MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI
TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME : DIPLOMA IN ELECTRICAL & ELECTRONICS (POWER SYSTEM)

COURSE CODE : EU

DURATION OF COURSE : SIX SEMESTERS	WITH EFFECT FROM 2013-14
SEMESTER : SECOND	DURATION : 16 WEEKS
FULL TIME / PART TIME : FULL TIME	SCHEME : G

SR. NO	SUBJECT TITLE		abbrevi ation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME										SW (17200)
					TH	TU	PR	PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
									Max	Min	Max	Min	Max	Min	Max	Min	
1	Communication Skills $		CMS	17201	02	--	02	03	100	40	--	--	25#	10	25@	10	
2	Engineering Mechanics β		EGM	17204	03	01	02	03	100	40	--	--	--	--	25@	10	
3✶	Applied Science	Physics	APH	17210	02	--	02	02	50 / 100	40	25@ / 50	20	--	--	--	--	50
		Chemistry	ACH	17211	02	--	02	02	50		25@		--	--	--	--	
4	Fundamentals of Electrical Engineering		FEE	17214	04	--	02	03	100	40	25#	10	--	--	25@	10	
5	Engineering Mathematics $		EMS	17216	03	01	--	03	100	40	--	--	--	--	--	--	
6	Development of Life Skills $		DLS	17010	01	--	02	--	--	--	--	--	25@	10	--	--	
				Total	**17**	**02**	**12**	**--**	**500**	**--**	**75**	**--**	**50**	**--**	**75**	**--**	**50**

Student Contact Hours Per Week: **31 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 750**

@ - Internal Assessment, # External Assessment, [   ] No Theory Examination, $ - Common to all branches, β - Common to CE, ME, EE and CH Groups

Abbreviations: TH-Theory, TU- Tutorial, PR-Practical, OR-Oral, TW- Term Work, SW- Sessional Work

➢ Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).

➢ Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms

➢ Code number for TH, PR, OR, TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

✶ Applied Science is divided into two parts- Applied Science (Physics) and Applied Science (Chemistry). Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Applied Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head.

✶ **Candidate remaining absent in examination of any one part of Applied Science subject i.e. Physics, Chemistry will be declare as Absent in Mark List and has to appear for examination. The marks of the part for which candidate was present will not be processed or carried forward.**

Course Name : All Branches of Diploma in Engineering & Technology

Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/X/IC/IE/IS/

ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/EU

Semester   : Second

Subject Title : Communication Skills

Subject Code : 17201

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	03	100	--	25#	25@	150

NOTE:

➢ **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**

➢ **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**
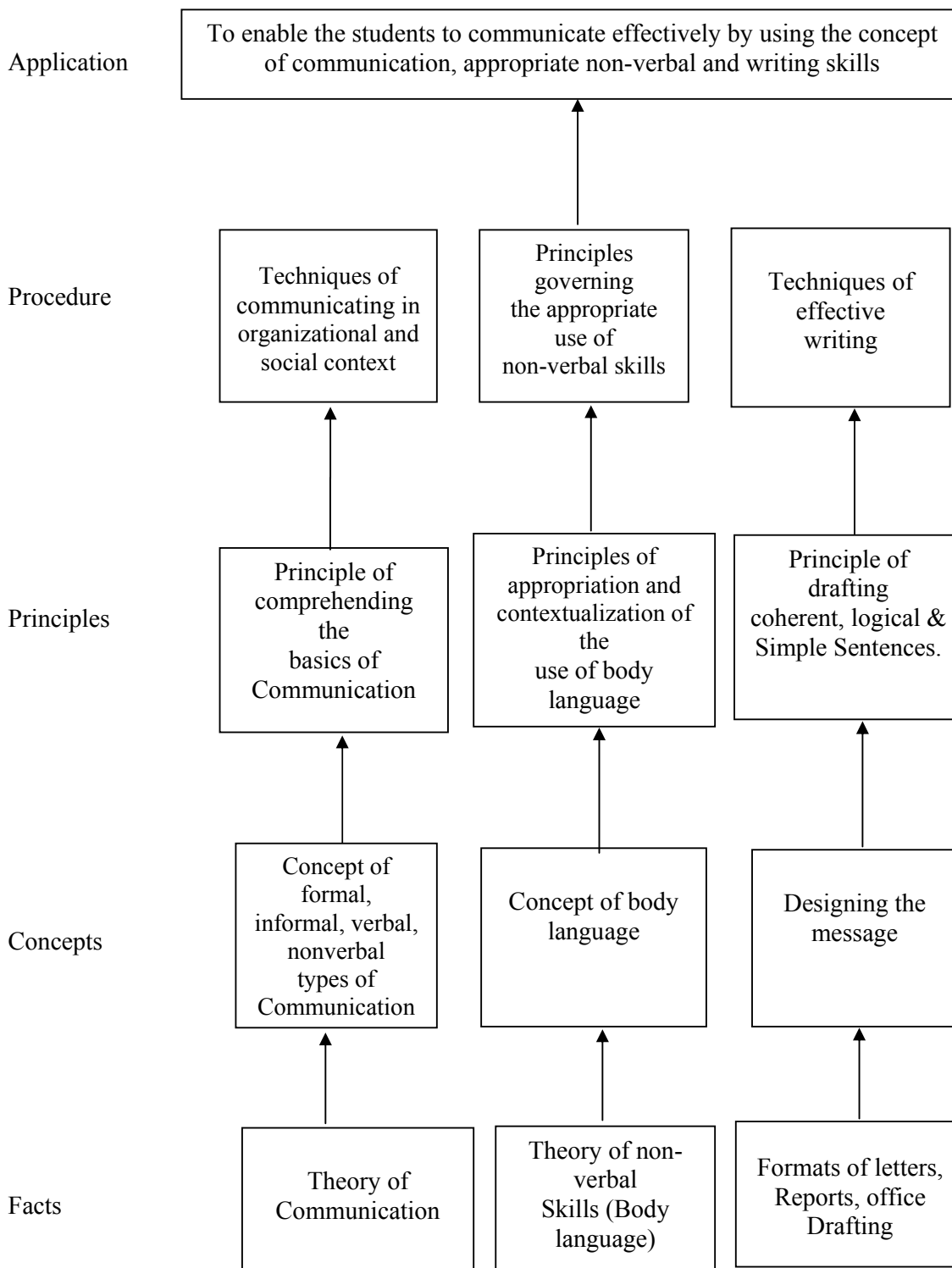
Rationale:

In this age of globalization, competition is tough. Hence effective communication skills are important. Communication skills play a vital and decisive role in career development. The subject of Communication Skills introduces basic concepts of communication. It also describes the verbal, non-verbal modes and techniques of oral & written communication.

It will guide and direct to develop a good personality and improve communication skills.

General Objectives:

Students will be able to:

1. Utilize the skills necessary to be a competent communicator.

2. Select and apply the appropriate methods of communication in various situations.

Learning Structure:

Application

To enable the students to communicate effectively by using the concept of communication, appropriate non-verbal and writing skills

Procedure

Techniques of communicating in organizational and social context

Principles governing the appropriate use of non-verbal skills

Techniques of effective writing

Principles

Principle of comprehending the basics of Communication

Principles of appropriation and contextualization of the use of body language

Principle of drafting coherent, logical & Simple Sentences.

Concepts

Concept of formal, informal, verbal, nonverbal types of Communication

Concept of body language

Designing the message

Facts

Theory of Communication

Theory of non-verbal Skills (Body language)

Formats of letters, Reports, office Drafting

Theory

Name of the Topic	Hours	Marks
Topic 01 - Introduction to Communication: **Specific Objective:** ➣ Describe the process of communication. **Contents:** • Definition of communication • Process of communication • Types of communication -- Formal, Informal, Verbal, Nonverbal, Vertical, Horizontal, Diagonal	**06**	**16**
Topic 02 - Effective communication **Specific Objective:** ➣ Identify the principles and barriers in the communication process **Contents:** ✦ Principles of communication. ✦ Barriers to communication a. **Physical Barrier**: ✦ Environmental (time, noise, distance & surroundings), ✦ Personal (deafness, stammering, ill-health, spastic, bad handwriting) b. **Mechanical** :　Machine oriented c. **Psychological:** Day dreaming, prejudice, emotions, blocked mind, generation gap, phobia, status inattentiveness, perception. d. **Language** :　Difference in language, technical jargons, pronunciation & allusions.	**08**	**20**
Topic 03 - Non verbal & Graphical communication: **Specific Objectives:** ➣ Effective use of body language & nonverbal codes ➣ View and interpret graphical information precisely. **Contents:** 3.1 Non- verbal codes:　　　　　　　　　　　[08 Marks] • Proxemics, • Chronemics • Artefacts 3.2 Aspects of body language (Kinesics)　　[10 Marks] • Facial expression • Eye contact • Vocalics, paralanguage • Gesture • Posture • Dress & appearance • Haptics	**08**	**28**

3.3 Graphical communication [10 Marks] • Advantages & disadvantages of graphical communication • Tabulation of data & its depiction in the form of bar graphs & pie charts.		
Topic 04 - Listening **Specific Objective:** ➤ Effective use of listening **Contents:** • Introduction to listening • Listening versus hearing • Merits of good listening • Types of listening. • Techniques of effective listening.	02	08
Topic 05 - Formal Written Communication **Specific Objectives:** ➤ Use different formats of formal written skills. **Contents:** • Office Drafting: Notice , memo & e-mail • Job application with resume. • Business correspondence: Enquiry letter, order letter ,complaint letter, adjustment letter. • Report writing: Accident report, fall in production, investigation report. • Describing objects & giving instructions	08	28
	32	**100**

Skills to be developed in practical:

Intellectual Skills:

1. Analyzing given situation.

2. Expressing thoughts in proper language.

Motor Skills:

1. Presentation Skills focusing on body language.

2. Interpersonal skills of communication

Journal will consist of following assignments:

01: Draw the diagram of communication cycle for given situation.

    State the type and elements of communication involved in it.

02: Graphics:-   a) Draw suitable bar-graph using the given data.
               b) Draw suitable pie-chart using the given data.

03: Role play: Teacher should form the group of students based on no. of characters in the situation. Students should develop the conversation and act out their roles.

04: Collect five pictures depicting aspects of body language from different sources such as magazines, newspapers, internet etc. State the type and meaning of the pictures.

NOTE: The following assignments should be performed by using Language Software.

