

# AMBEDKAR POLYTECHNIC



**CURRICULUM FOR DIPLOMA COURSE**

**IN**

**COMPUTER ENGINEERING**

**FIRST YEAR**

**(TERM I & TERM II)**

**FOR**

**DELHI STATE**



**GOVT. OF DELHI**  
**AMBEDKAR POLYTECHNIC**  
**PATPAR GANJ ROAD,**  
**SHAKARPUR, DELHI - 110 092**

**BOARD OF TECHNICAL EDUCATION, DELHI**  
**STUDY AND EVALUATION SCHEME-SCHEMS-SEMESTER SYSTEM**  
**COMPUTER ENGINEERING**

TERM-I

S.NO	SUBJECT	LTP	EVALUATION SCHEME						TOTAL MARKS
			INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
			THEORY	PRACTICAL	WRITTEN MARKS	HOURS	PRACTICALS	HOURS	
1	Communications Skills	3 2 -	50	-	100	3	-	-	150
2	Applied Maths-I	4 2 -	50	-	100	3	-	-	150
3	Engineering Drawing	2 - 6	-	50	100	3	-	-	150
4	Introduction to Information Technology	2 - 8	50	50	-	-	100	3	200
5	Workshop Practice	- - 6		50	-	-	50	3	100
	Student Centred Activities	5							
		11 4 25	150	150	300		150		750

TERM-II

S.NO	SUBJECT	LTP	EVALUATION SCHEME						TOTAL MARKS
			INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
			THEORY	PRACTICAL	WRITTEN MARKS	HOURS	PRACTICALS	HOURS	
1	Applied Maths-II	4 1 -	50	-	100	3	-	-	150
2	Applied Physics	4 1 3	50	50	100	3	50	3	250
3	Basic Electronics	3 1 4	50	50	100	3	50	3	250
4	Electrical Engg.	3 - 3	50	50	100	3	50	3	250
5	Programming in C	3 1 4	50	50	100	3	50	3	250
	Student Centred Activities	5							
		17 4 19	250	200	500		200		1150

## TERM-III

S.NO	SUBJECT	LTP	EVALUATION SCHEME						TOTAL MARKS
			INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
			THEORY	PRACTICAL	WRITTEN M MARKS	HOURS	PRACTICALS	HOURS	
1	Operating System	313	50	50	100	3	50	-	250
2	Digital Electronics	313	50	50	100	3	50	3	250
3	Data structure in C	313	50	50	100	3	50	3	250
4	Micro Processor	313	50	50	100	3	50	3	250
5	Computer in Workshop-I	-- 6	-	50	-	-	50	-	100
6	Student Centered activities	6							
		12 4 24	200	250	400		250		1100

## TERM-IV

S.NO	SUBJECT	LTP	EVALUATION SCHEME						TOTAL MARKS
			INTERNAL ASSESSMENT		EXTERNAL ASSESSMENT				
			THEORY	PRACTICAL	WRITTEN M MARKS	HOURS	PRACTICALS	HOURS	
1	Object oriented programming	3 1 4	50	50	100	3	50	3	250
2	Computer Organization	3 1 -	50	-	100	3	-	-	150
3	Data Communication	3 1 3	50	50	100	3	50	3	250
4	Data Base Management System	3 1 3	50	50	100	3	50	3	250
5	Peripheral & Interfaces	3 1 3	50	50	100	3	50	3	250
6	Computer workshop-II	- - 4	-	50		-	50	3	100
	Student Centred Activites	3							
		15 5 20	250	250	500		250		1250

Note:

- 1 . A three day awareness Camp shall be offered on ecology and environmental during third semester
2. A three day awareness camp shall be offered on entrepreneurship
3. In each semester 2 hours will be devoted towards student: centred activities during these periods,  
student may undertake independent library studies and may contact their teacher for removing their difficulties. In addition, extension lectures may from professionals, Industrial /field visits, seminar, NCC, hobby clubs and other co-curricular activities can be undertaken.
4. Two days awareness camp shall be offered on emerging area/technology in field of computer & communication in 2nd year.
5. Seminar is to be given by the student on the latest topics and projects undertaken under the guidance of a teacher.

