation, machines, Transmission & Distribution etc. In addition of these students are acquainted with like Power Electronics, Industrial Automation, and Energy Audit Etc.

Student with Diploma in Electrical Engineering can get good opportunities work as Supervisor with electrical Contractors. They can work as Junior Engineer in Electricity Boards, BEST, and BSES etc. There is good scope is work in sales. There is good scope is work in Sales and servicing department of Industries.

Objectives: On completion of Diploma students will be able to work as:-

- Electrical Supervisor
- Junior Engineer
- Electrical Maintenance Engineer

PRACTICAL TRAINING:

The students receive institutional training for the first four semesters. In the 5th semester they are given inplant/field training. They return to the polytechnic in the 6th and 7th semesters for institutional training. In the concluding 8th semester, they again receive inplant/field training. This scheme enables the students to be exposed to industry during the training, which is provided for practice orientation and improves their prospects for employment.

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
TEACHING AND EXAMINATION SCHEME

ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2012(Progressively)

SEMESTER-I

Sr. No.	Subject Name and Code	Pre-requisite	Scheme of Instructions and Periods per week					Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/C	
			L	P	D	T	Cr	Hrs	Mks	SSL	Paper	TW	PR	OR	TTL			
1-1	Basics of computer system 120002	-	2	2	-	-	4	-	-	-	-	50@	50**	-	100	B*	224	
1-2	Basic Mathematics 120003	-	3	-	-	1	4	03	80	20	80	-	-	-	100	B*	404	
1-3	Chemistry-I 120004	-	2	2	-	-	4	03	80	20	80	25@	50**	-	175	B*	224	
1-4	Communication Skill 120005	-	3	-	-	1	4	03	80	20	80	25@	-	-	125	B*	404	
1-5	Physics-I 120008	-	2	2	-	-	4	03	80	20	80	25@	50**	-	175	B*	224	
1-6	Engineering Drawing-I 120014	-	2	-	4	-	6	-	-	-	-	50@	50**	-	100	C*	246	
1-7	Electrical Workshop 120301	-	-	4	-	-	4	-	-	-	-	50@	-	-	50	B*	044	
TOTAL			14	10	4	2	30	04 PAPERS		80	320	225	200	-	825			
TOTAL PERIODS = 30										TOTAL MARKS = 825								

* Compulsory , # Award winning subject , ** assessed by internal and external examiners jointly, @ Assessed by internal examiner only
L-Lecture period, P-Practical period, D- Drawing practice Period, T- Tutorial, Cr-Credit, SSL –Sessional, TW-Term work, PR- Practical
OR-Oral, Gr-Group, B-Basic, C-Core, A-Application, M-Management.

Head of Department

Principal

1. SUBJECT DETAILS:-

Program: All	SEMESTER: I
Course: Basic Mathematics	Code: 120003
Group: B*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:-

Scheme of instruction & Periods Per Week					Theory Paper duration & marks			Scheme of Examination						Gr	Scheme L/Pr/Cr
L	P	D	T	Cr	Np	Hrs	Mks	SSL	Theory Paper	T/W	PR	OR	Total		
3	0	-	1	4	1	3	80	20	80	--	--	--	100	B*	404

3. RATIONALE:-

Basic Mathematics is classified as Basic Science subject which intends to teach students the facts concepts and principles of Mathematics that can be applied to solve problem in all Engineering courses

4. OBJECTIVES:-

Students will be able to understand

1. concepts of Partial Fractions, Determinant, Matrices and Binomial Theorem
2. concepts of Trigonometry and Coordinate Geometry
3. Applications of Trigonometry.

5. DETAILED CONTENTS:-

SECTION-I

(A)	ALGEBRA	HOURS	MARKS
1	PARTIAL FRACTION	06	08
	1.1. Definition of partial fraction, proper and improper fractions 1.2. To resolve into partial fractions - Linear factors - Repeated linear factors - Non repeated quadratic factors		
2	DETERMINANT	06	10
	2.1 Definition and expansion of 2 nd and 3 rd order determinant 2.2 Cramer`s rule to solve equations in 2 and 3 unknowns 2.3 Properties of determinant and solving problems		
3	MATRICES	12	12
	3.1 Definition of a matrix of order m x n and types of matrices 3.2 Addition, subtraction, scalar multiplication and multiplication between Matrices 3.3 Transpose of a matrix 3.4 Minor cofactor of an element of a matrix, adjoint of matrix and inverse of matrix by adjoint method 3.5 Solution of simultaneous equations containing 2 and 3 unknowns by		

	matrix inversion methods.		
4	BINOMIAL THEOREM	08	10
	4.1 Definition of combination 4.2 Expansion 4.3 Middle term 4.4 Independent term 4.5 Approximate value		
	TOTAL	32	40
SECTION-II			
5	TRIGONOMETRY	16	20
	5.1 Trigonometric ratios of allied compound and sub-multiple angles 5.2 Factorization and de-factorization formulae. 5.3 Inverse trigonometric functions , principle value 5.4 Properties of the triangle 5.5 Solution of triangle		
6.	CO-ORDINATE GEOMETRY	08	10
	STRAIGHT LINE 6.1 Slope and intercept of straight line 6.2 Equation of straight line - Slope point form - Slope intercept form - Two point form - Intercept form - Normal form 6.3 Intersection of two lines, angle, condition of parallel and perpendicular lines 6.4 Length of perpendicular from a point on the line 6.5 Perpendicular distance between two parallel lines		
	CIRCLE 6.6 Equation of circle - Centre radius form - Diameter form - Intercept form	08	10
	6.7 General equation of circle		
	6.8 Tangent line and normal line		
	TOTAL	32	40

6. Implementation Strategy(planning): Conducting lectures as per lesson plan and conducting tutorial in the same class room.

7. Reference Books:

Sr. No.	Author	Title	Publishers & Address
1.	Shri. S.P. Deshpande	Calculus for Polytechnics	Pune Vidyarthi Graha Prakashan Pune-30
2.	Shri. B.M. Patel Shri J.M. Rawal	Applied Mathematics	Nirali Prakashan Mumbai
3.	Dr. B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers 2/B, Delhi-6
4.	J.N. Wartikar, P.N. Wartikar	A text book of Applied Mathematics	Pune Vidyarthigraha Prakashan, Pune- 411030
5.	S.S.Sastry	Introductory methods of Numerical analysis	Prentice Hall of India –New Delhi
6.	M.K.Jain	Numerical method for Scientific and engineering computation	Wiley estern

8. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

Basics of Computer System

(T.W. = 50 Marks, Pr. = 50 Marks, Lecture 2/week,
Practical 2/week, Credit: 4)

SUB Code: 120002

Teaching And Examination Scheme:

Subject Group : B*	Scheme of Instructions and Periods per week			No. of Papers, duration & Marks	Scheme of Examination					Detailed Syllabus Ref. No.	Scheme L.Pr./Cr.
	Lecture	Pract. or Drg.	Tutorial		Sessional Work	Paper	Term work	Pract. Exam	Total		
Basics of Computer System	2	2	--	--	-	-	50 @	50**	100	--	224

Rationale:

This subject envisages making the students know the fundamentals of computer systems and its organisation. It will enable the students to comprehend the organisation 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 operating System., its design architecture, command structures.

Objective:

The student will be able to:

1. Get familiarized with computerisation.
2. Utilise computers in engineering /technical field.
3. Use computer concepts for Microsoft applications
4. Promote Computer Literacy .
5. Awareness of Open Source technology: Linux OS
6. Familiar with ERP .
7. Learn networking concepts
8. Operate Internet/e-mail facility

Theory Contents:**1. Fundamentals of Computer concepts :****(Periods-5 hrs,)**

Computer specifications PC, PC-XT , PC-AT, Pentium, net book, notebook, Hand held devices and its applications, general architecture of computers; Computer peripherals (I/O Device), Storage DEVICES , printers and output peripherals; General computer terms, computer software, system software, applications software , operating systems, advantages of software and application packages.

2. Introduction to Windows:**(Periods-2 hrs)**

Structure of a Window, Basic techniques for working in Windows Using Menus;, folder, files ,users management, Working with A dialogue box, Type of Options ; Starting Windows , Task Bar, Start Menu.

3. Introduction to Computer Network**(Periods-3 hrs,)**

Network Goals, Devices, Topologies, Cables and connectors, Addressing

4Introduction to MS-Office**4.1 Introduction to WORD package****(Periods-3 hrs)**

Starting Word Document ; Typing and Editing text, Copying and Moving, Typing Special Characters (Symbols); Some common features : Changing the case of text, Moving & copying text with drag and drop, Justifying text, inserting bulleted & numbered lists , Arranging and moving between open documents; Finding and replacing, formatting ; Using the spell checker , Checking grammar, mail merging

4.2 Concepts of POWER POINT**(Periods-3 hrs)**

How to make an effective presentation, Physical aspects of presentation ; A Presentation Graphics package ; 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; Slide show

4.3 Fundamentals of EXCEL

(Periods-4 hrs)

Starting EXCEL: What is a spreadsheet, creating & editing spreadsheet, modifying the sheet. Study of Toolbars, Formula bar and Status bar. Inserting Header and footer, cells, rows, columns, worksheet, formatting individual cells row, column, sheet, manipulating Data by using Sort. Saving and Retrieving saved worksheet.

5. LINUX as Operating System

Linux Fundamentals

(Periods-6 hrs)

Introduction to open source technology, advantages of linux, Basics of Unix & Linux, Multi-user & Multitasking capabilities of Linux, change of password, the file types, structures of file system, important directories of the file system.

6. Introduction to INTERNET:

(Periods-4 hrs)

What is INTERNET , intranet, client-server architecture ,various file formats , Application of INTERNET: E-mail, , WWW, Study of various search engine using LYNX, LOGIN PROCEDURE, Study of INTERNET EXPLORER, Creating mailing account, Surfing using WORLD WIDE WEB information relating to employment, education, alumni, social networking .

7. Introduction to Enterprise resource planning

(Periods-02hrs)

Introduction, ERP modules , ERP Vendors , Software, case studies : SAP.

Total Theory Hrs.= 32 hrs

Total Practical Hrs. = 32 hrs.

List of practical:

- 1) Study of Computer hardware and peripherals
- 2) Study of Networking Topologies and commands ipconfig,ping,netconfig etc.
- 3) i) Getting started with Windows by using different menus and working with dialogue box
ii) Working of Control panel, Screen saver and Help commands using Windows
- 4) i) Creating, Editing and Saving a document , Table using Word package
ii)Creating Document with Table, editing using special characters & saving.
iii) Using tool bar menus like Standard , Formatting , Tables and Borders
iv) Performing functions spell check , find , replace , go to , page setup , print preview and print commands.
5) i) Creating a new presentation and getting acquainted with various menus like FILE, EDIT, VIEW, INSERT, FORMAT, TOOLS, SLIDESHOW
ii) Choosing Auto Layout and working with tools and to prepare a slide show
iii) To Perform special effects using one slide show demonstration
- 6) Creating Spread Sheet for various combinations of computational tables.
- 7) LINUX basic commands.and Advanced commands.
- 8) Creating file using Vi editor, editing, saving file & quit from Vi editor.
- 9)Creating an internet account ,Internet terms, Use of Shell account and study of mailing , Software to send & receive mail on Hard Disk.
- 10)Use of Internet explorer package ,search Engine & retrieve education related information from TCP/IP account and downloading procedure

Reference Books:

1. Computer and Common sense by Hunt & Shelly.
2. Computer Fundamentals by V. Rajaraman (Prentice hall)
3. PC Guide for Windows (ITC Publication/Galgotia publication)
4. Learning Word 6.0 for Windows step-by-step, Galgotia.
5. Linux: TheComplete reference - 5/E by petterson
6. Unleashed Linux

Additional References:

1. Mastering MS Office (BPP Publication)
2. Data Communications and Distributed Networks, U.D. Black, Prentice-Hall

Website:

www.linux.org

www.mocrosoft.com

www.cisco.com

Shri Vile Parle Kelavani Mandal's
Shri Bhagubhai Mafatlal Polytechnic

1. SUBJECT DETAILS:

Course : C/M/E/IE/PL/CH/DE Engineering	Semester : I
	Duration : 16 Weeks
Subject : Chemistry-I	Sub Code : 120004
Group : Basic	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods per 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	Pract.	Oral	Total	
2	2	-	-	4	1	3	80	20	80	25	50**	-	175	2/ 2/ 4

3. RATIONALE:

This subject is classified under the category of Basic Sciences. It intends to develop the understanding of fundamental principles of chemistry. 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

- (i) Understand basic principles of chemistry.
- (ii) Apply the principles to other subject.
- (iii) Understand the language of chemistry.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Atomic Structure: 1.1 Dalton's Atomic Theory 1.2 Rutherford's Scattering Experiment 1.3 Drawbacks of Rutherford's Model 1.4 Bohr's Theory of an atom 1.5 Quantum numbers 1.6 Orbits and orbitals, shape of s and p orbitals 1.7 Pauli's exclusion principle	18	08

	1.8 Hund's rule		
	1.9 Aufbau principle		
	1.10 Heseinberg's Uncertainty Principle		
	1.11 Electronic configuration of first twenty elements		
	1.12 Study of inert gases		
	1.13 N/P Ratio		
	1.14 Nuclear stability mass defect and binding energy		
	1.15 Definition and types of valency - electrovalency, covalency, co-ordinate valency		
2.	2.0 Electrochemistry :	14	05
	2.1 Atom, ion		
	2.2 Arrhenius theory, degree of ionization		
	2.3 Mechanism of electrolysis		
	2.4 Faraday's Laws of Electrolysis.		
	2.5 Numerical problems based on its applications		
	2.6 Applications of electrolysis		
	a) Electroplating		
	b) Electrotyping		
	c) Electrorefining		
	d) Electrometallurgy		
3.	3.0 Metals and Metalloids :	08	03
	3.1 Types of metals		
	3.2 Mechanical Properties of Metals such as Hardness, Toughness, Ductility, Malleability, Tensile Strength, Tenacity, Machinability, Extrusion, Forging, Castability, Weldability, Soldering.		
	3.3 Physical properties and applications of some commonly used metals and metalloids such as Fe, Cu, Al, Cr, Ni, Sn, Pb, Zn, Ag, Si.		

SECTION-II

Chapter	Content	Marks	Hours
4.	4.0 Corrosion : 4.1 Definition 4.2 Types of Corrosion a) Atmospheric Corrosion b) Mechanism of Atmospheric Corrosion c) Immersed Corrosion – Galvanic Cell Type Corrosion, Concentration Cell Type Corrosion, Oxygen Concentration Cell Type Corrosion d) Mechanism of Immersed Corrosion 4.3 Factors affecting corrosion 4.4 Methods of prevention of corrosion. a) Purification of Metal b) Alloying c) Cathodic Protection d) Controlling External Environment e) Application of Protective Coatings 4.5 Methods of applying Metal Coating. a) Hot Dipping – Galvanizing, Tinning b) Metal Spraying c) Alloying – Sheradizing d) Electroplating e) Metal Cladding	20	09
5.	5.0 Water : 5.1 Sources of Water. 5.2 Impurities in natural water. 5.3 Physical and chemical characteristics of water. 5.4 Hardness of water a) Causes of Hardness of Water b) Types of Hardness – Temporary, Permanent c) Degree of Hardness of Water d) Estimation of hardness of water e) Disadvantages of hard water – for domestic purpose, industrial purpose, Steam generation in Boilers. f) Steam generation in Boilers – Boiler Corrosion, Scales & Sludges, Caustic Embrittlement, Priming & Foaming.	12	04
6.	6.0 pH : 6.1 Concept of pH 6.2 pH scale, applications of pH in industry	08	03

6.3 Problems based on hydrogen ion and hydroxyl ion concentration

Total	Marks	Hours
	80	32
Practice Hours	=	32

5A. PRACTICE:

List of Experiments:

01– 06: Techniques of determination of concentration of solutions:

Volumetric Analysis

- a) Neutralization Titration
 - i) Titration between Strong Acid and Strong Base using Phenolphthalein as indicator – 2 sets
 - ii) Titration between Strong Acid and Weak Base using Methyl Orange as indicator – 2 sets
- b) Redox Titration
 - i) Titration between KMnO_4 and $\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$
 - ii) Titration between KMnO_4 and Mohr's Salt [$\text{FeSO}_4 \cdot (\text{NH}_4)_2\text{SO}_4 \cdot 6\text{H}_2\text{O}$]

07- 08: Determination of:

- a) Hardness of water
 - i) EDTA method
 - ii) Soap Solution method
- b) Chloride content in water

09. Determination of pH of different solutions.

10. To prepare a chart showing application of metals like Fe, Cu, Al, Cr, Ni, Sn, Pb, Co.

6. IMPLEMENTATION STRATEGY (PLANNING):

- Theory topics and practice experiments should be done simultaneously. This will help the students to understand the topics.
- 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

QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-
Total	-	40	-	40	-	20

1. Subject Details

Subject (Code): Communication Skill (120005)

COURSE: ME/CE/EE

COURSE: PE/CH/DE/IE

Group : B*

Semester : I/I/I

Semester : II/II/II/II

2. Teaching and Examination Scheme

Scheme of Instructions and Periods per week					Theory Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/Cr
L	P	D	T	Cr	Hrs	Mks	SS L	Paper	TW	PR	OR	Total		
3	-	-	1	4	3	80	20	80	25@	-	-	125	B*	404

3.Rationale : The communicative competence in English is the pre- requisite for the employment market at national and international level today. However, the ability to communicate effectively does not come easily to many people. No matter how brilliant and invaluable your idea is, it is worthless until shared either orally or in written manner. Here arises the need to learn communication skills which will enable the students to enhance their comprehension, writing and oral skills in English.

4.Objectives:

1. Student will understand the process of communication.
2. Student will learn the various grammatical structures which will enhance their oral and written communication.
3. Student will be proficient in all four language skills (LSRW) Listening, speaking, reading writing
4. Students will acquire proficiency in spoken English by using language lab.

5.Detailed Contains

SECTION -1

Topic No.	Topic & Sub -Topics	Hours	Marks
1.	<u>Basics of communication</u> 1.1 Nature and Definition of communication 1.2 Process/ cycle of communication 1.3 Characteristics of communication 1.4 Objectives of Communication	04	06
2	<u>Methods of communication</u> 2.1 Verbal & Non verbal, 2.2 Formal & Informal 2.3 Oral & written Communication 2.3 Advantages & disadvantages Of Oral and written communication	03	06

3.	<u>Language Grammar</u> 3.1 Tense & its Types 3.2 Parts of speech 3.3 Degree and Its types 3.4 Use of Modal Auxiliary 3.5 Basic sentence types 3.6 Clause & its Types	04	06
4.	<u>Vocabulary Building</u> 4.1 Word Formation Processes Affixation : prefix ,Suffix, clipping , Backformation shortfoms, Acronyms etc 4.2 Technical jargons , 4.3 Nouns Ending with –tion, -er,-logy,-ee,-aire- metry , -ity 4.4 Errors arising out of wrong use of words	02	06
5	<u>Phonetics & Spoken English</u> 5.1 Language Skills : Listening & Speaking 5.2 English sound system (RP) Vowels & Diphthongs(RP) , Consonants(RP) 5.3 Word Accent , stress a Rhythm and Intonation	05	08
6	<u>Networks of Communication In organization</u> 6.1 Importance communication in Organization 6.2 Horizontal communication 6.3 Vertical – downward & upward 6.4 Grapevine communication 6.5 Diagonal Communication	03	04
7	<u>Non- Verbal Methods of Communication</u> 7.1 Body language and its aspects 7.2 Paralinguistic, use Colour , sign symbols for communication 7.3 Non verbal Codes : Haptics, Chronemics , Proxemics, Artifacts etc	03	04
Total	Total	24	40

SECTION –II

Topic No.	Topic & sub- Topics	Hours	Marks
8	<u>Barriers To communication</u> 8.1 Definition of Barrier 8.2 Types of barriers of communication Mechanical, Psychological , Linguistic, socio-cultural & Environmental etc 8.3 Elimination / Removal of barrier.	04	05
9	<u>Communication : Media & Technology</u> 9.1 Advanced Means Communication 9.2 Facsimile (FAX), Internet, E-mail, 9.3 Videoconferencing 9.4 Netiquettes	04	05
10.	<u>Letter writing</u> 10.1 Importance of business communication 10.2 7 Cs of Good writing , 10.3 Layouts: Block , semi –block ,Complete Block , 10.4 letter of Enquiry, Complaint , Order , letter to editor	05	10
11	<u>Reading comprehension</u> 11.1 Reading Unseen passages for comprehension	04	08
12	<u>Report Writing</u> 12.1 Definition of Report 12.2 Formats of reports 12.3 Types of Report : Accident, Committee Investigation etc.	04	08
13	<u>Paragraph writing</u> 13.1 Development of Paragraph on Given topic	03	04
Total		24	40

List of Assignments

1. Explain the process of communication with the help of diagram . Give some real life examples , functioning in the similar way .
2. Explain the four types of sentences , Give at least two examples of each .
3. List down the relationship between the clause and sentence , give an example of it .
4. Find out any twenty difficult words from the English newspaper and understand their meaning by using dictionary and use it in your own sentences.

5. Listen and repeat the teacher's (or recorded) pronunciation of the given group of words(#)
6. Define syllable, vowel and consonant form RP , give at least five examples of each.
7. Listen the recorded CD's on particular topic , and try to imitate the pronunciation by following intonation and rhythm .(#)
8. Read the given passage and record it in your own voice the check the correctness of pronunciation. (#)
9. Listen and mark the primary ,secondary accent for following words . (#)
10. Write the phonetic transcription of given words by using dictionary .(#)
11. List down the points related to non verbal communication to be remembered while walking for an interview , and on the stage.
12. Collect the resume of an eminent personality (like scientist , social worker , industrialist or renown politician) an prepare a speech introducing him / her.
13. Explain the Various formats of letter writing and give an examples of each.
14. Develop the paragraph on the given topic .

Note :

1. Each student has to attempt any ten assignments.
2. # marked are compulsory assignments to be conducted in Language Lab.

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching Plan
2. Tutorials / assignments

Reference Books:

Name of book	Author	Publication
Business Communication	Lesikar and Petic	Tata Mcgraw Hill Publication New Delhi . 1995
Business communication	P.C Perdesi	Nirali Publications, Pune. 2000
Communication Skills for Technical students	-----	Orient Longman New Delhi .
Business Communication	Dr. Urmila Rai	Himalaya Publication, Mumbai .

QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-
Total	-	40	-	40	-	20

1. SUBJECT DETAILS:

Course : Diploma in Electrical Engineering	Semester : I
Subject : Electrical Workshop	Code : 120301
Group: B*	
Group: Basic (B*)	COMPULSORY

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions and Periods per Week				No. of papers, duration and Marks			Scheme of Examination						Scheme L/Pr/Cr
L	P	T	Cr	NP	Hrs	Mks	SSL	Th paper	TW	Pract	Oral	Total	
-	4	-	4	-	-	-	-	-	50@	-	-	50	044

3. RATIONALE:

The subject gives general idea about Electrical Engineering. Students are introduced to various types of wires, switches and meters. Students will be exposed to see and handle the various types of wires used for domestic and commercial applications.

4. OBJECTIVE

Students will be able to understand

1. Various types of wires, switches as per IS and IEC Standards.
2. Various types of meters
3. The connections for different types of wirings

5. PRACTICALS :

1. Study of Electrical Symbols
2. Study of Ammeter and Voltmeter
3. Study of wattmeter and Energy Meter
4. Study of Millimeter
5. Types of Wires-TRC/CTS/PVC
6. Study of Wiring Circuits- Series/Parallel/Staircase

7. IMPLEMENTATION STRATEGY:

- 1 As per Lab plan .