05 Practice conversations with the help of software.

06 Describe people/personalities with the help of software and present in front of your batch.

07 Prepare and present elocution (three minutes) on any one topic with the help of software.

08 Describe any two objects with the help of software.

Learning Resources:

Sr. No.	Author	Title	Publisher
01	MSBTE, Mumbai.	Text book of Communication Skills	MSBTE, Mumbai.
02	MSBTE, Mumbai.	CD On Communication Skills	MSBTE
03	Joyeeta Bhattacharya	Communication Skills	Reliable Series
04	Communication Skills	Sanjay Kumar, Pushpa Lata	Oxford University Press

Web Sites for Reference:

Sr. No	Website Address
01	Website: www.mindtools.com/page8.html-99k
02	Website: www.khake.com/page66htm/-72k
03	Website: www.BM Consultant India.Com
04	Website: www.letstak.co.in
05	Website: www.inc.com/guides/growth/23032.html-45k

Course Name : Civil, Chemical, Mechanical and Electrical Engineering Group

Course Code : AE/CE/CH/CR/CS/CV/EE/EP/FE/ME/MH/MI/PG/PT/PS/EU

Semester   : Second

Subject Title : Engineering Mechanics

Subject Code : 17204

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	01	02	03	100	--	--	25@	125

NOTE:

- ➢ **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- ➢ **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**

Rationale:

In day to day life we come across different structures, at the time design of the structures analysis plays an important role. Perfect analysis is possible only when one known the types and effect of forces acting on the structure.
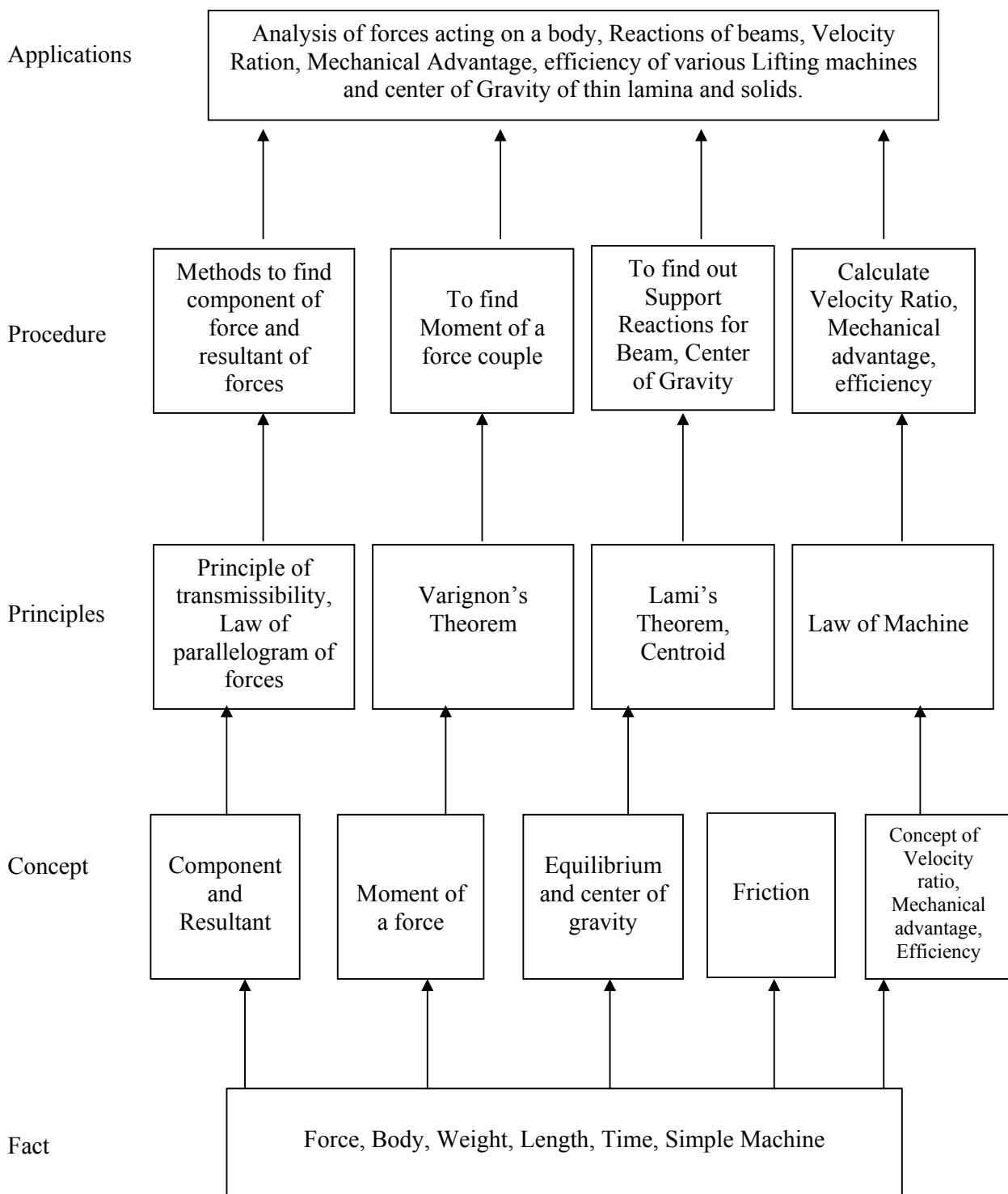
This subject provides knowledge about the different types of forces/loads their effects while acting in different conditions/systems. The subject also provides the knowledge about basic concepts of laws of engineering, their application to different engineering problem.

This subjects work as a prerequisite for future subjects such as MOS, SOM, DOS, TOM, DOM. Etc.

General Objectives:

The students will able to:

- ➢ Understand the effect of different types of coplanar forces.
- ➢ Apply Principles of equilibrium in finding reactions of different types of beams.
- ➢ Apply principles of equilibrium for locating centroid and centre of gravity for given solids.
- ➢ Understand working of different types of machines.

Learning Structure:

Applications
| Analysis of forces acting on a body, Reactions of beams, Velocity Ration, Mechanical Advantage, efficiency of various Lifting machines and center of Gravity of thin lamina and solids. |

Procedure

| Methods to find component of force and resultant of forces | To find Moment of a force couple | To find out Support Reactions for Beam, Center of Gravity | Calculate Velocity Ratio, Mechanical advantage, efficiency |

Principles

| Principle of transmissibility, Law of parallelogram of forces | Varignon's Theorem | Lami's Theorem, Centroid | Law of Machine |

Concept

| Component and Resultant | Moment of a force | Equilibrium and center of gravity | Friction | Concept of Velocity ratio, Mechanical advantage, Efficiency |

Fact

| Force, Body, Weight, Length, Time, Simple Machine |

Theory

Topic and Contents	Hours	Marks

Topic 1: Simple Machines
 	
Specific Objectives:
 	
  ➢ Calculate velocity ratio for given machine.
 	
  ➢ Find Efficiency of given machine.
 	
Contents:
 	
1.1 Definitions : ……………………………………..... (06 Marks)
 	
    Simple machine, compound machine , load , effort , mechanical advantage , velocity ratio , input of a machine ,output of a machine efficiency of a machine , ideal machine, ideal effort and ideal load, load lost in friction, effort lost in friction.
 	
1.2 Analysis : ………………………………………..... (04 Marks)
 	
    Law of machine, maximum mechanical advantage and maximum efficiency of a machine, reversibility of a machine, condition for reversibility of a machine, self locking machine. Simple numerical problems.
 	
1.3 Velocity Ratio for simple machines : …………….... (10 Marks)
 	
    Simple axle and wheel, differential axle and wheel, Weston's differential pulley block, single purchase crab, double purchase crab, worm and worm wheel, geared pulley block, screw jack, calculation of mechanical advantage, efficiency, identification of type such as reversible or not etc.
	08	**20**

Topic 2 : Force systems
 	
Specific Objectives :
 	
  ➢ Define related terms in mechanics.
 	
  ➢ Calculate Components of forces.
 	
Contents:
 	
2.1 Fundamentals and Force systems: ………………. (04 Marks)
 	
    Definitions of mechanics, Engineering mechanics, statics, dynamics, Kinetics, Kinematics, rigid body, classification of force system according to plane coplanar and non coplanar ,sub classification of coplanar force system- collinear , concurrent, non concurrent, parallel, like parallel, unlike parallel, general etc. Definition of a force, S.I. unit of a force, representation of a force by vector and by Bow's notation method. Characteristics of a force, effects of a
	06	**12**

force, principle of transmissibility.

2.2 Resolution of a force and Moment of a force: …………….. (08 Marks)

Definition, Method of resolution, along mutually perpendicular direction and along two given direction. Definition of moment, S. I. unit, classification of moments, sign convention, law of moments Varignon's theorem of moment and it's use, definition of couple, S.I. unit, properties of couple with example.

Topic 3 : Composition of Forces
Specific Objectives:
  ❯ Calculate resultant analytically for given force system.
  ❯ Calculate resultant graphically.
Contents:
3.1 Analytical method: …………………………………… (10 Marks)
    Definition of Resultant force, methods of composition of forces, Law Of parallelogram of forces, Algebraic method for determination of resultant for concurrent and non concurrent, parallel coplanar force system.
3.2 Graphical method: ……………………………………... (10 Marks)
    Space diagram, vector diagram, polar diagram, and funicular polygon. Resultant of concurrent and parallel force system only.
	10	**20**

Topic 4: Equilibrium
Specific Objectives:
  ❯ State conditions of equilibrium for given force system.
  ❯ Calculate reactions of beams for different static loading.
Contents:
4.1 Equilibrant and Lami's Theorem: ……………………………. (12 Marks)
    Definition of equilibrant, relation between   resultant and equilibrant, equilibrant of concurrent and non-concurrent force system. Analytical and graphical conditions of equilibrium for concurrent, non-concurrent and parallel force system, free body and free body diagram. Statement and explanation of Lami's theorem, Application of Lami's theorem for solving various engineering problems.
4.2 Beams:…………………………………………………… (08 Marks)
    Definition, Types of beams (cantilever, simply supported, overhanging, fixed, continuous), Types of end supports (simple support, hinged, roller), classification of loads, point load, inclined point load, uniformly distributed
	08	**20**

load. Analytical method to determine reactions of simply supported, cantilever and over hanging beam subjected to point loads and UDL and graphical method to determine reactions for beams subjected to vertical point loads & udl only.		

