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/IE/IC/DE/IU/ED/EI

DURATION OF COURSE : 6 SEMESTERS FOR EJ/EN/EX/ET/IE/IS/IC/DE AND 8 SEMESTERS FOR IU/ED/EI

SEMESTER : THIRD **WITH EFFECT FROM 2009-10** **DURATION : 16 WEEKS**

PATTERN : FULL TIME **SCHEME : E**

Sr. No.	SUBJECT TITLE	Abbreviation	SUB CODE	TEACHING SCHEME			EXAMINATION SCHEME									
				TH	TU	PR	PAPER HRS	TH (01)		PR (04)		OR (08)		TW (09)		SW (16003)
								MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	
1	Applied Mathematics	AMA	12054	03	--	--	3	100	40	--	--	--	--	--	--	50
2	Basic Electronics	BEX	12058	04	--	02	3	100	40	50#	20	--	--	25@	10	
3	Electrical Engineering	EEG	12068	04	--	02	3	100	40	--	--	--	--	25@	10	
4	Principle of Digital Techniques	PDT	12069	03	--	02	3	100	40	--	--	--	--	25@	10	
5	Industrial Measurement	IME	12070	03	--	02	3	100	40	--	--	25#	10	25@	10	
6	Programming in 'C'	PIC	12071	01	--	02	--	--	--	50#	20	--	--	25@	10	
7	Professional Practices-III	PPR	12072	--	--	05	--	--	--	--	--	--	--	50@	20	
	TOTAL			**18**	**--**	**15**	--	**500**	**--**	**100**	**--**	**25**	**--**	**175**	**--**	**50**

Student Contact Hours Per Week: **33 Hrs.**

THEORY AND PRACTICAL PERIODS OF 60 MINUTES EACH.

Total Marks **: 850**

@ Internal Assessment, # External Assessment, ▭ No Theory Examination.

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

- Conduct two class tests each of 25 marks for each theory subject. Sum of the total test marks of all subjects is to be converted out of 50 marks as sessional work (SW).
- Progressive evaluation is to be done by subject teacher as per the prevailing curriculum implementation and assessment norms.
- Code number for TH, PR, OR and TW are to be given as suffix 1, 4, 8, 9 respectively to the subject code.

Course Name : Electrical and Electronics Engineering Group

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

Semester : Third

Subject Title : Applied Mathematics

Subject Code : 12054

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	PR	TU	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:

The study of mathematics is necessary to develop the skills essential for studying new technological development. This subject introduces some applications of engineering, through which the student can understand the link of mathematics with engineering principles.

OBJECTIVE: The Student will be able to:

1. Apply Mathematical term, concept, principles, and different methods.
2. Apply Mathematical methods to solve technical problems.
3. Execute management plans with precision.
4. Use Mathematical techniques necessary for daily and practical problems.

LEARNING STRUCTURE:

Applications	Apply the principles of Mathematics to solve problems in Electrical and Electronics Field				
Procedure	Methods of finding integration, definite integration and its properties..	Methods of solving differential equation of first order and first degree.	Use of Laplace transform for solving problems of Differential Equetions	Use of Fourier series for expansion of function at the given intervals	Methods for finding approximate roots by using bisection, Regula-falsi, Newton-raphson method, Gauss elimination, Jacobi and Gauss-seidal methods
Concept	Integration of standard functions. Rules of integration. Integration by parts, partial fractions.	Order, degree of differential equation.	Laplace Transform of standard functions, properties. Inverse L. T. Convolution theorem.	Eular's formula for Fourier series expansion.	Higher order algebraic equations. Upper and lower triangular matrix, iterative methods.
Facts	First order differentiation. Definition of integration as anti derivative.	Integration. Definition of differential equation	Definition of Laplace transform and Inverse Laplace transform.	Definition of periodic, even and odd functions.	Relation between degree of equation and roots. Relation between no. of unknowns and equations

Contents: Theory

Chapter	Name of the Topic	Hours	Marks
01	**Integration:** 1.1 Definition of integration as anti-derivative. Integration of standard function. 1.2 Rules of integration (Integrals of sum, difference, scalar multiplication). 1.3 Methods of Integration. 1.3.1 Integration by substitution 1.3.2 Integration of rational functions. 1.3.3 Integration by partial fractions. 1.3.4 Integration by trigonometric transformation. 1.3.5 Integration by parts.	10	16
	1.4 Definite Integration. 1.4.1 Definition of definite integral. 1.4.2 Properties of definite integral with simple problems.	04	08
	1.5 **Applications of definite integrals.** 1.5.1 Area under the curve. 1.5.2 Area between two curves. 1.5.3 Mean and RMS values	02	08
02	**Differential Equation** 2.1 Definition of differential equation, order and degree of differential equation. Formation of differential equation for function containing single constant. 2.2 Solution of differential equations of first order and first degree such as variable separable type, reducible to Variable separable, Homogeneous, Nonhomogeneous, Exact, Linear and Bernoulli equations.	08	16
	2.3 Applications of Differential equations. 2.3.1 Laws of voltage and current related to LC, RC, and LRC Circuits.	02	04
03	**Laplace Transform** 3.1 Definition of Laplace transform, Laplace transform of standard functions**.** 3.2 Properties of Laplace transform such as Linearity, first shifting, second shifting, multiplication by t^n, division by t. 3.3 Inverse Laplace transforms. Properties- linearly first shifting, second shifting. Method of partial fractions, 3.4 Convolution theorem. 3.5 Laplace transform of derivatives, 3.6 Solution of differential equation using Laplace transform (up to second order equation).	08	20

04	**Fourier Series** 4.1 Definition of Fourier series (Euler's formula). 4.2 Series expansion of continuous functions in the intervals $(0,2l),(-l,l),(0,2\pi),(-\pi,\pi)$ 4.3 Series expansions of even and odd functions. 4.4 Half range series.	06	12
05	**Numerical Methods** **4.1 Solution of algebraic equations** Bisection method. Regularfalsi method. Newton – Raphson method.	04	08
	4.2 Solution of simultaneous equations containing 2 and 3 unknowns Gauss elimination method. Iterative methods- Gauss seidal and Jacobi's methods.	04	08
	Total	**48**	**100**

Learning Resources:
Books:

Sr. No.	Title	Authors	Publications
1	Mathematics for polytechnic	S. P. Deshpande	Pune Vidyarthi Griha Prakashan, Pune
2	Calculus: single variable	Robert T. Smith	Tata McGraw Hill
3	Laplace Transform	Lipschutz	Schaum outline series.
4	Fourier series and boundary value problems	Brown	Tata McGraw Hill
5	Higher Engineering Mathematics	B. S. Grewal	Khanna Publication, New Dehli
6	Introductory Methods of Numerical analysis	S. S. Sastry	Prentice Hall Of India, New Dehli
7	Numerical methods for scientific & engineering computations	M. K. Jain & others	Wiley Eastern Publication.