**COMPUTER ENGINEERING  
DETAILED CONTENTS  
OF  
VARIOUS SUBJECTS  
FIRST YEAR**

<b>Sr. No.</b>	<b>Subjects</b>	<b>Page No (S)</b>
<b>SEMESTER-I</b>		
1.1	Communication Skills	01
1.2	Applied Math-I	02
1.3	Engineering Drawing.	03
1.4	Introduction to information Technology	03
1.5	Workshop Practice	06
<b>SEMESTER-II</b>		
2.1	Applied Maths - II	07
2.2	Applied physics (Theory)	08
2.3	Basic Electronics	10
2.4	Electrical Engineering	11
2.5	Programming in C.	13

## Rationale

Diploma holders are supposed to communicate effectively through verbal and written modes. They are also expected to acquire skills in preparing different kinds of reports as globalization has made reporting an essential part of communication (interaction). In view of the above requirements, this subject has been added to develop necessary competencies in written and oral communication. Efforts should be made to arrange practice sessions to encourage active participation in mutual interaction.

## Detailed Contents

**1.Introduction:** Definition of communication, its purpose and importance.

**2.Methods of communication:**

Oral, written and non-verbal (presentation, interview, group discussion, Telephonic communication. Concept of effective communication and its essentials.  
Barrier to communication technique of overcoming these barriers.

**3.Written communication :** Drafting of notices with or without agenda, press release advertisements, memoranda circular Forces, electronics mail. complaints, representations, and letters to the editor.

**4.Business Correspondence :**

Trade inquiry Request for Prices and Quotations  
Offers and Quotations  
Placing orders and their Executions  
Claims. Complaints and Adjustments  
Business Circulars like launching a new product, Change of premises, Relating to opening new business etc.

**5.Letter Writing:** Application for employment. covering letter forwarding an application, Preparation of Curriculum Vitae/Resume Application on prescribed form, preparing job related advertisement.

**6.Precis writing:** Making precis of an unseen passage of about 200 to 250 words and giving a suitable title also.

**7.Report writing:** Different types of reports, Essential of a good and effective report, drafting press report/release reporting in letter style and in memo style

## Guidelines for Tutorials

1. Telephonic conversation - Making and Receiving Calls
2. Mock Exercises on interview for a Job
3. Group discussions on current issues
4. Listening comprehension from Radio or TV talk in English
5. Extempore speech/Declaration contents
6. Presentation of a report with the help of Audio-Visual aids.

## PREFERENCE BOOKS

1. Essentials of Business Communication by Rajendra Pal & J S Korlahalli (Sultan Chand & Sons)
2. Business Communication -- K.K. Sinha (Galgotia Publishing House)
3. Communication Techniques /Skills - R K Chadha (Dhanpat Rai Publications) .
4. Applied Indian Communication Techniques:- P Prasad (S.K. Katani & Sons)
5. A guide to Business Correspondence - A.N. Kapoor (S. Chand & Company Ltd).

# APPLIED MATHS-I

L T P  
4 1 -

## Rationale

Applied mathematics forms the backbone of engineering discipline. Basic elements of permutation and combination, trigonometry, vectors, complex numbers and statics have been included in the curriculum as foundation course and to provide base for continuing educations to students.

## Detailed contents

### 1. Determinants & Matrices

Determinant (up to 3<sup>rd</sup> order only) - Expansion of Determinant Sarus' diagram

Row and Column expansion

Properties of determinant

Matrices - Types of matrices

Addition, Subtraction & Multiplication of matrices

Properties of addition, multiplication and scalar multiplication of matrices

Inverse of a matrix by adjoint matrix method

Solution of linear equations by matrix method

### 2. Vector Algebra

Definition, notation and rectangular resolution of a vector. Addition and subtraction of vectors and their properties, Scalar and vector products of two vectors only and their properties

### 3. Coordinate Geometry

Point: Cartesian and polar co-ordinates and their conversion, distance between two point, internal and external division formula, co-ordinates of centroid and incentre, Area of triangle, conditions of collinearity of points, simple problems on locus.