6. REFERENCE BOOK:

1. Electrical Wiring Estimation and Costing By Dr. S L Uppal, Khanna Publication, Delhi

1. SUBJECT DETAILS:

Courses :EE/IE/PE/CH/DE	Semester : I
	Duration : 16 Weeks
Subject: Engineering Drawing – I	Code : 120014
Group : C*	

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	PR	Total
			Hrs	NP	Mks					
02	04	06	-	-	-	-	-	50 @	50**	100

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, missing views, 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 : 1.1 Importance of Engineering Drawing for the study of technical courses 1.2 Drawing instruments, types of lines and dimensioning. 1.3 Scale (reduced, enlarged and full size) Plain scale and diagonal scale. 1.4 Geometrical constructions. Practice sheet/s: 1. One sheet on lettering, lines, dimensioning techniques and geometrical constructions.	-	02
02	2.0 Principal Planes and Quadrants: 2.1 Concept of principal planes and quadrants 2.2 I and III angle method of projections	-	01
03	3.0 Orthographic Views :	-	02

3.1 Projections of various objects having flat and curved surfaces using I and III angle projection method.

Practice sheet/s: -

- i) One sheet on orthographic projection four objects with linear features
- ii) Home Assignment: Four problems in sketchbook.

04 **4.0 Conversion of Pictorial View :** 04

4.1 Conversion of pictorial views in to non-sectional orthographic views. The objects may have slots, holes cavities etc.

Practice sheet/s:

1. One sheet with non sectional orthographic views for the objects with curvilinear features.
2. Home Assignments: Four problems in sketchbook.

05 **5.0 Isometric Views and Projections:** 04

5.1 Isometric Views and Projections of linear and curvilinear features.

Practice sheet/s:

1. One sheet with four problems on Isometric view having linear and curvilinear features.
2. On sheet with four problems on Isometric projection having linear and curvilinear features.
3. Home Assignments: Four problems in sketchbook .

06 **6.0 Engineering curves :** 03

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 sheet/s: -

1. One sheet with four Problems containing cycloid, epicycloids, hypocycloid, involute and helix
2. Home Assignments: Four problems in sketchbook.

SECTION-II

07 **7.0 Conversion of Pictorial View into Sectional Orthographic:** 06

7.1 Conversion of pictorial views with cutting plane into sectional orthographic projection (full section only)

Practice sheet/s:

1. One sheet with four problems.
2. Home Assignments: Four problems in sketchbook.

08 **8.0: Missing Views :** 05
 8.1 Given two views (F.V. – T.V. or F.V.-S.V.) ,deriving the third view-non sectional or sectional.
 8.2 Full section
 8.3 Half section
 8.4 Offset section concept.
 Practice sheet/s:
 1. Two sheets with four problems each.
 2. Home Assignments: Four problems in sketchbook.

09 **9.0 Conic Sections:** 05
 9.1 Ellipse: Oblong, arcs of circle and concentric circle method.
 9.2 Parabola: Eccentricity and rectangular methods.
 9.3 Hyperbola: Eccentricity and rectangular methods.

 Practice sheet/s:
 1. One sheet with four problems on Ellipse Parabola and Hyperbola, Involute and Helix.
 2. Home Assignments: Four problems in sketchbook.

6. IMPLEMENTATION STRATEGY (PLANNING) :

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

1. Theory Teaching Plan
2. Term Work Plan for practical giving problems to draw in the class.
3. Home assignments to practice at home
4. Conduct of three periodical test
5. Use of OHP models and charts 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 : CE/ME/EE/IE/PE/CH/DE	Semester : I
Subject : PHYSICS-I	Subject Code : 120008
Group : B*	Duration : 16 Weeks

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods per 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	Pract.	Oral	Total	
2	2	-	-	4	1	3	80	20	80	25@	50**	-	175	2/ 2/ 4

RATIONALE:

The student has to attain a remarkable knowledge level regarding properties of materials and laws of Physics via concepts of “matter”, “energy” and “measurement”. This stands fundamentals, essential for various branches of engineering and involves a theory and practical approach with due stress on practical application aspect of the subject. This is emphasized by widening scope of Laboratory work, selecting such text and specialized reference books.

4. OBJECTIVES:

Student will be able to :

1. Appreciate the importance of precision involved in measurement.
2. Acquire the knowledge of material properties and laws of Physics.
3. Understand heat as energy, concept of temperature and its measurement, Behaviour of gases, concept of heat engine.
4. Understand nature of sound energy, its propagation, acoustic details, utilization of ultrasonic waves.

5. DETAILED CONTENTS:

A) THEORY CONTENTS:

SECTION-I

	Marks	Hours
Chapter 1 <u>Measurement of physical quantities and units</u>	-	02
1.1 System of units: CGS, MKS, FPS, MKSA; Units: Fundamental, Derived, Supplementary, Conversions		
1.2 SI Units and Standards- ‘metre’, ‘kilogram’, ‘second’, ‘degree kelvin’, ‘candela’, ‘ampere’, ‘mole’		

Chapter 2	<u>General Physics</u>	08	04
	2.1 Elasticity 'Elasticity' 'Modulii', Poisson's ratio, Measurement by Searle's method, Elastic behavior of wire, Engineering applications, Numerical problems.	04	02
	2.2 Surface Tension and Capillarity Molecular theory, Surface Tension and Capillarity, Applications, Numerical Problems.	08	03
	2.3 Viscosity Streamline flow, Critical velocity, Newton's formula, 'poise'. Poiseuille's equation, Stokes formula, Applications, Reynolds number, Numerical Problems.		
Chapter 3	<u>Heat</u>		
	3.1 Specific heats of gases C_p and C_v in terms of enthalpy, Mayer's relation, Numerical problems.	10	02
	3.2 Heat Transfer – Conduction Steady state, Temperature gradient, Coefficient of Thermal conductivity, Thermal conductivity of a good conductor – Searle's method, Thermal conductivity of rubber tube – Calorimetric method, Thermal conductivity of a poor conductor – Lee's method.	10	03
		TOTAL	40
			16
<u>SECTION-II</u>			
Chapter 4	<u>Thermodynamics</u>		
	4.1 Thermometry: Zeroth law, Standard gas thermometer, Platinum resistance thermometer, Thermo-electric thermometer, Optical pyrometer.	06	03
	4.2 Elementary Thermodynamics : Mechanical equivalent of heat and First law of thermodynamics, Isothermal and Adiabatic processes.	06	02
	4.3 Thermodynamic processes – Reversible, Irreversible. P-V diagram, Heat engine, Entropy.	04	01
Chapter 5	<u>Sound</u>		
	5.1 Simple Harmonic Motion: General equation of SHM, Graphical representation, Numerical problems.	04	02
	5.2 Wave Motion: Types of waves, Forced vibration and Resonance, Velocity of sound (tube closed at one end), Numerical problems, Sonometer- frequency of A.C. supply.	08	03
	5.3 Intensity of Sound : 'phon', 'decibel', Logarithmic formula for Intensity of sound.	04	02

5.4 Acoustics and Reverberation: Reverberation, Sabine's formula, Numerical problems, Acoustical planning, Noise reduction and Sound Insulation, Ultrasonic – Production and Uses; Sonic, Subsonic, Supersonic.

08 03

TOTAL 40 16

B) PRACTICAL CONTENTS:

a) Experiments to be performed (Any 08)

1. Use of Measuring Instruments – Vernier Callipers, Micrometer Screw Gauge, Spherometer.
2. Young's Modulus by Searle's Apparatus
3. Elastic Constants by Searle's Method.
4. Surface tension by Capillary rise method
5. Viscosity by Poiseuille's method
6. Viscosity by Stokes method
7. Ratio of Specific Heats Cp/Cv by Clement and Desorme's Apparatus
8. Thermal Conductivity of a Good Conductor by Searle's Apparatus.
9. Thermal Conductivity of Rubber Tube by Calorimetric Method.
10. Thermal Conductivity of an Insulator by Lee's Method.
11. Constant Volume Thermometer
12. Velocity of Sound by Resonance.
13. Velocity of Sound by C.R.O.
14. Frequency of A.C. Supply by Sonometer and Verification by C.R.O.

b) Demonstrations (Any 04)

- (i) Use of Precision Measuring Instruments (Dial Vernier, Dial Micrometer, Traveling Microscope etc.)
- (ii) Poisson's Ratio for Rubber Tube
- (iii) e.m.f. of a Thermocouple
- (iv) Temperature of Flame (Optical Pyrometer)
- (v) Study of Ultrasonics

6. Term-Work:

Compulsory term-work on the list of experiments written in a journal and carrying 25 marks on timely submission basis specified at the index sheet of Physics Journal.

7. Scheme of Practical Examination:

- (i) Each candidate will be examined in one experiment from among those prescribed in the syllabus. The duration of the experiment will be two hours (with a coupling of Demonstration if any).
- (ii) 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, adjustments and observations	20 Marks
(b) Circuit Diagram, figures and tabulation	10 Marks
(c) Formula, calculations and graphs if any	10 Marks
(d) Oral	05 Marks
(e) Correct answer or appropriate result	05 Marks
<hr/>	
Total	50 Marks

- (iii) Each candidate will be jointly examined by both External and Internal Examiners.
- (iv) Certain demonstrations are coupled with certain conventional experiments during the examination. Marks allotted for demonstration are 15 and marks for conventional experiments are 35. The conventional experiment is assessed out of 50 as mentioned under (iv) in the above scheme and then converted out of 35. Assessment of a demonstration is judged by answers (oral or written) given by candidate in front of the relevant demonstration setup.
- (v) 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.
- (vi) While assessing, the overall performance and the ability of the candidate to handle the apparatus independently, will be considered.

8. IMPLEMENTATION STRATEGY (PLANNING):

- (i) Theory – Lesson Plan
- (ii) Practical – Scheme of marking for T/W, Scheme of assessment for Practical Examination.

9 (a). TEXT BOOKS:

Sr.No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	R.K. Gaur and S.L. Gupta	Engineering Physics	Any	1981-96 2001 Reprint 2004, 2008	Dhanpat Rai & Sons, New Delhi
2.	M.R. Shrinivasan	Physics for Engineers	Any	1976	New Age International, New Delhi
3.	P.G. Kshirsagar and M.N. Avadhunuhu	A Text Book of Engineering Physics	Any	1992 Reprint 1993 till 2005	S. Chand and Co. Ltd, New Delhi
4.	Gambhir, Durgapal and Banerjee	Introductory Physics - Vol- 1,2 &3.	Any	1972	Wiley Eastern

9 (b). REFERENCE:

Sr.No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Resnik and Halliday	Physics Vol. 1 & 2	Any	1986	Wiley Eastern
2.	B.L. Theraja	Engineering Physics	Any	1962 Reprint 1974-87	S. Chand and Co. Ltd, New Delhi

QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-
Total	-	40	-	40	-	20

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
TEACHING AND EXAMINATION SCHEME

ELECTRICAL ENGINEERING
 2012(Progressively)
 SEMESTER-II

w.e.f Batch admitted in June,

Sr. No.	Subject and Code	Pre-requisite	Scheme of Instructions and Periods per week					Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/C		
			L	P	D	T	C	Hrs	Mks	SSL	PP	TW	PR	OR	TTL				
2-1	Applied Mechanics 120001	-	3	2	-	-	5	03	80	20	80	50 @	-	-	150	C*	325		
2-2	Dev. Life Skill 120006	-	2	-	-	1	3	-	-	-	-	50 @	-	50 **	100	B*	303		
2-3	Workshop Practice 120009	-	1	4	-	-	5	-	-	-	-	50 @	-	-	50	C*	145		
2-4	Chemistry-II 120010	-	2	2	-	-	4	03	80	20	80	25 @	50 **	-	175	B*	224		
2-5	Engg. Mathematics 120012	-	3	-	-	1	4	03	80	20	80	-	-	-	100	B*	404		
2-6	Physics –II 120013	-	2	2	-	-	4	03	80	20	80	25 @	50 **	-	175	B*	224		
2-7	Engineering drawing-II 120015	-	2	-	4	-	6	-	-	-	-	50 @	50 **	-	100	C*	246		
TOTAL			15	10	4	2	31	04 PAPERS		80	320	250	150	50	850				
TOTAL PERIODS = 31										TOTAL MARKS = 850									

* Compulsory , # Award winning subject , ** assessed by internal and external examiners jointly,@ Assessed by internal examiner only
 L-Lecture period, P-Practical period, D- Drawing practice Period ,T- Tutorial, Cr-Credit, SSL –Sessional, TW-Term work, PR- Practical
 OR-Oral, Gr-Group, B-Basic, C-Core, A-Application, M-Management.

Head of Department

Principal

1. SUBJECT DETAILS:

Course : PE CH IE DE /CE ME EE	Semester: I / II
	Duration : 16 Weeks
Subject : Applied Mechanics	Code : 120001
Group : 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	Sessional Marks	Term Work	Practical /Orals	Total
			Hrs.	N/P	Mks					
3	2	5	3	1	100	80	20	50@	-	150

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

Chapter	Topics	Periods	Marks
1	Introduction to Mechanics, 1.1 Mechanics definition, classification, Statics & Dynamics, Kinematics, kinetics 1.2 Fundamental units of measurements (FPS, MKS, SI), derived Units, Conversion of units, Scalars & Vectors with examples 1.3 Definition of particle, body and rigid body, mass & weight.	03	06
2	Resolution Of Forces 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.	05	08

	<p>2.3 Resolution of a force into two components along any directions.</p> <p>2.4 Resolution of a force into two components at right angles to each other by analytical method.</p> <p>(Applications levers, chain & links, connected bodies like trains etc.)</p>		
3	<p>Composition Of Forces</p> <p>3.1 Composition, Resultant of force</p> <p>3.2 Law of parallelogram of forces,</p> <p>3.3 Moment of force, couples lever arm,</p> <p>3.4 Varignon's theorem</p> <p>3.5 Resultant of coplanar concurrent, parallel, and non-concurrent, non parallel forces</p> <p>(Applications in shafts, crane, joints of trusses, etc)</p>	05	08
4	<p>Equilibrium</p> <p>4.1 Definition of equilibrant., relation between Resultant and Equilibrant, Conditions of Equilibrium, Types of Equilibrium Stable, Unstable and Neutral equilibrium</p> <p>4.2 Equilibrium of coplanar concurrent forces, Lami's theorem.</p> <p>4.3 Equilibrium of coplanar parallel forces & coplanar Non- concurrent Forces.</p> <p>4.4 Analytical conditions of equilibrium for coplanar concurrent & Non-concurrent Forces.</p> <p>(Applications of crane stability, link mechanisms, inclined plane, wedges, anchor blocks for water pipe lines, balance, levers, pulley & pulley blocks)</p> <p>Practicals:</p> <p>(a) Simple roof truss.</p> <p>(b) Bell crank lever.</p> <p>(c) Levers of different types.</p> <p>(d) Extension of Springs.</p> <p>(e) Compression of springs</p>	06	10
5	<p>Beam Reactions</p> <p>5.1 Types of supports (constraints), simple, roller, hinged & fixed.</p> <p>5.2 Types of Beams, simply supported, hinged & roller supported, Cantilever, Over hang Beams.</p> <p>5.3 Types of Loads, Point(Concentrated) Load, Uniformly Distributed Load(U D L)</p> <p>5.4 Problems on above combination of loads</p> <p>(Application like bearings of shafts, guy, rocker and roller supports of railway bridges,)</p>	05	08
SECTION II			

6	<p>Friction 6.1 Definition, types of friction, Static friction, dynamic friction 6.2 Fundamental laws of static friction. Coefficient of friction. Cone of friction. Angle of friction, Angle of repose, Rolling friction 6.3 Study of inclined plane, wedge and block system, ladder friction. (Application in clutches, Brakes, Dynamometers, journals, Belt & Rope drives, stator & Rotor in electric motors, Bearings.) Practicals: (a) Friction between wooden surfaces (b) Friction between wooden surfaces and glass, metal surfaces</p>	06	10
7	<p>Centre of gravity 7.1 Center of gravity of solids, centroid of plane laminas, definition, 7.2 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. 7.3 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>	06	10
8	<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 1. Study of machines – Simple and Differential Axle & Wheel 2. Weston differential pulley block, Simple screw jack, Worm & Worm Wheel, Single & Double purchase crab winch, system Of pulleys.</p>	06	10
9	<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- parallelfoces 1. Applications in finding reactions of beams Stresses in</p>	06	10

	simple frames		
	Total	48	80

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.
6	S S BHAVIKATTI	Applied Mechanics			Tata Mcgregw Hill

QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-
Total	-	40	-	40	-	20

Shri Vile Parle Kelavani Mandal's
Shri Bhagubhai Mafatlal Polytechnic

1. SUBJECT DETAILS:

Course : C/M/E/IE/PL/CH/DE Engineering	Semester : II
Subject : Chemistry-II	Duration : 16 Weeks
Group : B*	Code : 120010
	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods per Week					No. of Papers, Duration & Marks			Scheme of Examination						Scheme L/Pr/Cr.
L	P	D	T	Cr	NP	Hrs	Mks	SSL	Theory Paper	TW	PR	Oral	Total	
2	2	-	-	4	1	3	80	20	80	25@	50**	-	175	224

3. RATIONALE:

This subject is an extension of Chemistry-I and is classified under the category of Basic Sciences. The subject intends to impart knowledge of various engineering materials, their properties, selection of material and applications in various engineering field.

4. OBJECTIVES:

After studying the subject the student will be able to

1. Identify the properties of metals and non-metallic materials.
2. Select materials for different engineering applications.
3. Compare the effects of pollutants on environment and will be able to suggest preventive measures.
4. Understand the importance of pollution free environment.

5. DETAILED CONTENTS:

SECTION-I

Chapter	Content	Marks	Hours
1.	1.0 Metallurgy : 1. Definition of Metallurgy 2. General metallurgical processes 1. Concentration by Gravity Separation, Electromagnetic Separation, Froth Floatation. 2. Chemical Processes - Calcination, Roasting 3. Reduction – Smelting, Aluminothermic Process, Electrolysis. 4. Refining – Poling, Liquation, Distillation, Electrolytic Refining 5. Metallurgy of iron 1. Occurrence of Iron, 2. Extraction of iron by Blast Furnace 3. Classification of steel – Based on its carbon content and its applications. 4. Properties of cast iron, wrought iron and steel. 5. Effects of elements on properties of steel. 6. Heat treatment of steel – Hardening tempering, annealing and normalizing	22	09
2.	2.0 Alloys : 1. Definition 2. Preparation of Alloys	10	04

	3. Classification of Alloys 4. Purposes of Alloying 5. Properties, composition and application of following non-ferrous alloys: (i) Duralumin (ii) Magnalium (iii) Monel metal (iv) Alnico (v) Babbit metal (vi) Gun metal (vii) Brass (viii) Bronze		
3.	3.0 Thermal Insulators : 1. Definition and characteristics of Thermal Insulators 2. Preparation, properties and applications of Thermocole and Glasswool. 3. Properties and applications of Asbestos and Cork.	08	03

SECTION-II

Chapter	Content	Marks	Hours
4.	4.0 Lubricants : 1. Definition 2. Functions of Lubricants 3. Types of lubricants 4. Types of lubrication 1. Fluid Film Lubrication 2. Boundary lubrication 3. Extreme pressure lubrication 1. Classification of Lubricants 2. Characteristics of Lubricants 1. Degree of acidity 2. Saponification number 3. Viscosity & Viscosity index 4. Flash and fire point 5. Pour point & Cloud point 1. Selection of Lubricants	18	07
5.	5.0 Polymer Chemistry: 1. Plastics 1. Definition 2. Types of plastics 3. Properties of plastics 4. Engineering applications of plastics 1. Rubber 1. Natural and Synthetic Rubber 2. Properties – elasticity, abrasion, resistance, Tack, Rebound, Hardness, Stress, Strain. 3. Vulcanization of Rubber 4. Applications of Rubber.	06	03
6.	6.0 Protective Coatings: 1. Purposes of applying Paints 2. Characteristics of good paints 3. Constituents of paints 1. Pigments 2. Vehicle 3. Thinners 4. Driers 5. Fillers 6. Plasticizers 1. Application of Paints 2. Failure of Paint Film 3. Varnishes 4. Types of Varnishes	06	03

	5. Characteristics of Good Varnish 6. Applications of Varnishes 7. Distinction between Paints & Varnishes		
7.	7.0 Environmental Chemistry: 1. Causes of pollution 2. Types of Pollution 1. Air Pollution – Air Pollutants: sulphur dioxide, sulphur trioxide, carbon monoxide, nitrogen dioxide, carbon dioxide, Green House Effect, Global Warming 2. Water Pollution – Sources & Effects of Water pollution 3. Noise Pollution – Sources & Effects of Noise pollution 1. Methods of preventing: 1. Air Pollution 2. Water Pollution 3. Noise Pollution 1. Medical Waste and e-waste – their origin and disposal	10	03

Total	Marks	Hours
	80	32
Practice Hours	=	32

5A. PRACTICE:

List of Experiments:

01– 08: Qualitative Analysis of **Eight Solutions** containing One Basic and One Acidic Radical listed below:

- Basic Radicals:** Pb^{+2} , Cu^{+2} , Al^{+3} , Fe^{+2} , Fe^{+3} , Ca^{+2} , Ba^{+2} , Mg^{+2} , K^+ , Na^+ , NH_4^+ .
- Acidic Radicals:** Cl^- , SO_4^{-2} , CO_3^{-2} , NO_3^- .

09. Determination of Viscosity Index of a Lubricant.

10. Determination of Flash Point of a Lubricant using:

- Abel's Flash Point Apparatus
- Pensky Marten's Flash Point Apparatus

6. IMPLEMENTATION STRATEGY (PLANNING):

- Theory topics and practice experiments should be done simultaneously. This will help the students to understand the topics.
- 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

Development of Life Skills

COURSE: ME/CE/EE

COURSE: PE/CH/DE/IE

Sub Code: 120006

Semester : II/II/II

Semester : I/I/I/I

Group : B*

Teaching and Examination Scheme

Scheme of Instructions and Periods per week					Theory Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/Cr
L	P	D	T	Cr	Hrs	Mks	SSL	Paper	TW	PR	OR	Total		
2		-	1	3	-	-	-	-	50@	-	50**	100	B*	303

Rationale : Human resource is the most important resource. Until this resource is motivated and utilized to the maximum, organizational effectiveness cannot be achieved. There is need to help students in the overall growth of personality and train them in organizational requirements their workplace. Students coming from various rural and cultural backgrounds face variety of complexities to function globally, as they lack in interpersonal skills, self –motivations, leadership and business ethics. Thus learning basic life skills like Time management, Leadership, Conflict Management, Negotiation, and Decision Making will imbibe social adaptability and human sensibility as an integral part of their mind set.

Objectives:

1. Students will learn various life skills to increase his/ her efficiency and utility at workplace.
2. The student will learn to perform the given task with innovative ideas.
3. The Student will learn to express his /her view and experiences on various topics.
4. The Student will learn to make maximum use of time for more creative and constructive work.
5. Students will learn how to cope with stress of study and work .