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Basic Electronics

Subject Code : 12058

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS.	TH	PR	OR	TW	TOTAL
04	--	02	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:

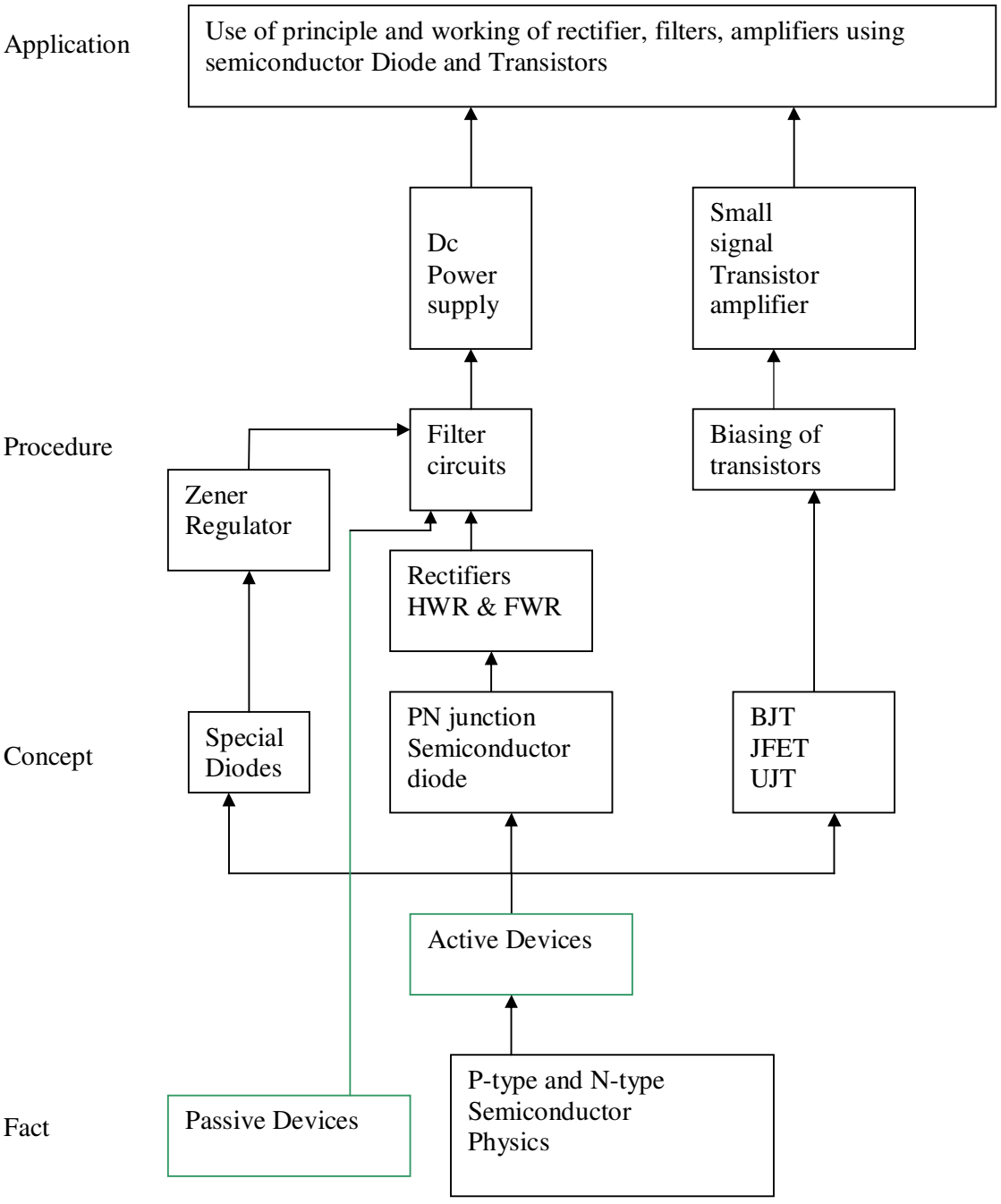
Electronics is a major part of our day to day life. In each and every field electronic systems are used. Basic electronics is one of the subject which is the base of all advance electronics. It starts with PN junction which makes the student to follow the functioning of all semiconductor based electronics. This is a core group subject and it develops cognitive and psychomotor skills.

Objectives:

Student will be able to:

1) Describe the formation of PN junction.
2) Draw the characteristics of basic components like diode, transistor etc.
3) Draw and describe the basic circuits of rectifier, filter, regulator and amplifiers.
4) Know voltage amplifiers.
5) Test diode and transistors.
6) Read the data sheets of diode and transistors.

Learning Structure



Content: Theory

Chapter	Name of the Topic	Hours	Marks
1	**Semiconductor diode** Rectifying diode Review of P-type and N-type semiconductor Junction of P-type & N-type i.e. PN junction Barrier voltage , depletion region ,Junction Capacitance Forward biased & reversed biased junction Diode symbol , circuit diagram for characteristics (forward & reversed) Characteristics of PN junction diode Specifications:- Forward voltage drop , Reversed saturation current, maximum forward current , power dissipation Package view of diodes of different power ratings (to be shown during practical hours) **Zener diode** construction (reference to doping level) Symbol , circuit diagram for characteristics (forward & reversed) Avalanche & zener breakdown Specifications:- Zener voltage , power dissipation , break over current, dynamic resistance & maximum reverse current **Special diodes** Point contact diode , Schottky diode **Optical Diodes** LED, IRLED, photo diode, and laser diode. Symbol, operating principle & applications of each. **PASSIVE COMPONENTS** Resistor: definition, symbol, unit. Types of resistors : fixed, variable, LDR, Thermistor (symbol and list of application only) Resistor colour code, wattage (w.r to size) 2) Capacitor : definition, symbol, unit Types of capacitor(to be shown in practical, no theory) Fixed : mica, paper, ceramic, electrolytic Variable : Gang capacitor 3) Inductor : definition, symbol, unit Types of Inductors : fixed ,variable Transformer :symbol, types (step up and step down), application. **NOTE:The above topic(PASSIVE COMPONENTS)is to be covered in practical for Electrical engineering students only.No questions will be set on this topic in theory examination.**	**12**	**20**

2	**Rectifiers & Filters** Need of rectifier , definition Types of rectifier – Half wave rectifier, Full wave rectifier, (Bridge & centre tapped) Circuit operation Input/output waveforms for voltage & current Average (dc) value of current & voltage (no derivation) Ripple , ripple factor , ripple frequency , PIV of diode used , transformer utilization factor , efficiency of rectifier. Comparison of three types of rectifier Need of filters Types of filters A] shunt capacitor B] Series inductor C] LC filter D] π filter Circuit operation, dc output voltage, ripple factor (formula), ripple frequency, Dependence of ripple factor on load . Input/output waveforms , limitations & advantages	**10**	**14**
3	**Transistors** **1] Bipolar junction transistor(BJT)** Introduction , Basic concept Types of transistors , structure & symbols Transistor operation Conventional current flow , relation between different currents in transistor Transistor amplifying action Transistor configurations:- CB , CE & CC Circuit diagram to find the characteristics Input/output characteristics Transistor parameters- input resistance, output resistance, α , β & relation between them. Comparison between three configurations Transistor specifications:- $V_{CE\ Sat}$, $I_{C\ Max}$, V_{CEO} , I_{CEO}, α , β $V_{CE\ Breakdown}$, Power dissipation (to be explained during practical using data sheets) Testing of transistor using multimeter(To be shown during practical) Construction, working principle, characteristics of Photo transistor Introduction to opto-coupler **2] Unipolar transistor (JFET)** Construction, working principle & characteristics. **3] Unijunction Transistor(UJT)** Construction, working principle& characteristics.	**12**	**22**
	Biasing of BJT Introduction , need of biasing , concept of dc load line , selection of operating point (Q point) , need of stabilization of Q point, (thermal run away concept)		

4	Types of biasing circuits A] Fixed biased circuit B] Base biased with emitter feed back C] Base biased with collector feed back D] Voltage divider E] Emitter biased Circuit operation of each circuit. Introduction to two port n/w Hybrid model for CE.	**10**	**12**
5	**Regulated power supply** What is regulator? Need of regulators , voltage regulation factor Concept of load regulation & line regulation Basic Zener diode voltage regulator **Linear Regulators** Basic block diagram of dc power supply **Transistorised series & shunt regulator - circuit diagram & operation.** Regulator IC's – 78xx, 79xx, 723 as fixed, variable & dual regulator.	**08**	**12**
6	**Small signal amplifiers** **C**oncept of amplification Small signal amplifier using BJT Graphical analysis Determination of current , voltage & power gain , Input & output resistance , phase shift between input & output. AC Load Line Function of input & output coupling capacitors & criteria for the value selection. Function of emitter bypass capacitor & its value selection. AC equivalent circuit of transistor CE amplifier. Single stage CE amplifier with voltage divider bias. Its explanation. Frequency response of single stage CE Amplifier, Bell, Decibel unit. Bandwidth & its significance. Effect of coupling & emitter bypass capacitor on bandwidth. Introduction to CB & CC amplifier & List of applications. Cascade Amplifiers (Multistage Amplifier) Need of Multistage Amplifiers, Gain of amplifier. Types of amplifier coupling – RC, transformer & Direct coupling. Two stage amplifier circuit diagram, working, frequency Response, merits & demerits & applications of each.	**12**	**20**
	Total	**64**	**100**

Practical:

Skills to be developed:

Intellectual Skills:

1. Identification and selection of components.
2. Interpretation of circuits.
3. Understand working of Regulated dc power supply.

