MAHARASHTRA STATE BOARD OF TECHNICAL EDUCATION, MUMBAI

TEACHING AND EXAMINATION SCHEME FOR POST S.S.C. DIPLOMA COURSES

COURSE NAME : ELECTRONICS AND VIDEO ENGINEERING

COURSE CODE : EV

DURATION OF COURSE : 6 SEMESTERS **WITH EFFECT FROM 2012-13**

SEMESTER : THIRD **DURATION : 16 WEEKS**

FULL TIME / PART TIME : FULL TIME **SCHEME : G**

SR. NO.	SUBJECT TITLE	Abbre viation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									SW (17300)
							PAPER HRS.	TH (1)		PR (4)		OR (8)		TW (9)		
				TH	TU	PR		Max	Min	Max	Min	Max	Min	Max	Min	
1	Applied Mathematics $	AMS	17301	03	--	--	03	100	40	--	--	--	--	--	--	50
2	Fundamentals of Communication	FOC	17316	03	--	02	03	100	40	25#	10	--	--	25@	10	
3	Electrical Engineering β	EEN	17318	03	--	02	03	100	40	--	--	--	--	25@	10	
4	Electronics Devices and Circuits β	EDC	17319	04	--	04	03	100	40	25#	10	--	--	25@	10	
5	Principles of Digital Techniques β	PDT	17320	03	--	02	03	100	40	25#	10	--	--	25@	10	
6	Programming in C β	PIC	17020	01	--	02	--	--	--	--	--	--	--	25@	10	
7	Professional Practices-I β	PPO	17021	--	--	03	--	--	--	--	--	--	--	50@	20	
			Total	**17**	**--**	**15**	**--**	**500**	**--**	**75**	**--**	**--**	**--**	**175**	**--**	**50**

Student Contact Hours Per Week: **32 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 800**

@ - Internal Assessment, # - External Assessment, [ ] No Theory Examination, $ - Common to all branches, β - Common to EJ/EN/ET/EX/IS/ IC/DE/IE/MU/IU/ED/EI

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.

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

Semester : Third

Subject Title : Applied Mathematics

Subject Code : 17301

Teaching and Examination Scheme:

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

Applied mathematics is designed for its applications in engineering and technology. It includes the topics integration, differential equation, probability distribution. The connection between applied mathematics and its applications in real life can be understood and appreciated.

Derivatives are useful to find slope of the curve, maxima and minima of function, radius of curvature. Integral calculus helps in finding the area. In analog to digital converter and modulation system integration is important. Differential equation is used in finding curve. Probability is used in Metrology and quality control.

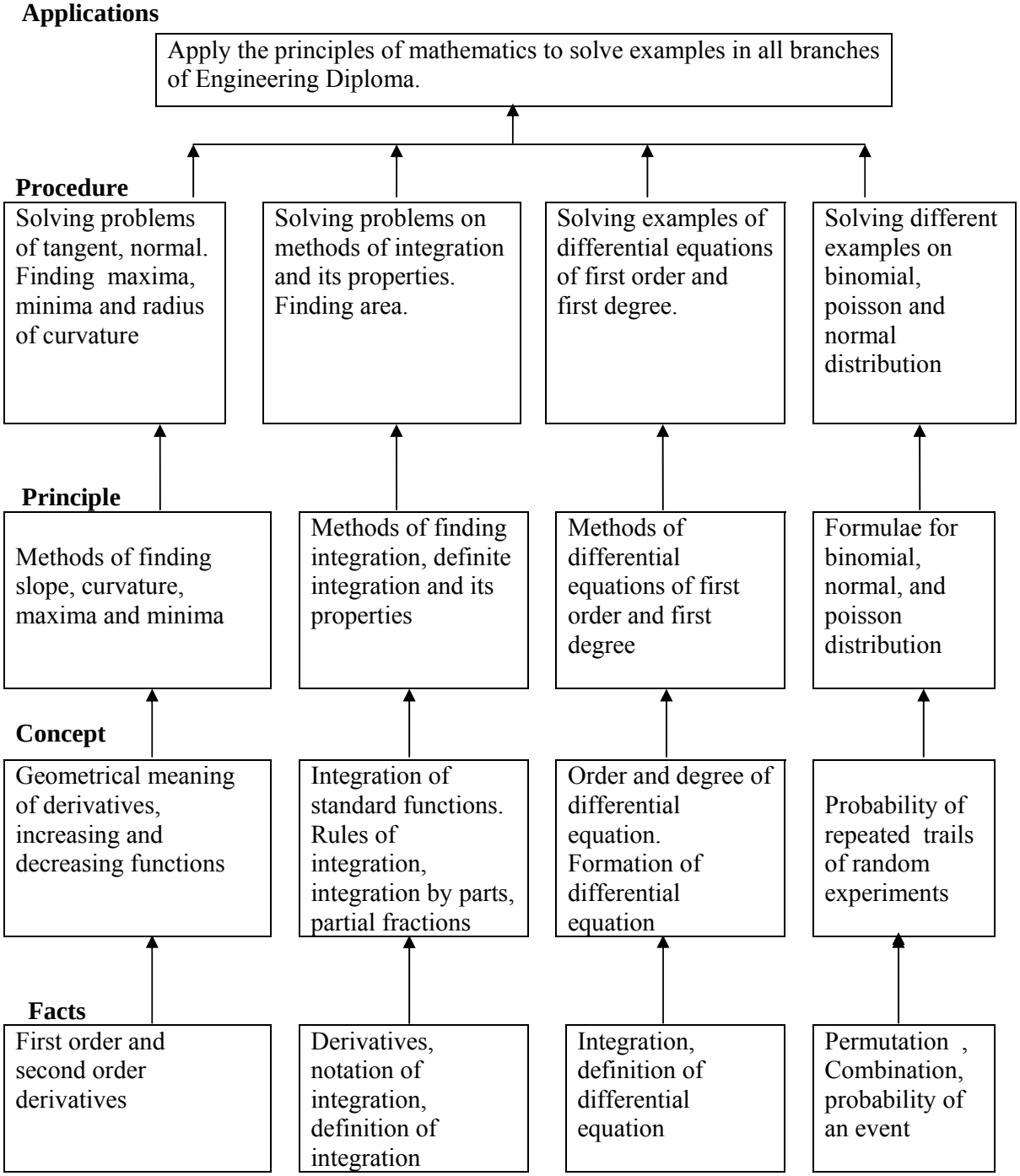
The fundamentals of this topic are directly useful in understanding engineering applications in various fields.

General Objectives:

Students will be able to:

1. Apply derivatives to find slope, maxima, minima and radius of curvature.
2. Apply integral calculus to solve different engineering problems.
3. Apply the concept of integration for finding area.
4. Apply differential equation for solving problems in different engineering fields.
5. Apply the knowledge of probability to solve the examples related to the production process.

Learning Structure:



Theory:

Topic and Contents	Hours	Marks
Topic-1 Applications of Derivative **Specific objectives :** ➢ Find slope, curvature, maximum and minimum value of functions related to different engineering applications. • Examples for finding slope , equations of tangent and normal to the curve • Maxima and minima. • Radius of curvature.	06	16
Topic-2 Integral Calculus		
2.1 Integration ---------- 20 **Specific objectives :** ➢ Integrate function using different method. • Definition of integration as anti derivative, rules of integration. • Integration of standard functions • Methods of integration Integration by substitution. Integration by partial fractions. Integration by parts and generalized rule by parts.	14	44
2.2 Definite Integrals ---------- 16 **Specific objectives :** ➢ Solve problems on definite integrals using the properties. • Definite integral- Definition, examples. • Properties of definite integrals without proof and simple examples.	08	
2.3 Application of Definite Integrals ----------08 **Specific objectives :** ➢ Find area. 1. Area under a curve. 2. Area between two curves.	04	
Topic 3 - Differential Equation.		
3.1 Differential equation **Specific objectives :** ➢ Solve the differential equation of first order and first degree ➢ Solve different engineering problems using differential equation • Differential equation- Definition, order and degree of a differential equation. Formation of differential equation containing single constant. • Solution of differential equation of first order and first degree for following types Variable separable form, Equation reducible to variable separable form. Linear differential equation. Homogeneous differential equation. Exact differential equation.	10	20

Topic 4 - Probability		
4.1 Probability **Specific objectives : ---------- 08** ➢ Solve different engineering problems related to probability process. • Definition of random experiment, sample space, event, occurrence of event and types of event (impossible, mutually exclusive, exhaustive, equally likely) • Definition of probability, addition and multiplication theorems of probability.	02	20
4.2 Probability Distribution ---------- 12 • Binomial distribution • Poisson's Distribution • Normal distribution	04	
Total	**48**	**100**

Learning Resources:

1) Books:

Sr. No	Title	Authors	Publication
1	Mathematic for Polytechnic	S. P. Deshpande	Pune Vidyarthi Girha Prakashan' Pune
2	Calculus : Single Variable	Robert. T. Smith	Tata McGraw Hill
3	Higher Engineering mathematics	B. V Ramana	Tata McGraw Hill
4	Higher Engineering mathematics	H. K. Dass	S .Chand Publication
5	Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Delhi
6	Applied Mathematics	P. N. Wartikar	Pune Vidyarthi Griha Prakashan, pune

2) Websites :

i) www.khan academy

Course Name : Diploma in Electronics and Video Engineering

Course Code : EV

Semester : Third

Subject Title : Fundamentals of Communication

Subject Code : 17316

Teaching and Examination Scheme:

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

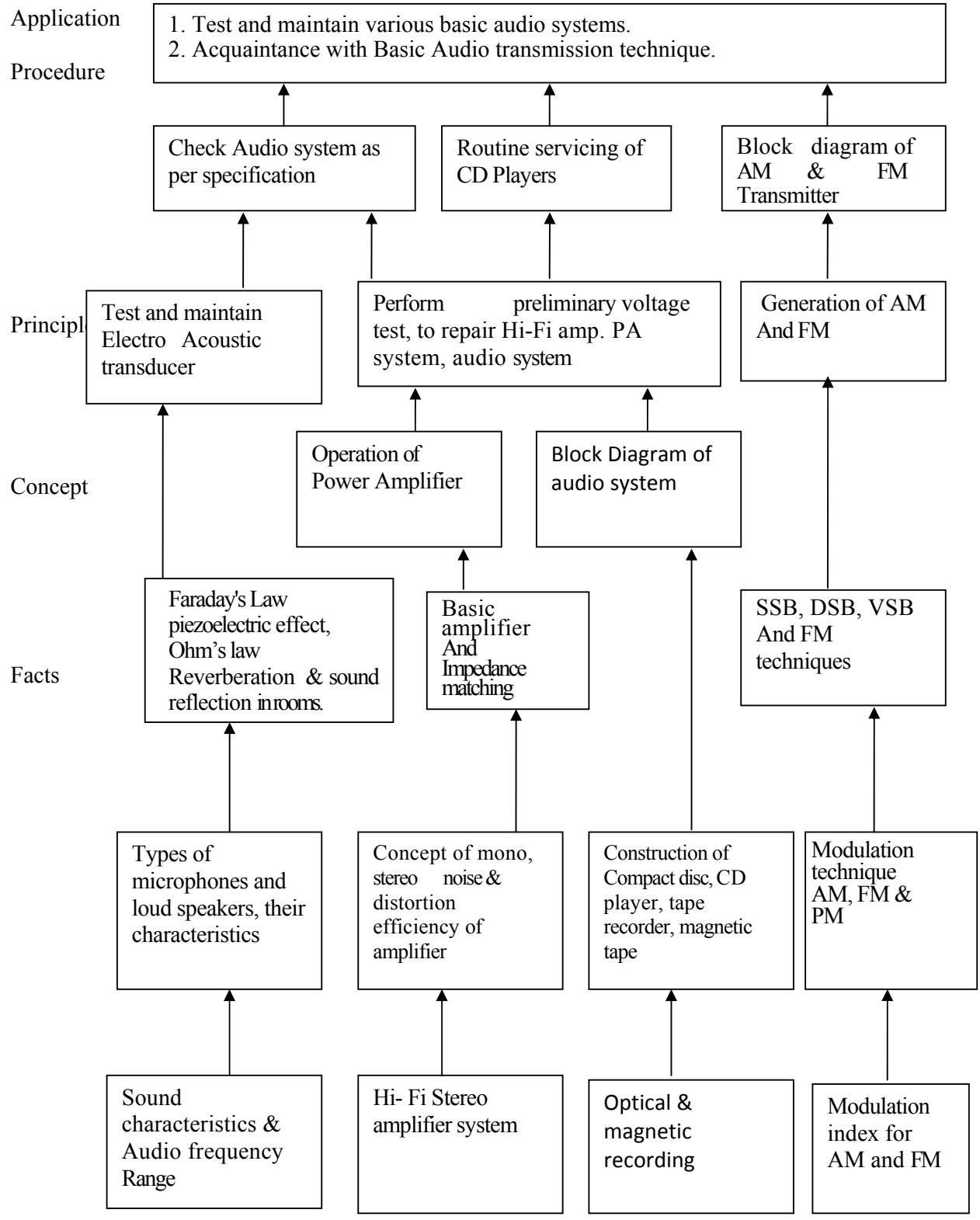
Knowledge of various electronic component and devices is prerequisite .This subject forms the foundation of audio communication technique. Students will learn various audio systems.
In the topic sound and electro Acoustics, student will understand the operation of loud speakers and microphones which are used in many audio and video communication systems.
The topic on Hi-Fi amplifiers is useful to understand the concept of hi fidelity and graphics equalizer. This concept is used in all modern audio video systems.
The topic on PA system will give idea to the students about how to install a PA system as per user's requirements.
The topic on audio players is useful in knowing the structure and working of CD player and noise reduction techniques. The concept will help the students in understanding VCD players in higher semester. The noise reduction technique is used in most of the advanced audio/video systems.
The topic Amplitude and Frequency modulation are important as it forms the foundation of all analog telecommunication systems. Thus the subject is very important as it forms the basis of telecommunications systems.

General Objectives.

Students will able to.

- Understand structure, construction and operation of various electro Acoustic transducers.
- Understand constructional details of audio system and operation of hi-fi systems, PA systems and audio CD players.
- Get fundamental knowledge of maintaining & troubleshooting different audio systems such as hi-fi systems, PA systems, CD players etc.
- Understand generation, modulation and transmission of audio signals.

Learning Structure:



Theory:

Topics and Contents	Hours	Marks
Topic 1. Sound & Electro Acoustics. **Specific Objectives:** ➢ Define & Describe Acoustic Reverberation ➢ Identify, describe construction and operation of different types of microphones, loudspeakers and baffles. ➢ Application of various microphones and L.S. in various audio systems. **Contents:** **1.1.** Nature of sound & its Parameters [08] • Amplitude, frequency & wavelength • Pressure and intensity of sound waves • Human ear response to audio frequencies • Audibility range • Overtones & timbre, pitch • Concept and necessity of Reverberation • Characteristics of Microphones • Selection criterion of microphones • Construction working principle, characteristics of Moving coil microphones, ribbon microphones, condenses microphones, electric microphone • Concept and application of Special microphones : Lavalier microphones, Tie-Clip microphones, Radio (wireless microphones) Noise cancelling microphones, Shotguns type microphones , fiber optical microphones, Digital interface microphones **1.2.** Loudspeakers [08] Construction working principle, characteristics and applications of: • Moving coil cone type , Electro dynamic , horn type loudspeakers • Types of Baffles • Multi way speaker system (woofer, Tweeters and Squawker.) • cross over network its need circuit diagram and operation of (2 way & 3 way speaker system)	10	16
Topic 2. Hi-Fi Audio Amplifiers **Specific Objectives:** ➢ List various voltage & power amplifiers. ➢ Describe operation of Hi-Fi amplifier , graphic equalizer and its controls using well labeled diagram. **Contents:** 2.1 Audio Amplifier [12] • Types and characteristics of audio amplifier • Class A voltage pre amplifier • Power amplifiers : Single-transistor, push pull amplifier and complementary symmetry push pull amplifier • Block diagram of Hi-Fi system and its application amplifier circuits • Causes affecting fidelity & their remedies • Concept of stereophony, difference between monophony & stereophony 2.2 Audio Amplifier Control [06] • Circuit diagram and operation of Microphones gain control, volume control, tone controls, (Bass & treble)	08	18

• Circuit diagram and operation of: Stereo controls, Balance control, loudness control, master gain control & blend control. • Concept of parametric & Graphic equalizer		
Topic 3. Public Address Systems **Specific Objectives:** ➢ Explain operation and panel controls of PA system ➢ Application of PA system as per requirement **Contents:** • Need and use of Public Address Systems • Specification of Public Address Systems • Block diagram of Public Address Systems and its operation • Typical Public Address installation planning for public meeting, auditorium, debating chambers and open air etc.	06	12
Topic 4. Audio Recording Players **Specific Objectives:** ➢ Describe structure, manufacturing process of compact disk ➢ Describe various controls used in CD player ➢ Describe noise reduction techniques **Contents:** **Magnetic and Optical Recording** • Principle of magnetic recording. • Optical recording • Types of optical recording of sound • Method of optical recording of sound on film: variable density method, variable area method. • Reproduction of sound from film • Compact Disc • Preparation of compact disc • Concept, block diagram and operation of optical recording on compact disc • Playback process • Block diagram of detection circuit • Advantages and disadvantages of compact disc **Noise reduction techniques** • Pre emphasis and De emphasis • Dolby A system • Dolby B system	10	16