Topic No.	Topic & sub Topic	Hours	Marks
1.	<u>Area of Self Development</u> 1. Introduction, 2. Areas of self development, 3. self analysis,	02	07
2	<u>Time Management</u> 2.1 Introduction, 2.2 Time planning, How to plan time, 2.3 Time wasters, Time management 2.4 Time matrix etc.	02	06
3.	<u>Stress Management</u> 3.1 Definition of stress, 3.2 Types of personality and stress, 3.3 Sources of stress 3.4 Stress Busters 3.5 Psychological reaction to stress 3.6 Yoga and stress control . etc	02	08

4	<u>Emotion</u> 4.1 Emotional Maturity 4.2 Emotional Stability and Emotional Intelligence, 4.3 How to control Emotions etc.	03	07
5	<u>Frustration</u> 4. Definition of frustration, 5. Anatomy of frustration, 6. Causes of frustration, 7. Effects of frustration, 8. handling of frustration	02	07
6 7	<u>Motivation</u> 6.1 Introduction to Motivation 6.2 Self- Motivation , 6.3 Attitude & Aptitude etc <u>7. Interpersonal Skills</u> 7.1 Interpersonal Relations 7.2 Factors of Attraction, 7.3 Personal Effectiveness, Assertiveness/ Non-assertiveness , 7.4 Empathy	02 03	07 08
8	<u>Conflict Management</u> 8.1 Definition of Conflict 8.2 Sources of Conflict , 8.3 Types of Conflict, 8.4 Conflict Resolution , 8.5 Steps In Conflict Resolution	02	08
9	<u>SWOT Analysis</u> 9.1 Concept of SWOT 9.2 Scope of SWOT, 9.3 SWOT as decision making tool , 9.4 How to go about SWOT	02	07
10.	<u>Ethics</u> 10.1 What Are Ethics? 10.2 Values & Value formation 10.3 Moral Development 10.4 Decision Making	02	07
11.	<u>Group discussion & Interview techniques</u> 11.1 Importance of Objective GD 11.2 Procedure for GD, 11.3 Evaluation criteria for GD. 11.4 Types of interviews 11.5 preparation for interviews 11.6 Some Do's and Don'ts for interview 11.7 FAQ in interview	04	08

12.	<u>Study Habits</u> 12.1 Establishment of good study habits 12.2 Efficient use of time 12.3 Prioritize the work 12.4 power of concentration 12.5 setting comfortable place for study 12.6 visiting library 12.7 staying alert 12.8 Review of class notes 12.9 study can be funny.	02	07
13	<u>Working in Team</u> 13.1 Definition of Team 13.2 Importance and necessity in working team 13.3 Team dynamics 13.4 Transforming groups into teams	02	07
14	<u>Task Management</u> 14.1 Definition of task 14.2 Task characteristics, 14.3 Task sponsor and task stakeholder 14.4 Planning the task 14.5 Task evaluation	02	06
		32	100

List of Assignments:

1. Identify your areas of self development and plan strategies to improve it.
2. Enlist your time- wasters. And write down how you use your time on any average day, and see how you can improve time utility.
3. Expose yourself to situations that irritate and make you angry. Enlist the thing you will do to remain calm.
4. Look back in your life and list five occasions, when you were frustrated, Recall the strategies you used to overcome that frustration.
5. What are the things that motivate you (Friendliness, Warmth, Honesty, Appreciation) and Things that Demotivate you (Rejection , Criticism, Fear of failure , insult)
6. Enlist the ten various sources of interpersonal conflicts, and Methods to resolve it.
7. Listen to lecturer on particular topic and take down notes and check how good you were in capturing the structure, hierarchy of concepts and essence of speech.
8. What are the things you would do, if you have only One week to live. ?
9. Make a general purpose SWOT analysis to discover your strengths and learning areas and on the basis of that decide a career .
10. Identify some negative attitudes you have and find solutions for replacing it
11. Identify your values and prepare a code of ethics for yourself .

(Note: Teacher will do necessary changes in the assignments as per requirement) .

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Theory topics and practice experiments should be done simultaneously. This will help the students to understand the topics.

7.Reference Books:

Name of book	Author	Publication
Organizational Behavior	Fred Luthans	Tata McGraw Hill Sixth 1992
Basic managerial skills for all	E .H. Megrath	Prentice Hall of India Ltd 1989
Managing Time First	Dr.R.L.Bhatia	Wheeler Publishing 1994
Development of Generic skill - I & Development of life skills -II	K . Sudesh	Nandu Publication ,Mumbai
How to motivate people	Patrick Forthsayth	Kogan page first Edition 200

1. SUBJECT DETAILS :

Courses : CE/EE/PE/CH	Semester : II
Subject: Engineering Drawing-II	Subject Code : 120015
Group :C*	Duration : 16 Weeks

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	PR	Total
02	04	06	-	-	-	-	-	50@	50**	100

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 concept of straight lines, planes and solids in space and section of solids, development of surfaces. They are introduced to machine drawing by screw fasteners.

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 Projection of Straight Lines : 1.1 Projections of lines inclined to both the reference planes (no traces) (both ends of line in one quadrant only) Practice Sheet/s 1. One sheet with four problems 2. Home Assignments: Four problems in sketchbook.		04

02	2.0 Projection of Planes : 2.1 Projection of planes – regular polygons and circle. inclined to both the reference planes. - Practice Sheet/s 1. One sheet with four problems 2. Home Assignments: Four problems in sketchbook	05
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03	3.0 Projections of Solids : 3.1 Projection of solids like prisms, pyramids, cylinders and cones with axis inclined to both the reference planes. Practice Sheet/s 1. One sheet with four problems 2. Home Assignments: Four problems in sketchbook.	07
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SECTION – II

04	1. Section of Solids 4.1 Auxiliary inclined and auxiliary vertical sections of prism, pyramid, cylinder and cone 1. Projection of true shape of the sections (Solids resting on its base. Prism and cylinder with axis parallel to both reference planes.) Practice Sheet/s (i) One sheet on four problems of sections of solids (ii) Home Assignment: Four problems in sketchbook.	05
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05	Development of Lateral Surfaces of Solids 5.1 Development of lateral surfaces of prisms, pyramids, cone and cylinder 5.2 Antidevelopment - Practice Sheet/s (i) One sheet on four problems of development. (ii) Home Assignments: Four problems in sketchbook	06
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6.1 Different profiles of threads

6.2 Conventional representations of left hand – right hand threads, single and multistart square threads, external and internal threads.

1. Different types of nuts.
2. Different types of bolts.
3. Lock nuts (Castle, slotted nut, simond's nut etc) use of plane and spring washers.

Practice Sheet/s

1. One sheet with Problems on various screw fasteners to be sketched by free hand.
2. Home Assignments: Four problems in sketchbook.

6.IMPLEMENTATION STRATEGY (PLANNING) :

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

- i) Theory Teaching Plan
- ii) Term Work Plan for practical giving problems to draw in the class.
- iii) Home assignment to practice at home
- iv) Conduct of three periodical test
- v)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:-

Program: All	SEMESTER: II
Course: Engineering Mathematics	Code: 120012
Group: B*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:-

Scheme of instruction & Periods Per Week					Theory Paper duration & marks			Scheme of Examination						Gr	Scheme L/Pr/Cr
L	P	D	T	Cr	Np	Hrs	Mks	SSL	Theory Paper	T/W	PR	OR	Total		
3	0	-	1	4	1	3	80	20	80	--	--	--	100	B*	404

3. RATIONALE:-

Engineering Mathematics is classified as Basic Science subject which intends to teach students the facts concepts and principles of Mathematics that can be applied to solve problem in Engineering field

4. OBJECTIVES:-

Students should be able to understand

1. Derivatives and applications of derivatives in different areas
2. Complex numbers and Vector Algebra and their various applications.

5. DETAILED CONTENTS:-

SECTION-I

Chapter	Contents	Hours	Marks
1.	FUNCTION AND LIMIT	14	18
	1.1. Definition of variable , constant, value of function , composite function 1.2. Limits of algebraic, trigonometric ,exponential and logarithmic functions		
2.	DERIVATIVES	18	22
	2.1 Definition of Derivatives 2.2 Rules of Differentiation 2.3 Composite function 2.4 Inverse trigonometric function 2.5 Implicit function 2.6 Logarithmic function 2.7 Parametric function 2.8 Derivative of one function w.r.t. another function 2.9 Second order differentiation		
	TOTAL	32	40
	SECTION-II		

3	APPLICATION OF DERIVATIVES	08	12
	3.1 Geometrical meaning of Derivative 3.2 Tangent and normal line 3.3.Rates 3.4 Velocity and Acceleration 3.5 Maxima and minima 3.6 Radius of curvature		
4	COMPLEX NUMBER	16	16
	4.1 Definition of complex number 4.2 Algebra of complex number, equality, addition, subtraction, multiplication and division 4.3 De Moivre's theorem 4.4 Euler's form of circular function 4.5 Hyperbolic functions		
5	VECTOR ALGEBRA	08	12
	5.1 Definition of vector 5.2 Algebra of vectors, equality, addition, subtraction and multiplication, 5.3 Dot product 5.4 Cross product 5.5 Scalar triple product 5.6 Work done 5.7 Moment of force about a point and line 5.8 Area of triangle, parallelogram 5.9 Volume parallelepiped, tetrahedron		
	TOTAL	32	40

6. Implementation Strategy(planning): Conducting lectures as per lesson plan and conducting tutorial in the same class room

7. Reference Books:

Sr. No.	Author	Title	Publishers & Address
1.	Shri. S.P. Deshpande	Calculus for Polytechnics	Pune Vidyarthi Graha Prakashan Pune-30
2.	Shri. B.M. Patel Shri J.M. Rawal	Applied Mathematics	Nirali Prakashan Mumbai
3.	Dr. B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers 2/B, Delhi-6
4.	J.N. Wartikar, P.N. Wartikar	A text book of Applied Mathematics	Pune Vidyarthigraha Prakashan, Pune- 411030
5.	S.S.Sastry	Introductory methods of Numerical analysis	Prentice Hall of India –New Delhi
6.	M.K.Jain	Numerical method for Scientific and engineering computation	Wiley eastern

8 QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Course : CE/ME/EE/IE/PE/CH/DE	Semester : II
Subject : PHYSICS-II	Subject
Code: 120013	
Group : B*	Duration : 16
Weeks	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of Instructions & Periods per 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	Pract.	Oral	Total	
2	2	-	-	4	1	3	80	20	80	25@	50**	-	175	2/ 2/ 4

3. RATIONALE:

The fundamental coverage under semester-I plus a continued similar way of progressive studies related to laws of Physics forms a foundation for various branches of engineering.

4. OBJECTIVES:

The student will understand:

- 1) Light energy with its 'dual' nature, concept of photon and photo cell, utilization of 'interference', 'diffraction' and 'polarization'
- 2) Concept of static charge and charges in motion, magnetic material, 'Atomic conception/ atomic structure, arrangement of atom in solids'.
- 3) Concept of semi-conductor, Light/Electromagnetic waves in the form of stimulated radiation, 'Light as wave guide', Ohmic resistance and zero resistivity'.
- 4) Non destructive testing technique .
- 5) Material with nano dimensions/ on atomic and molecular scale.

5. DETAILED CONTENTS:

1. THEORY CONTENTS:

SECTION-I

		Marks	Hours
Chapter 1	<u>Optics</u>		
	1. Photo electricity	12	03
	Planck's hypothesis, Photoelectric effect, Einstein's equation, Types of Photocells, Applications ,Numerical Problems.		
	2. Interference, Diffraction, Polarization	08	03
	Interference, Thin films, Newton's rings, Optical flatness, Diffraction, Diffraction grating. Polarization, Optical activity and Polarimeter, Photoelasticity (general treatment).		

Chapter 2	<u>Electricity</u>		
	Static Electricity	04	02
	1. Coulomb's law, Intensity and Potential, Numerical Problems.	06	02
	2. Capacitance, Principle of capacitor, Parallel plate capacitor, 'Combinations', Energy stored, Numerical Problems.		
	2.2 Current Electricity	04	03
	Specific resistance, e.m.f. and P.D. Wheatstone's bridge, Post office box, Potentiometer; Numerical problems.		
	2.3 Electromagnetism	06	03
	Current carrying conductor in magnetic field, 'ampere', Moving coil and Mirror galvanometer, Shunt, Ammeter, Voltmeter, Numerical problems.		
		TOTAL	40 16
	<u>SECTION-II</u>		
		Marks	Hours
Chapter 3	<u>Magnetism</u>		
	Magnetic materials – 'dia', 'para', 'ferro'; 'Modern concepts', Magnetic hysteresis and magnetic shielding..	04	03
<hr/>			
Chapter 4	<u>Modern Physics</u>		
	4.1 Bohr's Theory	06	02
	Structure of atom, Bohr's postulates and Atom Model,.Hydrogen spectrum and Rydberg constant.		
	4.2 Crystal Structure	06	02
	Space lattice, Unit cell, Cubical crystal structure – SC, BCC, FCC,Co-ordination Number, Packing density, Miller indices.		
	1. Band theory of Solids	06	02
	Classification of materials into Conductors, Insulators, Semiconductors,P and N type Semiconductors, P-N Junction.		
	2. LASERs and MASERs	06	02
	Elementary ideas, Stimulated emission Ammonia gas Maser, Ruby Laser, He-Ne Laser, Holography.		
	3. Fiber Optics	02	01
	Wave guide for light, Optical fibre, Step and Graded index.		
	4. Superconductivity	02	01
	Principle of Superconductivity, Meissner effect, Superconducting state materials, Properties, Applications.		
Chapter 5	<u>Nondestructive testing (NDT)</u>	04	02
	US waves, Radiography, X-rays,Liquid penetration.		

Chapter 6 **Nanotechnology**

Concept of manipulating matter on an atomic and molecular scale, and of new materials with dimensions on the nano scale, applications. 04 01

TOTAL 40 16

2. **PRACTICAL CONTENTS:**

1. Experiments to be performed (Any 08)

1. Study of Spectrometer (Minimum Deviation and Refractive Index and Angle of Prism).
2. Wavelength of Light by Diffraction Grating.
3. Specific Rotation by Polarimeter.
4. 'J' by Electrical Method and Specific Heat of Oil by Electrical Heating
5. Use of Wheatstone's Bridge and Post Office Box (Resistance, Specific Resistance and Temp. Coefficient of Resistance).
6. 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).
7. Determination of Rydberg Constant.
8. Study of Crystal Structure.
9. Energy gap of a semiconductor.
10. Wavelength of Laser Beam (He-Ne) by Diffraction Grating.

11. Demonstrations (Any 03)

1. Study of Photocell.
2. Spectra of Ionsed Gases.
3. Study of Newton's Rings.
4. Study of Photoelastic Bench.
5. Study of Para and Diamagnetism by Electromagnet.
6. Hysteresis by C.R.O.
7. Optical Principles of O.H.P.

6. Term-Work:

Compulsory term-work on the list of experiments written in a journal and carrying 25 marks on timely submission basis specified at the index sheet of Physics Journal.

7. 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 (with a coupling of Demonstration if any).
2. 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:

1. Connections, adjustments and observations20 Marks
2. Circuit Diagram, figures and tabulation10 Marks
3. Formula, calculations and graphs if any10 Marks
4. Oral05 Marks
5. Correct answer or appropriate result05 Marks

Total50 Marks

6. Each candidate will be jointly examined by both External and Internal Examiners.

7. Certain demonstrations are coupled with certain conventional experiments during the examination. Marks allotted for demonstration are 15 and marks for conventional experiments are 35. The conventional experiment is assessed out of 50 as mentioned under (iv) in the above scheme and then converted out of 35. Assessment of a demonstration is judged by answers (oral or written) given by candidate in front of the relevant demonstration setup.
8. 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.
9. While assessing, the overall performance and the ability of the candidate to handle the apparatus independently, will be considered.

8. IMPLEMENTATION STRATEGY (PLANNING):

1. Theory – Lesson Plan
2. Practical – Scheme of marking for T/W, Scheme of assessment for Practical Examination.

9 (a). TEXT BOOKS:

Sr.No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	R.K. Gaur and S.L. Gupta	Engineering Physics	Any	1981-96 2001 Reprint 2004, 2008	Dhanpat Rai & Sons, New Delhi
2.	M.R. Shrinivasan	Physics for Engineers	Any	1976	New Age International, New Delhi
3.	P.G. Kshirsagar and M.N. Avadhunhu	A Text Book of Engineering Physics	Any	1992 Reprint 1993 till 2005	S. Chand and Co. Ltd, New Delhi
4.	Gambhir, Durgapal and Banerjee	Introductory Physics - Vol-1,2 &3.	Any	1972	Wiley Eastern

9 (b). REFERENCE:

Sr.No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	Resnik and Halliday	Physics Vol. 1 & 2	Any	1986	Wiley Eastern
2.	B.L. Theraja	Engineering Physics	Any	1962 Reprint 1974-87	S. Chand and Co. Ltd, New Delhi
3.	B.L. Theraja	Modern Physics	Any	1975, 1976,78,79,80,81,82,83.	S. Chand and Co. Ltd, New Delhi
4.	Avinash	An Introduction	Any	2012	ISBN 978-

	Kapoor, Partha Goswami	to Nanophysics and Nanotechnology			81-8487- 040-4
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QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-
Total	-	40	-	40	-	20

1. Subject Details

Subjects: Workshop Practice
Course: ME/PE/CH
Course: CE/EE/IE/DE
Group: C*

Subject Code : 120009
Semester – I
Semester – II
Duration – 16 weeks

2. Teaching and Examination Scheme

Teaching Scheme		Credits	Examination Scheme and Maximum Marks							
Theory	Practical		Paper			Theory	Sessional	Term Work	OR	Total
Hrs per Week	Hrs Per Week		Hrs	NP	Mks					
01	04	05	-	-	-	-	-	50 @		50

3. Rationale

Production is a value adding activity, where raw material is converted into finished goods, by using different resources like man, machine, materials, methods etc. Handling of different tools & equipments is a part of production system. So students should be aware of methods of handling of different tools and safe practices. This subject deals with identification of tools, its applications, precautions, handling procedures, etc.

4. Objectives

The student will be able to

1. Know basic workshop processes.
2. Select right tools and right manufacturing processes for performing the job correctly.
3. Identify, select and use various marking, measuring, holding, striking and cutting tools & equipments.
4. Read dimensions and be able to do marking required for making the job
5. Use different fitting tools like files, hacksaws, hammers, try square, chisel (crosscut chisel), centre punch etc and carpentry tools like cross-cut saw, jack plane, chisel, rasp file, marking gauge, mallet, scriber etc.
6. Operate, control different machines and equipments.
7. Inspect the job for specified dimensions
8. Produce jobs as per specified dimensions.
9. Adopt safety practices while working on various machines.

5. Detailed Contents

Sr.No.	Details Of Theory Contents	Period
01	CARPENTRY SHOP 1. Introduction. 2. Various types of Woods. 3. Different types of Tools, Machines and Accessories.	04
02	WELDING SHOP 1. Introduction 2. Types of Welding, ARC welding, Gas welding, Gas Cutting. 3. Safety Precautions in Welding Safety Equipments and its use in Welding Process	04
03	FITTING SHOP 1. Introduction 2. Various Marking, Measuring, Cutting, Holding and Striking tools. 3. Different fitting operation like Chipping, Filing, Right Angle, Drilling, Tapping. 4. Working Principle of Drilling machine, Tapping dies its use. 5. Safety Precautions and Safety Equipments.	04
04	SHEET METAL SHOP. 1. Introduction 2. Various types of Tools, Equipments and Accessories. 3. Different types of operations in Sheet Metal Shop. 4. Soldering and Brazing. 5. Safety Precautions	04
Total		16

Practical

Sr.No.	Details of Practical Contents
01	CARPENTRY & PATTERN MAKING SHOP (Group of TWO Students) 1. Demonstration of different Wood Working Tools / Machines. 2. Demonstration of different Wood Working Processes, like Planning, Marking, Chiseling, Grooving, etc. 3. One Carpentry and one Pattern Making job for group of students.

02 WELDING SHOP

1. Demonstration of different Welding Tools / Machines.
2. Demonstration on Arc Welding, Gas Welding, Gas Cutting and Rebuilding of Broken parts with Welding involving Butt and Lap joint.

03 FITTING SHOP (Group of TWO Students)

1. Demonstration of different Fitting Tools and Drilling Machines and Power Tools.
2. Demonstration of different operations like Chipping, Filing, Drilling, Tapping, Cutting etc.
3. Two job for a group of student involving practice of Chipping, Filing, Drilling, Tapping, Cutting and Sawing operations.

04 SHEET METAL SHOP

1. Demonstration of different Sheet Metal Tools.
2. Demonstration of different Sheet Metal Operations like Sheet Cutting, Bending, Lancing, Soldering and Brazing.

1] The instructor shall give demonstration to the students by preparing a specimen job as per the job drawing.

2] The workshop diary/journal shall be maintained by each student duly signed by instructor of respective shop

3] Journal should contain

a. Sketches of different tools used in workshop with practical applications.

b. Materials used for different job with their properties, advantages, disadvantages and applications.

c. Job/Part Drawings.

4] Journal should be certified by the lecturer incharge.

7. References

1. S.K. Hajara Chaudhary- Workshop Technology-Media Promotors and Publishers,New Delhi
2. B.S. Raghuwanshi- Workshop Technology- Dhanpat Rai and Sons, New Delhi
3. R K Jain- Production Technology- Khanna Publishers, New Delhi
4. H.S.Bawa- Workshop Technology- Tata McGraw Hill Publishers,New Delhi

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
 TEACHING AND EXAMINATION SCHEME

Discipline: ELECTRICAL ENGINEERING
 2012(Progressively)

w..e.f. Batch admitted in June,

SEMESTER-III

Sr. No.	Subject Name and Code	Pre-requisite Sub Code	Scheme of Instructions and Periods per week					Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/C		
			L	P	D	T	Cr	Hrs	Mks	SSL	Paper	TW	PR	OR	TTL				
3-1	Applied Mathematics (120022)	-	3	-	-	1	4	03	80	20	80	-	-	-	100	C*	404		
3-2	Electrical Engg. Fundamentals (120302)	-	4	2	-	-	6	03	80	20	80	25@	50**	-	175	C*	426		
3-3	Electrical Engg. Materials (120303)	-	3	-	-	-	3	03	80	20	80	-	-	-	100	C*	303		
3-4	Power Generation (120304)	-	4	-	-	-	4	03	80	20	80	-	-	-	100	C*	404		
3-5	Maintenance of Domestic Appliances (120305)	-	-	2	2	-	4	-	-	-	-	50@	-	25* *	75	C	044		
3-6	General Mechanical Engineering (120027)	-	3	2	-	-	5	03	80	20	80	25@	-	25* *	150	C	325		
3-7	Basic Electronics (120020)	-	4	2	-	-	6	03	80	20	80	25@	50**	-	175	B*	426		
TOTAL			21	8	2	1	32	06 PAPERS		120	480	125	125	25	875				
TOTAL PERIODS = 32										TOTAL MARKS = 875									

* Compulsory, # Award winning subject, * * assessed by internal and external examiners jointly, @ Assessed by internal examiner only L-Lecture period, P-Practical period, D- Drawing practice Period ,T- Tutorial, Cr-Credit, SSL –Sessional , TW- Term work, PR- Practical , OR-Oral , Gr-Group, B-Basic, C-Core, A-Application, M-Management.

Head of Department

Principal

1. SUBJECT DETAILS:-

Course:IE/DE/EE	SEMESTER: III
Subject: Applied Mathematics	Code: 120022
Group: C*	
Compulsory	

2. TEACHING AND EXAMINATION SCHEME:-

Scheme of instruction & Periods Per Week					Theory Paper duration & marks			Scheme of Examination						Gr	Scheme L/Pr/Cr
L	P	D	T	Cr	Np	Hrs	Mks	SSL	Theory Paper	T/W	PR	OR	Total		
3	0	-	1	4	1	3	80	20	80	--	--	--	100	C*	404

3. RATIONALE:-

Applied Mathematics is classified as Basic Science subject which intends to teach students the facts, concepts and principles of Mathematics that can be applied to solve problems in Electrical/Electronics Engineering.

4. OBJECTIVES:-

Students will be able to understand

1. Integral calculus and its various applications.
2. Laplace transform and differential equations.
3. Statistics and Probability.

5. DETAILED CONTENTS:-

SECTION-I

		HOURS	MARKS
1	INTEGRAL CALCULUS		
	1.1 Integration as inverse of differentiation 1.2 Methods of Integration: substitution, parts, partial fraction 1.3 Definite integral and their properties, reduction formulae (No Proofs)	16	24
2	APPLICATIONS OF DEFINITE INTEGRALS		
	2.1 Length of arc 2.2 Areas 2.3 Volumes 2.4 Centre of Gravity 2.5 Moment of Inertia 2.6 Mean value and R.M.S. Value	08	08
3	STATISTICS		
	3.1 Mean, median, mode, standard deviation, cumulative frequency 3.2 Measures of dispersion, - range , mean deviation 3.3 Combined mean , combined standard deviation 3.4 Co-efficient of variance 3.5 Comparisons of two sets of observations	08	08
	TOTAL	32	40
	<u>SECTION-II</u>		
4.	LAPLACE TRANSFORM		
	4.1 Introduction, definitions	10	12

	4.2 Laplace transforms of elementary functions , definitions 4.3 Laplace transforms of elementary functions $t^n, e^{at} \sin (at), \cos (at)$ 4.4 Properties of laplace transform 4.5 Inverse laplace transform 4.6 Transform of derivatives and integrals		
5	DIFFERENTIAL EQUATIONS		
	5.1 Formation of differential equation 5.2 Differential equations of first order and first degree 5.3 Linear differential equations of higher order with constant coefficients 5.4 Applications of differential equations 5.5 Solution of linear differential equation using Laplace transform	14	20
6	PROBABILITY		
	6.1 Definition of random experiments, Sample space 6.2 Event, occurrence of event, types of event 6.3 Definition of probability, addition and multiplication theory of Probability 6.4 Conditional probability, Bay's theorem	08	08
	TOTAL	32	40

6. Implementation Strategy(planning): Conducting lectures as per lesson plan and conducting tutorial in the same class room.