Motor skills:

1. Ability to draw the circuits.
2. Ability to measure various parameters.
3. Ability to test the components using multimeter.
4. Follow standard test procedures.

List of Practical:

1] Forward & Reverse characteristics of diode
2] Forward & Reverse characteristics of Zener diode
3] Study of Rectifiers a] Half wave b] Full wave
4] Study of filter circuits. a] Capacitor Filter b] Inductor filter.
5] Input & output characteristics of transistor in CE mode
6] Input & output characteristics of transistor in CB mode
7] Characteristics of FET
9] Characteristics of UJT
10] Zener Diode Regulator
11] Transistor series and shunt regulator
11] Single stage common emitter amplifier
12] Two stage RC coupled amplifier [Frequency response]
13] Study of various Passive components.(To be conducted for only Electrical Engineering Students.)

Learning Resources:

1. Books:

Sr. No.	Author	Title	Publisher
01	N.N.Bhargava, D.C. Kulashreshtha, S.C. Gupta - TTTI Chandigharh	Basic Electronics & Linear Circuits	Tata McGraw Hill
02	Alberrt Malvino David J.Bates	Electronic Principles	Tata McGraw Hill
03	Allen. Mottershead	Electronic Devices & Components'	Prentice Hall of India
04	NIIT	Basic Electronics &Devices	Prentice Hall of India
05	Grob Bernard	Basic Electronics	Tata McGraw Hill
06	David J. Bell	Electronics Devices & Circuits	Prentice Hall of India

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Electrical Engineering

Subject Code : 12068

Teaching and Examination Scheme: 'E' Scheme

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
04	--	02	03	100	--	--	25@	125

NOTE:

- **Two tests each of 25 marks to be conducted as per the schedule given by MSBTE. Curriculum for first test and second test shall be approximately 40% and 60% respectively. Question paper for test: Q1: 3 bits of 3 marks each, option ¾ , Q.2 : 3 bits of 4 marks each, option 2/3, Q3: 3 bits of 4 marks each or 2 bits of 8 marks each, option 2/3 or ½.**
- **Total of test 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 restricted to second year diploma in electronics & telecommunication. Technicians / supervisors from all branches of engineering are expected to have some basic knowledge of electrical engineering. Also the technicians working in different engineering fields have to deal with various types of electrical drives and equipment. Hence, it is necessary to study electric circuits, different types of electrical drives, their principles and working characteristics.

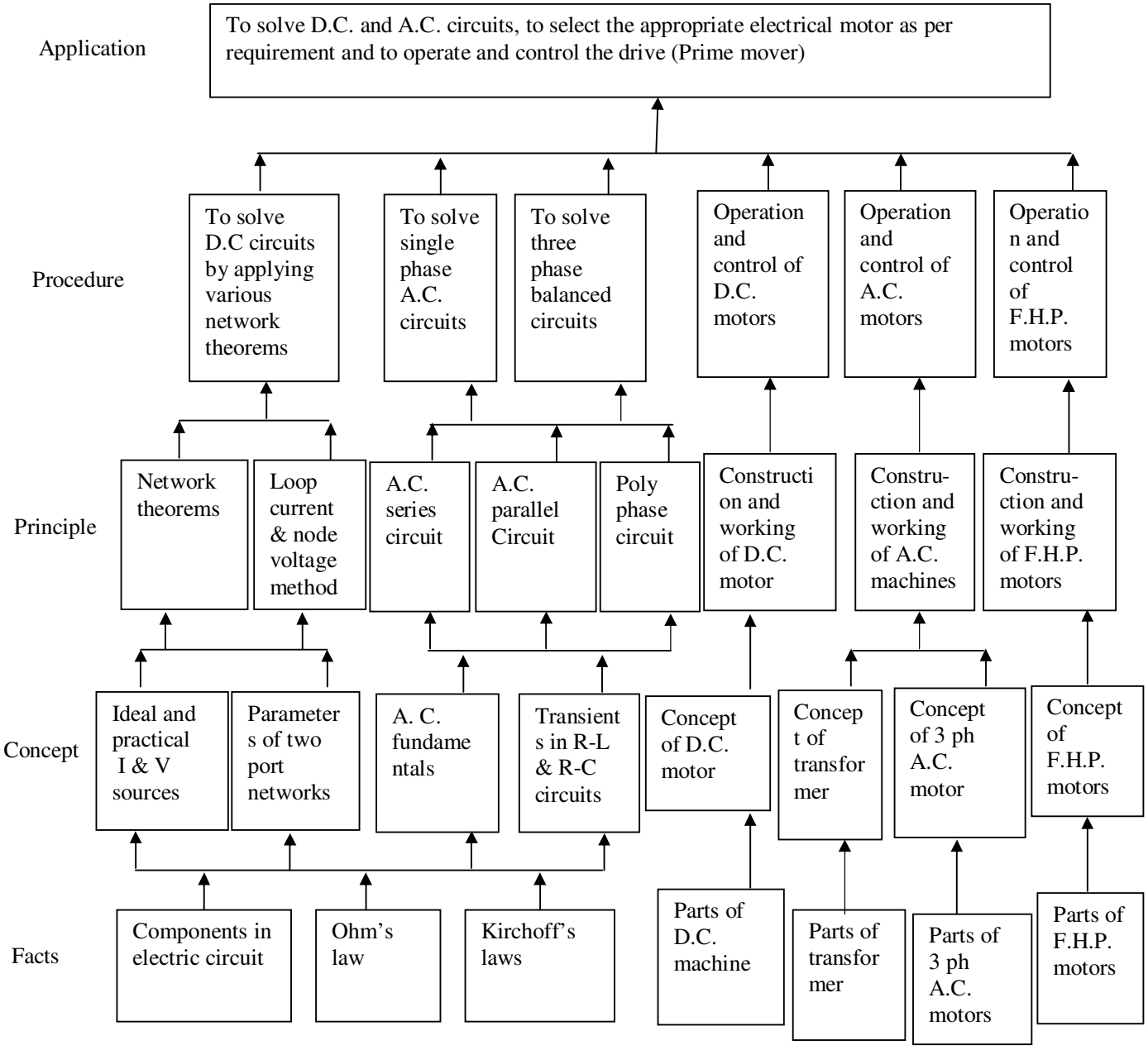
This subject covers analysis of ac and dc networks, working principles of commonly used ac and dc motors and their characteristics. The basic concepts studied in this subject will be very useful for understanding of other higher level subjects in further study.