Topic 5. Amplitude Modulation **Specific Objectives:** ➢ List different type of modulation ➢ Define AM, modulation index, draw and describe working of different types of AM modulators. ➢ Draw block diagram of AM transmitter and explain its working **Contents:** 5.1 Elements of Communication Systems. **[08]** • Bock diagram of communication system. • Need for modulation. • Types of modulation. • Definition of AM and modulation index. • Mathematical Representation. • Representation of AM wave in frequency & time domain. • Bandwidth of AM wave. • Power relation in AM. • Numerical based on modulation index and power relation • Representation double sideband suppressed carrier wave in frequency domain & time domain. • Representation of single side band wave in frequency domain & time domain. 5.2 AM signal generation and transmission **[12]** • Transistorized AM Modulator • Generation of DSBSC AM signal using diode balanced modulator • Generation of SSB AM signal using phase shift and third method • Concept of vestigial side band • Block diagram of AM transmitter and its operation	08	20
Topic 6. Frequency Modulation **Specific Objectives:** ➢ Define Frequency Modulation draw block diagram of Frequency Modulation and explain its operation ➢ Draw block diagram FM transmitter and explain its working **Contents:** **Concept of Frequency Modulation** • Definition of frequency modulation, mathematical representation of FM modulation index, numerical based on modulation index, frequency spectrum of the FM wave • Comparison of AM & FM **Generation of Frequency Modulation** • Generation of FM wave using varactor diode modulator and reactance modulator. • Block diagram of Armstrong frequency modulator system and its operation. • Block diagram of FM transmitters and its operators • Definition of phase modulation and its modulation index	06	18
Total	**48**	**100**

Practical:
Skills to be developed:

Intellectual skills:

- Proper selection of measuring instruments on the basis of range, least count, precision and accuracy required for measurement.
- To measure electrical parameter in given circuit.
- To read and interpret the graph.
- To interpret the results from observations and calculations.
- To use these results for parallel problems.

Motor skills:

- Proper handling of instruments.
- Measuring electrical parameter accurately.
- To list the observations in proper tabular form.
- To adopt proper procedure while performing the experiment.

List of Practicals:

1. To measure level of sound and audibility range.
2. To plot graph of impedance verses frequency of loud speaker.
3. To plot frequency response of cross over network.
4. To trace circuit of different types of power amplifiers and measure voltages at different points.
5. To observe main components in PA systems and draw the layout of PA system
6. To trace circuit of given Hi-Fi audio amplifier and rectify fault in Hi-Fi system in given stages: power supply unit, left channel and right channel.
7. To Plot frequency response of graphic equalizer.
8. To find and rectify fault in a PA system: - amplifier stage, volume control, driver / output transformer.
9. To observe drive mechanism and to draw layout of CD player and rectify fault in CD players.
10. To generate amplitude modulated signal, observe waveforms, calculate modulation index and observe effect of variation in modulation index w.r.t change in input voltage.
11. To observe and draw nature of waveform at different stages in FM transmitter.

List of Assignments:

1. List specifications for following microphone: moving coil, wireless and Digital interface microphone.
2. List specifications for following loudspeaker : moving coil cone type, Horn
3. Give specification for installation of Public Addressing System in Auditorium and on ground with respect to number of channels, mikes, speakers and amplifiers used.

4. For installation of Dolby system in a closed theater state specification with respect to types of mikes, speakers, inputs and amplifiers used.
5. Solve at least three numerical based on Amplitude Modulation based on bandwidth, modulation index and power relation.
6. Solve at least three numerical based on Frequency Modulation based on bandwidth, modulation index.

List of Equipments:

- CRO, Signal generator, Digital multi meter
- Trainer kits: Sound level measurement , Audibility range measurement, Crossover network, AM generator and FM transmitter
- Circuit boards of Single ended amplifier, Transformer coupled amplifier, Complementary symmetry amplifier, Graphic equalizer.
- Hi-Fi audio amplifier system, P.A. System, CD player.

Learning Resources:

1. **Books:**

Sr. No.	Title	Author	Publisher
1	Audio and video systems principals, maintenance and troubleshooting (2nd addition)	R.G Gupta	Tata McGraw Hill
2	Electronics communication systems	Gorge Kennedy (5th edition)	Tata McGraw Hill
3	Analog Communication	V.Chandra.Sekar	Oxford University Press
3	Basic Radio and Television	S.P Sharma	Tata McGraw Hill
4	Modern CD player servicing Manual	Lotia	P B Publication
5	Electronic communication system	Wayne Tomasi	Pearson

2. **Websites**
   1. www. physics.umd.edu/lecdem/mix/phy102/pH102chap07
   2. www. ece.umd.edu/~dilli/education/fiepresver3.ppt
   3. http://en.wikipidia.org/wiki/public-address

3. **Strategy for implementation:**
   - Visit to Auditorium should be organized so that students will be able to understand the installation of sound system w.r.t placement of mikes& loud speakers used, distance between them and their orientation**.**
   - Visit to sound recording studio is helpful for better understanding of the subject.
   - Students should be taken to a place where P.A. system is installed

Course Name : Electronics Engineering Group.

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

Semester : Third

Subject Title : Electrical Engineering

Subject Code : 17318

Teaching and Examination Scheme

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

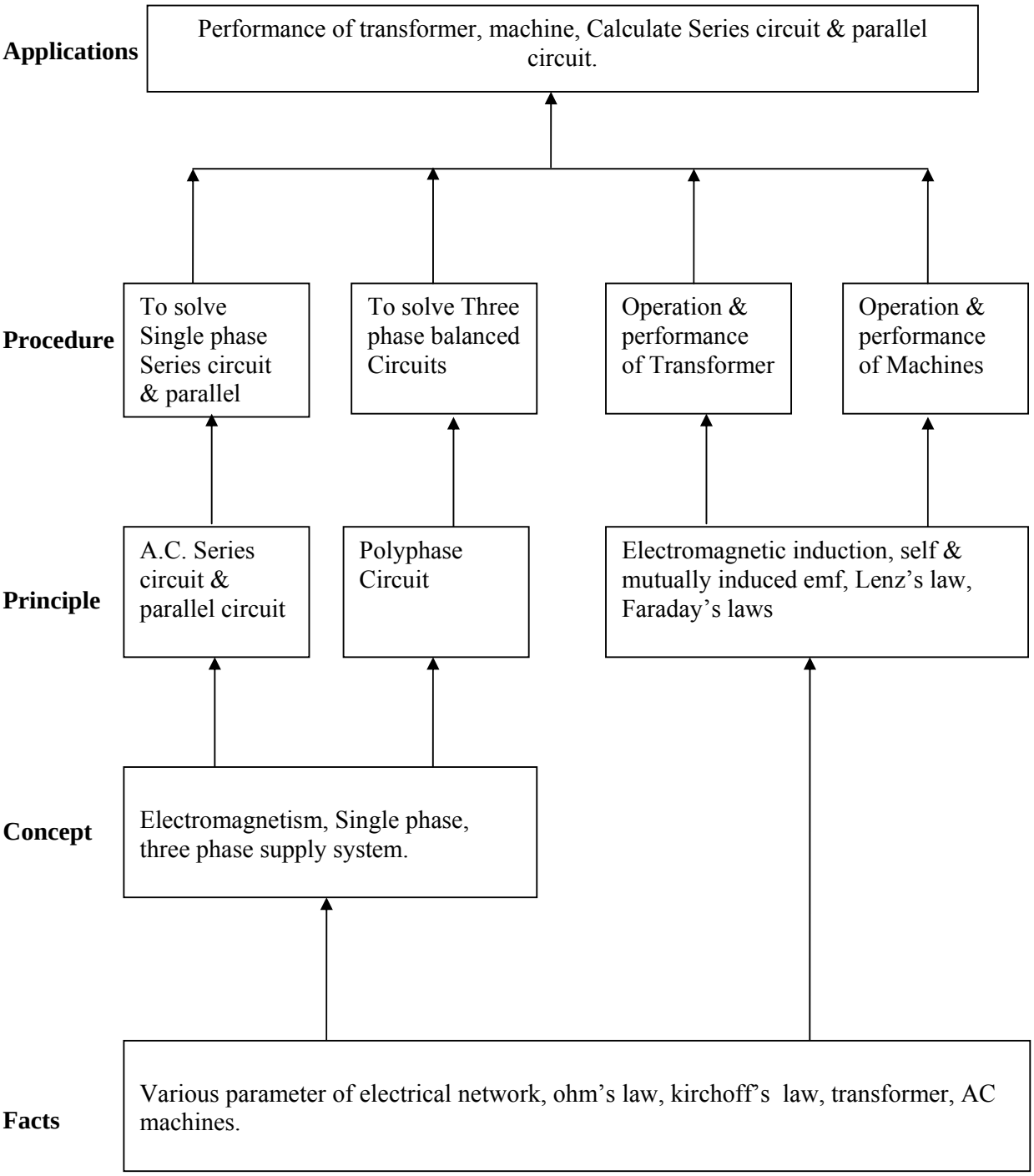
The basic concepts of electrical engineering are covered in the subject Elements of Electronics Engineering in the second semester. Electrical Engineering subject is designed for second year diploma course in Electronics Engineering group. The subject covers analysis of ac networks, working principles and characteristics of various drives. The subject includes various safety rules, methods and equipments used for system and operation. The basic concepts studied in this subject will be very useful for understanding of Power electronics and electronic drives of electronics course.