Topic 5: Friction:
Specific Objectives:
  ➢ Define terms related to friction.
  ➢ Apply conditions of equilibrium for forces acting on a body associated with friction.
Contents:
  5.1 Definition: ………………………………………… (04 Marks)
      Friction, limiting frictional force, coefficient of friction, angle of friction, angle of repose, relation between angle of friction, angle of repose and coefficient of friction. Cone of friction, types of friction, laws of friction, advantages and disadvantages.
  5.2 Equilibrium of body on Horizontal and inclined plane:……. (08 Marks)
      Equilibrium of body on horizontal plane subjected to horizontal and inclined force. Equilibrium of body on inclined plane subjected to forces applied parallel to the plane only. Concept of ladder fraction.
	08	**12**

Topic 6 : Centroid and Centre Of Gravity:
Specific Objectives:
  ➢ Calculate centroid of composite plain figures.
  ➢ Calculate centre of gravity of composite solids.
Contents:
  6.1 Centroid:………………………………………. (08 Marks)
      Definition of centroid. Moment of an area about an axis. Centroid of basic geometrical figures such as square, rectangle, triangle, circle, semicircle and quarter circle. Centroid of composite figure with not more than three geometrical figures.
  6.2 Center of gravity:…………………………………… (08 Marks)
      Definition, center of gravity of simple solids such as cylinder, sphere, hemisphere, cone, cube, and rectangular block. Centre of gravity of composite solids with not more than Two simple solids. (Hollow solids are not expected.)
	08	**16**

Total	**48**	**100**

Practicals:

Skills to be developed:

Intellectual Skills:

> ➢ Understand the forces acting on given structure.
> ➢ Interpret the results.

Motor Skills:

> ➢ Handle the equipment effectively.
> ➢ Draw graph for different relationships.

The term work consists of experiments from Group A and graphical solutions from Group B

Group A: To find MA, VR, Efficiency, Ideal Effort, Effort lost in friction for   various loads and establish law of machine. Calculate maximum efficiency and also check the reversibility of machines(Sr no. 1 to 4) :

1) Differential axle and wheel.

2) Single purchase crab or Double purchase crab

3) Weston's differential pulley block or worm geared pulley block

4) Simple Screw jack.

5) Verify law of moments.

6) Verify law of polygon of forces.

7) Verify of Lami's theorem.

8) Verify the Equilibrium of parallel forces – simply supported beam reactions.

9) Compare coefficient of friction on horizontal plane and inclined plane for the same surface.

 Group B: Graphical solutions for the following on A4 Size Graph Paper.
1) Concurrent force system   : Two problems
2) Parallel force system   : Two problems
3) Reactions of beam   : Two problems

List of Tutorials:

Form a group of five students. Each group shall be allotted three different types of problems on the following topics. Problems shall be submitted in separate note book. Teacher shall provide the feedback to the students on the submitted tutorials.

1. Calculation of M.A., V.R, Efficiency, law of machine for Simple machine.

2. Numerical on resolution of force/ Moment of force.

3. Calculation of resultant for different force system.

4. Numerical on law of parallelogram of forces.

5. Numerical on applications of Lami's Theorem.

6. Calculation of Reactions of beam subjected point load, UDL and inclined load.

7. Numerical on Friction body resting on horizontal Plane.

8. Numerical on Friction body resting on Inclined Plane.

9. Numerical on centroid of composite figures.

10. Numerical on centre of gravity of composite Solids.

Learning Resources:

1. **Books:**

Sr. No.	Author	Title	Publisher
01	R.S.Khurmi	Engineering Mechanics	S. Chand & Company Ltd.
02	Shames and Rao	Engineering Mechanics	Pearsion Education.
03	R.C.Hibbeler	Engineering Mechanics	Pearsion Education.
04	S. Ramamruthum	Applied Mechanics	Dhanpat Rai & Sones, Delhi.
05	S Rajasekaran	Essentials of Engg. Mech.	Vikas Publishing House Pvt. Ltd

2. **Cds, PPTs Etc:**

3. **IS, BIS and International codes:**

4. **Websites:**

5. **Implementation Strategy:**

6. **List of laboratory equipments :**

Course Name : Computer, Electrical and Electronics Engineering Group

Course Code : EE/EP/EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ED/EI/IU/CO/CM/IF/CD/CW/EU

Semester   : Second

Subject Title : Applied Science (Physics)

Subject Code : 17210

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	25@	--	--	75

NOTE:
- ➢ **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- ➢ **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work (SW).**
- ➢ **Applied Science is divided into two parts - Applied Science (Physics) and Applied Science (Chemistry). Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Applied Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head.**

Rationale:

Applied Physics is the foundation of all core technology subjects. Study of science and technology goes hand in hand. Technical knowledge can be gained more effectively using concepts of Physics. Curriculum of Applied physics includes applications used in the Electronics, Electrical and Computers industry.

Study of various topics like electrical Instruments and condenser enables the students to use various electrical instruments and study their applications. Semiconductor physics makes the students aware of semiconductor devices such as P-N Junction diode, Semiconductor devices are based on transport of charge.

Modern concepts like LASER and nanotechnology make the students to understand various properties and applications. The concept of LASER is beneficial for the students to understand the use of LASER in Fiber optic communication. Commercially lasers are used in sensing devices such as bar code recognition, distance meter (LIDAR), Transmission of optical signal through optical fibres & avoid cross talk .Application of laser namely HOLOGRAPHY is used to store data in ROM Chips. Holograms store large amount of data in 3D form.
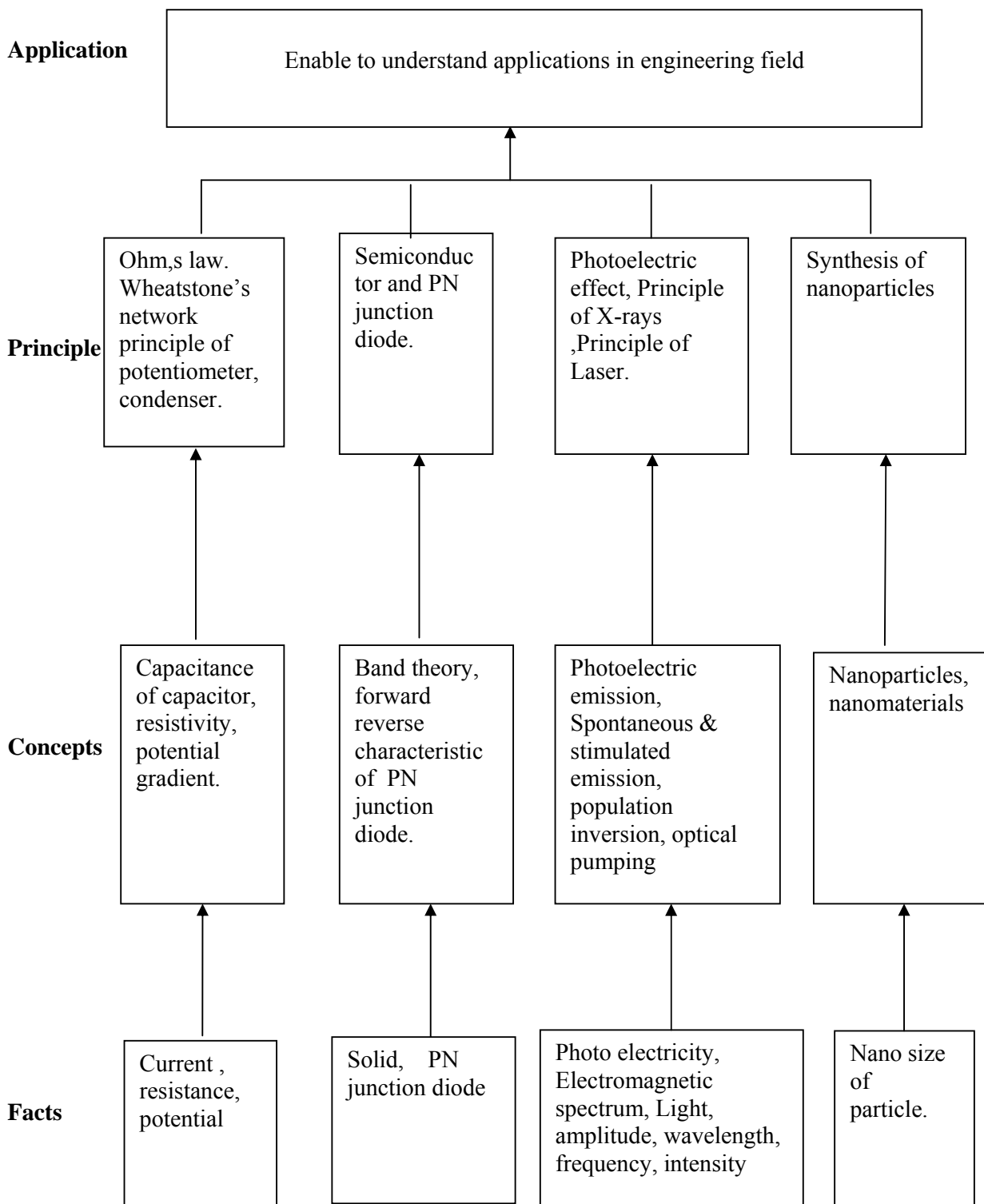
Nanotechnology will invoke the students to understand the nanoparticles and carbon nanotubes. Power can be transmitted at low voltage levels. Nanosized components show unique properties which are different from larger semiconductor components. These devices have increased data storage capacities of hard disks and led to small & faster microprocessors.

General Objectives: Students will be able to
1. Understand laws and principles of electrical circuits.
2. Classify solids on the basis of semiconductor band theory.

3. Understand principle of Laser and its applications in engineering field.
4. Identify superconductor and its types.
5. Understands applications of nanoparticles in engineering field.

Learning Structure:

Application

> Enable to understand applications in engineering field

Principle

| Ohm,s law. Wheatstone's network principle of potentiometer, condenser. | Semiconductor and PN junction diode. | Photoelectric effect, Principle of X-rays ,Principle of Laser. | Synthesis of nanoparticles |

Concepts

| Capacitance of capacitor, resistivity, potential gradient. | Band theory, forward reverse characteristic of PN junction diode. | Photoelectric emission, Spontaneous & stimulated emission, population inversion, optical pumping | Nanoparticles, nanomaterials |

Facts

| Current , resistance, potential | Solid, PN junction diode | Photo electricity, Electromagnetic spectrum, Light, amplitude, wavelength, frequency, intensity | Nano size of particle. |

Applied Physics (Computer/ Electrical / Electronic Engineering group) Theory:

Topics and contents	Hours	Marks

Topic1] Basic Electric circuits:
Specific objectives
  ➢ Calculate basic electric parameters for designing the simple electric circuits.
  ➢ Use basic electronic components like resistor, capacitor in electronic circuits.
  ➢ Use various networks such as Whetastone's network , potentiometer
  ➢ Study principle and applications of condenser
1.1 Simple D.C. electric circuits: **[04 Marks]**
  • Electric current: definition, symbol and unit, Ohm's law: statement, mathematical expression, resistivity: definition, unit, conductivity: definition, unit .
1.2 Wheatstone's network and potentiometer   **[06 Marks]**
  • Wheatstone's network, working principle, balancing condition, principle of potentiometer, potential gradient
1.3 Condensers: **[06 Marks]**
  • Capacity of condenser-definition and its unit, definition of 1 farad capacity, principle of condenser, derivation of capacity of parallel plate condenser, statement and derivation of series and parallel combination of condensers.
	12	16

Topic 2] Semiconductor Physics:
Specific objectives
  ➢ Differentiate between conductor, semiconductor, insulator
  ➢ Verify characteristics of P-N junction diode
  ➢ Study applications of P-N junction diode, photodiode.
 	