Objectives:

The student will be able to

1. Solve dc circuits by using different techniques and network theorems
2. Understand the importance, equations and definitions of two port networks and attenuators
3. State mathematical equations for transients in R-L and R-C circuit
4. Solve series and parallel ac circuits with R, L and C
5. Know importance, working and construction of single phase transformer
6. Explain construction, working, performance and applications of various types of ac and dc machines

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
1.	**D. C. Circuits**	10	12
1.1	Review of introduction to electricity - current, resistance, emf and potential difference, Ohm's law, D.C. sources, series and parallel circuit.		
1.2	Concept of open and short circuit		
1.3	Kirchoff's current and voltage law		
1.4	Maxwell's loop current method		
1.5	Node analysis		
1.6	Concept of ideal and practical current and voltage sources, Source conversion.		
1.7	Star / Delta and Delta / star conversion (no derivation) (Numerical on above)		
2.	**Network Theorems**	10	16
2.1	Network terminology – active, passive, linear, non-linear, bilateral, unilateral networks		
2.2	Statement, explanation and application of the following network theorems (DC circuits only)		
	- Superposition theorem		
	- Thevenin's theorem		
	- Norton's theorem		
	- Maximum power transfer theorem		
2.3	Concept of duality and construction of dual network		
3	**A.C. Fundamentals**	12	20
3.1	Difference between A.C. and D.C. quantity		
3.2	Advantages of A.C. over D.C.		
3.3	waveform of sinusoidal A.C. cycle		
3.4	Generation of single phase A.C. by elementary alternator		
3.5	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 but simple numerical on it)		
3.6	Vector representation of sinusoidal A.C. quantity, review of phasor algebra, representation of A.C. quantity in rectangular and polar form.		
3.7	Phase angle, phase difference, concept of lagging and leading – by waveforms, mathematical equations and phasors.		
3.8	Pure resistance in A.C. circuit – waveforms, equations and vector diagram (no derivation)		
3.9	Pure inductance in A.C. circuit – waveforms, equations and vector diagram (no derivation)		
3.10	Pure capacitance in A.C. circuit – waveforms, equations and vector diagram (no derivation)		
3.11	Concept of impedance and impedance triangle.		
3.12	Power – active, reactive and apparent, power triangle.		
3.13	Power factor and its significance.		
3.14	R-L series circuit – vector diagram, voltage and current equations.		
3.15	R-C series circuit – vector diagram, voltage and current equations.		

3.16	R-L-C series circuit – vector diagram, voltage and current equations.		
3.17	Simple numerical on R-L, R-C and R-L-C series circuit		
4	**Polyphase circuits**	06	10
4.1	Advantages of 3 phase system over 1 phase system		
4.2	Principle of 3-phase emf generation and its wave form		
4.3	concept of phase sequence and balanced and unbalanced load		
4.4	Relation between phase and line current, phase and line voltage in Star connected and Delta connected balanced system. (no derivation)		
4.5	Calculation of current, power, power factor in a 3 phase balanced system (simple numerical)		
5	**Transformer**	08	12
5.1	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)		
5.2	Emf equation (no derivation)		
5.3	Voltage ratio, current ratio and transformation ratio.		
5.4	kVA rating of a transformer		
5.5	Losses in a transformer		
5.6	Auto transformer – comparison with two winding transformer, applications		
6	**D.C. Motors**	06	10
6.1	Review of force on current carrying conductor, Flemings left hand rule		
6.2	Construction – brief description of each part its function and material used.		
6.3	Principle of operation		
6.4	Significance of back emf		
6.5	Types of D.C. motors		
6.6	Torque equation expression only (no derivation)		
6.7	Schematic diagram, characteristics and applications of dc shunt, series and compound motors.		
6.8	Necessity of starter		
6.9	Reversal of rotation of D.C. motor		
7	**Three phase induction motors**	05	10
7.1	Construction and principle of working		
7.2	Types – Squirrel cage and slip ring		
7.3	Synchronous speed, slip speed, slip and rotor frequency (no numerical)		
7.4	Torque – speed characteristics		
7.5	Necessity of starter		
7.6	Speed control methods – brief description only		
7.7	Reversal of rotation of 3 phase induction motor		
8	**Fractional Horse Power (FHP) motors**		

8.1	Schematic representation, principle of operation and applications of the Split phase single phase induction motors.	07	10
8.2	Universal motor – principle of operation, reversal of rotation and applications		
8.3	Stepper motor – types, principle of working and applications		
8.4	Servo motor – types, principle of working and applications		
	Total	**64**	**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 characteristic
2. Make proper connection
3. Take measurements accurately

A) List of Practical:

1. Verification of Kickoff's laws.
2. Verification of any one of the following network theorems
   i. Superposition theorem
   ii. Thevenin's theorem
   iii. Norton's theorem
   iv. Maximum power transfer theorem

   (Note – Select different theorem for different groups of students)
3. To plot charging curve of capacitor through resistance and to determine the time constant.
4. To observe sinusoidal A.C. waveform of any frequency on C.R.O. and to determine its frequency, time period, peak value, rms value, peak factor and form factor.
5. To draw vector diagram and to determine power factor of R-L-C series circuit.
6. To determine the relationship between line and phase values in three phase balanced star or delta connected load.
7. To determine transformation ratio of single phase transformer and to perform polarity test on single phase transformer.
8. To determine % efficiency and % regulation of a single phase transformer by direct loading.
9. Study of any one D.C. motor in your laboratory. Write a report based on the following points.
   - Rating (Specification)
   - Foundation arrangement
   - Supply arrangement
   - Continuity and insulation test
   - Identification of its terminals
   - Sketch different parts and state the function of each part in brief

Observe the direction of rotation reverse it.

10. To determine % slip of three phase induction motor and to reverse its direction of rotation.

B) Field work / Mini Project:

1. There are many electric devices / machines / equipment available in the market. Select any one device which is not included in your syllabus and prepare a short power point presentation for the class about how it works its features, cost, connections etc.
2. Search the web site www.howstuffworks.com and learn the basics of electricity, principle of working of motors and generators etc.
   Utilize professional practice periods for this work.

Learning Resources:
Books:

Sr. No.	Author	Title	Publisher
01	Mittle and Mittal	Basic Electrical Engineering	Tata McGraw Hill, New Delhi
02	B. L. Theraja,	Electrical Technology Vol – I and II	S. Chand Publications, Delhi
03	Soni, Gupta	Circuit Analysis	Dhanpat Rai and sons New Delhi

Course Name : Electronics Engineering Group

Semester : Third

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

Subject Title : Principles of Digital Techniques

Subject Code : 12069

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)**

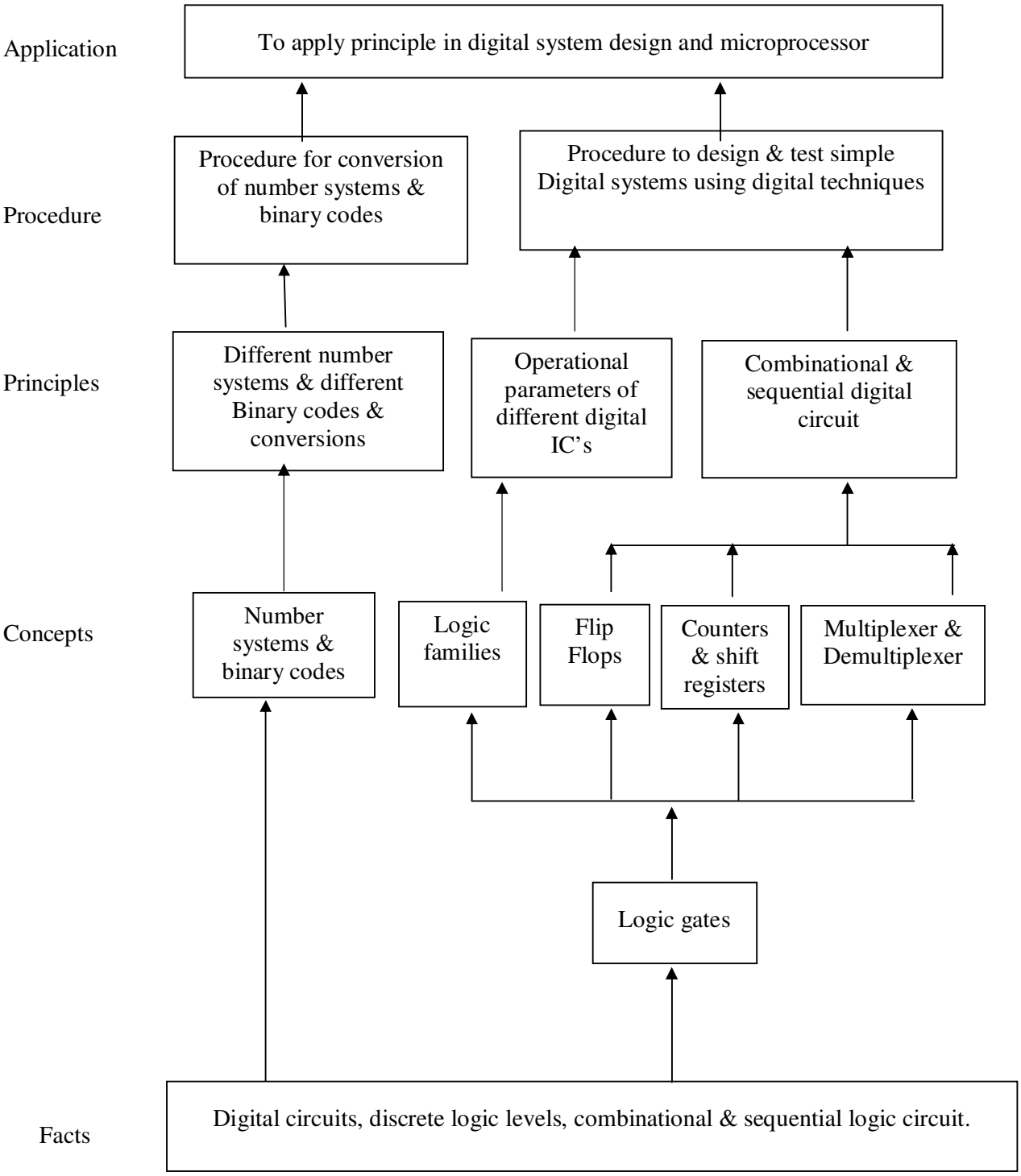
Rationale:

The advancements in microelectronics design, manufacturing, computer technology and information systems have caused the rapid increase in the use of digital circuits. Hence this subject is intended to learn facts, concepts, principles and applications of digital techniques. Thus, students can sharpen their skills of digital design by learning the concept of number systems, logic gates, combinational and sequential logic circuits etc.

Objectives: The subject student will be able to

1. Design basic digital circuits.
2. Do conversion of number systems.
3. Describe operation of basic logic gates.
4. Design of combinational circuit.
5. Design of sequential circuit.
6. Compare logic families.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hours	Marks
1.	**Number System** 1.1 Introduction to digital system. 1.2 Number System - Introduction to Binary, Octal, Decimal, Hexadecimal number system, Conversion of number systems, 1's complement and 2's complement, Binary arithmetic (addition, subtraction, division, multiplication). 1.3 Codes - BCD codes, 9's and 10's complement, 8421 BCD codes, Excess – 3 code, gray code, BCD arithmetic (addition, subtraction).	06	12
2.	**Logic Gates** 2.1 Fundamental concepts of Boolean algebra - Basic laws: Cumulative, Complement, Associative, Distributive, De Morgan's theorems. 2.2 Logic gates - Basic gates: NOT, AND, OR (Symbol, Truth table, Applications), EX-OR, EX-NOR (Symbol, Truth table, Application), Universal gates: NOR, NAND. NOR as Universal gate, NAND as universal gate.	04	12
3.	**Combinational Logic Circuits** 3.1 Introduction to combinational logic circuit. 3.2 Standard representation of Canonical forms (SOP & POS, Minterm, Maxterm) - Conversion between SOP & POS, Numericals based on above topic, Don't care conditions. 3.3 K – map reduction techniques and realization (only for SOP – 2, 3, 4 variables), Realization using K – map techniques of Half adder, full adder, Half subtractor, full subtractor, gray to binary, binary to gray converter, BCD to 7 – segment decoder using K-map. 3.4 Multiplexer - Necessity of multiplexer, Types of multiplexers 2:1, 4:1, 8:1, 16:1 with realization, Multiplexer Tree, Study of MUX ICs 74150, 74151, 74152, 74153, 74157, Applications of multiplexer. 3.5 Demultiplexer - Necessity and Principle of Demultiplexer, Types and realization of De Mux 1:2, 1:4, 1:8, 1:16, Demux Tree, Application of Demux as decoder, Study of ICs 74138, 74139, 74154, 74155.	16	32

4.	**SEQUENTIAL LOGIC CIRCUIT** 4.1 Introduction to Sequential Logic Circuit - Difference between combinational and sequential circuit. 4.2 Triggering methods (edge & level Trigger). 4.3 One bit memory cell - RS latch – using NAND & NOR. 4.4 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. 4.5 D and T flip flop. 4.6 Excitation table of flip flops. 4.7 Study of IC 7474 and 7475. 4.8 Applications of flip flops - Asynchronous counter: up/down, decade, 3 bit synchronous counter design, ring counter, twisted ring counter with wave forms, 4 bit shift register (SISO, SIPO, PISO, PIPO) with waveforms, Study of IC 7490 (mod – 6, mod – 20).	14	28
5.	**Logic Families** 5.1 Characteristics of logic gates: propagation delay, power dissipation, Fan in, Fan out, current sinking, current sourcing. 5.2 TTL logic family - Introduction to TTL logic, Realization of basic gates using TTL logic, TTL NAND gate – Totem pole output, open collector. 5.3 ECL logic family - Introduction to ECL logic, ECL OR, NOR gate. 5.4 MOS families - Introduction to PMOS, NMOS & CMOS logic, Realization of PMOS inverter, NAND, NOR, Realization of NMOS inverter, NAND, NOR, Realization of CMOS inverter, NAND, NOR. 5.5 Comparison of different logic families. 5.6 Study of 7400 TTL series / CD 4000 series gate ICs.	08	16
	Total	**48**	**100**

Practical:

Skills to be developed:

Intellectual skills:

1. Identification of digital IC's of logic gates, Flip-flops, multiplexer and demultiplexers.
2. Ability to test different digital ICs.
3. Ability to design the combinational and Sequential logic circuits.

Motors skills:

1. Ability to build the circuit.
2. To observe the result and handling the equipments.

List of Practical:

1. To know your laboratory of Principles of Digital Techniques
2. To verify the truth table of Basic logic gates using diode and transistor.
3. To Verify De' Morgan's Theorem.
4. To Verify NAND and NOR gate as universal logic gate.
5. To design and realize adder and subtractor.
6. To design and realize 3 bit binary to gray and gray to binary converter using gates.
7. To verify the operation of Multiplexer IC 74151 and Demultiplexer IC 74155
8. To realize and verify RS flip flop using NAND gate and verify master slave JK Flip-Flop usind IC 7476.
9. To verify SISO shift register performing right shift operation
10. To design 4 bit ripple counter (asynchronous up counter) using IC 7476
11. To implement the circuit assigned as mini project. (Any One)

Mini Projects:

1. Design 1 digit BCD to 7 segment decoder using IC7447.
2. Design 4 bit binary adder/subtractor using IC7483.
3. Design 4 bit synchronous counter using IC7476.
4. Design decade counter using IC7492/93.

Learning Resources:

Books:

Sr. No.	Author	Title	Publisher
1.	R. P. Jain	Modern Digital Electronics	Tata McGrew Hill
2.	Malvino & Leach	Digital Principles & Applications	Tata McGrew Hill

Course Name: Electronics Engineering Group

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

Semester : Third

Subject Title : Industrial Measurements

Subject Code : 12070

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

Rationale:

Reliable Measurements of various process quantities has been important for trade and commerce for Industrial activities.

Modern Engineering practices require adequately precise and fast measurement. This subject deals with measurement principles of process parameters like pressure, flow, level, temperature, displacement, humidity etc. covering nearly the entire gamut of Industrial Measurement.

Transducers are used for Measurement of parameters. Their specifications, limitations and applications, along with their static and dynamic behavior is important for studying this subject.