7. Reference Books:

Sr. No.	Author	Title	Publishers & Address
1.	Shri. S.P. Deshpande	Calculus for Polytechnics	Pune Vidyarthi Graha Prakashan , Pune-30
2.	Dr. B.S. Grewal	Higher Engineering Mathematics	Khanna Publishers 2/B, Delhi-6
3.	Schaum's outline series	Probability	McGraw Hill
4.	Schaum's outline series	Laplace Transform	McGraw Hill

8. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS

Program: Electrical Engineering	Semester : Third
Course : Power Generation	Code:120304
Group: C*	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	-	-	-	04	01	03	80	20	--	--	--	100

3. RATIONALE:

This is a core technology subject. Electrical diploma pass outs should know the principle of generation of electricity, methods of generation of electricity & recent trends in generation of electricity.

This subject will provide the basis for further studies in transmission, distribution and power system operation. Also the subject will provide the knowledge about the recent trends in non-conventional energy sources & their working principles.

4. OBJECTIVES:

The student will be able to:

- 1) Explain the working of different power plants
- 2) Identify different components of various systems in generating stations
- 3) Define the terms used in economics of power generation and explain their relation
- 4) Select alternative energy sources for given conditions
- 5) Explain the working of wind mills and solar systems

5. DETAILED CONTENT:

SECTION-I

Ch.No	Name of the topic	Hours	Marks
01	Basics of Power Generation Importance of electrical power in day today life 1.1 Various sources of energy 1.2 Overview of method of electrical power generation 1.3 Comparison of Sources of power	04	05
2	Thermal Power Stations 2.1 List of thermal power stations in the state with their capacities 2.2 Selection of site for thermal power stations. 2.3 Main parts , block diagram of thermal power stations. 2.4 Quality of fuel and its effect on quality of power generation 2.5 Operation of following components: 2.5.1 Boiler 2.5.2 Economizer. 2.5.3 Air pre heater 2.5.4 Super-heaters & re-heaters. 2.5.5 Steam prime movers. 2.5.6 Condensers. 2.5.7 Spray ponds & cooling towers. (Block diagrams & description in brief)	08	10
03	Nuclear Power Stations 3.1 Block diagram and working of Nuclear Power Station 3.2 Construction and working of Nuclear Reactor 3. 3 Fuels used in Nuclear Power Station 3. 4 Economics of Nuclear Power Station 3. 5 List of Nuclear power stations in state & county with their capacities.	08	08
4	Hydro Power Stations 4.1 List of Hydro Power stations with their capacities & number of units in the state. 4.2 Selection of site and Classification 4.3 Layout of hydro Power stations 4.4 Types of Turbines & generators used 4.5 Selection of turbine and alternator according to water head and Capacity.	07	10
5	Diesel Power Stations 5.1 Applications of diesel power stations 5.2 Diesel electric plant- Main components (Block Diagram) 5.3 Different types of engines & their working. Operation, maintenance & trouble shooting chart of diesel plant	05	07
		32	40

	SECTION –II	Hours	\ Marks
6	<p>Non-Conventional Energy Sources</p> <p>6.1 Types of non-conventional energy sources.</p> <p>6.2 Solar Energy</p> <p>6.2.1 Potential of solar energy.</p> <p>6.2.2 Photovoltaic effect – for solar energy.</p> <p>6.2.3 Construction & materials used in solar photo-voltaic cell</p> <p>6.2.4 Working & applications of solar energy.</p> <p>6.3 Wind Energy.</p> <p>6.3.1 Selection of site for wind mills</p> <p>6.3.2 Principle of electricity generation with the help of wind energy</p> <p>6.3.3 Block diagram and working of Wind energy plant and its applications</p> <p>6.3.4 List of major wind farms in the state with their approximate capacities</p> <p>6.4 Bio-mass & Bio-gas energy.</p> <p>6.4.1 Composition of Bio-gas & its calorific value.</p> <p>6.4.2 Traditional; non-traditional Biogas plants</p> <p>6.4.3 Bio-mass based power generation plants & their capacities.</p> <p>6.5 Geo-thermal Energy and its Applications.</p> <p>6.6 Ocean energy.</p> <p>6.6.1 Ocean thermal Electric conversion.</p> <p>6.6.2 Energy from tides</p> <p>6.6.3 Site requirements</p> <p>6.6.4 Advantages and Limitations of Tidal power generation.</p> <p>6.7 Fuel Cells: Construction, working and applications</p>	15	18
7	<p>Economics Of Power Generation</p> <p>7.1 Terms commonly used in system operation: connected load, firm power, cold reserve, hot reserve, spinning reserve.</p> <p>7.2 Terms used in system operation such as Load-curve, load duration curve, integrated duration curve. (Simple numerical based on Plotting above curves.)</p> <p>7.3 Factors affecting the cost of Generation: Average demand, Maximum demand, plant capacity factor & plant use factor, Diversity factor & load factor. (Simple numerical based on above)</p> <p>7.4 Choice of Size & number of Generator Units, difficulties involved in it.</p>	10	12

8	Interconnected Power Systems 8.1 Combined operation of power stations 8.2 Comparison of various types of power stations 8.3 Advantages of Interconnection. 8.4 Base load & peak loads, load allocation among various types of power stations 8.5 Economic loading of interconnected stations. 8.6 Load sharing and transfer of load between power stations. 8.7 Inter connection of power stations at state and national level	07	10
	Total	32	40

6. IMPLEMENTATION STRATEGY:

- 1) Adopting the lesson plan and delivering the same with relevant media
- 2) Arranging industrial visit to any one power plant (desirable) and submitting the report group wise

7. LEARNING RESOURCES:

1. Books:

Sr. No.	Author	Title	Publisher
1	Dr. S. L. Uppal	Electrical Power	Khanna Publishers.
2	Soni – Gupta - Bhatnagar	A course in Electrical Power	Dhanpatrai & Sons
3	Prof. G. D. Rai	Non conventional Energy sources	Khanna, New Delhi
4	Prof. Arrora and Dr. V. M. Domkundwar	A course in Power Plant Engineering	Dhanpatrai & Sons

2. Journals:

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

8 WEBSITE: www.tatapower.com

www.relianceindia.com

www.suzlonindia.com

9 QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Program: Electrical Engineering.	SEMESTER: III
Course: Electrical Engineering Fundamentals	Code: 120302
Group: C*	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	02		-	06	01	03	80	20	25@	50**	-	175

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

<i>Ch.No</i>	Contents	Hours	Marks
1	1.0 Resistance Parameter	10	12
	1.1 Concepts of electrical potential, Potential difference, 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 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.		
2	2.0 Magnetic circuits.	10	12
	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 Comparison of electric circuit with a magnetic circuit. 2.6 Calculation of ampere turn for series, parallel and series-parallel type magnetic circuit. Lifting power of a magnet.		
3	3.0 Inductance parameter.	06	08
	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.	06	08
	4.1 Charge, electric field, flux density, permittivity of medium, parallel plate capacitor and its capacitance. 4.2 Dielectric strength, intensity of field and voltage gradient 4.3 Expression for capacitance of a composite dielectric capacitor. 4.4 Capacitance in series and parallel.		
	TOTAL	32	40

Section –II

5	5.0 Sine wave.	10	12
	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 phase 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.		
6	6.0 Single phase circuit	14	18
	6.1 Behaviour 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		

	<p>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.</p>		
7	7.0 Three phase circuit.	08	10
	<p>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.</p>		
	TOTAL	32	40

6. LIST OF LABORATORY PRACTICES:

A report of the following experiments performed in the laboratory.(Any 10)

1. Verification of Kirchhoff's current law
2. Verification of Kirchhoff's Voltage law
3. Measurement of low resistance
4. Measurement of medium resistance and calculation of temperature rise.
5. Hysteresis loop.
6. Three voltmeter method.
7. Three ammeter method.
8. RLC in series resonance
9. RLC in parallel
10. Relation between line and phase quantities for star connection
11. Relation between line and phase quantities for delta connection
12. Verification of neutral shift and its measurement

7. IMPLEMENTATION STRATEGY (PLANNING):

- 1) As per the lesson plan.
- 2) Taking appropriate experiments time to time and continuously assessing the term work
- 3) Giving assignments etc.

8 REFERENCE BOOKS:

Sr.No	Author	Title	Publisher & address	Edition
1	B.L.Theraja	Electrical Technology Vol-I & II	S.CHAND Publication	
2	J.B.Gupta	Electrical Engineering	Dhanpatrai & sons	
3.	V.N.Mittal	Basic Electrical Engineering	TMH Publication	
4.	J.S.Katre	Basic Electrical Engineering	Kataria and sons	

9 Website: www.electricalindia.com

10 . QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1 SUBJECT DETAILS :

Program: Electrical Engineering. Course: Electrical Engineering Materials Group: C*	SEMESTER: III Code: 120303
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2 TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
03	-	-	-	03	01	03	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.

5. DETAILED CONTENTS:

Section-I

Ch.No	Topics	Hours	Marks
1	1.0 Engineering materials	10	30
	1.1 General classification a)Metals-ferrous materials like cast iron, steel and alloys, b)Non ferrous materials like copper, aluminum, brass, bronze, platinum, silver, gold, constantan, mercury, tungsten, magnesium, nichrome & kanthal. c) Non metals- wood, polymer(plastic and rubber), ceramics(glass, clay, refractory ,porcelain)		
	1.2 Brief overview about their mechanical properties like ductility, malleability, resilience, toughness, hardness, brittleness, creep behaviour, tensile & structural properties.		
	1.3 Electrical properties- conductivity, insulation, resistance, surface & volume resistivity, dielectric strength and breakdown voltage.		
	1.4 Thermal properties: Heat resistance, thermal conductivity, thermal expansion.		

	1.5 Chemical properties: Hygroscopic nature, chemical resistance and weathering & environmental properties.		
2	2.0 Conductor Material	08	25
	2.1 Properties and specifications of wire and cable materials particularly of aluminium and copper and their alloys. 2.2 Temperature effect on resistance of different materials. 2.3 Carbon and Graphite for brushes. 2.4 Arc lamps and electric furnaces. 2.5 Metal and alloys for fuses. 2.6 Materials for lamp filaments, contact material for circuit breaker contacts.		
3	3. Magnetic Materials	06	25
	3.1 Terms and Definitions. 3.2 Principal Ferromagnetic elements and their alloys for magnetic uses. 3.3 Common magnetic materials, iron and silicon alloys, nickel-iron alloys, permanent magnetic materials. 3.4 Magnetically soft steel materials and non-magnetic alloys, losses in magnetic materials. Ferrites.		
	TOTAL	24	40

SECTION-II

4	4.0 Semi-conductor Material	06	20
	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	06	20
	5.1 Different methods of polarizations, polar and non-polar dielectric, loss angle. 5.2 Capacitors, ceramic capacitors, paper, mica, SF6 gas.		
6	6.0 Insulating Materials	06	25
	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.		
7	7.0 Polymers	06	15
	7.1 <u>Definition</u> : Special characteristics of plastics, rubber & fibres. 7.2 <u>Classification of plastic</u> : Thermoplastic and thermo sets. 7.3 <u>Advantage and limitation</u> : Thermo sets like phenol formaldehyde, amino plastics (urea & melamine formaldehyde). 7.4 <u>Epoxy and unsaturated polyester</u> : 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.		
		TOTAL	24 40

6. IMPLEMENTATION STRATEGY (PLANNING):

1. Adopting the lesson plan and delivering the same
2. Collection of minimum three magnetic materials.
3. Collection of minimum ten insulating 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
4	Dr.H.P.Inamdar	Electrical Material	Vrinda Prblication

8 Website: www.engineering materials.com

9. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Program: Electrical Engineering. SEMESTER: III Course: Maintenance of Domestic Appliances 120305 Group: C	Code:
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2 TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
-	02	02	-	04	-	-	-	-	50@	-	25**	75

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

1. Identify the layout of domestic and industrial wiring circuits.
2. Understand the procedures to be followed to repair particular appliances.
3. Various low tension switch gear and protections used in domestic and industrial applications.

5. DETAILED CONTENT:

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 appliances:

Mixers, geysers, irons, toasters, heaters, table fans, washing machines, microwave oven.

B) Drawing sheets:

- 1) Electrical Symbols

- 2) Domestic Wiring circuits
- 3) Details and assembly: Irons, Mixers, Table fan, ceiling fan, washing machine, Microwave oven, Toaster, Flour scent tube , Instant water heater, Geysers
- 4) Details of Earthing

6. IMPLEMENTATION STRATEGY:

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

7. Website: www.bajajelectrical.com
www.lgelectronics.com

8 :Reference Books

Sr.no.	Author	Title	Publisher
1	S.L.Uppal	Electric Wiring, Estimating & Costing	Khanna Publications, New Delhi
2	B.D.Arora	Electric Wiring, Estimating & Costing	S. Kataria & Sons, New Delhi
3	K.B.Bhatia	Study of Electrical Appliance	Khanna Publications, New Delhi
4	Raina Bhattacharya	Electric Wiring, Estimating & Costing	TMH Publication

1. SUBJECT DETAILS:**Prgram: Electrical Engineering.****SEMESTER: III****Course: GENERAL MECHANICAL ENGG.****Code: 120027****Group: C****Optional****2 TEACHING AND EXAMINATION SCHEME:**

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
03	02	-	-	05	01	03	80	20	25@	---	25**	150

3. RATIONALE:

The main source of generation of electrical energy is different types of power stations. As an electrical engineer they should know the basic principles and working of boilers, different turbines etc. Students will be familiar with mechanical drives, IC engines, brakes and clutches. Refregeneration and Air-conditioning will be helpful in understanding subjects like BMS, HVAC.

4. OBJECTIVES:

After studying the subject the student will be able to

1. Understand basic principles of power plant.
2. Identify the various components of power plants.
3. Know the construction and working of steam engine, turbine, Gas turbine etc
4. Understand the need of couplings
5. Know the Construction and working of IC engine
6. Have general idea about and refrigeration and air conditioning.

5.DETAILED CONTENTS:**SECTION-I**

Ch. No	Topics	Hours	Marks
1.	1.0 Steam Boiler : 1.1 Introduction 1.2 Classification and applications 1.3 Comparison of fire tube and water tube boiler 1.4 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 1.5 Study of modern high pressure boiler like Lamont boiler 1.6 Boiler mountings like water level indicator, pressure gauge, safety valves, steam stop valve, fusible plug, blow off cock valve etc. 1.7 Boiler accessories like Economizer, Air pre-heater and super heater.	08	10
2.	2.0 Steam condenser 2.1 Types of condenser 2.2 Working	04	04
3.	3.0 Steam Turbine : 3.1 Introduction 3.2 Classification and applications 3.3 Constructional details and working of simple impulse turbine 3.4 Compounding of impulse turbine 3.5 Governing of steam turbine	08	10
4	4.0 Steam Engine: 4.1. Introduction 4.2. Classification and applications 4.3. Constructional details of steam engine 4.4. Working of simple double acting steam engine 4.5. Comparison of steam engine with steam turbine	04	08
5	5.0 Gas Turbine : 5.1 Introduction 5.2 Classification and applications 5.3 Constant pressure gas turbine 5.4 Constant volume gas turbine 5.5 Regeneration, re-heating and inter-cooling 5.6 Comparison of gas turbine with steam turbine	08	08
	TOTAL	24	40

SECTION II

CH.N O	CONTENT	HOUR S	MAR KS
6	6.0 Mechanical Drives: 6.1 Introduction 6.2 Classification and applications 6.3 Mechanical Drives like belt drive, chain drive, gear drive,	06	06

	Cam drive and Geneva drive		
7	7.0 Coupling : 7.1 Introduction 7.2 Classification and applications 7.3 Muff coupling, flange coupling, Old-ham coupling and Universal coupling	06	04
8	8.0 Brakes and Clutches: 8.1 Introduction 8.2 Classification and applications of brakes 8.3 Mechanical brakes like shoe brake, band brake, band and block brake and internal expanding shoe brake 8.4 Friction clutches like single plate, multiplate, cone and centrifuge clutch.	06	04
9	9.0 Internal Combustion Engine: 9.1 Introduction 9.2 Classification and applications 9.3 Constructional details of I.C. Engine 9.4 Two stroke and four stroke engine 9.5 Comparison of two stroke and four stroke engine 9.6 S.I. & C.I. engine 9.7 Comparison of S.I & C.I. Engine 9.8 Simple carburettor 9.9 Cooling and lubricating system	10	10
10	10.0 Refrigeration: 10.1 Introduction 10.2 Applications 10.3 COP and TON of refrigeration 10.4 Vapour compression refrigeration system 10.5 Vapour absorption refrigeration system 10.6 Comparison of vapour compression refrigeration system and vapour absorption refrigeration system	06	04
11	11.0 Air Conditioning: 11.1 Introduction 11.2 Applications 11.3 Window type room air conditioner 11.4 Central Air conditioning plant	06	04
	TOTAL	24	40

6. LABORATORY WORK:

Practice:

1. Study of low pressure boilers
2. Study of boiler accessories and mountings
3. Study of simple impulse turbine.
4. Study of simple double acting steam engine
5. Study of mechanical drives
6. Study of couplings
7. Study of mechanical brakes

8. Study of friction clutches
9. Study of I.C. Engines
10. Study of Cooling and lubricating system
11. Study of refrigeration system

7. IMPLEMENTATION STRATEGY (PLANNING):

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

8. 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

9 WEBSITE: www.bhelindia.com
www.bajajauro.com , www.bluestarindia.com

10. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Program: Electrical Engineering.
Course: Basic Electronics
Group: B*

SEMESTER: III
Code: 120020

2 TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	02	-	-	06	01	03	80	20	25@	50**	-	175

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

Ch.No	CONTENT	Hours	Mark s
1.	1.0 Semiconductor Physics: 1.1 Structure of atoms 1.2 Intrinsic Semiconductors Fermi level, Charge carriers. 1.3 Extrinsic semiconductors, doping, level of doping and conductivity of P-N junction. 1.4 Semiconductor diodes- types of different diodes, their characteristics and uses. 1.5 Half wave rectifiers 1.6 Full wave rectifiers 1.7 Bridge rectifier	10	12
2.	2.0 Transistors : 2.1 Working of P-N-P and N-P-N transistors. 2.2 Static characteristics 2.3 Cut-off, active and saturation regions. 2.4 Different configurations of amplifiers	12	16

	2.5 Low frequency and high frequency equivalent circuits. 2.6 Cut-off frequency for transistors. 2.7 Hybrid parameters for different configurations. 2.8 Different types of transistors: general purpose, switching transistor, power transistors, junction transistor, their characteristics and application 2.9 Transistor as an Amplifier, Switch, Inverter		
3	3.0 Field Effect Transistors: 3.1 Field effect, pinching effect 3.2 Different types JFET, MOS FET 3.3 Their characteristics 3.4 Equivalent circuits and uses	10	12
	TOTAL	32	40

SECTION-II

4.	4.0 Photo Devices: 4.1 Construction, characteristics and application of different photo devices as photo transistors, LEDs, LCDs, photo multipliers.	04	08
5.	5.0 Thyristors: 5.1 Basic principle of conduction 5.2 Two transistor for analogy 5.3 characteristics of S.C.R, DIAC, TRIAC and UJT 5.4 Simple applications of these devices	10	12
6.	6.0 Amplifiers: 6.1 Basic amplifier concept 6.2 Single stage and a two stage amplifiers and their Gain-Bandwidth plot 6.3 Computation of the gain of a two stage amplifier 6.4 Different classes of operation: class A, Class B, Class AB etc. 6.5 Bootstrap circuit Amplifiers with feedback, different feedback techniques	18	20
	TOTAL	32	40

6. LABORATORY PRACTICE:

Students are required to perform the experiments listed below (any 12)

1. P-N junction diode characteristics
2. Zener diode characteristics
3. Zener diode as voltage regulator
4. Half wave, full wave rectifier
5. C.E.Configuration
6. Frequency response of CE amplifier
7. UJT relaxation oscillator
8. FET characteristics
9. FET amplifier
10. SCR characteristics
11. DIAC characteristics

12. TRIAC characteristics
13. Two stage R-C coupled amplifier

7. IMPLEMENTATION STRATEGY (PLANNING):

1. Teaching plan
2. Minimum 12 practicals

8. REFERENCE BOOKS:

Sr.NO	Author	Title	Edition	Year of Publication	Publishers & Address
1	Millman and Halkias	Electronic devices and circuits	1993	1993	McGraw Hill
2	Bhargava	Basic electronics and linear circuits	2001	2001	TTTI, Chandigadh TMH, New Delhi
3	Millman and Halkias	Electronic devices and circuits	1993	1993	McGraw Hill
4	Robert Boylestad	Electronic devices and circuits theory	24th Indian Reprint	Eastern Economy Edition	PHI, New Delhi
5	Allen Mottershead	Electronic devices and circuits	26th Indian Reprint	July,2002	PHI, New Delhi
6	M.M. Shah	Design of electronic circuits & computer aided design	I reprint	September, 1993	Wiley Easten Mumbai

9.WEBSITE: www.google.com

10. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
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3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
 TEACHING AND EXAMINATION SCHEME

Discipline: ELECTRICAL ENGINEERING
 2012(Progressively)
SEMESTER-IV

w. e.f Batch admitted in June,

Sr. No.	Subject Name and Code	Pre-requisite Sub Code	Scheme of Instructions and Periods per week					Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/C		
			L	P	D	T	Cr	Hrs	Mks	SSL	Paper	TW	PR	OR	TTL				
4-1	Transmission & Distribution (120306)	-	4	-	2	-	6	03	80	20	80	50@	-	25* *	175	C*	426		
4-2	Electrical Measurements (120307)	-	4	2	-	-	6	03	80	20	80	25@	50**	-	175	C*	426		
4-3	Transformers and Induction Motors (120308)	-	4	2	-	-	6	03	80	20	80	25@	50**	-	175	C*	426		
4-4	Circuits and Networks (120309)	-	4	2	-	-	6	03	80	20	80	25@	50**	-	175	C*	426		
4-5	Electrical Estimation & Costing (120322)	-	3		2		5	03	80	20	80	50@	-	25* *	175	A	325		
4-6	DC Machines (120323)	-	2	2	-	-	4	-	-	-	-	50@	50**	-	100	C	224		
TOTAL			21	8	4	-	33	05 PAPERS		100	400	225	200	50	975				
TOTAL PERIODS = 33									TOTAL MARKS = 975										

* Compulsory, # Award winning subject, ** assessed by internal and external examiners jointly, @ Assessed by internal examiner only L-Lecture period, P-Practical period, D- Drawing practice Period ,T- Tutorial, Cr-Credit, SSL -Sessional , TW-Term work, PR- Practical , OR-Oral Gr-Group, B-Basic, C-Core, A-Application, M-Management.

Head of Department

Principal

1.SUBJECT DETAILS:

Program: Electrical Engineering course: Transmission & Distribution Group : C *	SEMESTER IV code: 120306
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2 TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	-	02	-	06	01	03	80	20	50@		25**	175

3. RATIONALE:

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

4. OBJECTIVE:

The student will be able to:

1. Know various types of transmission & distribution systems.
2. Identify various components and know their functions.
3. Draw substation layout as per the requirement.
4. Calculate voltage regulation & efficiency of transmission system.
5. Calculate voltage drop of distribution system.