Objectives:

The students will be able to

1. Understand single phase and three phase AC circuits.
2. Realize concept of electromagnetic induction and apply it to static and rotating machines.
3. Understand characteristics of rotating machines.
4. Know the importance of safety and various safety methods in electrical engineering**.**

Learning Structure:



Content Theory:

Topic	Hours	Marks
Topic 1: AC Fundamentals **Specific Objectives :** ➢ **Compare AC and DC system.** ➢ **Meaning of various terms related to AC system.** ➢ **Distinguish Various AC circuits and Understand rules and procedure to draw vector diagrams for the same.** ➢ **To realize concept of various resonance parameters and plot the graph.** **Contents :** • Difference between A.C. and D.C. quantity • Advantages of A.C. over D.C. • waveform of sinusoidal A.C. cycle • Generation of single phase A.C. by elementary alternator • Definitions: instantaneous value, cycle, amplitude, time period, frequency, angular frequency, R.M.S. value, Average value for sinusoidal waveform, Form factor, Peak factor (no derivation , simple numerical on it) • Phasor representation of sinusoidal A.C. quantity, review of phasor algebra, representation of A.C. quantity in rectangular. • Phase angle, phase difference, concept of lagging and leading by waveforms, mathematical equations and phasors. • Pure resistance, inductance and capacitance in A.C. circuit – waveforms, equations and phasor diagram (no derivation) • Concept of impedance and impedance triangle. • Power – active, reactive and apparent, power triangle. • Power factor and its significance. • R-L, R-C and R-L-C series circuit – phasor diagram, voltage and current equations. • Simple numerical on R-L, R-C and R-L-C series circuit. • Resonance in R-L-C series circuit: Conditions for resonance, graphical representation of resonance curve, resonant frequency, bandwidth and Q factor of series resonant circuit. • Resonance in parallel circuit, resonant frequency and Q factor, nature of resonance curve (No derivation &no numerical)	14	30
Topic 2: Polyphase Circuits **Specific Objectives :** ➢ **Compare three phase and single phase system.** ➢ **Define various terms related to three phase system.** ➢ **Interpret relations between line & phase values of current, voltage, power& power factor of star & delta connected systems.** **Contents :** • Advantages of 3 phase system over 1 phase system • Principle of 3-phase e.m.f. generation and its waveform • Concept of phase sequence • Balanced and unbalanced load • Relation between phase and line current, phase and line voltage in Star connected and Delta connected balanced system. (no derivation) • Calculation of current, power, power factor in a 3 phase balanced	06	12

system (simple numerical)		
Topic 3: Electromagnetic Induction **Specific Objective :** ➢ **Realize the concept of self and mutually induced EMF.** ➢ **Interprete Faraday's laws of electromagnetic induction.** **Contents :** • Relation between Magnetism and Electricity. • Production of Induced E.M.F. and Current. • Faraday's Laws of Electromagnetic Induction. • Fleming's Right Hand Rule • Lenz's Law • Induced E.M.F: Self Induced E.M.F., Mutually Induced E.M.F., direction of Induced E.M.F. and Currents. • Energy Stored in Magnetic Field • (No Derivation and No Numerical)	04	08
Topic 4: Single Phase Transformer **Specific Objective :** ➢ **Draw construction diagram and explain working principle of single phase transformer.** ➢ **Interprete the relationship between various parameters of transformers.** ➢ **Compare autotransformer & two winding transformer** **Contents :** • Construction and working of transformer, classification , brief description of each part, its function (power transformer, audio frequency transformer, radio frequency transformer, isolating transformer, pulse transformer, intermediate frequency transformer) • Significance of Emf equation (no derivation) • Voltage ratio, current ratio and transformation ratio. • KVA rating of a transformer • Losses in a transformer • % efficiency & % regulation • Auto transformer – comparison with two winding transformer, • Applications • Simple numerical on this topic	06	16
Topic 5: Three Phase Induction Motor **Specific Objectives :** ➢ **Realize construction principle of working & types of three phase induction motor.** ➢ **Identify speed torque characteristics.** ➢ **Use of variations in voltage, current and frequency for speed control of motors.** **Contents:** • Construction and principle of working • Types – Squirrel cage and slip ring • Synchronous speed, slip speed, slip and rotor frequency (no numerical) • Torque – speed characteristics • Necessity of starter • Basic concepts of speed control method using thyristor.	08	16

• Revesal of rotation of 3 phase induction motor.		
Topic 6: Fractional Horse Power Motors **Specific Objectives :** ➢ **Draw Schematic representation, Principle of working characteristics and applications of** **i) Single Phase Induction Motor** **ii) Universal Motor** **iii) Stepper Motor** **iv) Servo Motor** **Contents :** • Schematic representation, principle of operation and applications of the Split phase single phase induction motors. • Universal motor - Schematic representation principle of operation, reversal of rotation and applications • Stepper motor - Schematic representation types, principle of working and applications • Servo motor - Schematic representation types, principle of working and applications	08	12
Topic 7: Electrical Safety **Specific Objectives :** ➢ **Understand and reproduce use of safety equipments** **Contents :** • Study of different accessories like MCCB, ELCB, cables and wires used in domestic and commercial electrical wiring. • Use of megger as earth tester.(front panel diagram & different control terminals) • Necessity of earthing and list its types. • Electrical safety	02	06
Total	**48**	**100**

Practical:

Skills to be developed:

Intellectual Skills:

1. Identify various types of Machines.
2. Select Instruments and their ranges.

Motor Skills:

1. Draw machine characteristics.
2. Make proper connection.
3. Accuracy in measurements.

List of Practicals:

1. Calculation of inductance and impedance of choke coil.
2. Drawing phasor diagram to determine power factor of R-L-C series circuit and simulate various parameters on CRO.

3. Relationship between line and phase values of three phase balanced star and delta connected system.
4. Transformation ratio of single phase transformer by measuring the voltage and current on primary and secondary side of transformer.
5. Determination of % efficiency and % regulation of single phase transformer (1KVA, 230/115v).
6. Determination of slip of three phase IM by tachometer method and observation of variation in speed with respect to change in supply voltage.
7. Reversal of direction of rotation of single phase induction motor.
8. To measure insulation resistance using megger.
9. Study of different types of cables & switches.
10. Mini project which includes connection of switch, holder, plug socket, fuse & indicator.

Learning Resources:
Books:

Sr. No	Author	Title	Publisher
1	Hughes	Electrical & Electronics Technology	Pearson
2	Mittle & Mittal	Basic Electrical Engineering	Tata McGraw Hill, New Delhi
3	B.L. Theraja	Electrical Technology Vol- I & II	S. Chand Publications Delhi
4	V. K. Mehta, Rohit Mehta	Basic Electrical Engineering	S. Chand Publications Delhi

Websites: www.housestuff.com

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Electronics Devices and Circuits

Subject Code : 17319

Teaching and Examination Scheme:

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

The past decades have witnessed several unprecedented and exciting developments in the field of electronics. A large number of solid state devices have been invented and used to design various electronics circuit. It will meet the pressing needs of learners who wish to gain a sound knowledge and understanding of the principles of electronics devices and circuits. It will stimulate the expert knowledge of electronics device and its applications. The subject plays a vital role in bridging the various electronics subjects.

