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

COURSE NAME : ELECTRONICS ENGINEERING GROUP
COURSE CODE : EJ/EN/ET/EX/IS/IC/DE/IE/MU/IU/ED/EI/EV
DURATION OF COURSE : 6 SEMESTERS for EJ/EN/ET/EX/IS/IC/DE/IE/MU (8 SEMESTERS for IU/ED/EI)   WITH EFFECT FROM 2012-13
SEMESTER : SECOND   DURATION : 16 WEEKS
FULL TIME / PART TIME : FULL TIME   SCHEME : G

SR. NO.	SUBJECT TITLE		Abbre viation	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★	Applied Science	Physics	APH	17210	02		02	02	50	100	40	25@	50	20	--	--	--	--	
		Chemistry	ACH	17211	02	--	02	02	50			25@			--	--	--	--	
3	Elements of Electronics		EEX	17215	04	--	04	03	100	40	50#		20	--	--	25@	10	50
4	Engineering Mathematics $		EMS	17216	03	01	--	03	100	40	--		--	--	--	--	--	
5	Development of Life Skills $		DLS	17010	01	--	02	--	--	--	--		--	25@	10	--	--	
6	Electronic Workshop		EEW	17014	--	--	04	---	--	--	---		--	--	--	50@	20	
	Total				**14**	**01**	**16**	**--**	**400**	**--**	**100**		**--**	**50**	**--**	**100**	**--**	**50**

Student Contact Hours Per Week: **31 Hrs.**
THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.
Total Marks **: 700**
@ - Internal Assessment, # - External Assessment, [ ] No Theory Examination, $ - Common to all branches

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 subject are to be converted out of 50 marks as sessional work.
 ➤ 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 and SW 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/EX/IC/IE/IS/

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

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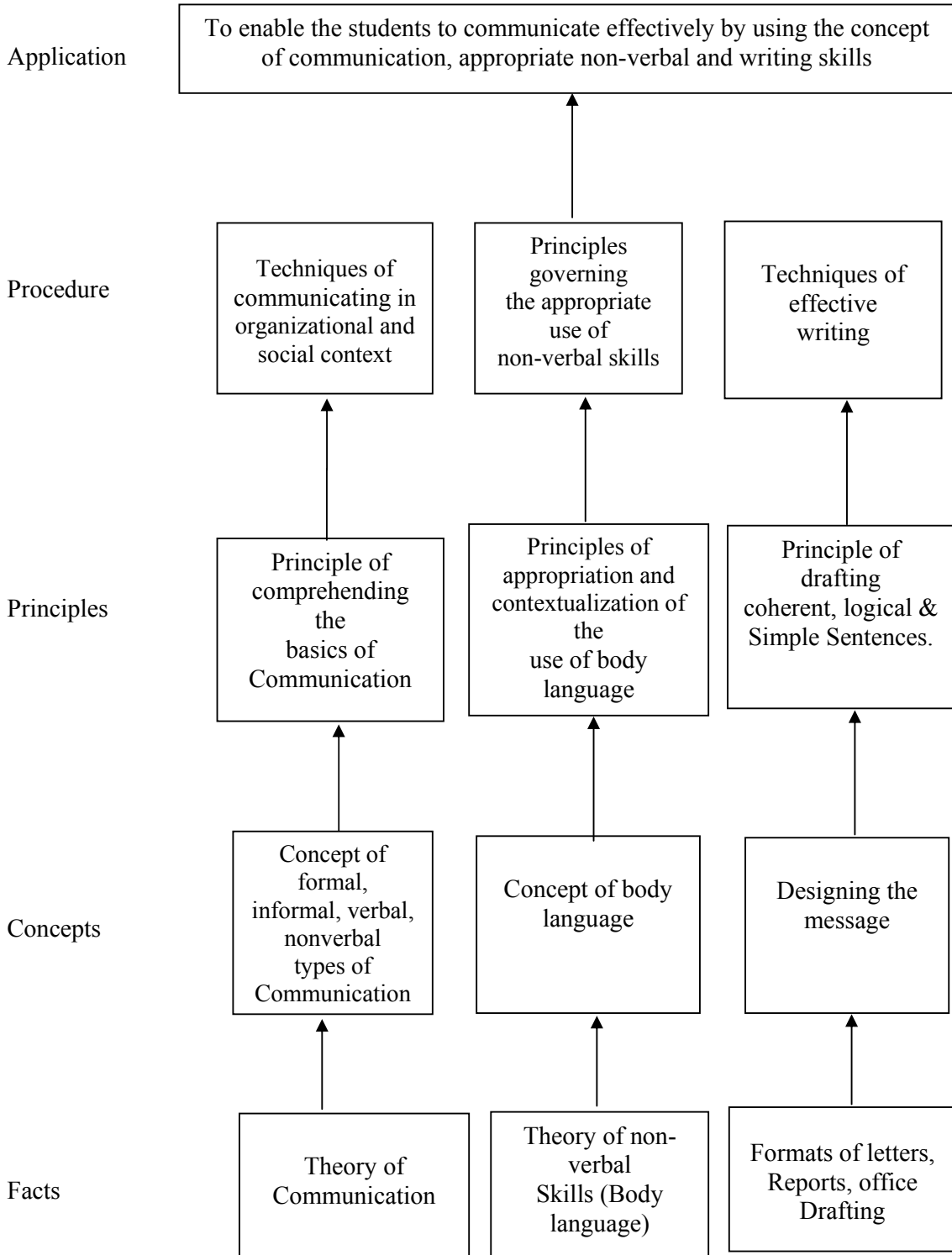
It will guide and direct to develop a good personality and improve communication skills.