The prerequisite knowledge of these topics is essential for understanding process Instrumentation.

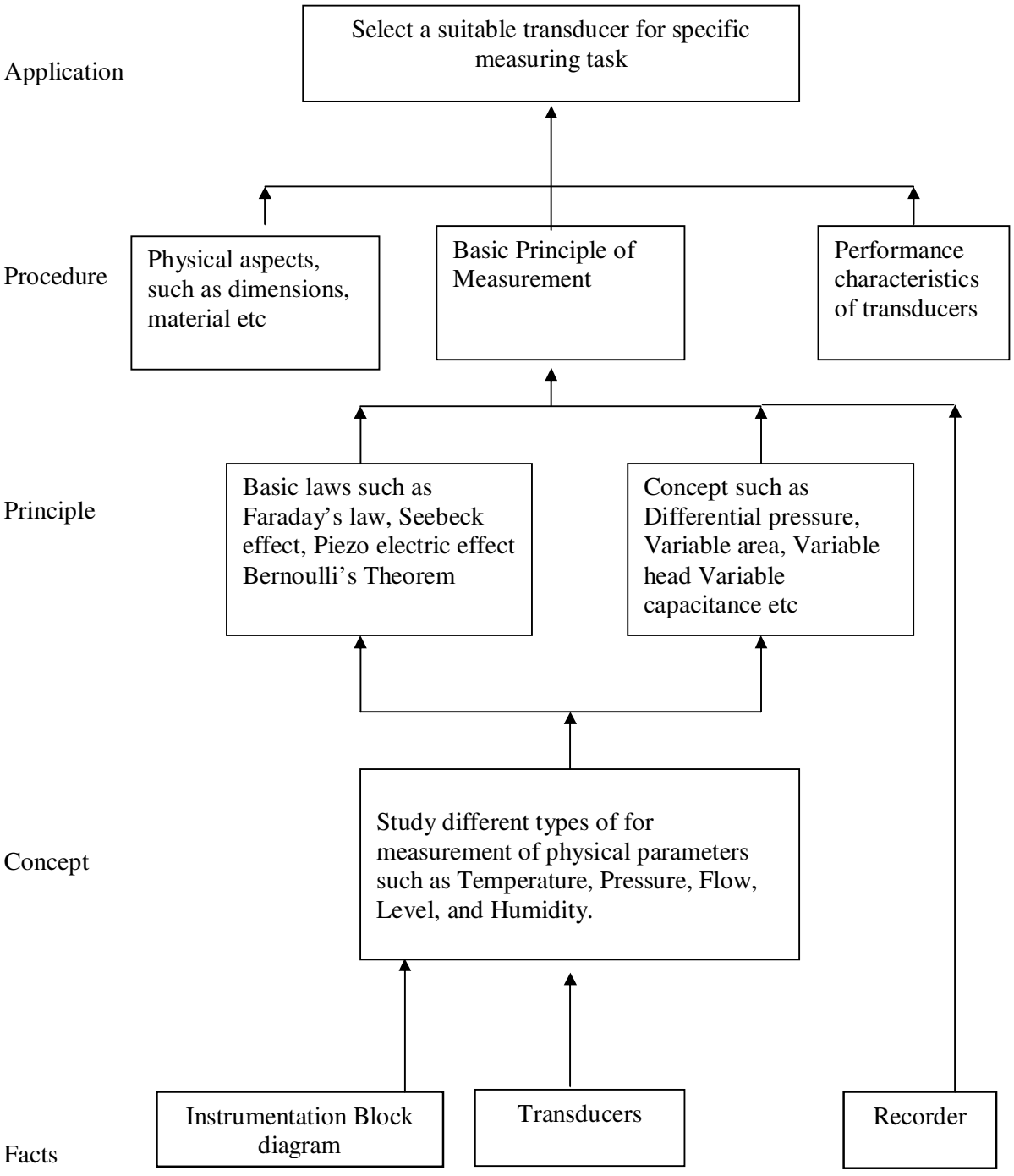
With this the student will be able to develop the supervisory skill and will be able to work as technician in Industries.

Objectives:

Student will be able to:

1. Select the most suitable transducer based on its performance characteristics, for specific measuring tasks
2. Define the physical quantities with proper units to ensure precise technical communication about the results of Measurement and perform calculations.
3. Use correct units for given Measurement.
4. Compare different types of transducer on their performance characteristics and applications.
5. Learn the operating principles of transducers for Measurement of pressure flow, level, temperature, displacement and humidity.
6. Solve problems related to range accuracy dead time etc.

Learning Structure:



Content: Theory

Chapter	Name of the Topic	Hours	Marks
01	**Transducers** 1.1 Definition 1.2 Classification based on • External power source required (Active, Passive) • Type of output (Analog and digital) • (Primary, secondary) 1.3 Selection Criteria 1.4 Block diagram of Instrumentation System. Explanation and need of each block. 1.5 Need of Recorder – Strip chart recorder, X-Y recorder (Block diagram, Principle of Working, Construction, Advantages & Disadvantages and Applications)	**04**	**10**
02	**Pressure Measurement** 2.1 Absolute, Gauge, Atmospheric, Vacuum – definition, Concept and Units 2.2 Principle of Working, Construction, Advantages & Disadvantages and Applications of 2.2.1 Manometers – Inclined Tube, U-Tube, Well Type 2.2.2 Elastic Pressure Transducers – Bourdon Tube, Bellows, Diaphragm, Capsule 2.2.3 Electronic Pressure Transducers – Strain gauge pressure transducer, LVDT, Piezoelectric 2.2.4 Calibration of Pressure Instruments – Dead Weight Tester	**08**	**20**
03	**Flow Measurement** 3.1 Types of Flow – Laminar, Turbulent, Reynold's number (Overview only) 3.2 Principle of Working, Construction, Advantages & Disadvantages and Applications of 3.2.1 Head Type Flow Meters – Ventury, Orifice Plate, Pitot Tube 3.2.2 Variable Area Flowmeter- Rotameter 3.2.3 Electromagnetic Flowmeters 3.2.4 Vortex Type Flowmeters- vortex shedding flowmeter 3.2.5 Corioli's Mass Flow Meter 3.2.6 Ultrasonic flow meter – Time Difference type, Doppler flowmeter. 3.2.7 Positive Displacement Flowmeters – Nutating Disc meter, Lobed Impeller Meter	**10**	**20**
04	**Level Measurement** 4.1 Principle of Working, Construction, Advantages & Disadvantages and Applications of 4.1.1 Float Type Level gauges 4.1.2 Hydrostatic Type Level Instruments –Air purge methods 4.1.3 Ultrasonic Level Measurement- Doppler and Time difference type 4.1.4 Radiation Level Measurement 4.1.5 Capacitive level measurement.	**08**	**16**

05	**Temperature Measurement** 5.1 Temperature Scales and their Conversion 5.2 Principle of Working, Construction, Advantages & Disadvantages and Applications of 5.2.1 Filled Systems – Liquid and Gas Filled thermometers 5.2.2 Bimetallic Thermometers 5.2.3 RTDs – PTC, Pt-100 (2-3-4 Wire systems-only circuit, no derivation) 5.2.4 Thermistor – types 5.2.4 Thermocouples – Seeback & Peltier Effect, Law of Intermediate Metals and Temperatures, Types J,K,R,S,T based on materials and temperature 5.2.5 Pyrometers – Radiation and Optical	**10**	**20**
06	**Miscellaneous Measurements** 5.1 Humidity – Absolute and Relative 5.1.1 Dry & Wet Bulb Thermometer – Psychometric Charts 5.1.2 Hair Hygrometer 5.2 Speed 5.2.1 Tachogenerators – A.C. & D.C. 5.2.2 Non-Contact Type – Photoelectric, Magnetic Pick Up Type	**08**	**14**
	Total	**48**	**100**

Practical:

Skills to be developed:

Intellectual Skills:

1. Reading
2. Sourcing of Web sites

Motor Skill:

1. Testing
2. Measurement

List of Practical:

1. Pressure Measurement by using strain gauge or To study pressure sensing elements (Bourdon tube, Diaphragm etc)
2. Calibration of pressure gauge by using dead weight pressure gauge tester.
3. Flow rate Measurement by using Rotameter

   Or Flow rate Measurement by using venturi.