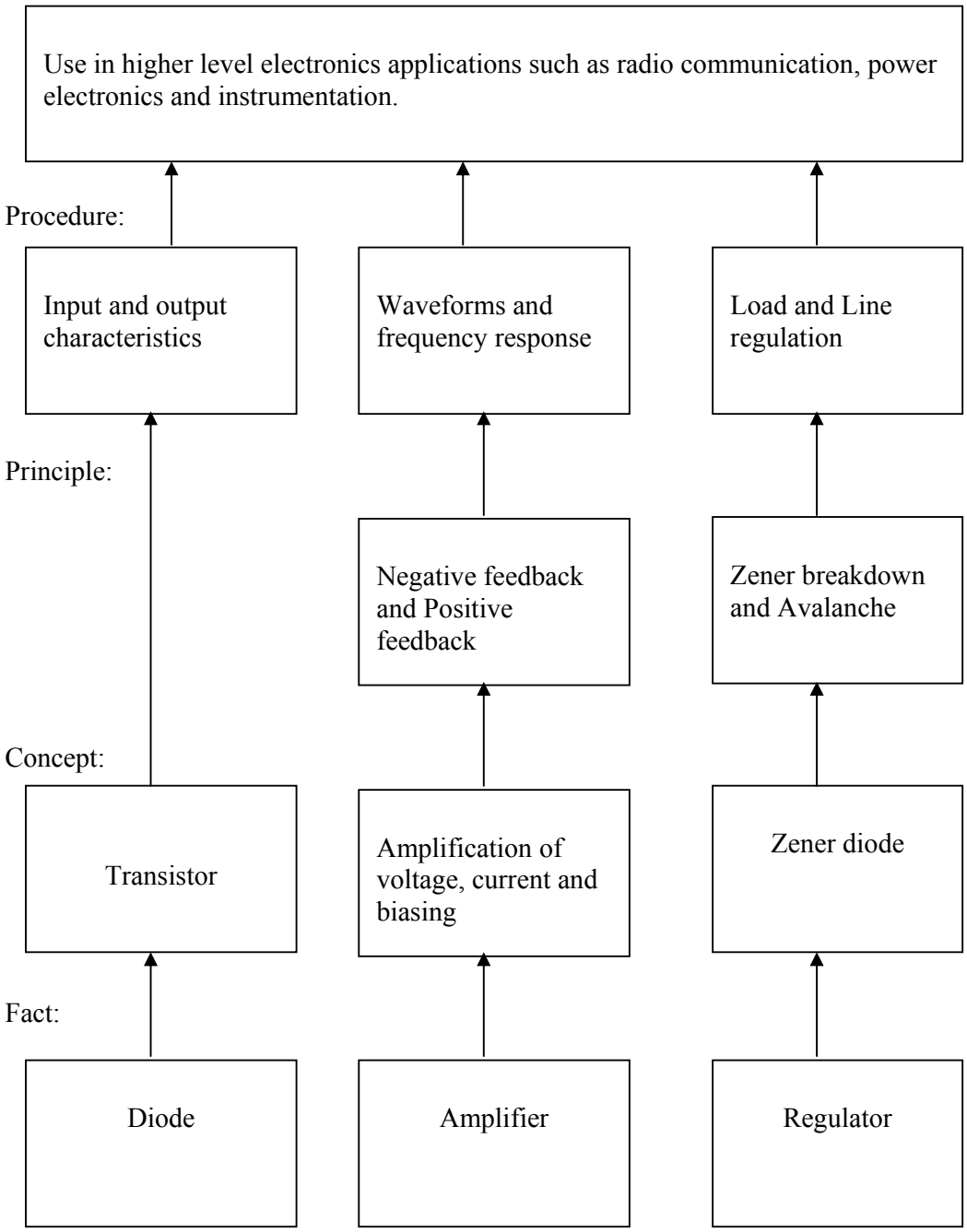
It intends to teach the operating principle and application of electronics circuits like amplifiers, regulators, time base generators, oscillators.

General Objectives:

The students will be able to:

1) Understand working principles of amplifiers, regulators and oscillators
2) Compare and classify amplifiers, oscillator time base generator, and regulator
3) Understand the use of these devices.

Learning Structure:



Theory:

Topics and contents	Hours	Marks
Topic 1) Transistors: Specific Objectives : ➢ Classify different types of BJT and their configuration. ➢ Select appropriate BJT based on application. ➢ State the need for biasing. Contents: 1.1 Introduction: [12] • Basic concept, • types of transistors, operation, • configuration (CB, CC & CE) & its input -output characteristics, • Comparison between CB, CC & CE, Transistor as switch 1.2 BJT Biasing: [12] • Need for biasing, • concept of DC load line, • operating point (Q), stabilization, thermal runaway • types of biasing i. Fixed biasing circuits. ii. Base biased with emitter feedback. iii. Voltage divider	14	24
Topic 2) Field Effect Transistors (FET): Specific Objectives : ➢ Select appropriate FET and MOSFET based on application. ➢ Appreciate the need for biasing. ➢ Identify the biasing circuit. Contents: 2.1 FET: Construction of JFET, (n-channel & p-channel), Working, principle & characteristics, (Drain characteristics & Transfer characteristics) 2.2 FET biasing: • Source self bias • Drain to source bias • Applications of FET 2.3 MOSFET: Introduction, types, construction, working & Applications.	08	12
Topic 3) Amplifier: Specific Objectives: ➢ Identify difference between small signal amplifier & power amplifier. ➢ Select the FET tuned amplifier for appropriate application. ➢ Compare different power amplifier. Contents: 3.1 Small Signal Amplifier: [08] • Concept of amplifier, • Single stage CE amplifier, • Frequency response, • Multistage amplifier, circuit diagram, working principle ,frequency	14	24

response.: • Types of amplifier coupling: Circuit diagram and operation of i. RC coupling, ii. Transformer coupling iii. Direct coupling. 3.2 FET Amplifier: [04] Common source, working principle and applications. 3.3 Power Amplifier: [08] • Comparison between small signal amplifier and power amplifier, • Classification: class A, class B, class AB & class C with respect to operating point on load line, efficiency, • Single stage class A , power amplifier circuit: operation, input output waveforms. • Class B push-pull amplifier, operation, input out waveforms and its advantages & disadvantages, applications of power amplifier. 3.4 Tuned Amplifier: [04] • Introduction & necessity of tuned amplifier, • basic tuned circuit, • Circuit diagram & operating principle of single & double tuned amplifiers.		
Topic 4) Feedback Amplifiers and Oscillators: Specific Objectives: ➢ Classify the feedback amplifier. ➢ Classify the oscillato**rs.** Contents: 4.1 Concept of Feedback : [08] • Types of feedback: negative and positive feedback, • Types of feedback connections, voltage shunt, voltage series, current series & current shunt. • Advantages of negative feedback. 4.2 Introduction to Oscillators: [04] • Need and condition for oscillators (Barkhausen's criteria), • Type of oscillator: RC phase shift oscillator and crystal oscillator-Concept, working and applications. • Numericals on above topics.	08	12
Topic 5) Time Base Generators: Specific Objectives: ➢ Classify time base generators. ➢ Understand the use of transistor as a switch. Contents: 5.1 Unijuction Transistor (UJT): [04] • Construction, Working principle & characteristics. 5.2 Types of Time Base Generators: [08] • Free running time base generator, working principle of UJT as time base generators, (Relaxation oscillator). • Circuit diagram and working of	10	12

i. Voltage time base generator, ii. Current time base generator, iii. Bootstrap time base generator, iv. Miller's sweep generator & its applications.		
Topic 6) Voltage Regulators: Specific Objectives: ➢ Appreciate the need for voltage regulator. ➢ Classify the types of voltage regulators. Contents: 6.1 Regulators: [08] • Need of regulators, • Concept of load & line regulations, • Zener diode as voltage regulator. • Transistorized regulators: series voltage regulator, shunt voltage regulator. 6.2 Linear Regulators: [08] • Block diagram of DC Regulated power supply and functions of each block. • Fixed and variable voltage regulators using IC's, LM 723, 78XX, 79XX,	10	16
Total	**64**	**100**

Intellectual Skills:

1. Interpretation of circuits.
2. Locate faults in circuits.
3. Interpret the waveforms.

Motor Skills:

1. Draw the circuits.
2. Test the components using multimeter and CRO.
3. Sketch circuit/block diagram.

List of Practical

1) Input output characteristics of common base configuration.
2) Input output characteristics of common emitter configuration.
3) Switching characteristics of BJT
4) Drain and gate characteristics of JFET.
5) Switching characteristics of MOSFET
6) V-I characteristics of UJT.
7) Frequency response of single stage common emitter amplifier, determine gain and BW.
8) Frequency response of two stage RC coupled amplifier using BJT.
9) Frequency response of single tuned amplifier of BJT& determine tuned frequency and BW.
10) Frequency response and BW of amplifier without & with negative voltage series feedback
11) Draw input and output wave forms of class B push pull amplifier and determine efficiency.
12) Test and verify oscillation frequency of RC phase shift oscillator.
13) Determine Frequency of saw tooth oscillator using UJT and verify with actual value.
14) Determine T-on, T-off, duty cycle of Miller's sweep generator
15) Test & verify zener as regulator.

16) Determine the line and load regulation of series voltage regulator
17) Draw characteristics (Load and Line regulation) of fixed regulator circuit using IC's78xx.
18) Build dual voltage regulator & test unregulated input & regulated output voltage.
19) Draw characteristics for high voltage regulator using LM IC 723.