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	08	28

• Haptics		
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 : 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

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.
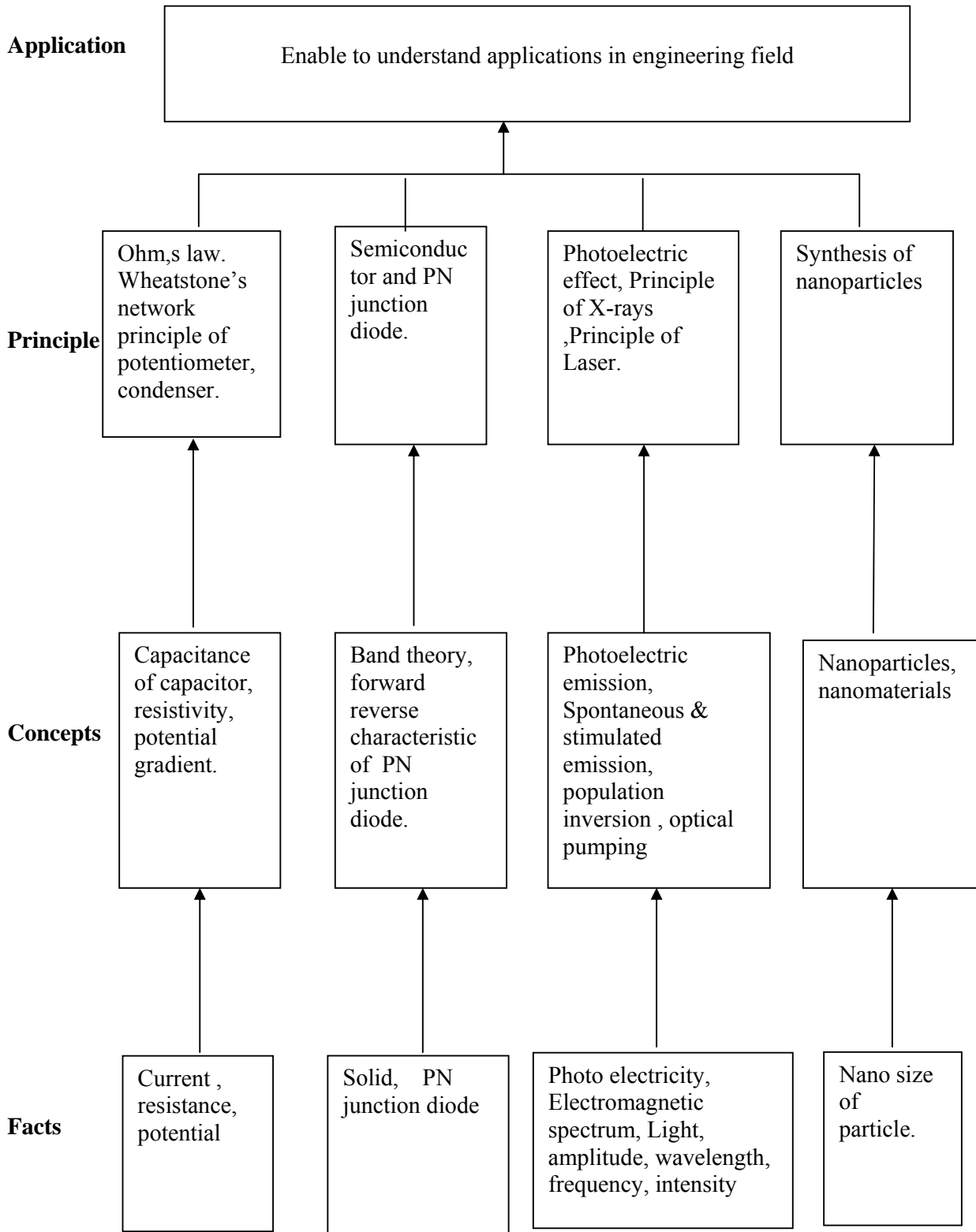
       Nanotechnology will invoke the students to understand the nanoparticles and carbon nanotubes. Power can be transmitted at low voltage levels. Nanosized components show unique properties which are different from larger semiconductor components. These devices have increased data storage capacities of hard 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, applications.
3.2 X-rays: **[06 Marks]**
   • Origin of X-rays, production of X-rays using Coolidge's X-ray tube,
	12	**18**