5.DETAILED CONTENT:

SECTION -I

Ch.No	Name of the topic	Hours	Marks
01	Basics of transmission systems 1.1 Introduction to transmission. 1.2 Necessity of transmission of electricity 1.3 Classification & comparison of different Transmission system.	02	04

02	Transmission Line Components 2.1 Introduction to line components. 2.2 Types of conductors-copper, Aluminium & state Their trade names. 2.3 solid, stranded & bundled conductors. 2.4 Line supports- requirements, types, and field, Applications. 2.5 Line insulators-requirements, types, and field, Applications. 2.6 Failure of insulator and reasons for Failure. 2.7 Distribution of potential over a string of Suspension insulators. 2.8 Concept of string efficiency, methods of Improving string efficiency. 2.9 Corona-corona formation, advantages & disadvantages 2.10 factors affecting corona, Important terms related to corona. 2.11 Spacing between conductors. 2.12 calculation of span length & sag calculation (numerical based on 2.7 , 2.8 , & 2.11)	12	14
03	Transmission Line Parameters 3.1 R,L & C of 1-ph & 3-ph transmission line & their Effects on line. 3.2 skin effect, proximity effect & Ferranti effect. 3.3 Concept of transmission of conductors & Necessity.	03	04
04	Performance of Transmission line. 4.1 Classification of transmission lines. 4.2 Losses, efficiency & regulation of line. 4.3 Performance of single phase short transmission Line (Approximate-numerical based on it) 4.4 Effect of load power factor on performance 4.5 Medium transmission lines-End condenser, Nominal T & nominal π Network with vector Diagram. 4.7 General circuit & Generalised circuit constants (A, B, C, D).	12	14
05	Extra High Voltage Transmission. 5.1 Introduction and Requirement. 5.2 EHAVC Transmission. 5.3 Reasons for adoption & limitations. 5.4 HVDC Transmission-Advantages, Limitations.	03	04
		32	40
	<u>SECTION-II</u>		
06	Components of Distribution System 6.1 Introduction. 6.2 Classification of distribution system. 6.3 A.C distribution. 6.4 connection scheme of distribution system. 6.5 Requirement of distribution system. 6.6 Design consideration. 6.7 A.C distribution calculations. 6.8 Method's of solving A.C-1 phase & 3 ϕ -phase 6.7 Connected (balanced) distribution system. (Numerical based on 1-ph & 3-ph balanced Distribution system)	12	16

07	Underground cables. 7.1 Introduction & requirement. 7.2 Classification of cables. 7.3 cable conductors. 7.4 Cable construction. 7.5 cable insulation, Metallic sheathing & mechanical , Protection. 7.6 Comparison with overhead lines. 7.7 Cable laying, cable faults, cable failure, loop test, Cause & remedies, Test for open circuit.	08	04
08	Substations. 8.1 Introduction. 8.2 Classification of indoor & outdoor substations. 8.3 Advantages & Disadvantages. 8.4 selection & location of site. 8.5 Main connection schemes. 8.6 Equipment's circuit elements of substations. 8.6.1 In coming & outgoing lines, Transformers, CT & PT, Relays, CB's, fuses, Isolators, Batteries, lightning arresters, Insulators. 8.6.2 Bus bar's material, types in detail. Connection diagram and layout of substations.	08	12
09	Voltage Regulation 9.1 Different types of regulation. 9.2 Tap changing transformer 9.3 Induction regulator 9.4 Single phase & three phase induction regulator.	04	08
	TOTAL	32	40

6. LABORATORY PRACTICE:

Practice: Drawing sheet of full imperial size depicting the constructional details.

7. IMPLEMENTATION STRATEGY:

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.

8. REFERENCE BOOKS:

REFERENCE BOOKS:

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

9 WEBSITE: www.tatapowerindia.com
www.mahagenco.com
www.relance.com

10 QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Program: ELECTRICAL MEASUREMENT	SEMESTER:IV
Course: ELECTRICAL MEASUREMENTS	CODE- 120307
GROUP: C*	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	02	--	-	06	01	03	80	20	25@	50**	-	175

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. Know the construction and working of various electrical measuring equipments like moving iron, moving coil, dynamometer type.
2. Measure different quantities like voltage, current, power and energy using analogue and digital instruments
3. Measure circuit constants like R, L, and C

5. DETAILED CONTENTS:

SECTION-I

Sr.No.	Content	Hours	Marks
1	1.0 Units and Standards of Measurement	4	5
	1.1 System of units , standards and dimensions 1.2 Types of standards, Primary & Secondary standards for voltage, current and resistance. 1.3 Absolute measurement of current & resistance.		
2	2..0 D.C Potentiometers	4	5

	2.1 Construction & principle of simple slide wire type Potentiometers, 2.2 Crompton Potentiometer 2.3 Standardization of Potentiometers. 2.4 Range of Potentiometers and Volt Ratio Box 2.5 Measurement of voltage, current, power & resistance. 2.6 Calibration of voltmeter, ammeter & wattmeter.		
3	3.0 Resistance Measurements	10	12
	3.1 Classification of resistance as low, medium & high resistance 3.1.1 Voltmeter & ammeter method , 3.1.2 Substitution method, Potentiometer method 3.2 Bridge method –Wheatstone’s bridge 3.2.1 Limitations of Wheatstone’s bridge, 3.2.2 Kelvin double bridge for low resistance. 3.3 Measurements of high resistance.(Insulation Resistance) 3.3.1 Surface leakage 3.3.2 Guard ckt. 3.4 Measurements of high resistance by loss of charge method. 3.5 Ohm –meters, series type shunt type and Megger 3.6 Mega ohm bridge		
4	4.0 A.C Bridges	6	8
	4.1 General theory of A.C Bridges 4.2 Different sources and detectors used for bridge circuits. 4.3 Different bridge networks, their balance equations & phasor diagrams under balanced conditions of 1) Maxwell’s bridge ,2) Wein bridge, 3) Schering bridge – low voltage & high voltage bridge		
5	5.0 Measurement of Energy	8	10
	5.1 Measurement of energy 5.1.1: Principle of operation, 5.1.2 Equation for torque , 5.2 Different adjustment in ac energy meter. 5.3 Construction and working principle of Electronic energy meter 5.4 Introduction to polyphase Energy Meter. 5.5 Calibration of single phase energy-meter with various types of loads.		
	TOTAL	32	40
	<u>SECTION II</u>		
Ch.No		Hours	Marks
6	6.0 Measuring Instruments	10	12
	6.1 Classification of Analog instruments 6.2 General Features of Indicating, recording & integrating instruments. 6.3 Torque acting on the moving system of indicating instruments. 6.4 Method of damping & damping curve 6.5 Principle of operation, Equation for deflecting torque, Usual scale distribution & its modifications , Sources of errors, remedies for errors & common usage of the following type of instruments (a) Permanent magnet moving coil instruments (b) moving iron instruments (c) electrodynamic or dynamometer type instruments (d) Induction instruments (e) rectifier instruments.		

	6.6 Series register, shunts, universal shunts, multiplying power of a multiplier.		
7	7.0 Instrument Transformer	6	8
	7.1 construction of Current transformers and potential transformers 7.2 phasor diagram, phase angle ,phase angle error, ratio error and Methods to minimize it.		
8	8.0 Measurement of power	10	12
	8.1 Power measurement using (a) Electrodynamics type and (b) Induction type wattmeter 8.2 Measurement of three phase power (a) One wattmeter method (b) Two-wattmeter method for balance and unbalanced loads and star and delta connection. 8.3 Variation of the ratio of the wattmeter reading against the power factor of the load. 8.4 Measurement of reactive power for balanced load. 8.5 Polyphase wattmeter.		
9	9.0 Miscellaneous Instrument	6	8
	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. 9.5 Digital power factor meter 9.6 Introduction to digital voltmeter, ohmmeter and capacitance meter.		
	TOTAL	32	40

6. LABORATORY WORK:

1. Calibration of voltmeter, ammeter and wattmeter using a dc potentiometer.
2. Calibration of dc Energy-meter.
3. Calibration of ac single-phase Energy meter.
4. Measurement of three phase power by one wattmeter method
5. Measurement of three-phase power by two-wattmeter method.
6. Variation of the ratio of two-wattmeter reading against power factor.
7. Measurement of reactive power.
8. Measurement of Insulation resistance using Loss of Charge method
9. Wheatstone bridge
10. Study of Electronic energy meter

7. IMPLEMENTATION STRATEGY:

1. Adopting teaching plan and continuous assessment
2. The subject shall be taught using proper sketches of instruments.
3. The principles & laws shall be explained. Application of each measuring instruments shall be explained to the students.

8. 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
3.	E.W Golding	Electrical Measurements & Measuring instruments	A.H.Wheeler & Co.

9 WEBSITE: www.automaticalelectrical.com
www.mecoindia.com
www.adtrontechnologies.com

10 QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
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4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS :

Program : Electrical Engineering	Semester : IV
Course : Transformers and Induction motors	
Code : 120308	
Group: C*	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	02	-	-	06	01	03	80	20	25@	50**	-	175

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, and 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.
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

Ch.No	Topics	Hours	Marks
1	1.0 Transformer	04	04
	1.1 Two winding single phase transformer, Core type and Shell type 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	04	06

	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	08
	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 (HV & LV 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		
4	4.0 Efficiency and Voltage regulation	08	08
	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 & condition for maximum efficiency 4.6 Per unit impedance, per unit reactance, per unit resistance. 4.7 All day efficiency.		
5	5.0 Auto – Transformer	02	04
	5.1 Concept of Autotransformer. 5.2 Copper saving. 5.3 Advantages and disadvantages of auto – transformer, Uses.		
6	6.0 Three phase transformer	04	06
	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	04	04
	7.1 Three phase to two phase conversion. Scott connection. 7.2 Load analysis. 7.3 Phasor diagram for balanced load and unbalanced load.		
	TOTAL	32	40

SECTION –II

Ch.No	Topic	Hours	Marks
8	8.0 Three phase Induction Motor	12	12
	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. Concept of slip. 8.5 Equation for rotor current , rotor e.m.f 8.6 Effect of slip on rotor current, frequency. 8.7 Torque equation, Condition for maximum torque.		

	8.8 Torque – speed, Torque – slip curve. Full load torque and starting torque. 8.9. Full load torque and maximum torque. 8.10. Starting torque and maximum torque, Torque in Synchronous watts 8.11. Power stages of three phase Induction Motor. 8.12 Relation between rotor input. Rotor copper loss and gross mechanical power .Double cage rotor. Application.		
9	9.0 Equivalent circuit and circle diagram	06	12
	9.1 Equivalent circuit of a induction motor 9.2 Approximate equivalent circuit. 9.3 No- load and block 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.		
10	10.0 Starting of Induction Motor	06	08
	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, starts delta type starters. Direct online starters. Starter using contactors – direct online forward reverse automatic and semi – automatic star – delta starters, interlocks. 10.3 Power wiring diagram and control circuit diagrams, circuit diagram.		
11	11.0 Speed control of induction motor	04	04
	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.		
12	12.0 Single phase induction motor	4	4
	12.1 Introduction, Types of single-phase motor. 12.2 Single-phase induction motor. 12.3 Double field revolving theory & Cross field theory. 12.4 Making Single-phase induction motor self-starting. 12.5 Starting method and types of Single-phase induction motor. Capacitor start and capacitor run motor, shaded pole motors, Universal motor – ac series motor.		
	TOTAL	32	40

6. LABORATORY PRACTICE:

1. Open circuit test on single phase transformer
2. Short circuit test on single phase transformer
3. Regulation and efficiency of single phase transformer
4. Three phase connection of single phase transformer (Star-star, delta-delta and star-delta)
5. Scott connection of transformer
6. Load test on three phase induction motor
7. No load test & blocked rotor test on three phase Induction Motor & predetermination of efficiency full load torque, full load slip by Circle diagram.
8. Study of different types of starters for three-phase induction motor.

9. Study of Schrage motor
10. Load test on single phase induction motor
11. Study of single phase induction motors

7. IMPLEMENTATION STRATEGY

Subject shall be taught by

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

8. REFERENCE BOOKS:

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

9. WEBSITE: www.hindustanmo.com
www.cglindia.com

10.QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1 SUBJECT DETAILS :

Program: Electrical Engineering	Semester : IV
Course: Circuits & Networks	Code :120309
Group : C*	

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
04	02	-	-	06	01	03	80	20	25@	50**	-	175

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, and symmetrical components are of theoretical importance.

4. OBJECTIVES:

Students will learn about

1. Basic Network theorem which is 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

Ch.No.	Contents	Hours	Marks
1	1.0 Network Analysis.	14	35
	1.1 Classification of circuit elements, unilateral, bilateral, linear, non-linear, lumped, distributed passive & active circuit elements. 1.2 Types of sources, source shift, source transformation 1.3 star delta transformation for resistance, 1.4 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		
2	2.0 DC Transient.	14	35
	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.		
3	3.0 Harmonics.	4	10
	3.1 Introduction to harmonics, Odd & even harmonics 3.2 Types of harmonics and its causes and effects 3.3. Harmonics in single phase ac circuits		
	TOTAL	32	40
<u>SECTION-II</u>			
Ch.No	Content	Hour	Marks
4	4.0 Symmetrical components	12	30
	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.		
5	5.0 Two-port network.	12	30
	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.		
6	6.0 Storage batteries.	8	20
	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.		
	TOTAL	32	40

6. LABORATORY PRACTICE:

A report of the following experiments performed in the laboratory. (Any 8)

1. Star-Delta transformation.
2. Maximum power transfer theorem.
3. Superposition theorem and effect of inductance.
4. Thevenin's theorem
5. Norton's theorem.
6. Reciprocity theorem.
7. Millman's theorem
8. Measurements of high resistance by loss of charge method, time constant
9. Measurement of Z-Y-T –h parameters for a T-network (Any one)

7. IMPLEMENTATION STRATEGY (PLANNING):

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

8.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
4	Sudhakar & Shyammoham	Network Analysis & Synthesis	TMH Publication

9.WEBSITE: -[www.network theorems.com](http://www.networktheorems.com)**10. QUESTION PAPER PATTERN**

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Program: Electrical Engg. SEMESTER: IV course: Electrical Estimation & Costing Group: A	Code: 120322
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2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
03	-	02	-	05	01	03	80	20	50@	-	25**	175

3. 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.

4. OBJECTIVES:-

- 1) Students will be able to define different types of electrical installations
- 1) Interpret the electrical drawings
- 2) Prepare detail estimate and costing of various electrical projects
- 3) Understand the concept of contracts, contractors, starters and its procedures

5. DETAILED CONTENT:

Ch.No	<u>Section –II</u>	Hour s	Mark s
01	Drawing and IE rules 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.	04	06

Ch.No	<u>Section –II</u>	Hour s	Mark s
02	Service Connection 2.1 Concept of service connection. 2.2 Types of service connection & their features. 2.3 Methods of Installation of service connection. 2.4 Estimates of underground & overhead service connections.	06	08
03	Residential Building Electrification 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 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.	10	16
04	Testing of Installation Testing of wiring Installation for verification of current, earthing, insulation resistance and continuity as per IS	04	10
	TOTAL	24	40

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.	06	12
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	10	16

Ch.No	<u>Section –II</u>	Hour s	Mark s
	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. 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	Contracts, Tenders and Execution 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 7.2.1 Administrative approval, Technical sanctions. 7.3.2. Billing of executed work.	08	12
	TOTAL	24	40

6. 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 flour mills etc.

7. IMPLEMENTATION STRATEGY:

1. Adopting the lesson plan
2. Giving pertinent assignment and assessing them time to time
3. visit to ongoing site for inspection of installations

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

B)IS/International Codes: IS- 5909, 7733, 2174, 732, 4648

9. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Program : Electrical Engineering	Semester : IV
Course: DC Machine	Code : 120323
Group: C	Optional

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
02	02	-	-	04	-	-	-	-	50@	50**	-	100

3. RATIONALE:

This subject deals with dc machines. DC machines have a historical importance and even today dc motors are used in different applications. It also deals with construction, basic theory, steady state characteristics of dc machines and method to control and applications

4. OBJECTIVES:

Students will be able to

1. Explain the construction of the dc machines.
2. Draw and explain the characteristics of any generator and motor.
3. Differentiate between lap and wave wound generator.
4. Explain the need and process of parallel operation of DC Generators
5. Understand the application of various machines.

5. DETAILED CONTENTS:

SECTION-I

<i>Chapter</i>	Contents	Hours	Marks
1	1.0 DC Machines	04	08
	1.1 Elementary dc generator, and elementary dc motors 1.2 Principle of operation, & construction of dc machines, 1.3 Emf 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	04	12
	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.		
4	4.0 Armature Reaction	04	12
	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 motors.		
5	5.0 Losses & efficiency in dc machines	04	08
	5.1 Power losses in dc machines 5.2 Factors influencing the losses. 5.3 Power flow analysis 5.4 Efficiency of dc generators 5.5 Condition for maximum efficiency of dc generator.		
	TOTAL	16	40

SECTION -II

6	3.0 D.C Motors	06	15
	3.1 Principle of motor, back emf & torque equation 3.2 Type of dc motor, Characteristics of dc motors 3.3.1 Speed – armature current 3.3.2 Torque-armature current 3.3.2 Speed – Torque 3.3 Losses and efficiency 3.4 Power stages		
7	Speed control of DC Motors	06	15
	3.1 Factors controlling the speed of a dc motor 3.2 Method of speed control of dc shunt 3.3 Method of speed control of dc series motors. 3.5 Ward Leonard method of speed control 3.6 Starting of dc motors. 3 terminal dc shunt motor starter.		
8.	DC Motor starters	04	10
	6.1 necessity of a starter		
	6.2 Shunt motor starters 3-point and 4-point starter		
	6.3 starting and controlling of series motors		
	6.4 Grading of starting resistance.		
	6.4 Applications of DC motors		
	TOTAL	16	40

6. LABORATORY 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.
- 6) Speed load curve of a dc shunt motor.

- 7) Speed load curve of a compound motor
- 8) Magnetization curve of a dc generator and determination of critical field resistance.

7. 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) Continuous assessment scheme.

8. 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

9. WEBSITE: www.generalelectric.com
www.bharatbijlee.com

10. QUESTION PAPER PATTERN

Que. No.	Section I		Section II		Periodical Test	
	Bits	Marks	Bits	Marks	Bits	Marks
1.	Any 3 out of 5	12	-	-	Any 2 out of 3	06
2.	Any 2 out of 4	12	-	-	Any 2 out of 3	08
3.	Any 2 out of 3	16	-	-	Any 1 out of 2	06
4.	-	-	Any 3 out of 5	12	-	-
5.	-	-	Any 2 out of 4	12	-	-
6.	-	-	Any 2 out of 3	16	-	-

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

DISCIPLINE : ELECTRICAL ENGINEERING

SEMESTER : V

w.e.f. - Batch admitted in June, 2012 (progressively)

Duration of Training : 24 weeks

Sr. No.	Subject Name & Code	Prerequisite Sub Code	Scheme of Examination					Gr	Cr
			Weekly Report	Quiz Test	Training Report	OR	Total		
5.1	INPLANT TRAINING-I (120355)	--	50@	50@	50**	50**	200	A*	15
TOTAL CREDITS = 15			TOTAL MARKS = 200						

* Compulsory, # Award Winning, ** Assessed by Internal Examiner and External Examiner jointly, @ Assessed by Internal Examiner only
L-Lecture Period , P-Practical period , D- Drawing Practice Period , T-Tutorial, Cr-Credit , SSL-Sessional, TW- Term work, PR- Practical , OR – Oral
, Gr - Group , B-Basic, C-Core , A-Application , M-Management

Head of Department

Principal

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
 TEACHING AND EXAMINATION SCHEME

Discipline: ELECTRICAL ENGINEERING

w.e.f Batch admitted in June, 2012(Progressively)

SEMESTER-VI

Sr. No	Subject Name and Code	Pre-requisite Sub Code	Scheme of Instructions and Periods per week					Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/C		
			L	P	D	T	Cr	Hrs	Mks	SSL	Paper	TW	PR	OR	TTL				
6-1	Stress Management (120025)	-	-	2	-	-	2	-	-	-	-	-	-	-	-	M	022		
6-2	Synchronous Machine (120310)	-	4	2	-	-	6	03	80	20	80	25@	50**	-	175	C*	426		
6-3	#Switchgear & Protection (120311)	-	4	-	2	-	6	03	80	20	80	50@	-	50**	200	A*	426		
6-4	# Power Electronics (120028)	120020	4	2	-	-	6	03	80	20	80	50@	50**	-	200	C*	426		
6-5	Basics of Control Systems (120312)	-	3	2	-	-	5	03	80	20	80	25@	-	25**	150	C	325		
6-6	Electrical Machine Design & Estimation (120313)	-	3	-	2	-	5	03	80	20	80	25@	-	25**	150	A	325		
6-7	# Elective –I (ANY ONE)	120302																	
	Traction & Drives (120314)		4	2			6	03	80	20	80	50@		50**	200	A*	426		
	Railway Traction (120315)		4	2			6	03	80	20	80	50@		50**	200	A*	426		
TOTAL			22	10	4	-	36	06PAPERS		120	480	225	100	150	1075				
TOTAL PERIODS = 36										TOTAL MARKS = 1075									

* Compulsory, # Award winning subject, ** assessed by internal and external examiners jointly, @ Assessed by internal examiner only. L- Lecture period, P-Practical period, D- Drawing practice Period, T- Tutorial, Cr-Credit, SSL –Sessional, TW-Term work, PR- Practical, OR-Oral, Gr-Group, B-Basic, C-Core, A-Application, M-Management.

Head of Department

Principal

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
 TEACHING AND EXAMINATION SCHEME

Discipline: ELECTRICAL ENGINEERING
SEMESTER-VII

w.e.f Batch admitted in June, 2012(Progressively)

Sr. No.	Subject Name and Code	Pre-requisite Sub Code	Scheme of Instructions and Periods per week					Paper Duration and Marks		Scheme of Examination						Gr	Scheme L/P/C		
			L	P	D	T	Cr	Hrs	Mks	SSL	Paper	TW	PR	OR	TTL				
7-1	# Project (120316)	\$	-	6	-	-	6	-	-	-	-	50	-	50**	100	A*	066		
7-2	# Industrial Management (120024)	-	3	0	-	-	3	03	80	20	80	-	-	-	100	M*	303		
7-3	# Instrumentation (120317)	-	4	2	-	-	6	03	80	20	80	50@	-	50**	200	A*	426		
7-4	# Testing and Maintenance (120318)	-	4	2	-	-	6	03	80	20	80	50@	50**	-	200	A*	426		
7-5	Utilization of Electrical Energy (120319)	-	3	2	-	-	5	03	80	20	80	25@	-	25**	150	A	325		
7-6	Microprocessor & Micro-controller (120029)		3	2			5	03	80	20	80	25@	25**	-	150	A	325		
7-7	# Elective –II (ANY ONE)																		
	PLC and SCADA (120320)	-	4	2	-	-	6	03	80	20	80	50@	-	50**	200	A*	426		
	Energy Audit and Conservation (120321)		4	2			6	03	80	20	80	50@		50**	200	A*	426		
	TOTAL		21	16	-	-	37	06 PAPERS		120	480	250	75	175	1100				
TOTAL PERIODS = 37										TOTAL MARKS = 1100									

* Compulsory, # Award winning subject, ** assessed by internal and external examiners jointly, @ Assessed by internal examiner only

L -Lecture period, P-Practical period, D- Drawing practice Period ,T- Tutorial, Cr-Credit, SSL –Sessional , TW-Term work, PR- Practical , OR-Oral, Gr-Group, B-Basic, C-Core, A-Application, M-Management. \$ - All the compulsory subjects upto 6th semester with term granted .