Learning Resources:

1. Books:

Sr. No.	Title	Author	Publisher
01	Applied Electronics	R.S. Sedha	
02	Electronics Devices and Circuits	Allen Mottershead	PHI(India), New Delhi
03	Electronics Circuit and Circuit Theory	Robert L.Boylestead Louis Neshelsky	Pearson
04	Electronics Device and Circuit	P.Ramesh Babu	Scitech
05	Electronic Devices and Circuits	David A. Bell	Oxford

2. Websites

1. www.nptel.com

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Principles of Digital Techniques

Subject Code : 17320

Teaching and Examination Scheme:

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

Digital Electronics plays important role in advancements of microelectronics design, manufacturing, computer technology and information systems that have caused the rapid increase in the use of digital circuits. Hence in every application digital technique is the backbone. Digital electronics requires the background of discrete signaling and logical functions, semiconductor switch theory. Hence this subject is introduced for students to sharpen their skills of digital implementation by learning the concept of number systems, logic gates, combinational and sequential logic circuits, memory, counter and shift register.

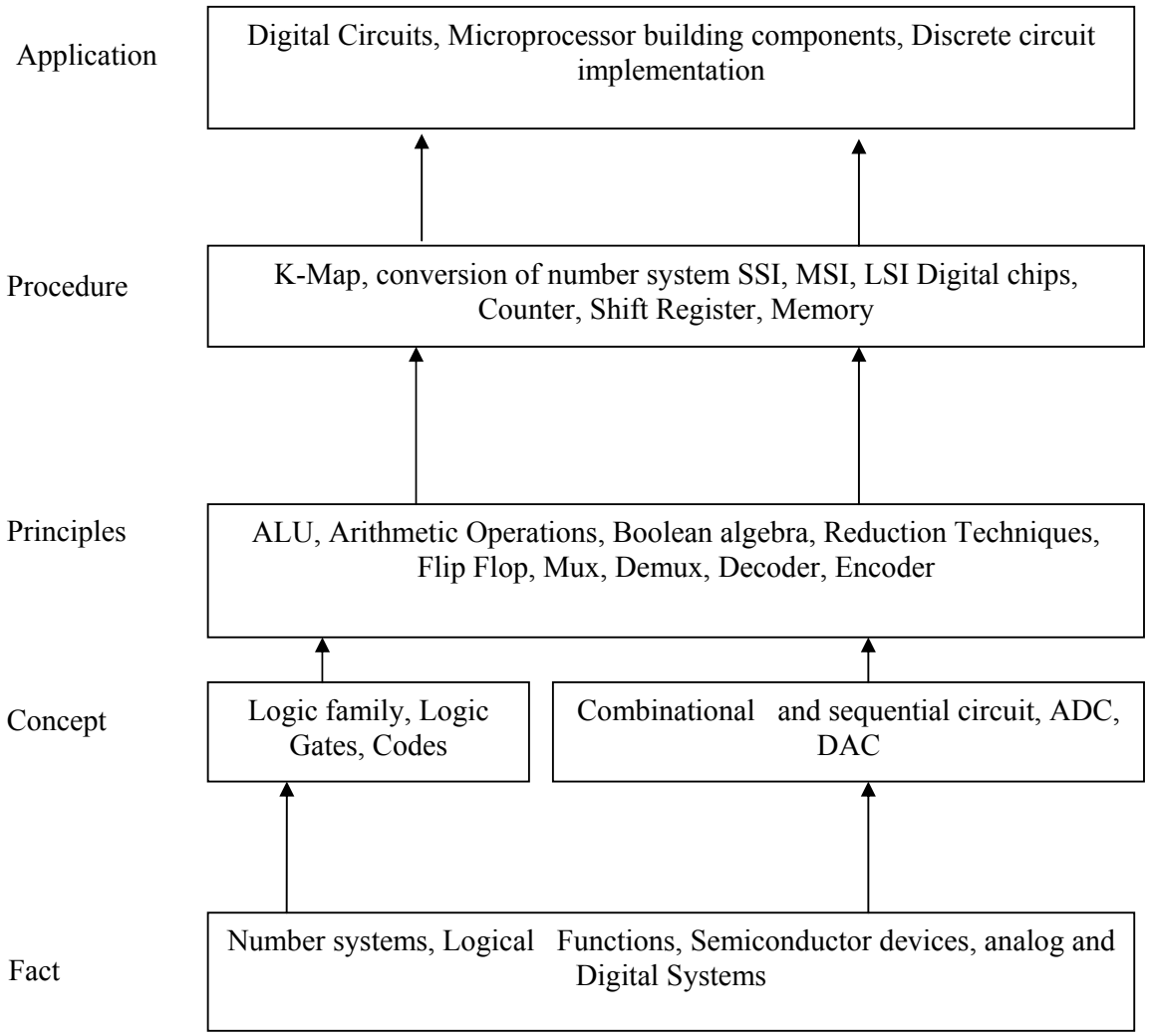
General Objectives:

The student will be able to

The subject student will be able to

1. Understand basic digital circuits.
2. Understand conversion of number systems.
3. Implement combinational and sequential circuits.
4. Understand logic families, data converters

Learning Structure:



Theory:

Topics and Contents	Hours	Marks
Topic 1: Number System **Specific Objectives:** ➢ Make conversion from one Number system to another. ➢ Perform simple arithmetic operations. **Contents :** **1.1 Introduction to digital signal, Advantages of Digital System over analog systems (08 Marks)** • Number Systems: Different types of number systems(Binary, Octal, Hexadecimal), conversion of number systems, • Binary arithmetic: Addition, Subtraction, Multiplication, Division. • Subtraction using 1's complement and 2's complement **1.2 Codes : (04 Marks)** • Codes -BCD, Gray Code, Excess-3, ASCII code • BCD addition, BCD subtraction using 9's and 10' complement **(Numericals based on above topic)**.	04	12
Topic 2: Logic gates and introduction to logic families ➢ Define Logic gates & logic families. ➢ Develop logic for simple digital circuit **Contents:** **2.1 Logic gates: (08 Marks)** • Basic gates and Derived Gates • NAND and NOR as Universal gates. • Boolean Algebra: Fundamentals of Boolean laws. • Duality Theorem, De Morgan's theorems. (numerical based on simplification of logic equations) **2.2 Logic Families: (08 Marks)** • Characteristics of logic families & Comparison between different logic families. • Logic families such as TTL, CMOS, ECL. • TTL NAND gate – Totem pole output, open collector. • CMOS Inverter	06	16
Topic 3 : Combinational Logic Circuits • Realize various digital Circuits using K-map. • Realize various combinational logic circuits. • Use peripheral devices like buffer. **Contents:** **3.1 Introduction: (08 Marks)** • Standard representation of canonical forms (SOP & POS), Maxterm & Minterm), conversion between SOP and POS forms. • K-map reduction technique upto 4 variables. (SOP & POS form), Design of half and full Adder, half and Full Subtractor using K-map, • Code Converter using K-map: Gray to Binary, Binary to Gray Code Converter (up to 4-bit), • IC 7447 as BCD to 7 segment decoder – driver	14	22

• IC 7483 as Adder & Subtractor, 1 digit BCD adder. • Block Schematic of ALU IC 74181 and IC 74381. **3.2 Necessity, Applications and realization of following: (14 Marks)** • Multiplexers(MUX): MUX tree • Demultiplexers (DEMUX): Demux tree, Demux as decoder • Study of IC 74151, IC 74155 • Priority Encoder 8:3, Decimal to BCD Encoder • Tristate logic, Unidirectional & bidirectional buffer ICs: IC 74244 and IC 74245		

Topic 4: Sequential Logic Circuit
• Distinguish various Flip flops, counters and shift registers.
• Implement asynchronous counter.
• Apply IC 7490, 7495 to design counter.
Contents:
4.1 **Sequential Circuits: (12 Marks)**
• Comparison between Combinational & Sequential circuits,
• One bit memory cell - RS latch – using NAND & NOR.
• Triggering Methods (Edge and level trigger)
• Flip Flops - S R Flip flop, Clocked SR flip flop with preset and clear, Drawbacks of SR Flip flop
• Clocked JK Flip flop with preset & clear, Race around condition in JK flip flop, Master slave JK flip flop.
• D and T type flip flop.
• Excitation table of flip flops.
• Block schematic and function table of IC-7474, 7475,74373
4.2 Study of Counters : (08 Marks)
• Counter: Modulus of counter, their types as Asynchronous and Synchronous counter.
• Asynchronous counter: (Ripple counter , 4 bit up/down Counter
• Synchronous counter: Excitation table of flip flops, implementation of 3 bit synchronous counter, its truth table and waveforms.
• Block schematic and waveform , IC 7490 as MOD-N Counter
4.3 Shift Register: (04 Marks)
• **logic diagram , Truth Table and waveforms of : 4-bit Shift** registers (SISO,SIPO, PISO,PIPO)
• 4 Bit Universal Shift register.
• Applications of Shift Register (Logic Diagram with waveforms) of:
  • Ring counter
  • Twisted ring counter
	12	24