minimum wavelength of X-ray, properties of X-rays, applications of X- rays: engineering, medical and scientific. **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

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.
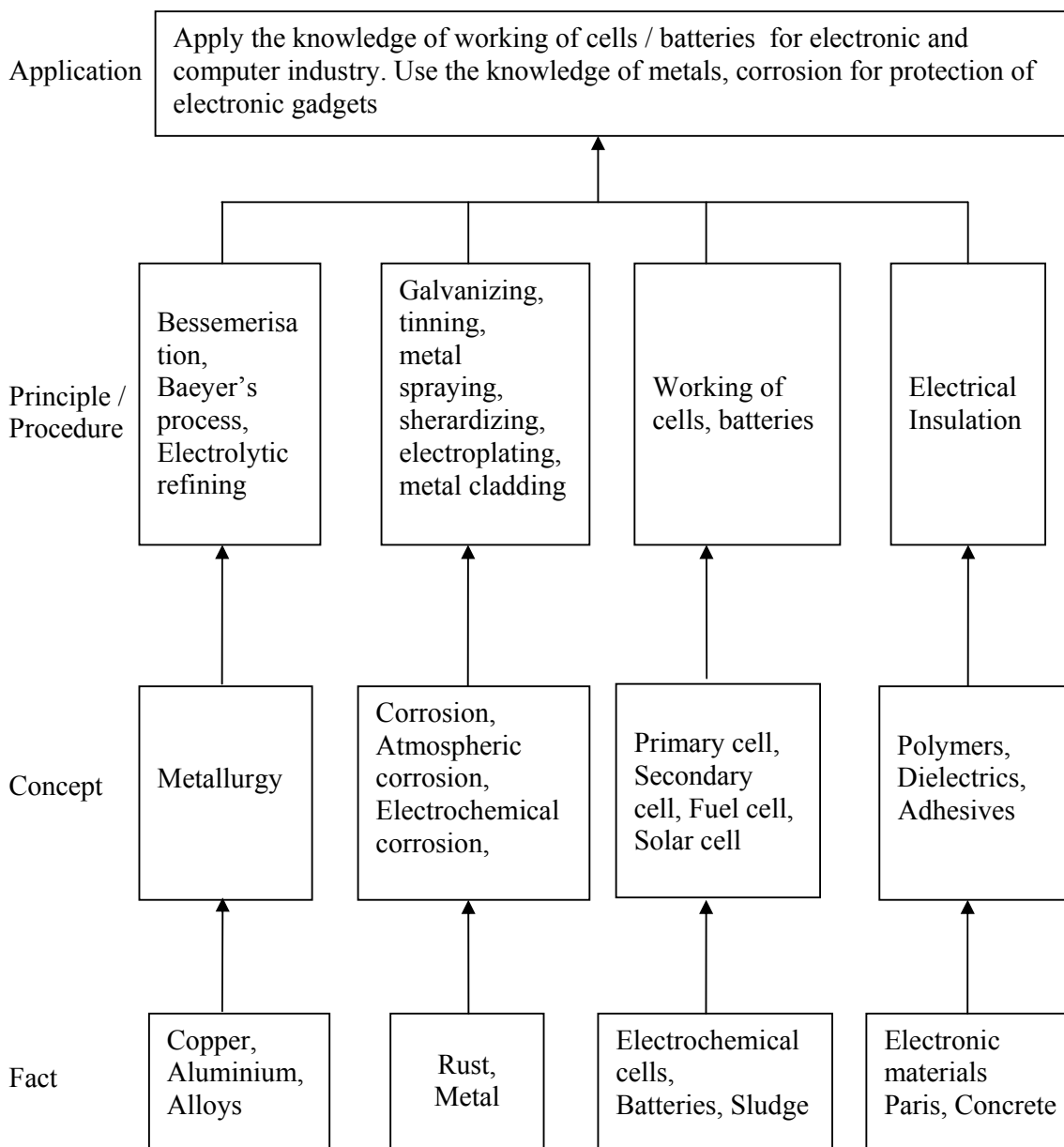
General Objectives:
The student will be able to
    1. Select proper type of cell based on the requirement in electronic and computer engineering.