  • Classification of solids on the basis of band theory: forbidden energy gap, conductor, insulator, semiconductor.
  • Classification of semiconductors, P-N junction diode, forward characteristics of P-N junction diode, reverse characteristics of P-N junction diode, photodiode, its symbol, principle and applications.
	04	10

Topic 3]: Modern physics.
Specific objectives:
  ➢ State the concept of photocell
  ➢ State applications of X - ray
  ➢ State properties and applications of LASER
3.1 Photo electricity: **[06 Marks]**
  • Photon (quantum), Plank's hypothesis, energy of photon**,** properties of photons.
  • Photo electric effect: circuit diagram, process of photoelectric emission, definitions:-threshold frequency, threshold wavelength, stopping potential, characteristics of photoelectric effect
  • Work function, Einstein's photoelectric equation, photo resistor (LDR) – symbol, principle, applications, photoelectric cell:- principle,.
3.2 X-rays: **[06 Marks]**
  • Origin of X-rays, production of X-rays using Coolidge's X-ray tube, minimum wavelength of X-ray, properties of X-rays, applications of X- rays: engineering, medical and scientific.
	12	18

3.3 Laser: **[06 Marks]** • Laser, properties of laser, spontaneous and stimulated emission, population inversion, optical pumping. • He-Ne Laser: Principle, construction and working, engineering applications of Laser		
Topic 4] Physics of Nanoparticles: **Specific Objectives** ➢ Study properties of nanoparticals. ➢ Study applications of nanotechnology. • History, nanoparticles, properties of nanoparticles, methods of synthesis of nanoparticles: physical method of synthesis of nanoparticles, engineering applications of nanotechnology.	**04**	**06**
Total	**32**	**50**

Practical:

Skills to be developed

1) **Intellectual skills-**

- Proper selection of measuring instruments

- Verify the principles, laws, using given instruments under different conditions.

- Read and interpret the graph.

- Interpret the results from observations and calculations.

2) **Motor skills-**

- Handle/operate the instruments.

- Measuring physical quantities accurately.

- Observe the phenomenon and to list the observations in a tabular form.

- Plot the graphs.

List of experiments:

Sr No	Title of Experiment	To be performed by a group of
1	Determine specific resistance by voltmeter ammeter method	4 to5 **students**
2	Verify law of resistances in series by using meter bridge.	4 to5 **students**
3	Verify principle of potentiometer	4 to5 **students**
4	Determine the characteristics of condenser using RC circuit.	4 to5 **students**
5	Verify characteristics of photoelectric cell.	4 to5 **students**
6	Verify characteristics of thermocouple.	4 to5 **students**
7	Plot forward characteristics of P-N junction diode	4 to5 **students**
8	Determine Joule's constant (J) by electrical method.	4 to5 **students**
9	Determine temperature co-efficient of resistance of metal (conductor) using platinum resistance thermometer	4 to5 **students**

Learning resources:
1. Reference Books:

Sr. No.	Title	Author	Publisher
01	Physics	Resnick and Hailday	Wisley Toppan Publishers – England
02	Engineering Physics	B.L. Theraja	S. Chand Publishers – New Delhi
03	Engineering Physics	V. Rajendran	Tata McGraw-Hill Publications
04	Conceptual Physics	P.G.Hewitt	Pearson education (Tenth edition)
05	Physics for Engineers	M.R.Srinivasan	New Age international publishers
06	Physics- Std XI, Std XII	--	HSC board/CBSE Board
07	Engineering Physics	D.K. Bhattachrya A. Bhaskaran	Oxford university press

2. Websites:
    http://hyperphysics.phy-astr.gsu.edu/hbase/permot2.html
    http://physics.info
    http://physics.org
    http://about.com
    http://classroom.com
    http://101science.com

3) Videos:
    http://www.youtube.com Laser cutter
    http://www.cmslaser.com

4) CD:
    Educational Cd of NCERT
    Educational cd of Pearson education India

5) PPT:
    www.slideshare.nt/donpraju/laser-ppt
    www.research.usf.edu/cs/rad/laser-ppt
    www.studyvilla.com/laser-ppt-ruby laser
    www.courses superconductor.ppt
    www.khanacademy.com

Course Name : Electronics / Electrical / Computer Engineering Group

Course Code : EE/EP/EJ/EN/ET/EX/EV/IC/IE/IS/MU/DE/ED/EI/IU/CO/CM/IF/CD/CW/EU

Semester   : Second

Subject Title : Applied Science (Chemistry)

Subject Code : 17211

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
02	--	02	02	50	25@	--	--	75

NOTE:

➢ **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
➢ **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**
➢ **Applied Science is divided into two parts - Applied Science (Physics) and Applied Science (Chemistry). Theory examination of both parts as well as practical examination of both parts will be conducted on separate days. Sum of theory marks of both parts shall be considered for passing theory examination of Applied Science. Similarly it is also applicable to practical examination. It is mandatory to appear theory and practical examination of both parts. Remaining absent in any examination of any part will not be declared successful for that examination head**.

Rationale:

The contents of this curriculum has four units which provide knowledge of cells and batteries, selection of appropriate materials for engineering applications and methods of protection by metallic and non-metallic coatings. This satisfies the need of the students to cope with the recent use of these materials and processes in their world of work.

Unit of cells and batteries covers working principle of construction, operations and their engineering applications. Now a days there are new electronic devices, gadgets coming up in the market which function on cells and batteries. Study of cells and batteries give complete knowledge of working of reversible and non-reversible cells, their classification, construction, chemical reactions during working and different chemicals used in manufacturing of cells and batteries will help the students to make proper selection in electronic equipments and computer industry.

Study of different polymers, insulators or dielectrics, adhesives and their chemical behavior will be useful in their applications in electrical appliances and electronic industries. Study of corrosion and methods of prevention will make students realize importance of care and maintenance of machines and equipments.

The contents of this subjects are designed to enhance student's reasoning capacity and capabilities in solving challenging problems at various levels of working in the electronic and computer industry.
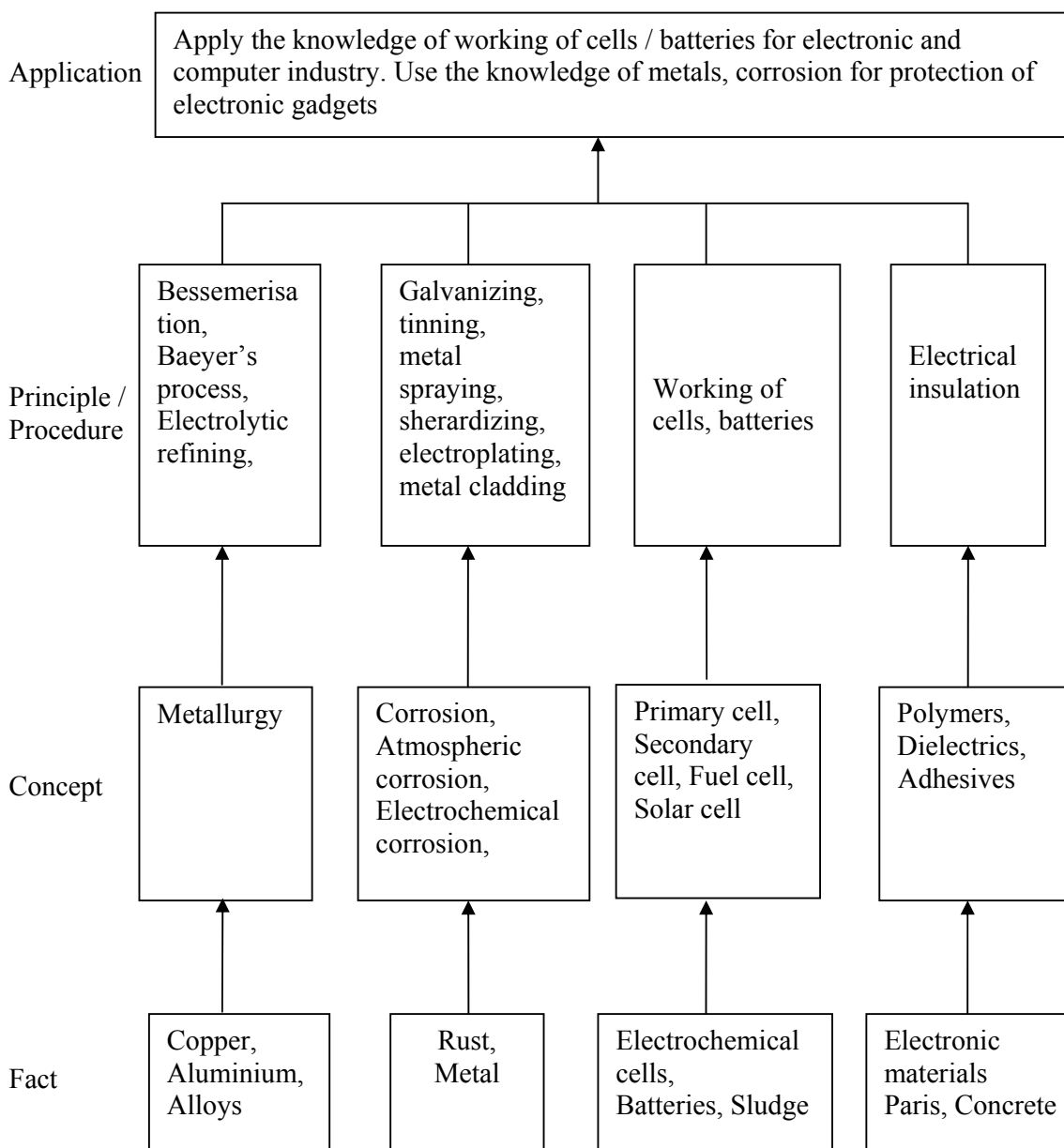
General Objectives:
The student will be able to
1. Select proper type of cell based on the requirement in electronic and computer engineering.
2. Apply knowledge of extraction, properties of copper and aluminium in engineering

applications.
3. Know various insulating or dielectric materials used for electronic equipments and computers.
4. Generalize different factors which affect atmospheric as well as electrochemical Corrosion.