Topic 5 : Data Convertors ➢ Identify operation of DAC and ADC. ➢ Use of IC 0800, 0809 in practical applications**.** **Contents:** **5.1 Introduction and Necessity of Code Convertors:** • DAC Types and comparison of Weighted resistor method, (Mathematical derivation) and R-2R Method (Mathematical derivation up to 3 variable), **5.2 ADC Types and their comparison**: Block Diagram and working of following ADCs **: (08 Marks)**	06	16

• Single slope ADC, Dual slope ADC, SAR ADC • IC PCF 8591 : 8 BIT ADC-DAC		
Topic 6: Memories ➢ Classify memories. ➢ Apply ICs 2716, 7481, 6116 in practical applications. **Contents:** 6.1 Principle of operation and classification of memory. • Organization of memories • RAM (Static, Dynamic), Volatile and Non-Volatile • ROM (PROM, EPROM, EEPROM) • Flash memory. • Comparison between EPROM and Flash **Study of Memory ICs :** • Identification of IC number and their function of following ICs: IC 2716, IC 7481& IC 6116.	06	10
Total	**48**	**100**

Practicals:

Intellectual skills:

1) Identify different ICs of logic gates, combinational and sequential circuits and memories.
2) Distinguish and realize combinational and sequential circuits.
3) Verify standard T.T and test ICs.

Motor skills:

1) Make proper connections as per given circuit diagram.
2) Build, test and debug the digital circuit.
3) Observe result and proper handling of equipments.

List of Experiments:-

Sr. No	Title of Experiment
1	Verify the truth table of Basic logic gates using diode and transistor.
2	Verify De Morgan's Theorem
3	Verify NAND and NOR gate as universal logic gate.
4	Verify Truth Table of bi-directional buffer – IC 74245
5	Realize adder and subtractor.
6	Verify the operational features of ADC – IC 0809/IC 0808 and DAC – IC 0800.
7	Verify the operation of Multiplexer IC 74151 and Demultiplexer IC 74155.
8	Realize and verify RS flip flop using NAND gate and verify master slave JK Flip-Flop using IC 7476.
9	Implement 4 bit ripple counter
10	Implement 4 bit R-2R D/A converter.

Learning Resources:
Books:

Sr. No	Title	Author	Publisher
01	Digital Principles	Malvino Leach	Tata McGrew Hill (TMH)
02	Modern Digital Electronics	R.P. Jain	Tata McGrew Hill (TMH)
03	Digital Electronics, Principles and Integrated Circuits	Anil K. Maini	Wiely India Edition
04	Digital Electronics (Second Edition)	P. Raja	SCITECH Publications (India) Pvt. Ltd.
05	Digital Electronics	G.K.Kharate	OXFORD Publication

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Programming in C

Subject Code : 17020

Teaching and Examination Scheme:

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

Rationale:

Today's most of the electronically operated devices, integrated circuits, controllers, equipments, gadgets are run by specific drivers/software. To understand design, develop and write drivers, programming knowledge is required.

Traditionally 'C' is the most popular, versatile, simple and commonly used middle level language to write efficient, compact and portable drivers/ software's.

The subject will enable the students to inculcate programming concepts and methodology used to write, debug, compile and execute simple 'C' programs using different data types, structures and functions.

Programming knowledge and skill acquired in this course will help in learning higher level courses such as visual programming language, microcontrollers, embedded systems and VLSI. Due to these powerful features C has not lost its importance and popularity in recently developed and advanced software industry. C can also be used for system level programming so as to develop Operating system softwares. C is still considered as first priority programming language.

This course will lay the basic foundation of programming which will enable students to develop simple to complex programs in the real world.

General Objectives.

Students will able to.

- Learn programming concepts and methodology
- Learn standard, sequential, decision and iterative structures of programming language
- Write, debug, compile and execute the programs
- Write programs for hardware interfacing.
- Design graphics using standard geometrical shapes and graphic functions
- Handle text and binary files for real life applications

Learning Structure:

Applications

Enable to write/develop software/programs such as
- Text editors, device drivers
- Operating system utilities
- Simple to complex academic applications
- GUI based applications
- Data communication between DTE and DCE
- To control specific/customized hardware

Procedure

Coding, compilation, syntax error removal	Debugging, Logical error removal	Execution of Program	Writing user defined functions, compiling it.	Writing interfacing programs to interface hardware, peripherals, drivers	Writing simple programs for data communication between DTE and DCE

Principle

Declaration and initialization of variables and constants	Writing simple formatted input output statements	Using standard 'C structures for decision making, looping	Declaring, defining and using user defined functions and user defined data types	Using library functions and header files	Graphics

Concept

Syntax rules, Semantic rules Logic development	Writing formulas, instructions	Data maintenance Priority of operators	'C' program Concept.	C standard structure of program	Header files concepts

Facts

Character set, Keywords, Tokens Identifiers	Variables Operators, constants expressions	Input and Output statements	Decision making and Looping	Basic, derived and user defined data types	ASCII code, Bit, bytes, memory allocation and size of memory

Theory:

Topic and Contents	Hours
Topic 1] Fundamentals of 'C' **Specific Objectives:** ➢ **Realize need of learning 'C'** ➢ **Write standard structure of 'C' program.** ➢ **Declare, initialize and assign values to variables** ➢ **Access memory location and memory allocation** ➢ **Use appropriate operators** ➢ **Form expression and statements** **Contents:** 1.1 History of C, Features of 'C', advantages of 'C', assembler, compiler, interpreter, structure of 'C' program 1.2 Character set, keywords, constants, variables, rules of variables, data type-declarations, initializations, assignments, memory sizes, formatting characters and minimum/maximum values for each data types, type modifiers, type conversion 1.3 Operators (arithmetic, Logical, assignment, relational, increment and decrement, conditional, bit wise, special operators) precedence, expressions, formatted input and output statements.	03
Topic 2] Decision and Loop Control **Specific Objectives:** ➢ **Use appropriate decision structure and loops based on given situation** ➢ **Enter, exit and transfer control to required statements** ➢ **Write structured programs with indentions** **Contents:** 2.1 Decision making and branching: if statement (if, if-else, if-else-if ladder, nested if-else), switch statement. 2.2 Loop Control: What is loop, why to use loops, pre test and post test loops, while, do-while and for loops, nested loops, break and continue statement	03
Topic 3] Arrays and Strings **Specific Objectives:** ➢ **Differentiate between simple and subscripted variables** ➢ **Identify need of arrays** ➢ **Identify situation where array logic is most appropriate.** ➢ **Use string handling.** **Contents:** 3.1 Arrays: Declaration, initialization of one dimensional, two dimensional arrays, size of array, memory allocation of array, accessing array elements using index. Operations such as searching and sorting of array. 3.2 Declaration and initialization of string variables, string handling functions from standard library (strlen (), strcpy (), strcat (), strcmp()).	03

Topic 4] Functions and Structures **Specific Objectives:** ➢ **Write modular programs** ➢ **Write user defined functions** ➢ **Compile and add user defined function in header files** ➢ **Add functions in library using utilities** ➢ **Declare, initialize and use structures i.e. user defined data types** **Contents:** 4.1 Basics of a function, Need of functions, How function works, Function definition, internal and external variables, scope and lifetime of variables, function call, passing arguments to functions (call by value, call by reference), return values, storage classes. category of function , Library functions 4.2 Structures: Defining structure, declaring and accessing structure members, initialization of structure, arrays of structure.	03
Topic 5] Graphics and File Handling **Specific Objectives:** ➢ **Write programs using graphic and text functions** ➢ **Identify need of file handling** ➢ **Work with files** **Contents:** 5.1 Graphics introduction, Initialization of graphics, using fonts, patterns, colours, styles, filling. Basic graphic functions 5.2 Why to use file, file types-text and binary, file handling-sequential and random, file operations- read, write, open, close, append, basic file functions	04
Total	**16**

Skills to be developed:
Intellectual skills:

1. Use of programming language constructs in program implementation.
2. Apply different logics to solve given problem.
3. write program using different implementations for the same problem
4. Study different types of errors as syntax semantic, fatal, linker & logical
5. Debugging of programs
6. Understanding different steps to develop program such as
   - Problem definition
   - Analysis
   - Design of logic
   - Coding
   - Testing
   - Maintenance (Modifications, error corrections, making changes etc.)