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 : Electronics Engineering Group.

Course Code : DE/ED/EI/EJ/EN/ET/EV/EX/IC/IE/IS/IU/MU

Semester   : Second

Subject Title : Elements of Electronics

Subject Code : 17215

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	04	03	100	50 #	--	25@	175

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:

The world of Electronics has encompassed day to day life of every individual with its glorious development and advancement in the technologies. Elements of Electronics subject is the foundation for all Electronics Engineering courses.

It includes basic components used in Electronics Engineering. It also gives the conceptual part of active and passive components, diodes and its various types and applications.

DC circuit and network theory is included as a part of fundamental electrical theory required for analysis of electronics subject.

General Objectives: The students will be able to:

1) Identify types of components and understand construction, working principle, specifications and applications.
2) Realize the DC circuit applications by applying the fundamental electrical laws.
3) Apply various electrical theorems for different circuit which are the foundations for electronics subject.

Contents: Theory

Name of Topic and Contents	Hours	Marks
Topic 1) Passive Components **Specific Objectives :** Students will be able to • Differentiate active & Passive components by observation, specification & application • Use various passive components as per requirements and applications **1.1 Resistor:** (8) • Classifications of resistors, material used for resistor. General specification of resistor- maximum voltage rating, power rating, temp. coefficient, ohmic ranges, operating temperature • Classification and application of resistor • Colour coding: with three, four & five bands • LDR – Working, Characteristics & application • TDR- listing of its type. • Potentiometer : linear and logarithmic, constructional diagram, specifications, applications of carbon and wire wound resistor **1.2 Capacitor :** (6) • Classification of capacitor, dielectric materials used in capacitor • Capacitor specifications: working voltage, capacitive reactance, frequency characteristic • Fixed capacitor : specifications & applications • Electrolytic capacitor: constructional diagram & working • Variable capacitors: requirement of variable capacitor, construction, working, specification of air gang, PVC gang capacitor, trimmer capacitor • Coding of capacitors using numerals, colour band system **1.3 Inductor:** (6) • Introduction of magnetic materials- Ferromagnetic & ferrimagnetic. B-H curve, hard & soft magnetic material, concept of Hysterisis, permeability, corecivity, reluctivity & losses in magnetic material. • Faradays law of electromagnetic induction, self & mutual induced emf. • Induction – Definition & expression (with simple derivation) of self inductance, mutual inductance, coefficient of coupling, Q factor, inductive reactance. • Constructional diagram & application of Air core, iron core & ferrite core, inductor frequency range for- AF, RF, IF torodial inductor. • Working Principle of slug tuned inductor • Colour coding of Inductor.	16	20