Learning Structure:

Application	Apply the knowledge of working of cells / batteries for electronic and computer industry. Use the knowledge of metals, corrosion for protection of electronic gadgets			

Principle / Procedure	Bessemerisation, Baeyer's process, Electrolytic refining,	Galvanizing, tinning, metal spraying, sherardizing, electroplating, metal cladding	Working of cells, batteries	Electrical insulation

Concept	Metallurgy	Corrosion, Atmospheric corrosion, Electrochemical corrosion,	Primary cell, Secondary cell, Fuel cell, Solar cell	Polymers, Dielectrics, Adhesives

Fact	Copper, Aluminium, Alloys	Rust, Metal	Electrochemical cells, Batteries, Sludge	Electronic materials Paris, Concrete

Theory Content:

Topics and Contents	Hours	Marks
Topic 1] Metallurgy: **Specific Objectives:** ➢ Describe the extraction processes of copper and aluminium. ➢ State engineering applications of copper and aluminium based on their properties. **1.1 Metallurgy of Copper:** **[4 Marks]** • Definition of metallurgy. • Extraction process: Ores of copper, extraction of copper from copper pyrite by concentration, roasting, smelting, bessemerisation, electrolytic refining. • Physical, chemical properties – action of air, water, acid, alkali. Applications of copper. **1.2 Metallurgy of Aluminium:** **[4 Marks]** • Extraction process: Ores of aluminium, extraction of aluminium from bauxite by Bayer's process, electrolytic reduction of alumina, electrolytic refining of aluminium. • Physical, chemical properties–action of air, water, acid, alkali. Applications of aluminium, anodizing of aluminium. **1.3 Solders:** **[4 Marks]** • Composition, properties and applications of- soft solder, tinmann's solder, brazing alloy, rose metal, plumber's solder.	**08**	**12**
Topic 2] Corrosion: **Specific Objectives:** ➢ Explain Mechanism of atmospheric corrosion and immersed corrosion. ➢ Describe different methods of protection of metal from corrosion **2.1 Corrosion:** **[6 Marks]** • Definition of corrosion, Types of corrosion. • Atmospheric Corrosion: Definition, mechanism of oxidation corrosion, types of oxide films and their significance, factors affecting rate of atmospheric corrosion. • Immersed Corrosion: Definition, mechanism of immersed corrosion by galvanic cell action- with evolution of hydrogen gas and absorption of oxygen gas, factors affecting immersed corrosion. **2.2 Protection of metals by:** **[8 Marks]** • Modification of environment, modification of properties of metal, electrochemical protection by sacrificial anodic protection and impressed current cathodic protection, use of protective coatings. • Application of metallic coatings: By galvanising, tinning, metal spraying, electroplating, metal cladding, cementation- sherardizing, chromising, colourising. • Application of non-metallic coatings: paint-definition, characteristics, constituents of paint and their functions.	**10**	**14**

Topic 3] Cells And Batteries:
 	
 Specific Objectives:
  ➢ Explain the concept of electrochemical cell.
  ➢ Describe construction and working of different types of cells.
 	
 Electrochemical cells/ batteries:
• Basic concepts : Definition of electrolyte, conductivity of electrolytes, Ohm's law, specific conductance, equivalent conductance, cell, battery, electrolytic cell, electrochemical cell, charging, discharging.
• Classification of electrochemical cells: Primary and secondary cells.
• Primary cells: construction, working and applications of - Dry Cell, Daniel cell,
• Secondary cells: construction, working and applications of - Lead-acid storage cell, Ni-Cd Cell
• Fuel cell : Definition, construction, working, advantages, limitations and applications of Hydrogen- oxygen fuel cell.
	10	**16**

Topic 4] Chemistry of Electronic Materials
 	
 Specific Objectives:
  ➢ State role of polymers in electronic engineering.
  ➢ Describe applications of dielectrics and insulators in electronic devices.
 	
4.1 Polymers: **[4 Marks]**
• Definitions, examples and applications of electrically conducting polymers, photoconductive polymers, electrically insulating polymers, liquid crystal polymers(LCP).
4.2 Insulators, Dielectrics and Adhesives: **[4 Marks]**
• Definition of dielectrics and insulator, Properties of gaseous, liquid and solid insulators , their examples. Properties and applications of- inert gases, silicone fluids, teflon , bakelite, ceramics and glass.
 	
• Definition, characteristics, advantages of adhesives, properties and applications of phenol formaldehyde resin, urea formaldehyde resin and epoxy resin.
	04	**08**

Total	**32**	**50**

Practical:

Intellectual Skills:

1. Select proper equipments and instruments.

2. Interpret the results.

3. Plan the set up of the experiment.

4. Verify the characteristics of materials.

Motor Skills:

1. Measure the parameters accurately.

2. Calibrate the equipments as per the standards.

3. Calculate the results.

4. Measure chemicals accurately.

5. Handle apparatus and various laboratory reagents.

6. Observe the completion of reaction.

List of Experiments:

Sr. No.	Name of the experiment
1	Determine percentage of copper in the given brass alloy or copper ore.
2	Determine percentage of aluminium in aluminium alloy.
3	Determine electrode potential of various metals to study their tendency towards corrosion.
4	Find the relation between loss in weight of aluminium strip in acidic and alkaline medium and rate of corrosion.
5	Determine the strength of given hydrochloric acid solution by titrating it against sodium hydroxide solution by using pH meter.
6	Determine thinner content in oil paint.
7	Determine neutralization point of acetic acid (weak acid) and ammonium hydroxide (weak base) and to calculate normality and strength of acetic acid.
8	Measure the voltage developed due to chemical reactions by setting up a Daniel cell.
9	To prepare urea formaldehyde resin and understand the structure and properties for its applications in engineering.

Learning Resources:
1. Reference Books:

Sr. No.	Author	Name of the Book	Publisher
1	S. S. Dara	Engineering Chemistry	S. Chand Publication
2	Jain and Jain	Engineering Chemistry	Dhanpat Rai and Sons
3	B. Sivasankar	Engineering Chemistry	The McGraw-Hill Companies
4	K. B. Chandrasekhar, U. N. Das, Sujatha Mishra	Engineering Chemistry	SCITECH

2. **List of websites, videos and animations :**

http://en.wikipedia.org/wiki/conductive_polymer

http://en.wikipedia.org/wiki/waste-management.

http://www.footprints-science.co.uk/Chemistry.htm

.http://www.youtube.com/watch?v=8tqfDE6vqcs&feature=related

http://www.splung.com/content/sid/3/page/batteries

www.teachnet-uk.org.uk/...**Metals**/...**metals**/**Properties**%20of%20**Meta**...

http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_ceramics

http://www.substech.com/dokuwiki/doku.php?id=full_index_of_articles_on_polymers

http://www.powerstream.com/BatteryFAQ.html

http://physchem.co.za/OB12-sys/batteries.htm#lead-acid (Dry Cell & Lead acid cell)

http://www.kentchemistry.com/links/Redox/flash/RedoxAgentsElectrodesBattery.swf (Battery)

http://www.kentchemistry.com/links/Redox/flash/battery.swf

http://www.kentchemistry.com/links/Redox/flash/halfcells.swf (Voltaic Cell)

http://group.chem.iastate.edu/Greenbowe/sections/projectfolder/animations/ZnCbatteryV8web.html(Dry Cell)

http://www.ausetute.com.au/battery.html (Batteries)

http://www.sherardizing.com/resources/files/9_Sherardizing_Corrosion.pdf (Sheradizing)

http://www.galvanizeit.org/aga/animation/4728?keepThis=true&TB_iframe=true&height=480&width=640 (Galvanizing)

http://www.galvanizeit.org/aga/animation/4728?keepThis=true&TB_iframe=true&height=480&width=640   (Galvanizing)

http://www.ehow.com/list_6725219_different-types-metal-cladding.html (Metal Clading)

http://www.authorstream.com/Presentation/sheelachawla-590475-insulators/ (Insulators)

http://www.sut.ac.th/engineering/metal/pdf/Nonferrous/02_Aluminium%20and%20aluminium%20alloy.pdf

http://www.youtube.com/watch?v=zU5sP64DeYA (Flow chart of extraction of Al)

http://www.youtube.com/watch?v=0Rs4vHo6_oc&feature=related (extraction of Al)

http://www.youtube.com/watch?v=XWGbUYsChOI (extraction of Cu)

fka.ump.edu.my/images/fka/.../5.2%20**Adhesives**.**ppt**

images.emchiey.multiply.multiplycontent.com/.../08a%20**Adhesives**...

Course Name   : **Electrical Engineering Group**

Course Code   : **EE/EP/EU**

Semester   : **Second**

Subject Title   : **Fundamentals of Electrical Engineering.**

Subject Code   : **17214**

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	25#	--	25@	150

NOTE:

> ➢ **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
> ➢ **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**
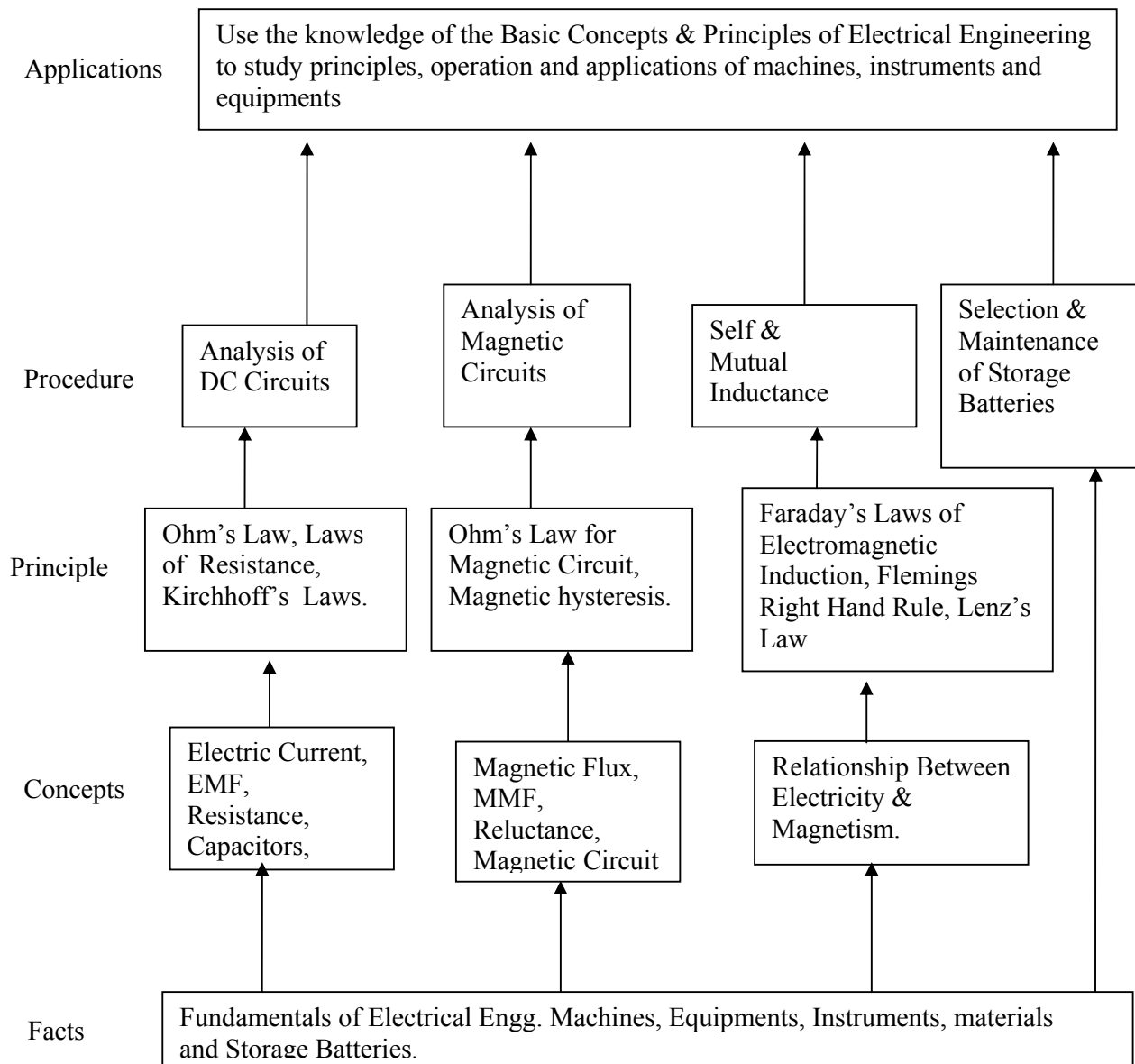
Rationale:

In the course of diploma in electrical engineering, study of electrical machines, instruments, devices and equipment's are involved. Besides this, concepts, facts and operations about power system, protection scheme and controls must be studied and developed by students of electrical engineering.