   Or Flow rate Measurement by using Orifice
4. Level Measurement by using air purge system.
5. To plot the Characteristics of RTD (PT-100) and Thermocouple
6. Speed Measurement by using Tachometer

7. Humidity Measurement by using Hygrometer

Or Vibration Measurement

8. Displacement or Position Measurement by using rotary encoder
9. Displacement Measurement by using LVDT
10. Calibration of Temperature Measuring Instrument
11. To record temperature using Strip Chart Recorder (Optional; may be included at the time of further revision)

NOTE:

- Take at least one Practical on Temperature transducer.
- Take at least one Practical on Pressure transducer.
- Take at least one Practical on Flow transducer.
- Others are compulsory.

Learning Resources:
Books:

Sr. No.	Author	Title	Publisher
1	S.K.Singh	Industrial Instrumentation and control	Tata McGraw Hill
2	A.K.Sawhney	Electrical and Electronic Measurements and Instrumentation	Dhanpat Rai & Sons,
3	D.Patranabis	Principles of Industrial Instrumentation	Tata McGraw Hill
4	B.C.Nakra K. K.Chawdhry	Instrumentation Measurement and Analysis	Tata McGraw Hill
5	Rangan Mani Sharma	Instrumentation systems and devices	Tata McGraw Hill
6	Bela Liptak Kriszta Venczel	Process Measurement Instrument Engineers Handbook	Chilton Book Co.

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Programming in 'C'

Subject Code : 12071

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
01	--	02	--	--	50#	--	25@	75

Rationale:

'C' is the most widely used computer language, which is being taught as a core subject. 'C' is general-purpose structural language that is powerful, efficient and compact, which combines features of high-level language and low-level language. It is closer to Man and Machine both. Due to this inherent flexibility and tolerance it is suitable for different development environments .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 to develop Operating system like applications C is still considered as first priority programming language.

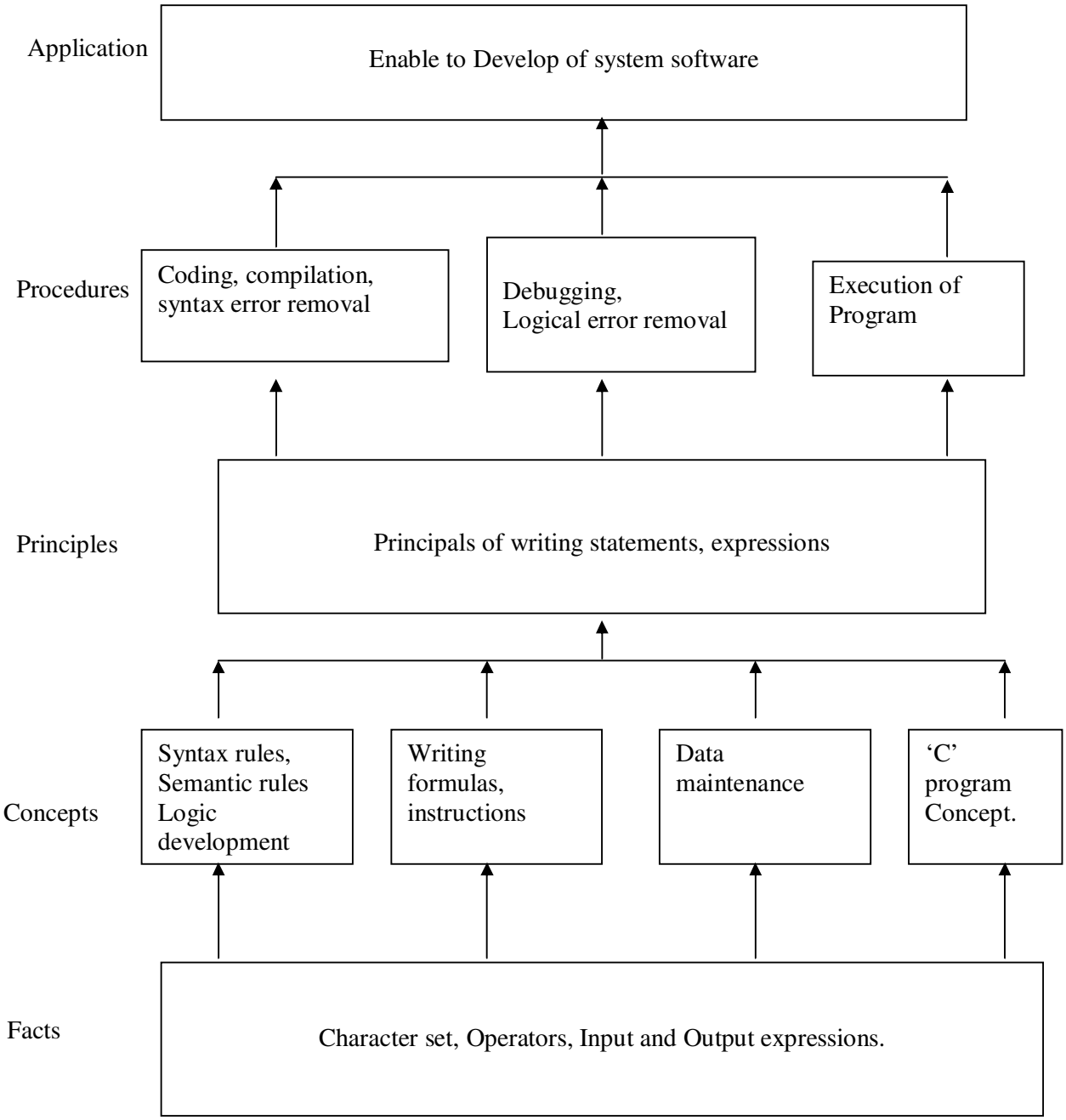
This subject covers from the basic concept of C to the pointers in C. This subject will act as "programming concept developer" for students. It will also act as "Backbone" for subjects like OOPS, VB, Windows Programming, JAVA, OOMD, etc.

Objectives:

The students will be able to:

1. Describe the concepts of constants, variables, data types and operators.
2. Develop programs using input and output operations.
3. Write programs using different looping and branching statements.
4. Write programs based on arrays and strings handling functions.
5. Write programs using user-defined functions, structures and union.
6. Write programs using C pointers.

Learning Structure:



Contents: Theory

Chapter	Name of the Topic	Hrs
1	**Basics of C**	02
	1.1 History of C, where C stands 1.2 C character set, tokens, constants, variables, keywords 1.3 C operators (arithmetic, Logical, assignment, relational, increment and decrement, conditional, bit wise, special, operator precedence), C expressions data types 1.4 Formatted input, formatted output.	
2	**Decision making**	03
	2.1 Decision making and branching if statement (if, if-else, else-if ladder, nested if-else) Switch case statement, break statement. 2.2 Decision making and looping while, do, do-while statements for loop, continue statement	
3	**Arrays and Strings**	03
	3.1 Arrays Declaration and initialization of one dimensional, two dimensional and character arrays, accessing array elements. 3.2 Declaration and initialization of string variables, string handling functions from standard library (strlen (), strcpy (), strcat (), strcmp ()).	
4	**Functions, Structures**	04
	4.1 Functions Need of functions, scope and lifetime of variables, defining functions, function call (call by value, call by reference), return values, storage classes. category of function (No argument No return value, No argument with return value, argument with return value), recursion 4.2 Structures Defining structure, declaring and accessing structure members, initialization of structure, arrays of structure.	
5	**Pointers**	04
	5.1 Understanding pointers, declaring and accessing pointers, Pointers arithmetic, pointers and arrays	
	Total	**16**

Practical:
Skills to be developed:

Intellectual skills:

1. Use of programming language constructs in program implementation.
2. To be able to apply different logics to solve given problem.
3. To be able to 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**.**

List of practical:

Write a C program

Any one

1) To display hexadecimal, decimal, octal format of the entered numbers.
2) To display entered number with leading zeros and trailing zeros.
3) To display entered numbers with right justification and left justification.