Topic 2) Semiconductor Diodes **Specific Objectives :** • Draw symbol and constructional sketch of various types of semiconductor, optical diodes • List diodes for the various applications • Understand concepts of PN Junction diode, Zener diode, Special diodes, optical diodes with schematic symbols. **2.1 P.N. Junction Diodes** Working principle & circuit diagram of characteristic of PN junction diode, Static & dynamic resistance, specification, forward voltage drop, maximum forward current power dissipation. **2.2 Zener diode** Constructional diagram, symbol, circuit diagram and characteristics of Zener diode Specification: Zener voltage, power dissipation, dynamic resistance **2.3 Special Diodes** Construction, symbol & applications of PIN diode, Schottky diode, Tunnel diode **2.4 Optical diodes** Construction, symbol, operating principle & applications of LED, IRLED, Photodiode, Laser diode	16	24
Topic 3) Rectifiers and Filters: **Specific Objectives :** • Draw circuit of different types of rectifiers. • Compare different types of rectifiers with respect to their parameters and applications • Compare different types of filters **3.1 Rectifiers** • Need of rectifiers. Types of rectifiers: • HWR,FWR (bridge and centre tap) circuit operation I/O waveforms for voltage & current • Parameters of rectifier (without derivation) Average DC value of current & voltage, ripple factor, ripple frequency, PIV of diode, TUF, efficiency of rectifier • Comparison of three types of rectifiers **3.2 Filters** • Need of filters • Circuit diagrams, operation and input-output waveforms of following types of filters Shunt capacitor Series inductor LC filter π filter Numerical examples based on parameters of rectifiers	10	16

Topic 4) Wave shaping Circuit **Specific Objectives :** • Draw circuit of different types of wave shaping circuits • Compare different types of wave shaping circuits with respect to the parameters and applications **4.1 Linear wave shaping circuit** • Need of wave shaping circuits, comparison between linear and non-linear wave shaping circuits • Operations of wave shaping circuits • Linear circuits: RC Integrator & differentiator **4.2 Non linear wave shaping circuits** • Circuit diagram, operation, waveforms of different types of clippers using diodes: series, shunt, (biased and unbiased) • Circuit diagram, operation, waveforms of different types of clampers: positive and negative	08	16

Topic 5) DC circuits and Network Theorems
Specific Objectives :
• Able to use basic rules of electrical circuits with the view of solving problems on electrical circuits
• They will be able to use various theorems to determine unknown electrical quantities in the network
 	
5.1 Fundamental of DC circuit
• Review of ohms law
• Concept of open &short circuit
• Kirchhoff's current and voltage law
• Maxwell's loop current method
 	
5.2 Node analysis
• Concept of ideal & practical current and voltage sources source conversion
• Star/Delta & Delta /Star conversion(no derivations)
• Network terminology- active, Passive, linear, non linear bilateral, unilateral network
 	
  5.3 Network theorem: Statement, explanation & applications of following
• Super position theorem
• Thevenin's theorem
• Norton's theorem
• Maximum power transfer theorem
  Numerical examples on above topic.
	14	24

Total	**64**	**100**

Practical:
Skills to be developed:

Intellectual Skills:
- Identify various components and find their values.
- Interpret characteristics of various devices and components.
- Verification of network theorems.

Motor Skills:
- Plot the characteristics of electronic devices and circuits.
- Testing of electronic devices and components.

List of Practicals:
1) Compute values of resistors by multimeter and colour coding
2) Verify the performance of LDR and to draw its characteristics
3) Draw the characteristics of linear and logarithm potentiometer.
4) Identify & test fixed and variable capacitors.
5) Identify & test inductors 5 inductor of different types.
6) Identify & test IC's (analog & digital)
7) Plot V-I characteristics of P-N junction diode and find static and dynamic resistance
8) Plot V-I characteristics of Zener diode and find the breakdown voltage of Zener diode
9) Plot V-I characteristics of Tunnel diode
10) Plot the characteristics of photo diode
11) Draw the waveforms of a) H.W.R. b) F.W.R. from C.R.O.
12) Draw o/p wave forms of capacitor and inductor fitter using bridge rectifier.
13) Plot frequency response of RC integrator and differentiator circuits.
14) Draw outputs for positive, negative and combinational clippers from C.R.O.
15) Draw the outputs waveforms of positive and negative clampers from C.R.O.
16) Verify the Superposition theorem for DC circuit.
17) Verify Thevenins theorem.
18) Verify Norton's theorem.
19) Plot graph of power dissipation for different value of resistors and to find out the maximum power dissipation.
20) Find out the current through known resistors by Maxwell's loop current method and verify it practically.