The basic aim of subject is that the student must learn the basic concepts, rules and laws of electric and magnetic circuits and practical's thereof. This study of subject will facilitate the understanding of principles and working of machines, instruments and equipment's. Use of multi media in learning resources will facilitate the learning

General Objectives:

The student will be able to:

1. Understand various definitions, laws and concepts involved in electrical field, circuits, magnetism.
2. Understand concepts of electrical circuits and magnetic circuits.
3. Realize importance of electromagnetic induction in regards to machines and power system.
4. Understand utility and maintenance of storage batteries.
5. Study different types of electric supply.

Learning Structure:

Applications — Use the knowledge of the Basic Concepts & Principles of Electrical Engineering to study principles, operation and applications of machines, instruments and equipments

Procedure — Analysis of DC Circuits | Analysis of Magnetic Circuits | Self & Mutual Inductance | Selection & Maintenance of Storage Batteries

Principle — Ohm's Law, Laws of Resistance, Kirchhoff's Laws. | Ohm's Law for Magnetic Circuit, Magnetic hysteresis. | Faraday's Laws of Electromagnetic Induction, Flemings Right Hand Rule, Lenz's Law

Concepts — Electric Current, EMF, Resistance, Capacitors, | Magnetic Flux, MMF, Reluctance, Magnetic Circuit | Relationship Between Electricity & Magnetism.

Facts — Fundamentals of Electrical Engg. Machines, Equipments, Instruments, materials and Storage Batteries.

Theory:

Topic and Detailed Content	Hours	Marks

Topic 1 Basic Concepts:
Specific Objectives: The students will be able to :
  ➢ Understand various parameters and quantities used in electric circuit.
  ➢ Classify types of electric currents.
  ➢ Calculate various electric quantities such as power ,current, energy and p.d. in simple circuits
Contents
1.1 Electrical Quantities
  • Concept of Electric Current.
  • Concept of Electric Potential, Potential Difference(P D)
  • Electro-Motive-Force (EMF).
1.2 Resistance
  • Concept of Resistance
  • Definition of Resistance
  • Concept of Resistivity and Conductivity
  • Effect of Temperature on Resistance.
  • Temp.co-efficient of Resistance (simple numerical)
1.3 Classification of Electric Current
  • Direct Current (DC)
  • Alternating Current (AC)
1.4 Sources of D.C. Supply
  • Concept of Voltage Source: Ideal and Practical
  • Concept of Current Source: Ideal and Practical
  • Source Conversion. (simple numerical)
1.5 Effects of Electric Current (Only Introduction)
  • Heating Effect
  • Magnetic Effect
  • Chemical Effect
1.7 Concept of Electrical Work, Power and Energy.
 Their SI units (simple numerical)
1.8 Types of Resistors and their Applications.
  • Carbon Composition
  • Deposited Carbon
  • High Voltage Ink Film
  • Metal Film
  • Metal Glaze
  • Wire Wound
  • Cermet
	08	12

Topic 2 D. C. Circuits:
Specific Objectives: The students will be able to :
  ➢ Calculate internal resistance of a given d.c.source and terminal voltage.
  ➢ Calculate equivalent resistance of various simple d.c. circuits.
  ➢ Apply Kirchhoff's laws.
  ➢ Identify different D.C.Circuits.and convert star to delta and vice versa.
  Contents
2.1 Ohm's Law and related terms
  • Ohm's Law
	12	20

• Internal resistance of source
• Concept of internal voltage drop
• Terminal Voltage.
2.2 Various connections of resistances
    • Resistance in Series, Voltage Division Formula.
    • Resistance in Parallel, Current Division Formula.
    • Calculations of Equivalent Resistance of simple Series,
    • Parallel and Series Parallel Circuits.(Simple Numericals)
2.3 Duality Between Series and Parallel Circuits.
2.4 Definitions of terms Related to Electric Circuits
• Active and Passive Circuit Parameters
• Linear Circuit and Non-linear Circuit,
• Unilateral Circuit and Bi-lateral Circuit,
• Electric Network, Passive and Active Network,
• Node, Branch, Loop, Mesh.
2.5 Kirchhoff's Laws (Simple Numericals with two equations only)
• Kirchhoff's Current Law
• Kirchhoff's Voltage Law
2.6 Star/Delta and Delta/Star Transformation. (Simple Numericals)		

Topic 3 Capacitors :
Specific Objectives: The students will be able to :
  ➤ Understand the concept of capacitance
  ➤ Identify types of capacitor
  ➤ Calculate equivalent capacitance of of various simple d.c. circuits.
  ➤ Draw charging and discharging curves of capacitor.
  ➤ Derive basic formulae for energy stored and formula for capacitance of parallel plate capacitor
Contents
3.1 Concept and Definition of Capacitor
3.2 Parallel Plate Capacitor:(Derivation and Simple Numerical)
• Uniform Di-electric Medium
• Medium Partly Air.
3.3 Various connections of capacitances (Simple Numerical)
• Equivalent capacitance of capacitors in series. :(Derivation and Simple Numerical)
• Equivalent capacitance of capacitors in parallel. :(Derivation and Simple Numerical)
• Calculations of Equivalent Capacitance of Series Parallel :(Simple Numerical)
3.4 Energy Stored in Capacitor.(Derivation and Simple Numerical)
3.5 Charging and Discharging of Capacitor
(No Derivation and No Numerical)
3.6 Concept of Breakdown Voltage and Di-electric strength
3.7 Types of Capacitors and their Applications.
• Electrolytic
• Non-Electrolytic (Paper, Mica, Film, Ceramic, Glass)
	06	**12**

Topic 4 Magnetic Circuits :
Specific Objectives: The students will be able to :
  ➤ Understand various terms involved in magnetic circuit.
  ➤ Find out various parameters/quantities of magnetic circuit.
  ➤ Draw B-H curve and hysteresis loop.
	10	**16**

➤ Distinguish between series and parallel magnetic circuit.

Contents

4.1 Concept of magnet and electromagnetic.

4.2 Concept of magnetic lines of force.

4.3 Magnetic Circuit –
- Definition of magnetic circuit.
- Ohm's law of Magnetic Circuit.

4.4 Definitions Concerning Magnetic Circuit.
- Magneto-Motive-Force (MMF),
- Ampere Turns (AT)
- Reluctance
- Permeance
- Reluctivity.

4.5 Comparison Between Electric and Magnetic circuit.

4.6 Concept Series Magnetic Circuit and Parallel Magnetic Circuit.

4.7 Calculations of Amp.-Turns for simple Series(without and with air gap)

4.8 Concept of Leakage Flux, Useful Flux & Fringing.

4.9 Magnetisation Curve (B - H Curve) (No Derivation and No Numericals)
- Magnetisation Curve for Magnetic and Non-Magnetic
- Materials.
- Magnetic Hysteresis, Hysteresis Loop.
- Area of Hysteresis Loop, Hysteresis Loss.

4.10 Applications of magnet
- Permanent Magnet
- Electromagnet.

Topic 5 Electromagnetic Magnetic Induction : Specific Objectives: The students will be able to : ➤ Understand relation between magnetism and electricity. ➤ Apply faraday's laws to calculate induced e.m.f. ➤ Distinguish between statically and dynamically induced e.m.f. ➤ Find out self inductance and energy stored in magnetic field. **Contents** 5.1 Relation Between Magnetism and Electricity. 5.2 Development of Induced e.m.f. and Current. 5.3 Faraday's Laws of Electromagnetic Induction. (Simple Numerical) • Faraday's First Law • Faraday's Second Law 5.4 Induced e.m.f.(Simple Numerical) • Statically Induced E.M.F • Dynamically Induced E.M.F5.5 Direction of Induced E.M.F. and Currents. 5.5 Direction of induced e,m,f, • Lenz's Law for statically induced e,m,f, • Fleming's Right Hand Rule for dynamically induced e.m.f. 5.6 Self Inductance 5.7 Coefficient of Self-induction (L) (Simple Numerical) 5.8 Mutual inductance 5.9 Coefficient of Mutual inductance (M) 5.10 Self induced e.m.f. and mutually induced e.m.f 5.11 Coefficient of Coupling (No Derivation and No Numerical) 5.12 Inductances in series. (No Derivation and No Numerical)	**12**	**16**