Straight line : Equation of a straight line in various standard forms. angle between straight lines, perpendicular distance formula.

Circle :The equation of circle in standard and general form, finding the equation of circle when its centre and radius are given any three points on it are given extremities of the diameter are given  
Conics Definitions of conics -- parabola, ellipse and hyperbola and their standard equations Finding the equation of a parabola when its focus and directrix or focus and vertex are given Finding the equation of an ellipse or hyperbola when focus, directrix and eccentricity are given. Given the standard, equation of conic, to find its focus directrix, vertex, axis, eccentricity and the length of latus rectum .

### 4. Differential Calculus

Limits: Concept of function, its value and limit, Evaluation of limits, four standard limits only, namely

$$\begin{array}{l} \lim_{x \rightarrow 0} \frac{\sin x}{x} \qquad \lim_{x \rightarrow 0} (1+x)^{1/x} \\ \lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} \qquad \lim_{x \rightarrow 0} \frac{a^x - 1}{x} \end{array}$$

Differentiation: Definition, its physical meaning as rate measure and its geometrical meaning.

Differentiation from First principles of  $x^n$ ,  $A^x$ ,  $\log^x$ ,  $\sin x$ ,  $\cos x$ ,  $\tan x$  only

Differentiation of  $\cot x$   $\sec x$   $\operatorname{cosec} x$  and of inverse t-ratios.

Differentiation of sum, product and quotient of functions.

Differentiation of function of a function.

Differentiation of implicit Function and Parametric equations. Logarithmic differentiation.

## REFERENCE BOOKS

1. Applied mathematics for polytechnics (8th Ed.) - H.K.Dass

2. Differential Calculus-Shanti Narayan .

3. Determinants-Schaum Series

4 Matrices-Schaum Series

5. Simple course in coordinate Geometry H.K .. Dass, H.C. Saxena, M.D. Raisinghoria

# ENGINEERING DRAWING

## RATIONALE

Engineering Drawing Known as the language of engineers is a widely used means of communications among the designers, engineers, technicians, draftsmen and craftsmen in the industry. The transition of ideas into practice without the use of this graphic language is really beyond imagination. The diploma holder is required to read and interpret the designs and drawings, provided to him for actual execution of the job. This course aims at building a foundation for comprehension of this language of engineering profession.

## DETAILED CONTENTS

### Introduction to Instruments and Material Used in Drawing

Plate No.1: Free hand sketching

Plate No.2: Conventional representation of lines, material, breaks, electric and electronics symbols.

Plate No.3 Free hand lettering and numerals in 3, 5, 8 & 12 mm series.

Vertical & inclined lettering at  $75^\circ$ , instrumental single stroke lettering in 12 mm

Plate No.4: Dimension techniques

Plate No.5: Three views of an object in first angle Projection

Plate No.6: Six views of an object in first angle projection

Plate No.7: Three views of an object in third angle projection

Plate No.8: Six views of an object in third angle projection

Plate No.9: Identification of surfaces from different objects including inclined & curved surfaces

Plate No.10 Sections - conventional representation of materials, general conventions of revolved & removed sections

Plate No. 11: Representation of pictorial / isometric of a simple object

Plate No.12 Isometric views of simple objects including slant & curved surfaces

Plate No.13 Isometric of a circle, semicircle, arcs & angles

Plate No.14 Missing views & lines

Plate No.15 Scales, diagonal scale, scale of chords.

### Reference Books

1. A text book of Engineering Drawing-Surjeet Singh

## INTRODUCTION TO INFORMATION TECHNOLOGY

### Rationale

Information technology has great influence on all aspects of life. Almost all work places and living environment are being computerized. In order to prepare diploma holders to work in these environments, it is essential that they are exposed to various aspects of information technology such as understanding the concepts of information technology and its scope; operating a computer : use of various tools of MS Office using internet etc

### Detailed Contents.

1. Information Technology : Its concepts and scope information seeking, information processing and information transmission.
2. Elements of Computers and Its working: Block diagram of Computer, input, output and storage devices, memory- primary and secondary, system software, application software.  
Types of Computers - Stand alone, multi-user, network/distributed, personal, micro computers, workstations, servers, mainframes and super computers.
3. Document preparation using word processing software: Purpose and characterisation of documents, spell checking, mail merge, paragraph and page layout, alignment and justification, tables, charts. graphs, diagrams,