Learning Resources:
1. Books:

Sr. No.	Title	Author	Publisher
01	Electronics Device & Circuit Theory	Robert L. Boylestead Louis Neshelsky	Pearson
02	Basic Electronics & Linear Circuit	N.N.Bhargava S.C. Gupta	Tata McGraw Hill
03	Electrical Technology	B.L. Thereja	S.Chand
04	Electronics Device & Circuit	David J. Bell	Oxford

2. Websites
   www.nptel.com

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/CW/PG/PT/AE/

CV/MH/FE/CD/ED/EI

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	

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	**58**

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/EX/IC/IE/IS/

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

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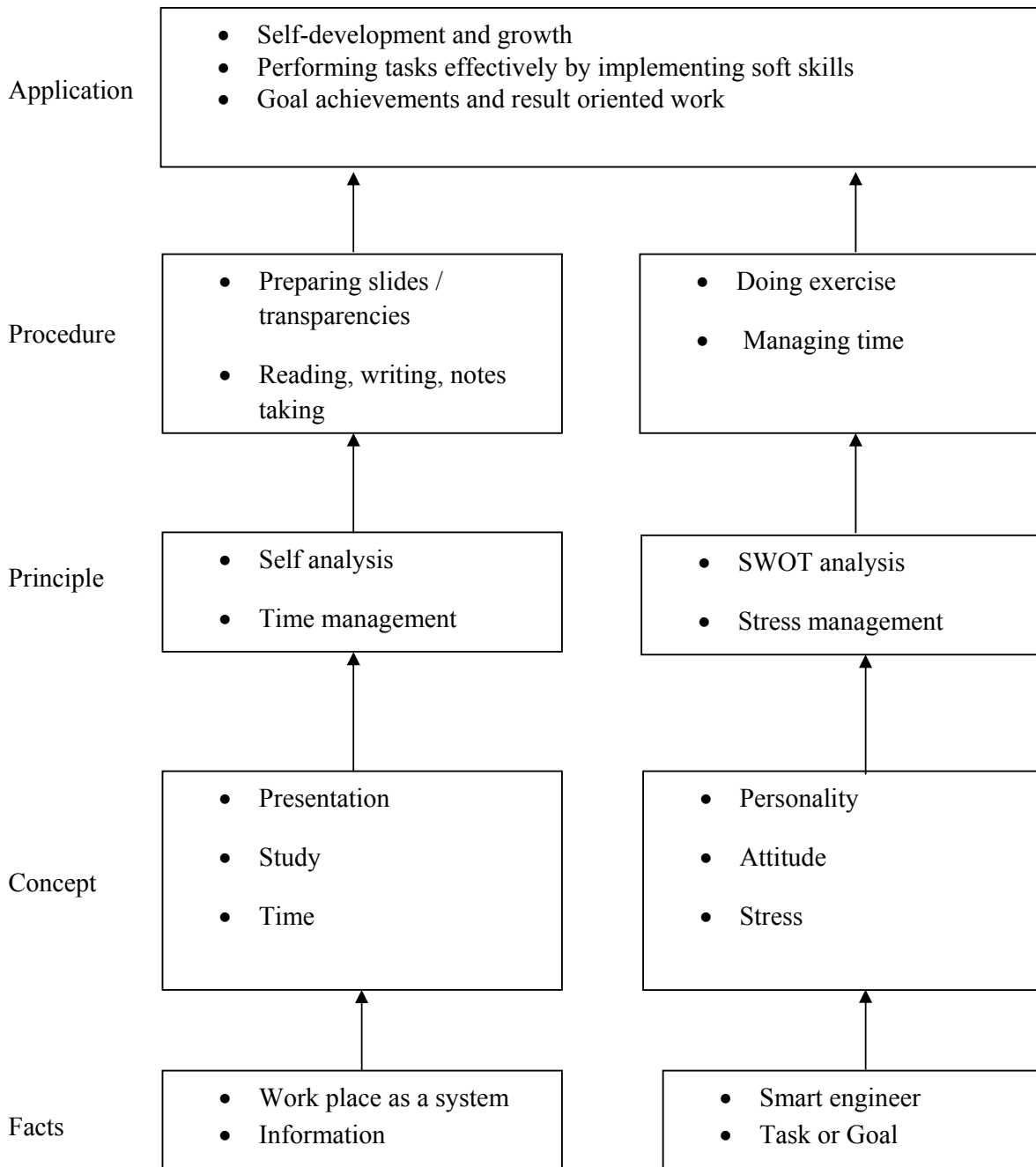
This subject aims to provide insights into various facets of developing ones personality in terms of capabilities, strengths, weakness, etc as well as to improve reading, listening and presentation skills. Also in this age fierce competition, the time and stress management techniques will immensely help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

Course Name : Electronics Engineering Group

Course Code : DE/ED/EI/EJ/EN/ET/EV/EX/IC/IE/IS/IU/MU

Semester   : Second

Subject Title : Electronic Workshop

Subject Code : 17014

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	04	--	--	--	--	25 @	25

Rationale:

Today electronics permeates all walks of life. Every electronics instruments/equipment needs a PCB as a major component. This subject helps to understand the basic skills and sequence to produce electronics instruments.