Head of Department

Principal

Shri Vile Parle Kelavani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC

TEACHING AND EXAMINATION SCHEME

DISCIPLINE : ELECTRICAL ENGINEERING

SEMESTER : VIII

w.e.f.- Batch admitted in June, 2012 (progressively)

Duration of Training : 24 weeks

Sr. No.	Subject Name & Code	Prerequisite Sub Code	Scheme of Examination					Gr	Cr
			Weekly Report	Quiz Test	Training Report	OR	Total		
8.1	# INPLANT TRAINING-II (120388)	120355	50@	50@	50**	50**	200	A*	15
TOTAL CREDITS = 15			TOTAL MARKS = 200 (Converted to 100 for Award of Diploma)						

* Compulsory, # Award Winning, ** Assessed by Internal Examiner and External Examiner jointly, @ Assessed by Internal Examiner only
L-Lecture Period , P-Practical period , D- Drawing Practice Period , T-Tutorial, Cr-Credit , SSL-Sessional, TW- Term work, PR- Practical , OR – Oral
, Gr- Group , B-Basic, C-Core , A-Application , M-Management

Head of Department

Principal

SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
Vile Parle (W) Mumbai-400056

Diploma course in Electrical Engineering
2012

With Effect From

CREDIT SUMMARY

Sr.No	Semester	Basic C	Core		Application		Management		Compulsory	Optional		Total credits	Remark
			C	O	C	O	C	O		E	O		
1	1	24	06	-	-	-	-	-	30	-	-	30	
2	2	15	16	-	-	-	-	-	31	-	-	31	
3	3	06	17	09	-	-	-	-	23	-	09	32	
4	4	-	24	04	-	05	-	-	24	-	09	33	
5	5	-	-	-	15	-	-	-	15	-	-	15	
6	6	-	12	05	12	05+ 06 E	-	02	24	06	12	42	
7	7	-	-	-	24	10+ 06 E	03	-	27	06	10	43	
8	8	-	-	-	15	-	-	-	15	-	-	15	
	Total	45	75	18	66	20+ 12 E	03	02	189	12	40	241	

C- Compulsory,O-Optional,E-Elective

HOD

PRINCIPAL

Shri Vileparle Kelvani Mandal's
SHRI BHAGUBHAI MAFATLAL POLYTECHNIC
Vile Parle (W) Mumbai-400056

Diploma course in Electrical Engineering

with Effect From 2012

CREDIT SUMMARY

Group	Max. Cr.	Compulsory Cr.	Optional Cr.	Remark
B = Basic	45	45	-	
C = Core	93	75	18	
A= Application	98	66	32	
M = Management	05	03	02	
	Total = 241	189	52	

HOD

PRINCIPAL

1.0 SUBJECT DETAILS:

Course: C/ME/EE/IE/P/CH/DE	Semester: VI
Subject: Stress Management	Code: 120025
Group: M	

2.0 TEACHING AND EXAMINATION SCHEME:

Teaching Scheme				Exam Scheme & Maximum Marks							
TH	TU	PR	CR	PAPER HRS.	TH	No. of paper	Sessional	PR	OR	TW	TOTAL
-	-	02	02	-	-	-	-	-	--	-	-

3.0 RATIONALE:

This subject is designed to provide overview of Yoga, Meditation, Art of Living, Stress Management and Spiritual Power in human being as support Engineer to achieve Auxiliary skill.

4.0 OBJECTIVES:

Students will be able to

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

5.0 CONTENTS:

Hrs.

1. HISTORICAL BACKGROUND AND YOGA LEARNING

10

- i) Yoga in Vedas
- ii) Yoga and its Principles
- iii) Consciousness
- iv) Yoga approach and Scientific view
- v) Pranayama: Breath Control, Breath and Postures, Rhythmic Breathing
- vi) Controlling the Body, Mechanism of Body: Kriyas and its high Therapeutic value.
- vii) Body as understood in its frame work systems and structure:..Asanas – Cultural and Relaxation Asanas -
- viii) Muscles strength, Muscular coordination strength of Immune system
- ix) Relation and Reflection techniques Shavasana – Shakshi Bhavanam.
- x) Bandhas and Mudras.
- xi) Depth of perception and expansion of awareness
- xii) Gross level – Muscular stretches
- xiii) Subtle level – Respiration changes and normalizing breath

2. MEDITATION AND ITS TECHNIQUES:

10

Meditative postures and kinds of Meditation

Bodily Benefits – Lower Blood Pressure ,lowers the levels of blood lactate, improves the immune

system, increases body vitality, controls insomnia and increases overall health of the body

Violence Free Society – Meditation develops happiness, contentment and calmness. When increasing number of people practice meditation, it has a calming effect on the environment. This is a potent way to achieve a violence free society.

Mental Benefits – Emotional stability, anxiety decreases, anger reduces, happiness increases, and intuition develops clarity and peace of mind, induces ability to focus, and reduces tension and fear.

Value Based Society – The effects of meditation include happiness, respect for the environment and others, appreciation of diversity in nature, a strong sense of social values. These qualities an individual level, helps develop a value based social system.

Spiritual Growth – Consciousness evolves, meditation brings harmony in creation, personal transformation, realization of SELF

Trusting, Happy and Content Society – These are the objectives of any society. Meditation empowers a society to achieve these qualities.

3. ART OF LIVING 08

1. Sudarshan Kriya
2. Life Skills
3. Ancient Wisdom
4. Practical knowledge to deal with the daily challenges of life
5. Interactive exercises
6. Dealing with your emotions
7. Improving Communication skills and Relationship

4. STRESS MANAGEMENT FOR STUDENTS 04

Stress management techniques:

1. Time management techniques
2. Organization techniques
3. Create a study environment
4. Memorization techniques
5. Be an Optimist
6. Sleep Well
7. Study Techniques

6. IMPLEMENTATION STRATEGY AND PRACTICE SKILL

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

7.0 BOOK LIST:-

1. The Yoga Sutra of Patanjali M.R.Yardi, Bhandarkar Oriental Research Institute, Pune
2. Indian Philosophy by Dr. S. Radhakrishnan
3. Introduction to Indian Philosophy by Dutta & Chatterji
4. Outlines of Indian Philosophy by Hiriyanna.

8.0 Book for reference

1. The Yoga system of Patanjali, James, Houghton , wood.
2. Yoga a sutras of Patanjali – Sadhana pada with Exposition of Vyasa
3. Light of Yoga (on Yama – Niyama) by B.K.S. Iyenger, Iyenger Institute Pune

4. Hatha Yoga Pradeepika – Yogi Swatmarama
5. Science of Yoga by I.K.Taimini

9.0 WEB REFERENCES:

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

The above subject will be taken by concerned expert in the field/ relevant to performance / performing practices,

02 credits are equivalent to (02 hours) practice session. Attendance and performance is mandatory for granting the term and earning the credits as per attendance rule.

1.0 SUBJECT DETAILS:

Course Name: Electrical Engineering	Semester : VI
Subject Title: Synchronous Machines	Subject code: 120310
Group : C*	Compulsory

2.0 TEACHING AND EXAMINATION SCHEME:

Teaching Scheme				Exam Scheme & Maximum Marks							
TH	TU	PR	CR	PAPER HRS.	TH	No. of paper	Sessional	PR	OR	TW	TOTAL
04	00	02	06	03	80	01	20	50**	--	25@	175

3.0 RATIONALE:

This subject deals with synchronous machine, their concept, principle, operation and maintenance characteristics which have historical importance & some application. The knowledge and skill obtained by the student will be useful to him as a supervisor or technician in discharging the technical function.

4.0 OBJECTIVES: Students will be able to understand

- Construction & principle of synchronous machine.
- Draw & interpret phasor diagrams for various loads of synchronous machine.
- Enlist the peculiar applications of synchronous machine.

SECTION I

Ch.No	Name of the topic	Hours	Marks
1	1.0 Synchronous Machines 1.1 Introduction-Basic Concepts In Magnetic Field 1.1.1 Rotating Machines 1.1.2 Rotating Magnetic Field 1.1.3 Concept of electro-mechanical energy conversion 1.2 Elementary machines 1.2.1 Simplified version of an a/c synchronous machines 1.2.2 Synchronous speed 1.2.3 Concept of stationary armature & rotating magnetic field 1.3 Salient pole & non-salient pole type field structure 1.4 Classification of stator armature winding 1.4.1 Double layer winding 1.5 Winding turns & winding factors 1.5.1 Pitch factor advantage of short pitch winding	08	08

	1.5.2 Distribution factor and distribution winding 1.6 E.M.F. equation of synchronous machines 1.7 Numerical on above related topics		
2	2.0 Synchronous Generators or Alternator 2.1 Operating Principle 2.2 Rating of Alternators 2.3 Classification of alternators according to their applications	02	04
3	3.0 Alternator on load 3.1 Armature reaction 3.2 Leakage reactance 3.3 Synchronous Reactance 3.4 Synchronous impedance 3.5 Phasor diagram of alternator on load 3.5.1 Unity p.f. 3.5.2 lagging p.f.by 90 3.5.3 leading p.f by 90 3.6 Numerical on above related topic	06	08
4	4.0 Voltage regulation of an alternator 4.1 Determination of voltage regulation by indirect method 4.1.1 Synchronous impedance and its determination by open and short circuit test 4.1.2 Voltage regulation by E.M.F. method 4.1.2 Voltage regulation by M.M.F. method	04	05
5	5.0 Effect of salient poles 5.1 Two reactance concept for salient pole machine 5.2 Power developed in salient pole synchronous alternator 5.3 Excitation systems for synchronous alternator	02	03
06	6.0 Parallel operation of alternators 6.1 Advantages of parallel operation of synchronous alternators 6.2 Synchronizing on Infinite Bus-Bars 6.2.1 Conditions for parallel connection or synchronizing 6.2.2 Methods of synchronization 6.3 Synchronizing Action 6.3.1 Effect of speed change 6.3.2 Effect of inequality of e.m.f. 6.4 Load sharing 6.4.1 Effect of change of excitation 6.4.2 Effect of change of Prime mover input 6.5 Synchronizing Power 6.5.1 Two alternators are operating in parallel at no-load 6.5.2 Alternator is connected to Bus Bars 6.6 Losses & Efficiency 6.6.1 Conventional efficiency from measurement of losses 6.7 Numerical	10	12
	Total	32	40

SECTION-II			
7.0	7.0 Synchronous Motor 7.1 Facts about synchronous motor 7.2 Synchronous m/c working as a motor 7.3 Principles of operation 7.4 Making synchronous motor self-starting & methods of starting	06	08
8	8.0 Synchronous motor on load 8.1 Effect of change of load with constant excitation 8.1.1 Pull out torque 8.1.2 Motor phasor diagram with different load 8.2 Effect of change of excitation with constant load 8.2.1 Under excitation 8.2.2 Normal excitation 8.2.3 Over excitation 8.2.4 Phasor diagrams with different excitation 8.3 V-curves & inverted V-curves 8.5 Hunting & Damper winding 8.6 Numerical examples	14	16
9	9.0 Power factor of synchronous motor 9.1 Synchronous condenser 9.2 Use of synchronous motor for improving p.f. as well as sharing the load 9.3 Efficiency of synchronous motor 9.4 Numerical	08	10
10	10.0 Industrial application 10.1 Advantages and disadvantages of synchronous motor 10.2 Use of synchronous motor as a drive for industrial application	04	06
	Total	32	40

6.0 TERM WORK:

List of practical-

1. Determination of magnetization characteristics of an Alternator
 - a. at no load rated speed
 - b. at no load half rated speed
 - c. at full load rated speed(non inductive load)
2. Determination of the relationship between terminal voltage & load Current of an alternator, keeping excitation and speed constant.
3. Determination of the relationship between terminal voltage & load current of an alternator for varying power factor load, speed & excitation remaining constant
4. Determination of excitation required to maintain constant voltage in an alternator when the alternator is loaded.
5. Determination of regulation & efficiency of an alternator from open circuit & short circuit.
6. Parallel operation of three phase alternators.
7. Determination of the effect of variation of excitation of a synchronous motor.

7.0. 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.

8.0 A) REFERENCE BOOKS :

Sr. No.	Author	Title	Publisher
1	J.B Gupta	Theory and Performance of Electrical Machines	Dhanpatrai & sons
2	B.L.Theraja	Electrical Technology Vol – II	S.Chand
3	S.K.Bhattacharya	Electrical Machines	Tata McGraw Hill
4	Ashfaque Hussain	Electrical Machines	Dhanpat Rai and Sons

- B) WEBSITES: www.wikipedia.com
www.siemenceindia.com
www.elearning.vtu.in
www.uotechnology.edu.iq

9.0 QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS :

COURSE: ELECTRICAL Engineering	SEMESTER:VI
SUBJECT: # Switchgear & Protection	CODE:EE-120311
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	SSL	TW	Oral	PR	Total
		Hrs	NP	Mks							
04	02	06	03	01	80	80	20	50@	50**	-	200

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

Ch.No	Contents	Hours	Marks
1	1.0 Switches:	04	05
	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	04	05
	2.1 Requirements of fuse, Different types of fuses-rewirable, 2.2 H.R.C, expulsion type, draw-out fuses. 2.3 Characteristics and different ratings of fuses.		
3	3.0 Relays	12	15
	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		

	<ul style="list-style-type: none"> 3.3.3 Electromagnetic 3.3.4 Induction type 3.4 Induction type <ul style="list-style-type: none"> 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. 		
4	4.0 Circuit Breaker	12	15
	<ul style="list-style-type: none"> 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 		
	Total	32	40

SECTION II

5	6.0 Fault Calculation	08	10
	<ul style="list-style-type: none"> 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. 		
6	7.0 Protection Systems	14	16
	<ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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		
7	5.0 Over Voltage Protection	06	08
	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		
8	8.0 Neutral Grounding	04	06
	8.1 Necessity, Different methods of neutral grounding, 8.2 Their advantages and disadvantages. 8.3 Comparison between earthing & neutral grounding		
	Total	32	40

6. LABORATORY/ TERM WORK :

- Drawing sheets of full imperial size depicting
 1. The constructional details, scheme details of different types of relays.
 2. Different types of circuit breakers, their components, assembly, etc.
 3. Constructional details, scheme details of Different protection schemes and protection devices.
 4. Devices used for overvoltage protections

7 . IMPLEMENTATION STRATEGY (PLANNING):

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

- 1) Lesson plan
- 2) Drawing sheets for various applications.
- 3) Visit to indoor/outdoor substations.
- 5) Use of ISS /IEC and ANSI codes.

8. A) 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

B) WEBSITES: www.siemenseindia.com
www.wikipedia.com
www.schneider-electric.com.au
www.niceindia.com

9.0 QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
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4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1.0 SUBJECT DETAILS:

Course: Electrical Engineering	Semester: VI
Subject: # Power Electronics.	Code : 120028
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	SSL	TW	Pract	Oral	Total
		Hrs.	Np	Mks							
04	02	06	03	01	80	80	20	50@	50**	-	200

3. RATIONALE:

To become a perfect technician in electrical engineering, knowledge and applications of electronic Power Devices, AC-DC Motor controls, Inverters, Choppers and SMPS is essential.

4. OBJECTIVES:

After studying this subject student will be able to:

1. Understand different of power devices used for electrical power control,
2. Understand concept and working of oscillators,
3. Draw circuits of inverters, choppers and analyze
4. Draw and analyze different types of Ac-DC motor control circuits.

Section I

Ch.No	Contents	Hours	Marks
1	Oscillators 1.1 Principle of Oscillator 1.2 Regenerative Feedback in Oscillators 1.3 Conditions For Sustained Oscillations 1.4 Frequency of Oscillation 1.5 Tuned Collector Oscillator 1.6 Phase Shift Oscillator 1.7 Hartley Oscillator 1.8 Colpitt's Oscillators 1.9 Crystal Oscillator.	08	10
2	Thyristors and Other Switching Devices 2.1 Power Semiconductor Devices 2.1.1 Thyristors (SCR), Two-Transistor Model of Thyristors 2.1.2 GTO, PUT, SUS, SCS, Light Activated Thyristor (LAT) 2.1.3 Diac, Triac, 2.1.4 IGBT	10	12

	2.2. Characteristics of SCR, Diac and Triac. 2.3. Switching Characteristics of SCR and TRICS 2.4. Turn-on and Turn-off Methods in SCR and Triac. 2.6. SCR and Triac Ratings.		
3	Thyristor Protection Circuits 3.1 Snubber Circuit. 3.2 Over-Voltage Protection. 3.3 Over-Current Protection. 3.4 Gate Protection.	06	08
4	Firing Circuits & Commutation Techniques 4.1 Firing Circuits for SCR and Trics. 4.2 Main Features of Firing Circuits. 4.3 Resistance & Resistance-Capacitive Firing Circuit. 4.4 UJT based Firing Circuit. 4.5 Pulse Transformer in Firing Circuit.	08	10
	Total	32	40

SECTION II

Ch.No	Contents	Hours	Marks
5	Phase Controlled Rectifier 5.1. Principle of Phase Control. 5.1.1.Single Phase Half-Wave Circuit With R-L Load. 5.1.2.Freewheeling Diode. 5.2.Full Wave Controlled Rectifier. 5.2.1.Single Phase Full Converter. 5.2.2.Single Phase Semi Converter. 5.3.Three Phase Full Converters. 5.4.Three Phase Semi Converters. 5.5.Three Phase Converter System Using Diodes. 5.6.Applications of SCR.	08	10
6	Choppers 6.1 Principles of Chopper 6.2 Control strategies 6.2.1 Constant frequency system 6.2.2 Variable frequency system 6.3 Step up choppers 6.4 Types of chopper circuits 6.4.1 Type A,B, C, D and E Chopper circuits	08	10
7	Inverters 7.1 Operating principles of inverter 7.1.1 Single phase voltage source Inverters 7.1.2 Single phase bridge Inverters 7.2 Principles of operation of different inverter circuits 7.3 Inverter waveforms 7.4 Inverter using Thyristors 7.5 Series and Parallel Inverters 7.6 A.C Voltage Control 7.7 Application of Inverter	10	12

8	Switching Power Supplies (Concept and Block Diagrams)	06	08
	8.1 Switch Mode Power Supply (SMPS)		
	8.2 Uninterruptable Power Supply (UPS)		
	8.3 BLDC Motor Drive		
	Total	32	40

6.0 TERM WORK:

1. RC triggered HWR
2. RC triggered FWR
3. IGBT Characteristics
4. UJT triggering of SCR
5. Oscillator chopper circuit (LC commutation)
6. Digital firing circuits
7. Impulse commutated chopper
8. Series inverter
9. Parallel inverter
10. Study of SMPS & UPS

7. IMPLEMENTATION STRATEGY (PLANNING) :

Subject shall be taught by

- Adopting lesson plan,
- Emphasizing relevant principles &
- Arranging industrial visit to the relevant industry if any .

8. A) REFERENCE 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	P.S.Bimbhra	Power Electronics	Khanna Publishers, New Delhi
7	Rajashekara, K., Bhat, A.K.S., Bose, B.K.	Power Electronics, The Electrical Engineering Handbook	

B) WEBSITES: <http://www.slideshare.net/rssraaz/power-electronics-16419609>
www.wikipedia.com
www.vonsch.com

9. QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
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4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Course Name: Electrical Engineering	Semester : VI
Subject Title : Basics of control system	Subject Code:120312
Group: C	Optional

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks								
Theory Hrs/Wk.	Pract. Hrs/Wk.		Paper			TH	SSL Marks	T/W	PR	Oral	Total
			Hrs	N/P	Mks						
3	2	5	3	1	80	80	20	25@	-	25**	150

3. RATIONALE:

Control system deals with the concepts of mathematical modeling of physical components and feedback systems. Advances in theory and practice of automatic control provide the means of attaining high performance of dynamic systems improving the productivity. Engineers will have good understanding and improve the logical thinking

4. OBJECTIVES: The student will be able to:

- 1) Explain the working of different types of control systems
- 2) Identify different components of control systems
- 3) Prepare the mathematical model of different systems
- 4) Analyze the time response of the systems
- 5) Select the criterion for the stability of the systems
- 6) Analyze the behavior of the systems with root locus, Bode plot

5.0 DETAILED CONTENTS:

SECTION I

Ch.No.	Name of the topic	Hours	Marks
01	INTRODUCTION TO CONTROL SYSTEMS 1.1 Introduction to control systems 1.2 Definitions 1.3 Classification of control systems 1.4 Open Loop & Closed Loop systems Advantages and Disadvantages Real time applications of open loop and closed loop system 1.5 Feedback control & Effects of feedback	02	04
02	COTROL SYSTEM COMPONENTS	06	10

	<p>2.1 Servomotors Requirement of good servomotor, Types of Servomotors DC Servomotor: Characteristics & Applications AC Servomotors: Construction, rotor, torque-speed Characteristics, applications,</p> <p>2.2 Stepper Motors , Characteristics & Applications</p> <p>2.3 AC and DC position Control</p> <p>2.4 Potentiometer, Potentiometer as an error detector</p> <p>2.5 Tachogenerators (Tachometers) AC & DC Tachometers: Working, Advantages, Disadvantages</p> <p>2.6 Introduction to Synchros as an error detector.</p>		
03	<p>TRANSFER FUNCTION & MATHEMATICAL MODELING OF SYSTEMS</p> <p>3.1 Concept of Transfer function</p> <p>3.2 Procedure for determining the transfer function of the control system</p> <p>3.3 Poles, Zeros, Pole-Zero plot and order of the transfer function</p> <p>3.4 Mathematical modeling of physical, Electrical, Mechanical systems</p> <p>3.5 Analogous Systems, mesh & node analysis (Simple Numerical only)</p>	05	08
04	<p>BLOCK DIAGRAMS AND SIGNAL FLOW GRAPHS</p> <p>4.1 Introduction</p> <p>4.2 Representation of control system by Block diagram</p> <p>4.2.1 Rules for Block diagram reduction</p> <p>4.2.2 Procedure to solve Block Diagram reduction problems</p> <p>4.5 Representation of control system by Signal Flow Graphs</p> <p>4.5.1 Rules for drawing signal flow graphs</p> <p>4.6 Mason's Gain Formula</p> <p>4.8 Drawing Signal Flow Graph from a given Block Diagram And vice-versa, (simple Problems on Block diagram only)</p>	06	10
05	<p>TIME DOMAIN ANALYSIS</p> <p>5.1 Laplace Transforms of Standard Test Signals: unit step, unit ramp, unit, and Parabolic and unit impulse.</p> <p>5.2 Transient response of first order system to standard test inputs</p> <p>5.3 Transient response of Second order system to unit step input.</p> <p>5.4 Time Domain Performance Specifications.(no derivation)</p> <p>5.6 Steady-state Error Analysis</p> <p>5.7 Type" of the systems, Static Error Coefficients and Steady-State Errors.</p>	05	08
	TOTAL	24	40

SECTION- II

Ch.No.	Name of the topic	Hours	Marks
06	<p>STABILITY</p> <p>6.1 Stability in terms of characteristics equation of a control system</p> <p>6.2 Location of poles & stability</p> <p>6.3 Stability Criterion , Hurwitz & Routh's stability criterion</p> <p>6.4 Application of Routh criterion, Relative stability analysis (Simple</p>	04	07

	Numerical)		
07	INTRODUCTION TO ROOT LOCUS 7.1 Introduction 7.2 Basic concepts of Root Locus 7.3 Rules and construction of approximate root loci. (without scale)	05	12
08	FREQUENCY DOMAIN ANALYSIS 8.1 Frequency domain specifications(no derivation) 8.2 Relationship between Time and Frequency domain specifications. 8.3 Bode Plots, Polar Plots, Gain margin and phase margin	05	07
09	INTRODUCTION TO PROGRAMMABLE LOGIC CONTROLLER 9.1 Introduction to PLC 9.2 Block Diagram and components of PLC 9.3 Processor unit 9.4 Components used in input and output devices 9.5 Introduction to wiring configurations used in ladder logic circuits 9.6 Ladder logic circuit diagram 9.7 Hardware and addressing of Programmable controllers 9.8 Addressing Techniques 9.9 Simple Programs	10	14
	TOTAL	24	40

6.0 TERMWORK: List of Practicals

1. Synchro Transmitter
2. Synchro pair as an error detector
3. Linear potentiometer characteristics
4. AC servomotor Speed –Torque characteristics
5. DC positional servo system
6. Stepper motor and relevant assignments on depicted topics
7. D.C.Motor Speed Control (Open Loop and Closed Loop)
8. Determination of Transfer Function by Drawing Bode Plot
9. Study of PLC & Practicals based on it

7.0 IMPLEMENTATION STRATEGY (PLANNING) :

Subject shall be taught by

- Adopting lesson plan,
- Emphasizing relevant principles & solving simple numerical
- Solving assignments on various topics

8.0 A) REFERENCE BOOKS:

Sr.No	Author	Title	Publisher
1	Dr.S.D.Bhide, S.Satyanarayan and N.A Jalgaonkar	Feedback Control System	Tecnova
2	U.A. Bakshi, V.U. Bakshi	Control System Engineering-I	Technical Publication
3	Ashfaq Husain, Haroon Ashfaq	Control Systems	Dhanpat Rai & Co.
4	Terry Bartelt	Industrial Electronics (Circuits, Instruments and Control Techniques)	Delmar Cengage Learning India Edition
5	Norman S. Nise	Control System Engineering	Wiley India publication Co.
6	Petruzualla	Industrial Electronics	TMH Publication

B) WEBSITES: www.wikipedia.com
www.site.uottowa.ca
www.gobookee.com
www.aoenger.com

9. QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
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1	Any 3out of 5	12	-	-	Any 2 out of 3	6
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4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Course: Electrical Engineering	SEMESTER: VI
Subject: Electrical Machine Design & Estimation	Code: 120313
Group – A	Optional

2.. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks								
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	TW	Pract	Oral	Total
		Hrs.	NP	Mks							
03	02	05	03	01	80	80	20	25@	-	25**	150

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 and procedures of designing of basic components and machines like transformer, coils with proper selection conducting, insulating & constructional materials will help the students in future to be a good technician.