Motor Skills:

1. Proper handling of Computer System**.**
2. Typing skill

List of practical: (Any ten form following)
Experiment No.1 (Any one)

- Display hexadecimal, decimal, octal format of the entered numbers.
- Accept kilometer and convert it into meter, cm, inch and feet.
- Accept four digit number and find sum of individual digits and print it in reverse order
- To find the roots of quadratic equation

Experiment No.2

- Demonstrate all possible formatting specifiers with there width and alignment options.
- Prepare salary statement and display on screen with proper formatting and alignments (Input name, basic salary, calculate various allowances such as DA, HRA, Conveyance and deductions such as income tax, Professional tax, provident fund and find net salary.

Experiment No.3 (Any one)

- Find greatest/ smallest of 3 numbers. (use if, if else, nested if)
- Display pass class, second-class, first class, distinction according to the marks entered. (use switch, if else-if else ladder)

Experiment No.4 (Any one)

- Display menu 1. Addition 2. Subtraction 3. Multiplication 4. Division and execute it using switch case.
- Write a program to calculate and print telephone bill or electricity bill.

Experiment No.5 (Any one)

- Display our College name twenty times on screen.
- Display all even numbers from 1-100.
- Perform addition of 1-100 numbers.
- Print ASCII tables of alphabets use continue statements.
- Print prime numbers from 1 to 100 use break statements

Experiment No.6 (Any one)

- Find smallest / largest number from array elements.
- Sort array elements in ascending / descending order.

Experiment No.7 (Any one)

- Enter elements for 3X3 matrix and display them.
- Calculate addition / subtraction of 2 dimensional matrix.
- Calculate multiplication of 2 dimensional matrix.

Experiment No.8 (Any one)

- Demonstrate output of standard library functions Strlen (), strcpy (), strcat (), strcmp ().
- Accept a string and arrange individual characters alphabetical order.
- Accept ten names of students and arrange them in alphabetical order

Experiment No.9 (Any one)

- Calculate area of circle using function.
- Calculate factorial of any given number using recursion.

Experiment No.10 (Any one)

- Demonstrate call by reference, call by value
- Maintain and manipulate student data using structure.

Experiment No.11 (Any one)

- Draw concentric circle with different radius and colors and give appropriate heading using fonts and styles
- Draw different geometric shapes and fill it with different fill patterns and give appropriate heading using fonts and styles

Experiment No.12 (Any one)

- Write a program to write and read text file
- Write a program to read numbers from file and print them in another file in ascending order.

Learning Recourses:

1. **Books:**

Sr. No.	Author	Name of the Book	Publisher
1	Balgurusamy	Programming in 'C'	Tata Mc-Graw Hill
2	Ashok N Kamthane	Programming in 'C'	Pearson
3	Kanetkar	Let's 'C'	BPB
4	Herbert Shildt	Complete reference C	Tata Mc-Graw Hill
5	Arpita Gopal	Magnifying 'C'	PHI Publications

2. **Websites:**
   - http://cplus.about.com/od/beginnerctutoriali/a/blctut.htm
   - http://computer.howstuffworks.com/c.htm
   - http://www.indiastudycenter.com/studyguides/sc/objtest/default.asp

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Professional Practices - I

Subject Code : 17021

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	03	--	--	--	--	50@	50s

Rationale:

Most of the diploma holders join industries. Due to globalization and competition in the industrial and service sectors the selection for the job is based on campus interviews or competitive tests.

While selecting candidates a normal practice adopted is to see general confidence, ability to communicate and attitude, in addition to basic technological concepts.

The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation of students in learning process.

Objectives:

To develop the following skills:

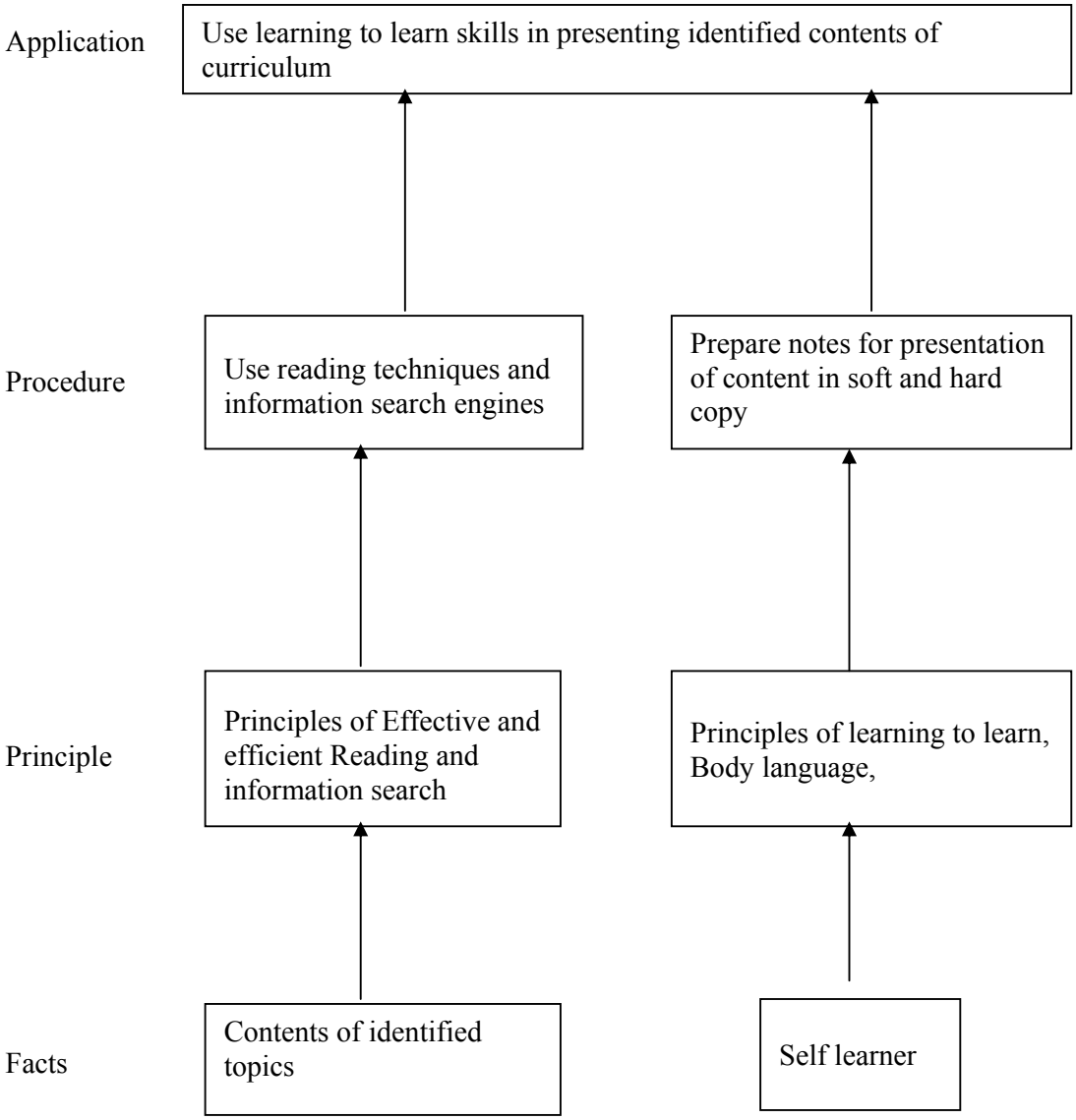
Intellectual Skills:

1) Acquire information from different sources.
2) Interpret the data acquired from different sources.
3) Prepare reports for given topic.

Motor Skills:

1) Present given topic in a seminar.
2) Interact with peers to share thoughts.
3) Prepare a report on industrial visit, expert lecture.

Learning Structure:



Contents:

Activity	Name of the Activity	Hours
1	**Field Visits** Structured field visits (minimum three) be arranged and report of the same should be submitted by the individual student, to form a part of the term work. The field visits may be arranged in the following areas / Industries. i) Power supply/UPS/SMPS/Inverter manufacturing unit ii) Electronics Instruments calibration laboratories iii) Electronic security systems iv) Radio station. v) Other related Industries.	16
2	**Lectures by Professional / Industrial Expert to be organized from the following areas (any four)** i) Alternative energy sources ii) E-learning iii) Management of E-Waste iv) Nanotechnology v) Any topic related to social awareness	08
3	**Seminar :** Any one seminar on the topics suggested below: Students (Group of 4 to 5 students) has to search / collect information about the topic through literature survey, visits and discussions with experts / concerned persons: Students will have to submit a report of about 10 pages and deliver a seminar for 10 minutes. i) Electronic rolling display ii) Electronic systems used in Multiplex iii) Electronic traffic control system iv) Any other suitable topic	16
4	**Market Survey:** A group of four students is expected to collect information from the market regarding specifications and cost of any three manufacturers for various instruments: CRO, Multimeter, UPS, DC Power supply, Function generator, Mobile handset, TV set of brand name, specifications, cost and applications.	08
	Total	**48**

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