5.13 Types of inductors and their applications. • Air Cored Inductors • Iron Cored Inductors • Ferrite Cored Inductors. 5.14 Energy Stored in Magnetic Field(Derivation and Simple Numerical)		
Topic 6 Storage batteries : Specific Objectives: The students will be able to : ➢ Understand difference between cell and battery. ➢ Understand series and parallel connections of batteries. ➢ Conduct maintenance of batteries. ➢ Find out self inductance and energy stored in magnetic field. **Contents** 6.1 Concept of Cell and Battery 6.2 Electrical Characteristics of Batteries. e.m.f. • Terminal Voltage • Internal Resistance • Amp.Hour Capacity • Efficiency: AH Efficiency and Watt Hr Efficiency 6.3 Necessity of Series Connection of Batteries 6.4 Necessity of Parallel Connection of Batteries 6.5 Charging of Batteries • Current Charging Method • Constant Voltage Charging Method • Precautions During Charging • Indications of Fully Charged Cells 6.6 Maintenance of Lead Acid Batteries. 6.7 Dry cell and Liquid Cell(Comparison) 6.8Applications of Storage Batteries	**05**	**08**
Topic 7 Basic of A.C. Fundamentals: Specific Objectives: The students will be able to : ➢ Understand induction of sinusoidal a.c. supply ➢ Understand basic a.c. quantities **Contents** 7.1 Simple loop a.c.generator with explaination of sinusoidal e.m.f. 7.2 Basic definitions : Cycle, Frequency, Time and Amplitude	**03**	**04**
Topic 8 Electric Materials: Specific Objectives: The students will be able to : ➢ Understand various materials used in electrical m/c, equipments. ➢ Understand importance of various properties of materials. **Contents** 8.1 Classification of electrical materials. 8.2 Conducting Materials (Physical, Mechanical and Electrical properties) ➢ Current Carrying Conducting Materials(Copper, Aluminum, Bronze and Iron) ➢ Non Current Carrying Conducting Materials(Cast iron, Cast Steel,etc) 8.3 Insulating Materials(Thermal , Mechanical and Electrical properties) ➢ Classification on basis of state of materials as solid ,liquid gaseous insulating materials (Introduction and applications) ➢ Classification on the basis of temperature withstanding ability as Y, A, E, B, F,H and C type with list of insulating materials in each	**08**	**12**

type. 8.4 Magnetic Material (Introduction and Applications) Classification of magnetic material as Paramagnetic, Diamagnetic and Ferromagnetic material • C.R.G.O. Silicon Steel • H.R.G.O. Silicon Steel • Amorphous Metal			
	Total	**64**	**100**

Practical:
Skills to be developed:

Intellectual Skills:
1. Identify and select electrical measuring instruments.
2. Interpret electrical circuit diagram.
3. Identify safety equipments required.
4. Decide the procedure for setting experiments.
5. Select electrical instruments of proper range.

Motor Skills:
1. Draw circuit diagram
2. Make wiring connections to connect electrical equipments and instruments.
3. Accurately measure electrical current and voltage drop.
4. Use of safety devices while working.

List of Practicals:
All experiments are compulsory.

Expt No.	Name of the Experiment
01	Know your electrical engineering laboratory: ➢ Draw layout of electrical laboratory. ➢ Prepare Charts of electrical safety and Study operation of fire extinguishing equipments. ➢ Study and use electric tools such as plier, screw driver, insulation cutter, tester etc.
02	To measure e.m.f. of d.c. source and to calculate its internal resistance by connecting it to an external load.
03	To use rheostat as current regulator and potential divider.
04	To determine the equivalent resistance of ➢ Series connected resistors ➢ Parallel connected resistors
05	To verify Kirchhoff's current law and voltage law.
06	To determine the equivalent capacitance of ➢ Series connected capacitors ➢ Parallel connected capacitors
07	To plot the charging and discharging curves of a capacitor(C) through resistor (R) and to determine the time constant of RC circuit analytically and graphically.
08	To plot B-H curve for a given magnetic material.
09	To plot the hysteresis loop for a given magnetic material
10	To demonstrate the Faraday's first law of electromagnetic induction for ➢ Statically induced e.m.f. ➢ Dynamically induced e.m.f.
11	To determine the temperature coefficient of resistance of copper.

Learning Resources:
  1. **Books:**

Sr. No.	Author	Title	Edition	Publisher
1	B. L. Theraja A. K. Theraja	A Text Book of Electrical Technology Vol-I (Basic Electrical Engg.)	Multicolour Edition 2005 And Subsequent Reprint	S. Chand & Co. Ramnagar, New Delhi
2	V. N. Mittle	Basic Electrical Engg.	Any Edition After 2005	Tata McGraw-Hill
3	Edward Hughes	Electrical Technology	Second And Any Subsequent Edition	Pearson Education, New Delhi
4	R.S. Ananda Murthy	Basic Electrical Engineering	Second Edition	Pearson
5	T. Thyagarajan	Basic Electrical Engineering	First Edition	Scitech
6	K Uma Rao	Basic Electrical Engineering	First Edition	Pearson
7	Sunil T.Gailwad	Basic Electrical Engineering	First Edition	Dreamtech Press 19-A Daryaganj, N.Delhi

  2. **Websites:**
  www.wikipedia.com , www.youtube.com , www.norsa.com, www.dreamtechpress.com

List of Machines and Equipments:

Sr No.	List of Equipments	Specifications	Qty.
1	D. C. Ammeter Rrange (0-5A)	Portable analog PMMC type as per relevant BIS standard	05
2.	D,C. Voltmeter Range (0-150/300V)	Portable analog PMMC type as per relevant BIS standard	05
3	D,C. Voltmeter Range (0-15/30/75 V)	Portable analog PMMC type as per relevant BIS standard	05
4	Rheostat (0-250 Ohm,2A)	Nichrome wire wound rheostat on epoxy resin or class F insulating tube with two fixed and one sliding contact	05
5	Rheostat (0-90 Ohm,5A)	Nichrome wire wound rheostat on epoxy resin or class F insulating tube with two fixed and one sliding contact	05
6	Rheostat (0-35 Ohm,10A)	Nichrome wire wound rheostat on epoxy resin or class F insulating tube with two fixed and one sliding contact	05
7	Rheostat (0-350Ohm,1.5A)	Nichrome wire wound rheostat on epoxy resin or class F insulating tube with two fixed and one sliding contact	05
8	D. C. Supply	A 230 V d.c. supply (with inbuilt rectifier to convert a.c.to d.c)	02
9	Oil filled capacitor	10 to 100μF Oil filled capacitor with rated voltage upto 500V	02

10	Electrolyte type capacitor	10 to 100μF electrotyoe capacitor with rated voltage upto 500V	02
11	Galvanometer	(50mV-0-50mV) PMMC type analog portable galvanometer	02

Note:

While procuring equipments detailed specifications are to be given. For detailed specifications manufactures catalogues and relevant BIS may be referred.

Above list with specifications are suggestive and may vary as per need of institute and already availability of equipments.

Kits for experiments are not recommended. Instead of that physical arrangement of experimental set along with source, elements and meters on table is recommended.

Course Name : All Branches of Diploma in Engineering and Technology.

Course Code : CE/ME/IE/EJ/DE/ET/EX/EE/EP/MU/EV/IS/CO/CM/IF/PG/PT/AE/

                            CV/MH/FE/CD/ED/EI/EU

Semester   : Second

Subject Title : Engineering Mathematics

Subject Code : 17216

Teaching and Examination Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
03	01	--	03	100	--	--	--	100

NOTE:

- ➢ **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE.**
- ➢ **Total of tests marks for all theory subjects are to be converted out of 50 and to be entered in mark sheet under the head Sessional Work. (SW)**

Rationale:

        This subject is an extension of Basic mathematics of first semester and a bridge to further study of applied mathematics. The knowledge of mathematics is useful in other technical areas.

        Differential calculus has applications in different engineering branches. For example concepts such as bending moment, curvature, maxima and minima.

        Numerical methods are used in programming as an essential part of computer engineering. For solution of problems in electrical circuits and machine performances complex number is used engineering mathematics lays the foundation to understand technical principles in various fields.

General objectives:

Student will be able to

1) Use complex numbers for representing different circuit component in complex form to determine performance of electrical circuit and machines.

2) Apply rules and methods of differential calculus to solve problems.

3) Apply various numerical methods to solve algebraic and simultaneous equations.

Learning Structure:

Application

Apply the knowledge numerical method , derivatives and complex number in various technical areas

Procedure

Performing algebraic operation, and apply De-Moivre's theorem for finding root of algebraic equation.	Find limit of functions, Find first and second order derivatives, Derivatives using rules of derivatives, Methods of differentiation.	Approximate root of algebraic equation using various methods. Unknown values in various simultaneous equations.

Principle

Algebra of complex number , De- Moivre's theorem	Theorems of limit and rules of derivatives	Methods of bisection, Regula falsi, Newton raphson, Gauss elimination, Jacobi's and Gauss Seidal.

Concept

Real and imaginary part of complex number, modulus, argument, polar, exponential form and conjugate of complex number	Interval, dependent and independent variables, increasing and decreasing function.	Iterative method

Facts

Complex number, imaginary root	Function, notation of derivatives, first order derivatives, second order derivatives, Partial derivatives, notation.	Algebraic equation and simultaneous equation

Content Theory:

Topic	Hours	Marks
Topic 1 - Complex number		
1.1 Complex number ------------------------ **14** **Specific objectives :** ➢ Find roots of algebraic equations which are not in real. • Definition of complex number, Cartesian, polar and exponential forms of complex number. • Algebra of complex number such as equality, addition, subtraction, multiplication and division. • De- Moivre's theorem with simple examples. • Euler's form of circular functions, hyperbolic functions and relation between circular and hyperbolic functions.	**08**	**14**
Topic 2 - Differential Calculus		
2.1 Function ------------------------ **14** **Specific objectives :** ➢ Identify the function and find the value of function. • Definition of function, range and domain of function. • Value of function at a point. • Types of functions and examples.	**08**	
2.2 Limits ---------------------------- **20** **Specific objectives :** ➢ To evaluate limit of function. • Concept and definition of limit. • Limits of algebraic, trigonometric, logarithmic and exponential functions with examples.	**08**	**58**
2.3 Derivatives ------------------------------ **24** **Specific objectives :** ➢ Find the derivatives by first principle. ➢ Solve problems using rules and methods of derivatives • Definition of derivatives, notation, derivatives of standard function using first principle. • Rules of differentiation such as, derivatives of sum or difference, product, and quotient with proofs. • Derivative of composite function with proof (Chain rule) • Derivatives of inverse trigonometric functions using substitution • Derivatives of inverse function. • Derivatives of implicit function. • Derivatives of parametric function. • Derivatives of one function w.r.t another function. • Logarithmic differentiation. • Second order differentiation.	**12**	
Topic 3 - Numerical Method		
3.1 Solution of algebraic equation -------------------------- **14** **Specific objectives :** ➢ Find the approximate root of algebraic equation. • Bisection method • Regula falsi method • Newton Rapshon method	**06**	**28**

3.2 Numerical solution of simultaneous equations ------------------ **14**
Specific objectives :
   ➢ Solve the system of equations in three unknowns.
   • Gauss elimination method
   • Jacobi's method
   • Gauss Seidal method
	06	

Total	**48**	**100**

Tutorials:
1) Tutorial are to be used to get enough practice.
2) In each tutorial make a group of 20 student students and for each group minimum 10 problems are to be given.