4. OBJECTIVES:

After undergoing this course students will be able to:

- Select the proper material for energy efficient design of machines
- Understand terminology involved in design of electrical machine
- Refer the standards associated with design procedures
- Prepare the schemes of lighting and estimate the various turn key projects in electrical installations.

5. DETAILED CONTENTS:

SECTION-I

Ch.No	Contents	Hours	Marks
1	1.0 Design of field coils	04	08
	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.		
2	2.0 DC Shunt motor starter	06	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.		

3	3.0 Induction Motor	06	10
	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	08	12
	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. 4.1.3 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		
	Total	24	40

SECTION II

Ch.No	Contents	Hours	Marks
5	5.0 Design of transformer	10	16
	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 t/f. 5.4 Main dimensions of single phase and three phase shell type t/f . 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.		
6	6.0 Cooling:	04	08
	6.1 Estimation of losses and quantity of oil required for cooling, 6.2 Dimensions of cooling time with or without tubes. 6.3 Calculation of cooling tubes.		
7	7.0 Illumination project	10	16
	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. 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.		
		TOTAL	24 40

6. TERM WORK: (Drawing Sheets of Full imperial size any 4 sheets)

1. Design of field coil/ lifting magnet
2. Design of DC shunt motor starter/ induction motor starter
3. Wiring residential flats./ building/ workshop lighting.
4. Estimation of wiring installation of overhead crane/ hoist.
5. Design of three-phase core type & single phase shell type

7. 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.

8. A) 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
4	M.G.Say	Theory and performance of Electrical Machines	Khanna publication

B) WEBSITES: www.siemenseindia.com
www.cglindia.com
www.wikipedia.com
www.tanndfonline.com

9. QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1.0 SUBJECT DETAILS :

Course Name: Electrical Engineering	Semester :VI
Subject Title : # Traction & drives	Subject code: 120314
Group: A*	Elective -I

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks								
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	TW	Pract	Oral	Total
			Hrs	Np	Mks						
04	02	06	03	01	80	80	20	50@	-	50**	200

3. RATIONALE:

Electrical drives are vary commonly used in industries and traction is a special application of electrical drive, this subject deals with different type of drives, duty cycle of motors, type of enclosures of motors etc. it also deals with selection of motor for a given application, the control devices and methods etc. this subject deals with discussion of drives use for some typical application like steel mills, paper mills etc.

This subject deals with economics of electric traction, speed-time curves, etc. it also deals with different types of motors used for electric traction, their starting methods, braking methods, etc. it also deals with traction equipments and traction sub-stations.

4. OBJECTIVES: The student will be able to:

- 1) Compare electric traction with other systems of traction prevailing in India methods
- 2) Study duty cycle of traction drives
- 3) Calculate ratings and energy consumptions
- 4) Make flywheel calculations
- 5) Select a motor for given application
- 6) Able to study different traction motors employed in India.

5. DETAILED CONTENTS:

SECTION -I

Ch.No	Name of the topic	Hours	Marks
1	Traction systems & track electrification 1.1 System of electric traction 1.2 System of electrification of traction 1.3 Advantages and disadvantages of electric traction	03	04
2	Traction mechanics 2.1 Speed time curve & simplified speed time curves 2.2 Max. and schedule speed & factors affecting maximum speed	10	10

	2.3 Problems associated with max speed 2.4 Tractive effort 2.5 Power of traction motor 2.6 Coefficient of adhesion, factors affecting coefficient of adhesion 2.7 Problems associated with tractive effort 2.8 Specific energy consumption 2.9 Factors affecting specific energy consumption 2.10 Problems associated with specific energy consumption		
3	Traction motors 3.1 Desirable characteristics of traction motors 3.2 Construction & running characteristics of A.C. series motor, D.C. motor 3.4 Suitability of series motor for traction duty	03	04
4	Controls of traction motor 4.1 Series parallel control 4.2 Traction methods 4.3 Advantages of series parallel starting 4.4 Problems associated with starting efficiency 4.5 Metadyne and amplidyne [construction, operation and application 4.6 Multiple unit control- master controller]	08	10
5	Braking 5.1 Requirements of braking systems 5.2 Types of electric braking 5.3 Rheostatic braking, plugging and regenerative braking 5.4 Conditions necessary to achieve electric regenerative braking 5.5 Suitability of motors for E.R.B.	04	06
6	Power supply arrangement 6.1 High voltage supply 6.2 Traction sub-station 6.3 Traction equipments 6.4 Overhead wires 6.5 Train lighting	04	06
	Total	32	40

SECTION II

7	Electrical drive 7.1 Concept of an electric drive 7.2 Mechanical features of electric drive 7.3 Multi-Quadrant operation of drives 7.4 classification of electric drives 7.5 characteristics of different types of load	06	08
8	Rating & heating of motors 8.1 Heating effects 8.2 Heating & cooling curves	10	12

	8.3 classes of duty cycles 8.4 determination of motor rating for different applications 8.5 load equalization 8.6 Flywheel calculations 8.7 Properties & applications of dc & ac motors		
9	Control of drives 9.1 Control switches, pressure switch, float switch, limit switches and different types of limit switches centrifugal switch, power type limit switch etc. 9.2 Different type of starters using contactors limit switches etc. Interlocking. Different starter schemes like DOL starter, Star-Delta starter using contactor etc. control panels and motor control centers (MCCs)	08	10
10	Industrial applications 10.1 Descriptive study of electrical drives needed for (1) steel mills, (2) Paper mills (3) Textile mills and different processes in textile mills (4) sugar mills (5) coal mills (6) cement mills (7) machine tool applications	08	10
	Total	32	40

6.0 TERMWORK:

As a Term-work student with group of maximum 5 students can select any one topic related to the subject and will have to submit the comprehensive report on it and some relevant assignments.

7. 0 IMPLEMENTATION STRATEGY:

To complete the syllabus following strategy will be implemented

- 1) Adopting proper lesson plan
- 2) Industrial visit
- 3) Project work & demonstration

8. A) REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher
1	H.Partap	Modern electric traction	Pritam surat & brothers
2	J.B.Gupta	Utilization of electrical power and electric traction	S.Chand
3	H.Partap	Art & science of electric drives	Khanna publications
4	S.K.Pillai	Electrical drives	Wiley eastern limited
5	G.K.Dubey	Fundamentals of electrical drives	Narosa publishing house

- B) WEBSITES: www.irieen.indianrailways.gov.in
www.wikipedia.com
www.intechopen.com
www.05abb.com

9.0 QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Course: Electrical Engineering	Semester: VI
Subject: # Railway Traction	Code : 120315
Group : A*	Elective- I

2. TEACHING AND EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks								
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	TW	Pract	Oral	Total
		Hrs.	Np	Mks							
04	02	06	03	01	80	80	20	50@	-	50**	200

3.0 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.

4.0 **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.

5. DETAILED CONTENTS:

SECTION-1

Ch.No	Topics	Hours	Marks
01	Power Supply Arrangements: 1.1 – Introduction 1.2 – High Voltage Supply. 1.3 – Constituents of Supply System. - Substations. - Feeding Posts.	10	15

	<ul style="list-style-type: none"> - Feeding and Sectioning Arrangements. - Sectioning and Paralleling Post. - Sub sectioning and Paralleling Post. - Sub sectioning Post. - Elementary Section. <p>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>		
02	<p>Overhead Equipments:</p> <p>2.1 – Overhead Equipments (OHE).</p> <p>2.2 – Principles of Design of OHE: -Composition of OHE. -Height of Contact Wire. -Contact Wire Gradient. -Encumbrances. -Span Length.</p> <p>2.3 – Automatic Weight Tension and Temp Compensation.</p> <p>2.4 – Uninsulated Overlaps.</p> <p>2.5 – Insulated Overlaps.</p> <p>2.6 – Neutral Section, Section Insulator, – Isolator.</p> <p>2.9 – Polygonal OHE: Single Catenary Construction. Compound Catenary Construction. Stitched Catenary Construction. Modified Y Compound Catenary.</p> <p>2.10 – Effect of Speed on OHE.</p> <p>2.11 – OHE Supporting Structure.</p> <p>2.12 – Different types of signal boards of OHE.</p> <p>2.13 – Maintenance of OHE: OHE Maintenance Schedule.(No Derivation and No Numerical)</p>	12	15
03	<p>3.0 Current Collecting Equipments:</p> <p>3.1 – Introduction.</p> <p>3.2 – Systems of Supplying Power in Electric Traction: Third Rail or Conductor Rail System. Overhead System.</p> <p>3.3 – Current Collectors for Overhead System: Trolley Collector or Pole Collector, Bow Collector, Pantograph Collector.</p> <p>3.4 – Types of Pantographs: 3.4.1 Diamond Pantograph and Faiveley Type.</p> <p>3.5 – Construction of Faiveley Type Pantograph.</p> <p>3.6 – Methods of Raising and Lowering of Pantograph.</p> <p>3.7 – Maintenance of Pantograph.</p>	10	10
	Total	32	40

Section -II

Ch. No	Topic	Hours	Marks
04	<p>4.0 Signaling and Supervisory Control:</p> <p>4.1 – Requirements of Signaling System</p> <p>4.2 – Types of Signals.</p> <p>4.3 – Colour Light Signals.</p> <p>4.4 – Three and Four Aspects of Colour Light Signals.</p> <p>4.5 – Track Circuits.</p> <p>4.6 – DC Track Circuit.</p> <p>4.7 – AC Track Circuit.</p> <p>4.8 – Supervisory Control:</p> <ul style="list-style-type: none"> - Introduction. - Advantages of Remote Control. <p>Systems of Remote Control: DC versus Voice Frequency (VF) Signaling. Remote Control System Equipment and Network.</p> <ul style="list-style-type: none"> - Mimic Diagram. - Control Desk for TPC. - Remote Control Switching Equipments. - The F.M.V.F.T. - Power Supply. - Controlled Station Equipments. 	10	15
05	<p>5.0 Train Lighting:</p> <p>5.1 – Systems of Train Lighting.</p> <p>5.2 – Special Requirements of Train Lighting.</p> <p>5.3 – Method of obtaining Unidirectional Polarity.</p> <p>5.4 – Method of obtaining Constant Output.</p> <p>5.5 – Single Battery System.</p> <p>5.6 – Double Battery Parallel Block System.</p> <p>5.7 – Failure of Under frame Generating Equipments.</p> <p>5.8 – End on Generation.</p> <p>5.9 – Railway Coach Air Conditioning:</p> <ul style="list-style-type: none"> - Requirements. - Types of Installations. - Air Conditioned Rolling Stock. <p>5.10 – Air Conditioning Equipments on Coaches.</p>	10	10
06	<p>6.0 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.</p> <p>6.2- Conventional control ,control voltage (Typical 110volt D.C Why ?) Storage batteries, Electro pneumatic, Electromagnetic relays and their interlocks.</p> <p>6.3- Governors, Transducers, different measuring instruments based on specific principles. (speed, oil level, temp., voltage, current etc.)</p> <p>6.4- Digital control and driver's display system. Typical arrangement of driver's desk. Indications, Gauges, safety interlocking and equipments.</p>	12	15

	6.5- Identification of standard symbols used for electrical equipments (relays, contactors, interlocks N.O/N.C etc) in power/control circuits.		
		Total	32
			40

6. TERM WORK:

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

7. IMPLEMENTATION STRATEGY:

- 1 Lesson Plan
- 2 Visits to Indian Railways

8 A) REFERENCE 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.

B) Website : www.iricen.indianrailways.com

www.wikipedia.com

www.05abb.com

www.ee.polyu.sdu.hk

9. QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3 out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3 out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1.0 SUBJECT DETAILS:

Course: Electrical Engineering	Semester: VII
Subject : # Project	Code : 120316
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	SSL Marks	T/W	Oral	Total
		Hrs	N/P	Mks						
00	06	06	-	-	-	-	-	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. OBJECTIVES: Student will be able to

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

5. TERM WORK:

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

6.0 A) REFERENCE BOOKS: 1. Magazine Electrical India

2. Electronics for you

- B) WEBSITES:** www.wikipedia.com
www.1000projects.org
www.projectreportstore.com
www.project.webcrawler.com
www.niir.org

1. SUBJECT DETAILS :

Course: ME/CE/CH/IE/DE/EE	Semester : VI/VII
Subject: # Industrial Management	Code : 120024
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	80	80	20	-	-	100

3. RATIONALE:

Management is the process of getting work done through people for achieving the objectives of the organization. This subject “Industrial Management” covers the fundamentals principles, objectives, techniques 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 and apply management processes and techniques in the industrial organization.

4. OBJECTIVES : Students will be able to:-

1. Understand the process of formation and promotion of Industry.
2. Understand and apply the necessary Management/ Supervisory skills required in the organization
3. Know and understand the basic principles of supervision..
4. Understand the principles and practices in Human Resources Management.
5. Understand the basics concept of marketing, purchasing, finance and accounts.

5. DETAILED CONTENTS :

SECTION-I

Chapter	Content	Hours	Marks
1.	Introduction to Indian Industry 1.1 Meaning - Definition 1.2 Classification of Industry 1.3 Infrastructure and Location of Industry 1.4 Importance of Industry 1.5 Types of required in industries.	04	07

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	04	07
3.	Supervisor & Supervision 3.1 Meaning and definition 3.2 Role and Responsibilities of supervisor 3.3 Qualities of Supervisor 3.4 Skills of Supervisor 3.5 Functions of Supervisor	05	08
4.	Management 4.1 Introduction to management 4.2 Meaning, definition and importance. 4.3 Relevance of management to engineers. 4.4 Principles of management. 4.5 Resources of management	05	08
5.	Human resource management 5.1 Importance of human resources to industry. 5.2 Recruitment, selecting and placement of man-power. 5.3 Employee welfare measures in industry. 5.4 Industrial Training. 5.5 Industrial safety	06	10
	TOTAL	24	40

SECTION – II

6.	Industrial Relations 6.1 Meaning and Importance. 6.2 Types of Industrial Relations. 6.3 Industrial disputes – Causes. 6.4 Methods and machinery for resolving industrial disputes. 6.5 Trade union – Its role in maintaining industrial peace.	03	06
7	Procurement 7.1 Types of purchase. 7.2 Principles of purchase. 7.3 Purchase procedures. 7.4 Inventory and inventory control. 7.5 Duties of storekeeper.	03	06

8.	Marketing 8.1 Importance of marketing. 8.2 Difference between Sales and marketing. 8.3 Product life cycle and marketing strategies. 8.4 Channels of distribution. 8.5 Packaging and advertising.	05	08
9.	Finance 9.1 Sources of finance. 9.2 Working capital and fixed capital. 9.3 Financial statements of a company. 9.4 Financial ratios. 9.5 Budgets and budgetary control.	05	08
10.	Cost and cost calculation 10.1 Objectives of cost calculation. 10.1 Classification of cost. 10.3 Variable and fixed cost. 10.4 Direct and indirect cost. 10.5 Functional cost. 10.6 Cost control and cost reduction. 10.7 Overheads and types of overheads. 10.8 Cost calculation of a product. 10.9 Break even analysis. 10.10 Depreciation depreciation calculation.	08	12
	TOTAL	24	40

6 . IMLEMENTATION STRATEGY:

1 . Lesson Plan

7 .REFERENCE BOOKS :

Sr. No.	Author	Title	Edition	Year of Publication	Publishers & Address
1.	T.R. Banga S.C. Sharma	Industrial Organisation & Management	12	2012	Khanna Publication
2.	O.P. Khanna	Industrial Management	5	2012	Dhanpat Rai & Sons
3	T.R. Banga S.C. Sharma	Industrial organization and Engineering Economics.	10	2010	Khanna Publication
4	Shelekar	Industrial Management	4	2011	

8. QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1.0 SUBJECT DETAILS:

Course: Electrical Engineering	Semester: VII
Subject: # Instrumentation	Code : EE-120317
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	SSL	TW	Pract	Oral	Total
			Hrs.	Np	Mks						
04	02	06	03	01	100	80	20	50@	-	50**	200

3. 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.

5. DETAILED CONTENTS:

SECTION –I

Ch.No.	Topic	Hours	Marks
1	<i>Introduction to Instrumentation system</i> 1.1 Facts and concept of Instrumentation 1.2 Basic block diagram of Instrumentation system & its function 1.3 Static and dynamic characteristics 1.4 Accuracy and precision 1.5 Sensitivity and Resolution 1.6 Linearity and nonlinearity 1.7 Repeatability and reproductively 1.8 Hysteresis and Drift	6	8

	1.9 Speed of Response, lag, fidelity, dynamic error		
2	<p><i>Transducers</i></p> <p>2.1 <i>Concept of Transducers</i></p> <p>2.2 Classification of Transducers</p> <p>2.2.1 Primary and Secondary Transducers</p> <p>2.2.2 Electrical and Mechanical Transducers</p> <p>2.2.3 Analog and Digital Transducers</p> <p>2.2.4 Active and passive Transducers</p> <p>2.3 Construction and working principles of Transducers</p> <p>2.3.1 Resistive, Inductive and capacitive transducers</p> <p>2.3.2 Potentiometer (various) and strain gauge (No derivation only formula)</p> <p>2.3.3 Types of strain gauges:- unbounded, bounded, Semiconductor</p> <p>2.3.4 Bourden tube, Bellows, Diaphragm.</p> <p>2.3.5 LVDT and RVDT.</p> <p>2.3.6 Piezoelectric transducer, photoconductive cell, photovoltaic cells, load cell.</p> <p>2.3.7 Digital tachometer ,Accelerometer</p>	12	14
3	<p><i>Signal conditioning</i></p> <p>3.1 Concept of signal conditioning</p> <p>3.2 Block diagram of AC and DC signal conditioning and working</p> <p>3.3 Operational Amplifiers, OP AMP - 741, signal conditioning circuits using OPAMP, its working and function</p> <p>3.3.1 Integrator, Differentiator, adder, subtractor, Inverter etc.</p> <p>3.3.2 Instrumentation Amplifier, Differential amplifier,</p> <p>3.3.3 V to I converter, Ito V converter, V to F converter</p> <p>3.4 Filters:- Types and frequency response (No derivation)</p> <p>3.5 Multiplexing</p> <p><i>Use of signal conditioning circuit for Instrumentation system for Industrial applications</i></p>	8	10
4	<p><i>DATA Processors & Data transmission</i></p> <p>4.1 Necessity of data processing in Instrumentation.</p> <p>4.2 Generalized Data acquisition system: Block diagram. & explanation</p> <p>4.3 Objectives of DAS</p> <p>4.4 Concept of Data transmission</p> <p>4.5 Block diagram of data transmission system & explanation</p> <p>4.6 Advantages and disadvantages of digital data transmission over analog transmission</p>	6	8
	<i>Total</i>	32	40

Section –II

Ch.No.	Topic	Hours	Marks
5	<p style="text-align: center;">Temperature Measurement</p> 5.1 Electrical and non-electrical methods. 5.2 Different transducers used Liquid filled thermometers, 5.3 Mercury thermometers, Vapor pressure thermometers, 5.4 Gas thermometers, Bi-metal thermometers, 5.5 Resistance thermometers, 5.6 Thermocouples 5.7 Optical pyrometer, radiation pyrometer. 5.8 Errors of temperature measurements and remedies	10	12
6	<p style="text-align: center;">Indicating and recording devices</p> 6.1 Analog indicators Oscillographs, 6.2 Magnetic tape recorder 6.3 Galvanometers etc.	4	6
7	<p style="text-align: center;">Pressure Measurement</p> 7.1 Measurements using mechanical methods- 7.1.1 u-tube manometer 7.1.2 Well type manometer, 7.1.3 Limp diaphragm, 7.1.4 metal diaphragms or bellows. 7.1.5 Bourdon tubes-spiral or helical tubes. 7.2 Electric transducers. 7.2.1 The pirani gauges, strain gauges. 7.2.2 Linear variable differential transducers. 7.2.3 Variable capacitance gauges 7.2.4 Electro pneumatic transducers. Piezo electrical transducers.	10	12
8	<p style="text-align: center;">Flow and P_H Measurement</p> Mechanical transducers, 8.2 Elbow flow meters, 8.3 Variable area meters, 8.4 Pilot tube, 8.5 Flow construction head meters, 8.6 Electrical transducers, 8.7 Magnetic flow meter, 8.8 Differential transformer transducers, 8.8 Turbine meters. 8.9 P-H measurements 8.9.1 Electrodes. 8.9.2 Principles of P-H meters (Lux Meter + Anemometer)	8	10
Total		32	40

6. LIST OF PRACTICALS-

- 1) Experiments on Thermistor
- 2) Experiment on Thermocouple
- 3) Experiment on RTD
- 4) Experiment on LVDT
- 5) Experiment on Strain gauge
- 6) Study of P-H meter & some assignments on relevant topics
- 7) Study of instrumentation amplifier.
- 8) Study of digital tachometer.
- 9) Study of photo diode.

7. IMPLEMENTATION STRATEGY (PLANNING):

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

- 4) Orientation of teaching and laboratory staff towards curriculum objectives.
- 5) Lesson planning.
- 6) Arranging industrial expert's lectures

8. A) 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

B) WEBSITES: www.wikipedia.com
www.wileyindia.com

9. QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS

Course: Diploma in Electrical Engineering	Semester: VII
Subject: # Testing And Maintenance	Code: 120318
Group : A*	Compulsory

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks			Scheme of examination				
L	P	D	T	CR	PP	Hrs	MARKS	SSL	TW	PR	OR	TOTAL
04	02	-	-	06	01	03	80	20	50@	50**	-	200

3. RATIONALE:

This subject deals with the safety aspects and various tests that are carried out on Electrical machines to find the losses and efficiency. Syllabus also deals with maintenance of Electrical machines according to ISS and signifies the importance of insulation and its testing.