Any One

4) To demonstrate all possible formatting specifiers.

Any one

5) To find greatest/ smallest of 3 numbers.
6) To display pass class, second-class, distinction according to the marks entered.

Any one

7) To find even or odd numbers.
8) To display spellings of number 1-10 on entry.

Any one

9) To display menu 1. Addition 2. Subtraction 3. Multiplication 4. Division and execute it using switch case.
10) To demonstrate continue and BREAK statements.

Any one

11) To display our College name twenty times on screen.

12) To display all even numbers from 1-100.

13) To perform addition of 1-100 numbers.

Any one

14) To find smallest / largest number from array elements.

15) To sort array elements in ascending / descending order.

Any one

16) To enter elements for 3X3 matrix and display them.

17) To calculate addition / subtraction of 2 dimensional matrix.

18) To calculate multiplication of 2 dimensional matrix.

Any one

19) To demonstrate output of standard library functions

Strlen (), strcpy (), strcat (), strcmp ().

Any one

20) To calculate area of circle using function.

21) To calculate factorial of any given number using recursion.

Attempt All

22) To demonstrate call by reference, call by value

23) To maintain and manipulate student data using structure.

24) To perform 4 arithmetic functions on pointers.

Learning Recourses:

1. Books:

Sr.No.	Author	Name of the Book	Publisher
1	Balgurusamy	Programming in 'C'	Tata Mc-Graw Hill
2	Kanetkar	Let's 'C'	BPB
3	Herbert Shildt	Complete reference C	Tata Mc-Graw Hill

2. Websites:

- http://cplus.about.com/od/beginnerctutoriali/a/blctut.htm
- http://computer.howstuffworks.com/c.htm
- Objective questions:
    1. http://www.indiastudycenter.com/studyguides/sc/objtest/default.asp

Demo lectures with power point presentations using LCD projector should be arranged to develop programming concepts of students.

Course Name : Electronics Engineering Group

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

Semester : Third

Subject Title : Professional Practices-III

Subject Code : 12072

Teaching and Examination Scheme:

Teaching Scheme			Examination Scheme					
TH	TU	PR	PAPER HRS	TH	PR	OR	TW	TOTAL
--	--	05	--	--	--	--	50@	50

Rationale:

Most of the diploma holders jin 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.

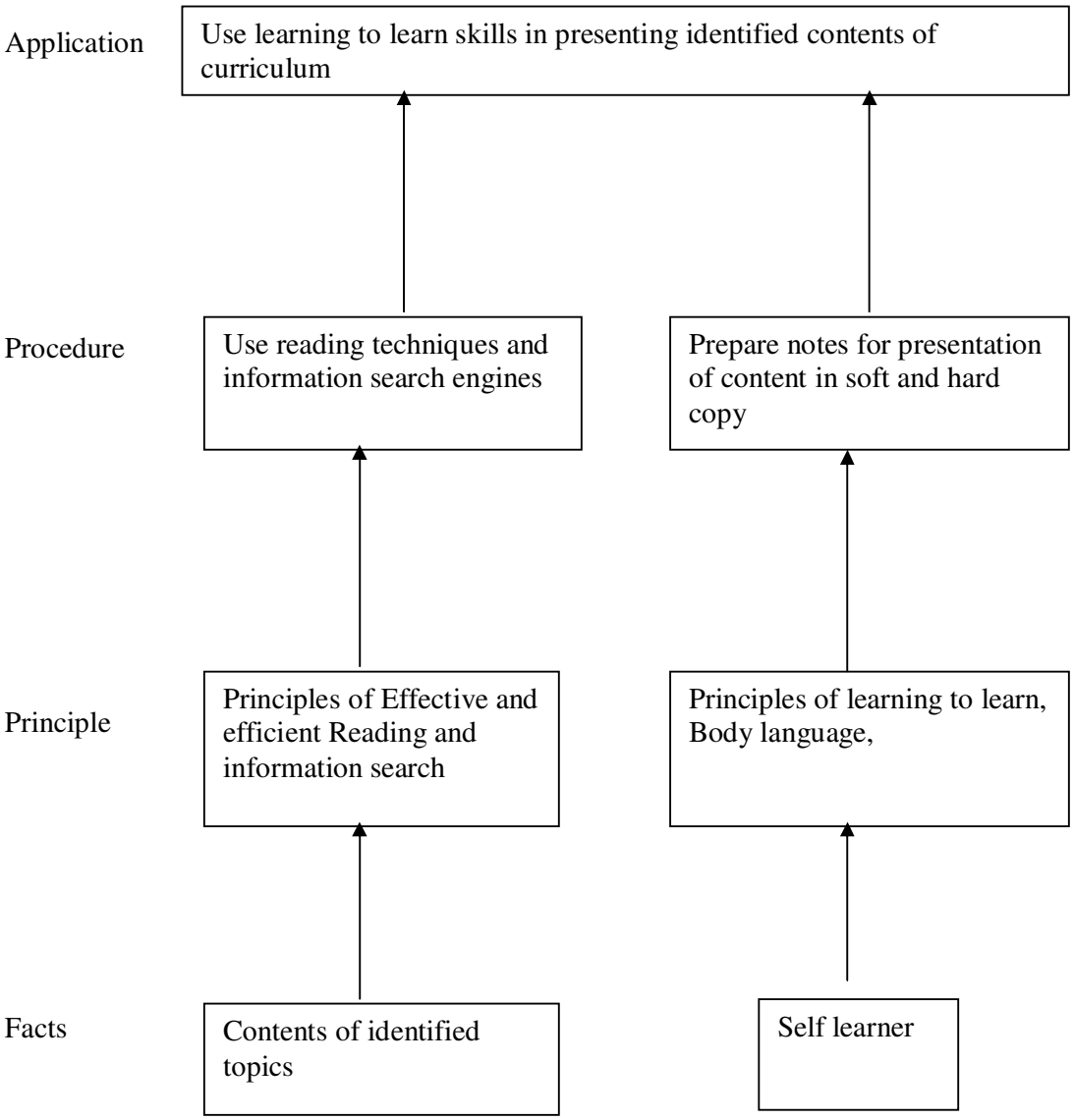
The purpose of introducing professional practices is to provide opportunity to students to undergo activities which will enable them to develop confidence. Industrial visits, expert lectures, seminars on technical topics and group discussion are planned in a semester so that there will be increased participation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

Objectives:

Student will be able to:

1. Acquire information from different sources.
2. Prepare notes for given topic.
3. Present given topic in a seminar.
4. Interact with peers to share thoughts.
5. Prepare a report on industrial visit, expert lecture.

Learning Structure:



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) Residential building for Electronic security systems iv) Small hydro power station v) Wind mill	24
2	**Lectures by Professional / Industrial Expert to be organized from of the following areas (any four)** i) Non conventional energy sources ii) Energy audit iii) Water pollution control iv) Software for P.C.B. layout v) Mobile communication vi) Various government schemes such as EGS, vii) Industrial hygiene. viii) Hydro power generation	16
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. 1. Water supply schemes/Problems of drinking water in rural area 2. Problems related to traffic control 3. Electronic rolling display 4. Electronic systems used in Multiplex 5. Pani Panchayat Yojana for equal distribution of water 6. Any other suitable topic	20
4	**Market Survey:** A group of four students is expected to collect information from the market regarding specifications and cost of any four items CRO, Multimeter, UPS, Power supply for brand name, specifications, cost and applications.	20
	Total	**80**