Electronics workshop –I is pre-requisite for electronics workshop-II.

This subject is important as it provides the knowledge of fabrication, construction, working, testing of PCB.
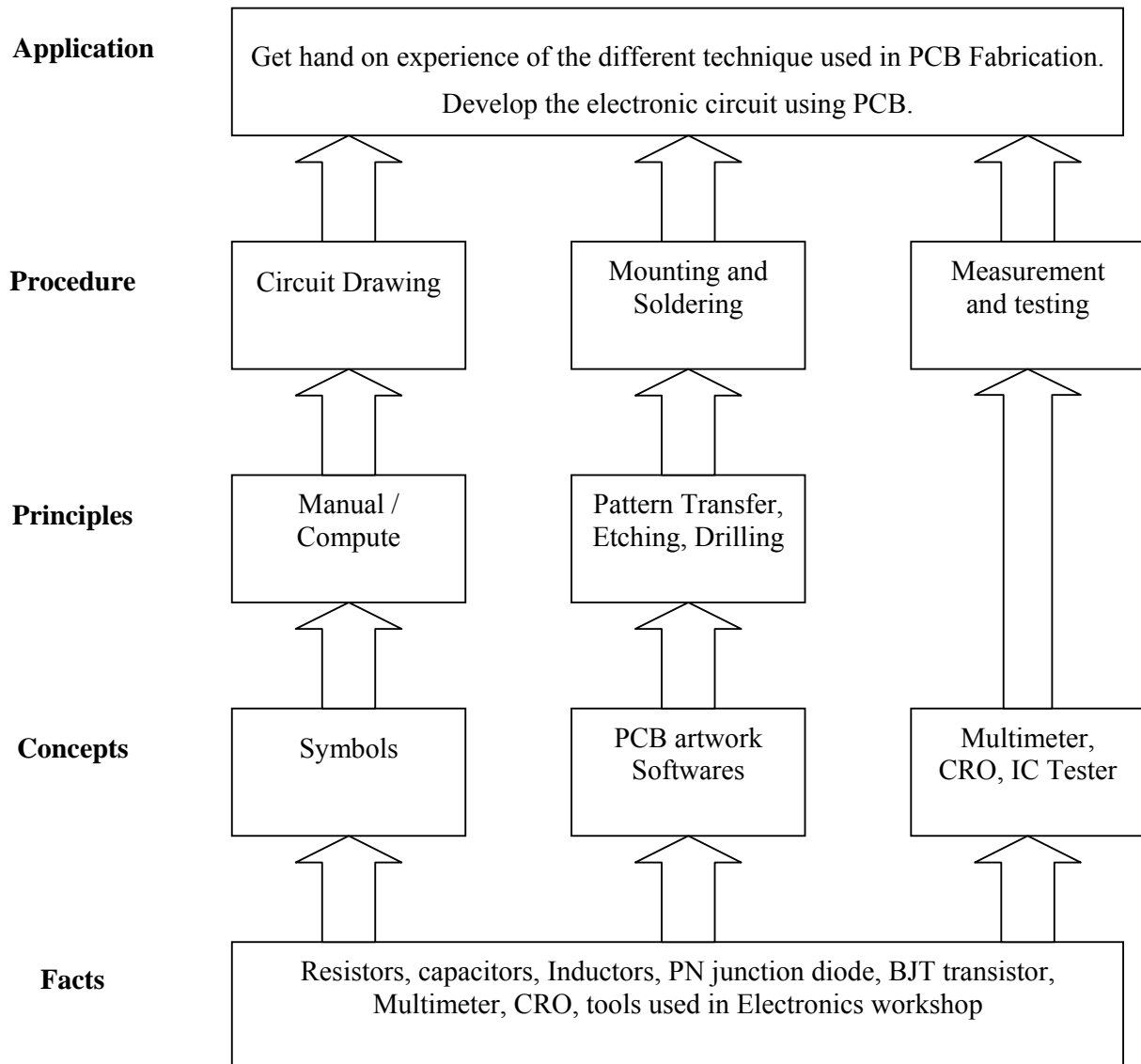
This subject is helpful for students for developing electronics projects. The subject gives basic skills of assembling, testing, and troubleshooting of PCB as well as electronics circuits.