4. OBJECTIVE:

Students will be able to

- Know the causes, effects and safety measures of electrical accidents.
- Understand the types of tests as per ISS carried out on various Electrical machines.
- List and understand the importance of maintenance of Electrical machines.
- Know various tests on insulations used in Electrical machines

5.0 DETAIL CONTENT:

SECTION-I

Chapter	Contents	HOURS	MARKS
1	1.0 Electrical Safety 1.1 Introduction to safety 1.2 I.E Act and regulations for safety at work 1.3 Electrical Accidents and precautions 1.4 Operation of fire Extinguisher.	03	06
2	2.0 Testing and Maintenance of D.C. Machines	11	12
	2.1 Objectives of testing 2.2 Types of Tests as per ISS 2.2 Failure of electrical machines 2.3 Methods of testing and various tests on dc machines 2.4.1 Brake test 2.4.2 Swinburne's test 2.4.3 Hopkinson's test		

	2.4.4 Calibrated machine test 2.4.5 Retardation test 2.4 Separation of losses in D.C machines. 2.5 Testing and remedies for common trouble.		
3	3.0 Testing and Maintenance of Transformers	12	12
	2.1 Polarity and phasing out, 2.2 DC resistance of windings. 2.3 Measurement of voltage ratio 2.3.1 Magnetizing current and core loss 2.3.2 Copper loss and impedance 2.3.3 Efficiency Test. 2.3.4 Temperature rise, its permissible limits. 2.4 Determination of temperature rise. 2.5 Insulation test, H.V. Test and impulse test. 2.6 Parallel operation of single-phase and Three phase transformers. 2.7 Notes and phasor diagrams of phase grouping of poly phase transformers such as star /star, star/delta, star/zig-zag etc. 2.8 Preventive and routine maintenance for distribution transformers as per ISS 10028-1981. 2.9 Test before commissioning ISS 2026-1962, ISS 1886-1967.		
4	4.0 Installation Testing	06	10
	3.1 Testing of LT and HT installation . 3.2 Checking phase sequence. 3.3 Megger test of insulation. 3.4 Earth resistance test.		
	Total	32	40

SECTION II

5	5.0 Testing of Synchronous Machines	12	14
	5.1 Necessity of Parallel operation of three phase alternators. 5.2 Conditions for parallel operation. 5.3 Different methods of synchronizing. 5.4 Alternator on infinite bus bars, load sharing and control of power factor. 5.5 Maintenance of synchronous machines as per ISS 4889-1968.		
6	6.0 Testing and Maintenance of Induction motor	14	16
	6.1 Causes of failures of induction motor 6.2 Phenomenon of noise production, methods to reduce noise. 6.3 Routine tests as per ISS 375-1970. 6.3.1 Measurement of D.C resistance 6.3.2 Measurement of insulation resistance 6.3.3 High voltage test 6.3.4 Reduced voltage running up test 6.3.5 No load test 6.3.6 Open circuit voltage ratio test		

	6.3.7 Locked rotor test 6.3.8 Measurement of slip 6.4 Type tests on Three phase induction motor 6.4.1 Temperature rise test 6.4.2 Momentary overload test 6.4.3 Full load test 6.5 Preventive and routine maintenance as per ISS 900-1965. 6.6 Testing of single-phase induction motors as per ISS 996-1964..		
7	7.0 Insulation tests	06	10
	7.1 Classification of insulation as per ISS 1271-1958. 7.2 Insulation resistance, effect of temperature on insulation, revarnishing of insulation. 7.3 Vacuum impregnation. Care of electrical equipment during periods of inactivity.		
	Total	32	40

6. TERM WORK (ANY 8 EXPERIMENTS):

- 1) Swinburne's test on a D.C machine.
- 2) Hopkinson's test on two D.C shunt machines.
- 3) Brake test on DC motor.
- 4) Separation of losses of D.C machine
- 5) Polarity test on single phase transformer
- 6) Parallel operation of two single phase transformer
- 7) Back to back test on single phase transformer and determination of efficiency & Regulation.
- 8) Testing of single-phase induction motors as per ISS 996-1964.
- 9) Synchronizing of Alternators

7. IMPLEMENTATION STRATEGY (PLANNING):

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

- 7) Orientation of teaching and laboratory staff towards curriculum objectives.
- 8) Lesson planning.
- 9) Arranging industrial expert's lectures.
- 10) Visit to nearby testing laboratory if any

8. A) 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
4	S.K. Sahdev	Electrical Machines	Unique International Publications,Jalandhar
5	Nagrath and Kothari	Electrical Machines	Tata Mc Graw Hill, New Delhi

B) WEBSITES: www.yourpdf.net
www.siemenceindia.com
www.wikipedia.com
www.ggsfindia.org

9. QUESTION PAPER PATTERN:

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5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS :

Course: ELECTRICAL ENGINEERING	SEMISTER: VII
Subject: Utilization of Electrical Energy	Code: 120319
Group: A	Optional

2. TEACHING AND EXAMINATION SCHEME:

Scheme of instruction & periods per week					Theory paper duration & marks				Scheme of examination			
L	P	D	T	CR	PAPER	HOURS	MARKS	SSL	TW	PR	OR	TOTAL
03	02	-	-	05	01	03	80	20	25@	-	25**	150

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.

5.0 DETAILED CONTENTS:

SECTION-I

Sr.No	Topics	Hours	Marks
1	1.0 Illumination	10	15
	1.1 Definitions of terms used in illuminations. Light, Luminous flux, luminous intensity, Lumen, Candle power, illumination, lux or meter candle, mean horizontal candle power (MHCP), means spherical candle power (MSCP), means hemispherical candle power (MHSCP), Reduction factor, lamp efficiency, specific consumption, glare, space to height ratio, utilization factor, maintenance factor, depreciation factor, waste light factor, absorption factor, reflection factor, plane angle, solid angle.		
	1.2 Laws of illumination		

	<p>1.2.1 Law of inverse squares.</p> <p>1.2.2 Lambert's cosine law.(no numerical)</p> <p>1.3 Sources of light Construction, working and application of following lamps Incandescent lamps, halogen lamp, mercury vapour lamps, sodium vapour lamps, fluorescent Tube, compact fluorescent lamps (CFL), LED lamps, neon signs.</p> <p>1.4 Types of lighting schemes</p> <p>1.5 Design of lighting schemes</p> <p>1.5.1 Objectives of lighting scheme</p> <p>1.5.2 Factors to be considered while designing the lighting scheme</p> <p>1. 6 Lighting calculations (simple numerical)</p>		
2	2.0 Electric Heating	10	15
	<p>2.1 Advantage of electrical heating</p> <p>2.2 Modes of transfer of heating</p> <p>2.2.1 Conduction</p> <p>2.2.2 Convection</p> <p>2.2.3 Radiation</p> <p>2.3 Classification of electrical heating</p> <p>2.3.1 Resistance heating (construction and operation) Principle. Direct resistance heating, Indirect resistance heating, requirements of heating element material, Design of resistance heating element, methods of temperature control, application of resistance heating.</p> <p>2.3.2 Induction heating (construction and operation) Principle, Different types and applications of induction heating</p> <p>2.3.3 Dielectric heating Principle of Dielectric heating, advantage of Dielectric heating, imitations of Dielectric heating, application of Dielectric heating (simple numerical)</p>		
3	Electric Welding :	04	10
	<p>3.1 Electric arc welding</p> <p>3.1.1 Metal arc welding</p> <p>3.1.2 Carbon arc welding</p> <p>3.2 Electrodes for metal arc welding.</p> <p>3.3 Resistance welding</p> <p>3.3.1 Principle of resistance welding</p> <p>3.3.2 Types of resistance welding</p> <p>3.4 Arc welding Machines</p> <p>3.4.1 D.C arc welding machine</p> <p>3.4.2 A.C arc welding machine</p>		
	Total	24	40

Section -II

Sr.No	Topics	Hours	Marks
4	Electric Traction 4.1 Requirements of ideal traction system. 4.2 Traction mechanics 4.2.1 Train movement and energy consumption 4.2.2 Different types of services and their comparison 4.2.3 Important terms used in traction 4.2.4 Simplified speed-time curve (simple numerical) 4.3 Traction motors 4.3.1 Desirable Characteristics of traction motor 4.3.2 Suitability of series motor on traction.	06	10
5	Electric Drives 5.1 Introduction to Electric drives. 5.2 Advantages and disadvantages of electric drive 5.3 Classification of Electric drives 5.3.1 Group drive 5.3.2 Individual drive 5.3.3 Multi-motor drive 5.4 Types of transmission for drive 5.5 Factors governing selection of electric motors.	05	08
6	Elevators & Escalators 3.1 Types of elevator machines. 3.3 Speed of elevators. 3.5 Elevator motors & Controls (Introduction only) 3.6 Safety in elevators 3.7 Introduction to Escalators	06	10
7	Economic aspects of utilizing electrical energy. 7.1 Economic aspects of utilizing electrical energy. 7.2 Costing of electrical energy: fixed charge, Semi fixed charge & running Charge. 7.4 Various types of tariff: Simple tariff, Flat rate tariff, Block rate tariff, Two part tariff, Maximum demand tariff and Power factor tariff. 7.4 Types of consumers and their Tariffs: Domestic, Commercial, Agricultural and Industrial consumers. (Simple numerical on Tariffs) 7.5 Power factor improvement : causes of low power factor, disadvantage of Low power factor, Methods of power factor improvement 7.6 Most economical power factor (Derivation and simple numerical)	07	12
	Total	24	40

6. TERM WORK:

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 & some relevant assignments & Minimum one visit to any factory related to syllabus if any

7. IMPLEMENTATION STRATEGY (PLANNING) :

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

11) Orientation of teaching and laboratory staff towards curriculum objectives.

12) Lesson planning.

13) Arranging industrial expert's lectures.

14) Visit to medium scale industry

8 A) . REFERENCE 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
06	CL Wadhwa,	Generation, Distribution and Utilization if Electrical	Wiley Eastern Ltd. New Delhi.

B) WEBSITES: www.wikipedia.com
www.nprcet.org
www.techeduhry.nic.in
www.aast.edu

9. QUESTION PAPER PATTERN:

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4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1.0 SUBJECT DETAILS :

Course Name: Electrical Engineering	Semester : VII
Subject Title : Microprocessors and Microcontroller	Code: 120029
Group: A	Optional

2.0 TEACHING AND EXAMINATION SCHEME:

Teaching Scheme				Exam Scheme & Maximum Marks							
TH	TU	PR	CR	PAPER HRS.	TH	No. of paper	SSL	PR	OR	TW	TOTAL
03	00	02	05	03	80	01	20	25**	-	25@	150

3.0 RATIONALE:

Today microprocessors and microcontrollers have become an integral part of all automatic and semi automatic machines. Therefore there is a growing need of engineers / technicians in this field. Hence, it is necessary to study microcontroller basics, hardware and its programming. This subject covers microprocessor 8085 and microcontroller 8051 architecture, its instruction set, programming and applications. After completing this subject the student can write and execute programs for microcontroller and microprocessor based applications.

4.0 OBJECTIVES: The student will be able to

1. Describe architecture and operation of microprocessor 8085
2. Develop assembly language programs using instruction set of 8085
3. Describe architecture and operation of microcontroller 8051
4. Develop assembly language programs using instruction set of 8051
5. Design and develop microcontroller based systems
6. Explain various applications of microcontrollers

5.0 DETAILED CONTENTS:

SECTION-I

Ch.No	Topic	Hours	Marks
	Digital Circuits 1.1 Principle of operation and circuit configuration of a few logic gates as AND, OR, NOT, NAND 1.2 Astable, bistable and monostable multivibrators 1.3 Multiplexer, Demultiplexer	06	10
	2.0 Flip flops & counters 2.1 Different flip flops like JK, RS, T master slave 2.2 Counting circuits and counters	05	08
03	3.0 Introduction to Microprocessor 8085 Architecture & Interfacing 3.1 Evolution of microprocessor 3.2 Architecture of 8085	05	08

	3.3 Pin diagram 3.4 control signals 3.5 multiplexing of address & Data Bus		
04	8085 Assembly Language Programming 4.1 Programming Model of 8085 4.2 Addressing Modes 4.3 Instruction classification, Instruction format 4.4 Instruction set 4.5 Stacks & subroutines 4.6 Assembly Language programming 4.7 Applications of microprocessor	08	14
	Total	24	40

SECTION- II

Ch.No	Topic	Hours	Marks
05	Microcontroller Basics Introduction and applications Comparison between microcontrollers and microprocessors Evolution of microcontrollers Commercial microcontroller devices	02	04
06	8051 Architecture Block diagram of 8051 microcontroller Registers in 8051 General purpose or working registers Stack Pointer and Program counter Special function registers (SFR) Program Status word Data pointer (DPTR) Timer registers Ports Control registers	06	08
07	8051 connections, I/O ports and memory organization 8051 pin description 8051 connections Parallel I/O ports Memory organization	04	08
08	8051 addressing modes and instructions 8051 addressing modes 8051 instruction set 8051 assembler and assembling 8051 program Software simulators of 8051 8051 instructions and simple programs	08	12
09	Applications of microcontrollers Square wave and rectangular wave generation Pulse generation	04	08

	Interfacing D/A and A/D converters Interfacing relay Interfacing stepper motor Interfacing DC motor.		
	Total	24	40

6.0 TERM WORK : (any 8-10 Experiments)

1. Demonstration and study of microprocessor kit
2. Study of AND, NAND, OR and NOT gates using 8085
3. Study of counters
4. Study of astable, monostable and Bistable multivibrators using microprocessor
5. Program for addition of and subtraction of two hexadecimal numbers
6. Program for finding largest / smallest number
7. Program for arranging numbers in ascending / descending order
8. Program for 16 bit addition
9. Program for data masking
10. Program for multiplication of two eight bit numbers
11. Program using JMP Instruction
12. Two programs using loop & Counter

Using microcontroller 8051 kit:

1. Demonstration and study of microcontroller kit
2. Demonstration and use of software simulator / assembler
3. Programming examples (any two) – Data transfer instructions
4. Programming examples (any two) – Logical Operations
5. Programming examples (any two) – Jump and Call instructions
6. Demonstration and testing of the following applications (Any four)
 - Keyboard Interface
 - LCD display Interface
 - D/A or A/D converter Interface
 - Relay Interface
 - Stepper motor control
 - DC motor control
 - Any other practical application using microcontroller 8051

7.0 . IMPLEMENTATION STRATEGY (PLANNING):

- In depth study and understanding of the subject will be implemented by adopting
- 15) Orientation of teaching and laboratory staff towards curriculum objectives.
 - 16) Lesson planning.
 - 17) Arranging industrial expert's lectures

8.0 A) REFERENCE BOOKS:

Sr. No.	Author	Title	Publisher
01	Ajay V Deshmukh	Microcontrollers theory and applications	TMH, New Delhi
02	Kenneth J Ayala,	8051 microcontrollers architecture, Programming and Applications	International Thomson publishing, India
03	B. Ram	Microprocessor & Microcomputer	S. Chand publications
04	Ramesh Gaonkar	Microprocessor Architecture, Programming, and Applications with the 8085	Penram International Publishing (India) Pvt. Ltd.

B) WEBSITES : www.wikipedia.com
www.atmd.com
www.mikroe.com
www.eee.metu.edu.tr
www.ebooksgo.org

9.0 QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
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1	Any 3out of 5	12	-	-	Any 2 out of 3	6
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4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

Course: Electrical Engineering	Semester: VII
Subject :# PLC & SCADA	Code : 120320
Group : A*	ELECTIVE-II

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	Oral	Total
		Hrs.	Np	Mks						
04	02	06	03	01	80	80	20	50@	50**	200

3. RATIONALE:

Now a days PLC& SCADA systems are used in most of the industries for automation. PLC& SCADA systems are used for controlling various the plant operations. So the knowledge of PLC& SCADA system is essential to the instrumentation diploma holder. This course is introduced with the view that the students of instrumentation must be familiar with PLC& SCADA systems and their application in industries.

4. OBJECTIVES: - Students will be able

- To understand the concepts of PLC& SCADA system.
- To understand the operation of PLC& SCADA system
- To know the application of PLC& SCADA system.
- To know the specification of PLC& SCADA system.
- To know the programming of PLC.
- To state the elements of PLC& SCADA system.
- To draw the ladder diagrams for given problem.

5. DETAILED CONTENTS:

SECTION – I

Ch .No.	Name of the topic	Hours	Marks
1.0	Introduction to PLC 1.1 Need of automation 1.2 Advantages of automation 1.3 Introduction of PLC 1.4 History of PLC 1.5 Advantages & Disadvantages 1.6 Block diagram and functions of elements of PLC 1.7 Status indicators: Fault, Run, Power, Fault 1.8 Programming devices types	06	08

	1.9 Operation of PLC 1.10 Types of PLC: fixed and modular PLC 1.11 Types of Programming Language (Introductory approach) 1.12 Specifications of PLC		
2.0	PLC Instructions 2.1 Basic concept of ladder 2.2 Rules of ladder 2.3 Classification of PLC instructions 2.4 Bit type instructions: XIC,XIO,OTE,OTL,OUT,OSR 2.5 Logical instructions : OR,AND,NOT,XOR 2.6 Comparison instructions: EQU,NEQ,LES,LEQ,GRT,GERQ,LIM 2.7 Timer :TON,TOFF,RTU 2.8 Counter: CTU,CTD,HSC 2.9 Maths : ADD,SUB,MUL,DIV 2.10 Advanced maths : SCP 2.11 Data transfer :MOV,COP,MVM	10	12
3.0	Modules and I/O Devices 3.1 Basic concept of module 3.2 Types of modules 3.3 Input modules and output modules : DC module, Analog input Output module , special, modules :basic concepts 3.4 Digital and Analog I/O devices : Limit switch, proximity switch, ,potentiometer, RTD, relay, selector switch, thumbwheel: Basic concepts 3.5 Wiring diagram for connection of I/O devices	04	06
4.0	Commissioning & Troubleshooting of PLC 4.1 Mounting 4.2 Commissioning 4.3 Troubleshooting: basic concept, troubleshooting flowchart	04	04
5.0	Application Examples 5.1 Batch process Control 5.2 Diesel generator set control 5.3 Drum/Bottle Filling System 5.4 Traffic light control 5.5 Basic concept of VFD, Activating VFD through PLC System diagram, logic, I/O listing, ladder diagram	08	10
	Total	32	40

SECTION – II

Ch. No.	Name of the topic	Hours	Marks
6.0	Introduction to SCADA. 6.1 Introduction. 6.2 History of SCADA 6.3 Definition 6.4 Elements of SCADA 6.5 Benefits of SCADA 6.6 Types of SCADA: Single master single remote, single master multiple control, multiple master multiple control 6.7 Block diagram of SCADA	06	08
7.0	Remote control unit 7.1 Introduction 7.2 Block diagram 7.3 Elements of RTU systems 7.3.1 Communication subsystems 7.3.2 Logic subsystem 7.3.3 Termination subsystem 7.3.4 Power supply subsystem 7.4 Advanced RTU applications.	06	08
8.0	SCADA software:RSVIEW32 8.1 Features of RSview32 8.2 Various of editors of RSVIEW32 8.3 Concept of tag, types, addressing 8.4 Configuration of SCADA(RSVIEW32) 8.5 Alarm generation, trending	08	08
9.0	Communication protocols 9.1 Network topologies 9.2 RS232 9.3 RS488 9.4 HART protocol 9.5 Field bus 9.6 Ethernet	06	08
10.0	Applications 10.1 Packing system, 10.2 Use of SCADA for electricity distribution/generation 10.3 Water distribution system Mimic diagram ,program, device addressing, animation, alarm generation	06	08
	Total	32	40

6.0 LIST OF PRACTICALS : (Twelve Practical)

1. Development of basic logic functions using ladder logic.
2. Develop ladder diagram for Traffic control system and test it through PLC.
3. Develop the ladder program for counting the objects and test it with the PLC

4. Develop the ladder log program and test it : batch process, drum/bottle filling system, DG set
5. Develop Simple programs on Comparison and maths instructions and test it
6. Temperature measurement using PLC
7. Interfacing of I/O devices to PLC
8. Configuration of RSVIEW 32 In Touch software
9. Creation of analog, digital tags and addressing of these tags
10. Testing of I/O devices with SCADA system.
11. Creation and configuration of alarms.
12. Observation of trends of variables.
13. Develop ladder logic and graphics for SCADA applications (boiler control, packing systems and materials handling system).
14. Interfacing SCADA with ladder logic.
15. Observation of real time & historical data from any process with SCADA
- 16 Activating VFD through PLC
- 17 Modification of ladder diagram program of any node

Note:

1. Practical shall be performed on Allen -Bradley and Siemens PLC and RS View 32 and In Touch (Wonder ware) SCADA software.
2. Industrial visit shall be arranged to observe actual applications of PLC and SCADA systems

7. IMLEMENTATION STRATEGY

- 1 Lesson Plan
- 2 Conducting practical as per the list

8. A) REFERENCE BOOKS:-

Sr. No.	Name of Book	Name of Author	Edition	Publication
1.	Programmable logic control	George Batten, Jr.	II Edition	Mc Graw Hill
2.	Introduction to Programmable logic controllers	Gary Dunning	II Edition	Thosman Asia Pvt.Ltd.
3.	SCADA: supervisory control and data acquisition	Stuart A. Boyer	II Edition	ISA Publication
4.	Programmable Logic Controller	V. R. Jadhav	I Edition	Khanna Publications
5.	Instrument Engineers Handbook	Bela G. Liptak.,Kriszta Venczel	Revised Edition	Chilton Book Company

B) WEBSITES : www.wikipedia.com
www.cyber.st.dhs.gov
www.anshumantech.com
www.plscadatraining.org

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2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-

1. SUBJECT DETAILS:

COURSE : ELECTRICAL ENGINEERING	SEMESTER : VII
SUBJECT :# ENERGY AUDIT & CONSERVATION	CODE :120321
GRADE : A*	ELECTIVE-II

2. TEACHING & EXAMINATION SCHEME:

Teaching Scheme		Credits	Examination Scheme and Maximum Marks								
Theory Hrs. Per Week	Practical Hrs. Per Week		Paper			TH	SSL	TW	Pract	Oral	Total
		Hrs.	Np	Mks							
04	02	06	03	01	80	80	20	50@	-	50**	200

3. 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.

4. 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.

5. DETAILED CONTENTS:

SECTION- I

Ch.No.	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	10
2	2. Energy Environment 2.1 Environment And Social Concerns Related To Energy Utilization. 2.2 Green House Effect, Global Warming And Its Effects, 2.3 Pollution, Acid Rains, 2.4 Global Energy And Environment Management	06	08
3	3. Energy Management And Audits 3.1 Definition, Objectives Of Energy Management , 3.2 Need For Energy Audit, Types Of Audit 3.3 Energy Management : Key Elements ,Perspective , Contents Organizing , 3.4 Top Management Support , Role Of Energy Manager 3.5 Materials And Energy Balance , Detailed Energy Audit Methodology	10	12
4	4. Project And Finance Management 4.1 Investment Need , 4.2 Financial Analysis 4.3 Scope Of Project , Implementation Plan For Top Management	10	10
	Total	32	40

SECTION: II

Ch.No	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	10	12
6	6. Energy Efficient Technology In Electrical System 6.1 Maximum Demand Controller, 6.2 Automatic Power Factor Controllers, 6.3 Variable Speed Drives, 6.4 Energy Efficient Transformer & Energy Efficient Lighting Control	08	10
7	7. Energy Conservation In Transmission And Distribution Systems 7.1 Reactive Power Compensation ,Demand Side Management ,System 7.2 Voltage Optimization And Phase Current Balancing ,	08	10

	7.3 Losses In Transmission And Distribution System And Its Minimization		
8	8. Tariff And Energy Conservation In Industries 8.1 Energy Cost And Recent MSEB Tariffs , 8.2 Application Of Tariff System to Reduce Energy Bill, 8.3 Energy Conservation By Improving Load Factor And Power Factor	06	08
	Total	32	40

6. TERM WORK:

Term work consists of a study report (By Group of maximum five students) on any of the above mentioned topics and assignments

7. IMPLEMENTATION STRATEGY

1 Lesson Plan

2 Visit to Any relevant Industries

8. A) REFERENCE 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
4	BEE	General Aspects of Energy Management & Energy Audit	Bureau of Energy Efficiency

B) WEBSITES: [www.bee india.nic.in](http://www.bee.india.nic.in)
www.mahaurja.com
www.energyconservation.net
www.energymanagertraining.com

9.0 QUESTION PAPER PATTERN:

Que. No	SECTION-1		SECTION- 2		PERIODICAL TEST	
	BITS	MARKS	BITS	MARKS	BITS	MARKS
1	Any 3out of 5	12	-	-	Any 2 out of 3	6
2	Any 2 out of 4	12	-	-	Any 2 out of 3	8
3	Any 2 out of 3	16	-	-	Any 1 out of 2	6
4	-	-	Any 3out of 5	12	-	-
5	-	-	Any 2 out of 4	12	-	-
6	-	-	Any 2 out of 3	16	-	-