List of Tutorials:

Sr No.	Topic for Tutorial
1	Complex number (Examples based on algebra of complex numbers)
2	Complex number (Examples based on De Moivre's theorem and Euler's formulae)
3	Function
4	Limit (algebraic and trigonometric functions)
5	Limit (logarithmic and exponential functions)
6	Derivatives by first principle
7	Derivatives (Examples based on formulae of standard functions and rules)
8	Derivatives (Examples based on methods of differentiation)
10	Solution of algebraic equations
11	Solution of simultaneous equations

Learning Resources:
1) Books:

Sr. No.	Title	Authors	Publication
1	Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
2	Calculus : Single Variable	Robert T. Smith	Tata McGraw HILL
3	Advanced Engineering mathematics	Dass H. K	S. Chand Publication New Delhi
4	Fundamentals of Mathematical Statistics	S. C. Gupta and Kapoor	S. Chand Pablication New Delhi
5	Higher Engineering Mathematics	B. S .Grewal	Khanna publication New Delhi
6	Applied Mathematics	P. N. Wartikar	Pune vidyarthi Griha Prakashan, Pune

2) Websites: www.khan academy

Course Name : All Branches of Diploma in Engineering and Technology

Course Code : AE/CE/CH/CM/CO/CR/CS/CW/DE/EE/EP/IF/EJ/EN/ET/EV/X/IC/IE/IS/

                      ME/MU/PG/PT/PS/CD/CV/ED/EI/FE/IU/MH/MI/DC/TC/TX/EU

Semester   : Second

Subject Title   : Development of Life Skills

Subject Code : 17010

Teaching and Examination Scheme:

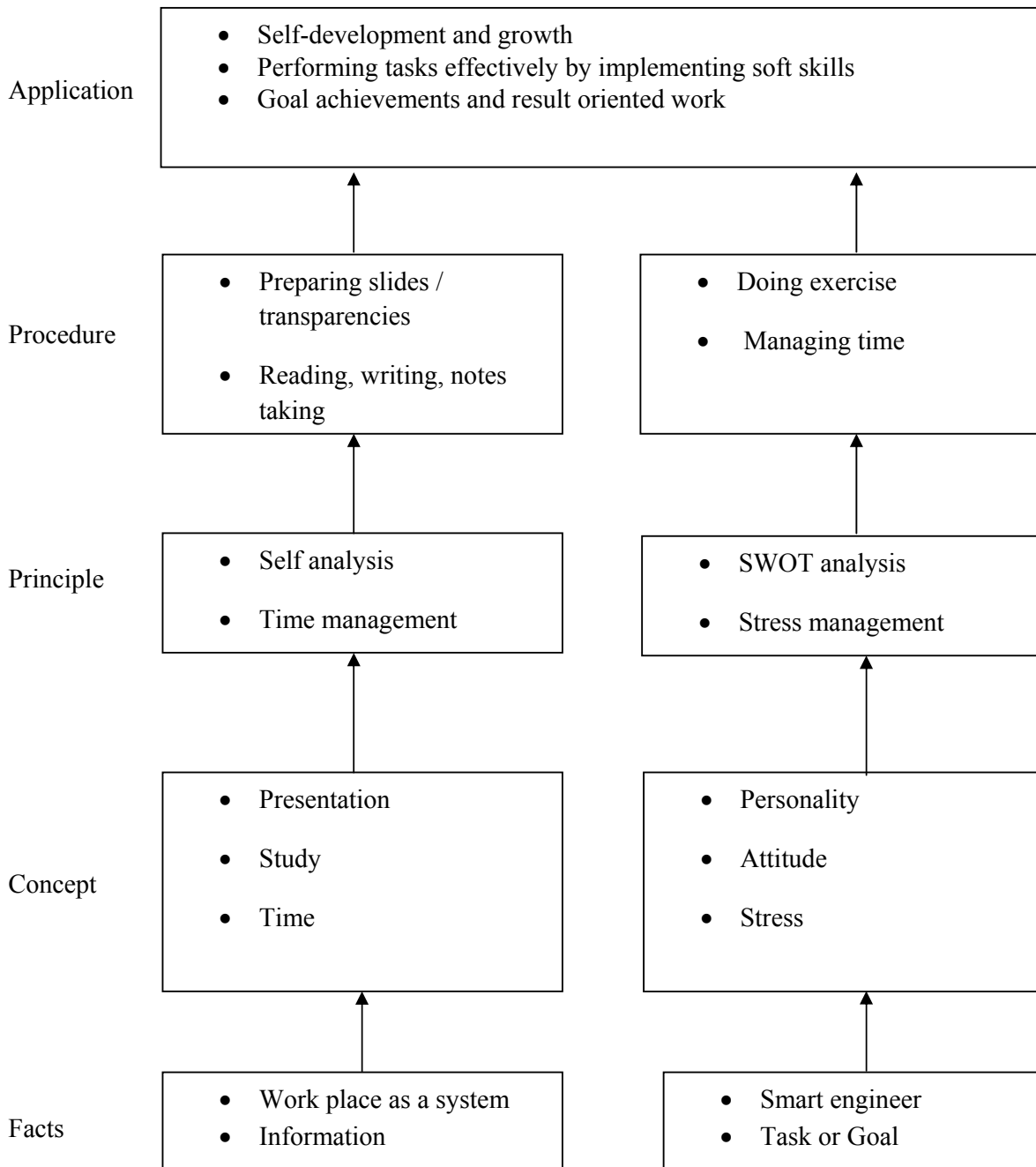| Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	--	--	--	25@	--	25

Rationale:

      Globalization has emphasized the need for overall development of technician to survive in modern era. Soft skills development in addition to technical knowledge; plays a key role in enhancing his/her employability.

      This subject aims to provide insights into various facets of developing ones personality in terms of capabilities, strengths, weakness, etc as well as to improve reading, listening and presentation skills. Also in this age fierce competition, the time and stress management techniques will immensely help the technician to live happy and purposeful life.

General Objectives:

After studying this subject, the students will be able to:

1. Understand and appreciate importance of life skills.
2. Use self-analysis and apply techniques to develop personality.
3. Use different search techniques for gathering information and working effectively.
4. Improve the presentation skills.

Learning Structure:

Application	• Self-development and growth • Performing tasks effectively by implementing soft skills • Goal achievements and result oriented work	
Procedure	• Preparing slides / transparencies • Reading, writing, notes taking	• Doing exercise • Managing time
Principle	• Self analysis • Time management	• SWOT analysis • Stress management
Concept	• Presentation • Study • Time	• Personality • Attitude • Stress
Facts	• Work place as a system • Information	• Smart engineer • Task or Goal

Theory:

Topic and Contents	Hours
TOPIC 1: SELF ANALYISIS Specific Objectives: ➢ To introduce oneself. Contents: 1.1 Need of Self Analysis 1.2 Attitude and types (positive, negative, optimistic and pessimistic) Guidelines for developing positive attitude.	02
TOPIC 2: STUDY TECHNIQUES Specific Objectives: ➢ To identify different process and strategies. ➢ To improve reading, listening and notes taking skills. Contents: 2.1 Learning strategies 2.2 Learning process 2.3 Organization of knowledge 2.4 Reading skills 2.5 Listening skills 2.6 Notes taking 2.7 Enhancing memory	03
TOPIC 3: INFORMATION SEARCH Specific Objectives: ➢ To search information as per the need. Contents: 3.1 Sources of information 3.2 Techniques of information search (library, internet, etc)	02
TOPIC 4: SELF DEVELOPMENT Specific Objectives: ➢ To set primary goals using SMART parameters. ➢ To Priorities the work effectively. ➢ To cope up with stress effectively. Contents: 4.1 Goal setting and its importance. 4.2 Characteristics of Goal setting (**SMART**- **S**pecific, **M**easurable, **A**ttainable, **R**ealistic, **T**ime bound) 4.3 Time Management - Importance, prioritization of work, time matrix, time savers, and time wasters. 4.4 Stress Management - Definition, types of stress, causes of stress, managing stress, and stress busters.	05
TOPIC 5: PRESENTATION TECHNIQUES Specific Objectives: ➢ To plan for presentation. ➢ To prepare contents for presentation. Contents:	02

5.1 Importance of presentation. 5.2 Components of effective presentation (Body language, voice culture , rehearsal, etc) 5.3 Preparing for presentation. 5.4 Use of audio/video aids. (audio, video, transparency's, PowerPoint presentations, etc) 5.5 Performing presentation (Seminars, paper presentations, compering, etc)	

TOPIC 6: GROUP DISCUSSION
Specific Objectives
  ➢ To understand the concept of group discussion
  ➢ To know the purpose of group discussion
Contents
6.1 Group discussion concept and purpose
6.2 Method of conduction
	02

Total	**16**

Practical:
Skills to be developed:

Intellectual Skills:

Student will be able to

- Develop ability to find his capabilities.

- Select proper source of information.

- Follow the technique of time and stress management.

- Set the goal.

Motor Skills:

Student will be able to

- Follow the presentation of body language.

- Work on internet and search for information.

- Prepare slides / transparencies for presentation.

List of Practicals/activities:

1. Giving self introduction. Observe the demonstration of self introduction given by the teacher and prepare a write up on the following points and introduce yourself in front of your batch in 5 minutes

   ➢ Name

   ➢ Native place

   ➢ Background of school from where he / she passed

   ➢ Family background

- ➢ Hobbies / salient achievements / idols if any for self development
- ➢ Aims of life as an Engineer

2. Provide responses to the questions based on the moral story given in the assignment.

3. Judge your attitude by responding to the tests given in the assignment and write comments on your score.

4. Read any chapter from the subject of Engineering Physics / Engineering Chemistry and identify facts, concepts, principles, procedures, and application from that chapter

5. Participate in the panel discussion on techniques of effective learning and provide the responses to the questions.

6. Access the book on Biography of Scientists/Industrialist/Social leader/Sports Person from library. Read the book and note the name of author, publication, year of publication, and summarize the highlights of the book.

7. Prepare notes on given topic by referring to books / journals / websites.

8. Prepare 8 to 10 power point slides based on the notes prepared on the above topic. Present the contents for 10 minutes Group wise(Group will be of 4 students)

Note – Subject teacher shall guide the students in completing the assignments based on above practical.

Learning Resources:
Books:

Sr. No.	Author	Name of Book	Publication
1	Richard Hale and Peter Whitlam	Target setting and goal achievement	Kogan Page
2	Andrew Bradbury	Successful Presentation Skills	The Sunday Times – Kogan
3	Ros Jay and Antony Jay	Effective Presentation	Pearson – Prentice Hall
4	Subject Experts - MSBTE	Handbook on Development of Life Skills	MSBTE
5	Nitin Bhatnagar and Mamta Bhatnagar	Effective Communication and Soft Skills	Pearson
6	D. Sudha Rani	Business Communication and Soft Skills	Pearson
7	Barak K Mitra	Personality Development and Soft Skills	Oxford University Press
8	Dr. T. Kalayani Chakravarti and Dr. Latha Chakravarti	Soft Skills for Managers	biztantra