General Objectives:

After studying this subject student will be able to:

1. Read and interpret Circuit diagrams, Data sheets of components

2. Improvement / Increases hands on skills by

     i.   Testing the circuit using software and bread board

     ii. Drawing the circuit diagram and its PCB using software

     iii. Troubleshooting of the electronic circuits.

3. Analysis technique, testing and assembly of electronic circuit, build the skills to develop and test electronic circuits.

Learning Structure:

Application

Get hand on experience of the different technique used in PCB Fabrication.
Develop the electronic circuit using PCB.

Procedure

| Circuit Drawing | Mounting and Soldering | Measurement and testing |

Principles

| Manual / Compute | Pattern Transfer, Etching, Drilling | |

Concepts

| Symbols | PCB artwork Softwares | Multimeter, CRO, IC Tester |

Facts

Resistors, capacitors, Inductors, PN junction diode, BJT transistor, Multimeter, CRO, tools used in Electronics workshop

Contents: Practical

Sr. No.	Contents	Skills to be Developed	Hours
JOB 1: Identify the controls of electronic equipments, test electronic components and observe the waveforms			
Activity 1	Identify the controls of the Electronic Lab. Equipments (Analog Multimeter, Digital Multimeter, CRO, &Function Generator)	Identification and testing of different instruments for measuring various parameters.	**20 Hrs**
Activity 2	Measure AC & DC Voltage & Current and Resistor using Digital and Analog Multimeter		
Activity 3	Test Resistor Capacitors, Inductors and Diodes using CRO		
Activity 4	Identify the Square wave, Triangular wave and Sine wave generated by Function Generator and measure their Amplitude and Frequency		
JOB 2: Draw circuit diagram of single regulated power supply, test it on breadboard and general purpose PCB			
Activity 1	Draw circuit diagram of simple single and Dual regulated power supply using 78XX & 79XX regulators.	Drawing Circuit Diagram. Use of bread board and general purpose PCB. Identify the faults.	**12 Hrs**
Activity 2	Test single regulated power supply using 78XX on Bread Board.		
Activity 3	Test single regulated power supply using 78XX on general purpose PCB.		
JOB 3: Prepare Circuit Diagram & PCB LAYOUT for Simple Dual regulated power supply using software on PC			
Activity 1	Identify the features of Electronic Circuit drawing software like Express SCH. Draw circuit diagram of simple Dual regulated power supply and single stage BJT amplifier using Express SCH	Use of electronic software for circuit & PCB art work drawing.	**16 Hrs**
Activity 2	Identify the feature of Electronic PCB LAYOUT drawing software like Express PCB. Write PCB artwork rules. And prepare PCB LAYOUT for Simple Dual regulated power supply using Express PCB software.		
Job 4 : Build and test Simple Dual regulated power supply on PCB			
Activity 1	Fabricate the PCB by pattern transfer, etching, cleaning and drilling	Fabrication of PCB, pattern transfer techniques, etching, drilling. Hands on skills for soldering & Troubleshooting of PCB	**16 Hrs**
Activity 2	Mount & solder the components on PCB And Testing of soldered PCB for continuity, dry soldering and output		
JOB 5: Visit the PCB Manufacturing Industry and write the report on it			

Note: 1. All Jobs and activities are compulsory

        2. Industrial visit is compulsory. Prepare Visit Report.

Learning Resource

Sr. No	Content / Software / Books	Source	Remark
01	Printed Circuit Boards	Author - Walter C. Bosshart	Publisher:- Tata McGraw Hill
02	Troubleshooting Electronic Equipment	Author – R.S.Khandpur	Publisher:- Tata McGraw Hill
03	Express PCB	http://www.expresspcb.com/ExpressPCBHtm/Download.htm	Freeware
04	Express PCB, EAGLE, Free PCB, PCB123,	http://www.electronics-lab.com/downloads/pcb/index.html	Freeware
05	Press & Peel Pattern Transfer Technique	http://www.techniks.com/how_to.htm	Freeware
06	Video Clip for PCB Manufacturing	http://www.youtube.com/watch?v=CiduYvjVq70	Freeware
07	Video Clip for PCB Manufacturing	http://www.youtube.com/watch?v=8-WGaAmpfOU	Freeware
08	User Manuals of instruments	Manufacturer of Instruments	Freeware