4. **Document Presentation Using Power Point:** preparation of slides and its presentation, hyperlinks.
  5. **Concept of Spreadsheet :** handling using spread sheets formulae, Graphs and Charts
  6. **Information Storage and Material :** creating, editing and viewing database, adding, deleting and undeleting records, searching a database, ordering the database, on a selected key.
  7. **Basic of Networking & Internet :** Concept of networking, Overview of Internet Browsers. E-mail, www, http, FTP.
- Virus:** learning various type of virus such as Polymorph virus, Stealth virus Boot Sector virus, file virus, partition table virus

Virus Detection, Prevention and cure

### List of Practical

1. Given a PC, name its various components and list their functions
2. identification of various parts of a computer and peripherals
3. Practice in installing a computer system by giving connections and loading the system software and application software.
4. Feature: of Windows 2000 / Windows XP
  - start
  - shut down and restore
  - creating operating on the icons
  - opening , closing and sizing the windows-using elementary job commands like - creating saving modifying, renaming, finding and deleting a file
  - creating and operating a folder
  - changing setting like-date ,time ,color (background and foreground)
  - using shortcuts
  - using online help
  - Windows system Tools
  - Control Panel.

### 7. MS WORD

- File Management:
  - Opening creating and saving a document, locating files copying contents in some different file (s).
- Page setup:
  - Setting margins, tab setting, ruler indenting
- Editing A Document :
  - Entering text, cut, copy, and paste using toolbars.
- Formatting A Document:
  - Using different fonts, changing font size and color, changing the appearance through bold / italic / underlined, highlighting a text, changing case, using subscript and superscript using different underline methods.
- Aligning of text in a document Justification of document, inserting bullets and numbering
- Formatting paragraph, inserting page breaks and column breaks
- Use of headers, footers : inserting foot note, endnote, use of comments
- inserting date, time, special symbols, importing graphic images drawing tools
- Tables and border:
  - Creating a table, formatting cells, use of different border styles, shading in tables, merging of cells, partition of cells, inserting and deleting a row in a table.
- Print Preview, zoom, page setup, printing options.
- using find, replace options.
- using tools like:
  - Spell checker, help, use of macros, mail-merge, thesaurus word content and statics, printing envelops and labels-using shapes and drawing toolbar.
- working with more than one window in MS-WORD
- how to change the version of the document from one window OS to another.
- conversion between different text editors, software and MS- WORD.

## **8. MS -EXCEL**

-Starting excel ,open worksheet ,enter ,edit ,data, formulas to calculate values, format data, create chart save worksheet, switching from another spread sheet, printing chart.

-Menu commands:

Create, format chart, organize, manage data, solving problem by analyzing data, exchange with another applications, Programming with ms-excel, getting information while working

-work books:

Managing work books (create, open, close, save).,working in work books, selecting the cells choosing commands ,data entry techniques Formula creation and links ,controlling calculations working with array

-editing a worksheet, copying, moving cells, Pasting, inserting, deletion, cells, rows, columns find and replace text, numbers of cells, formatting worksheet

-Creating a chart

Working with chart types, changing data in chart. formatting a chart. use chart to, analyze data

-using a list to organize data, sorting and filtering data in list

## **9. MS - ACCESS**

-Creating a database; table; the table window in designed view, defining fields primary key fields, planning the table

-Using database sheet view and designed view; modifying the design of a table, making a backup copy,

-Adding and editor:

The access editor, adding and modifying records, moving data among records, adding sample data

-Finding records:

Find options, finds using wild card, find and replace

-Quick sort:

Creating a quick sort, removing a quick sort

## **10. MS-POWER POINT**

-Preparing presentation:

-Creating a new slide. sorting slides, inserting pictures, setting header and footer

-Formatting

Setting fonts, alignments, slide design, slide layout

- Slide show:

View show, Rehearse timing, action buttons, slide transition, animations skills '

## **11. Internet and it's applications**

Log-in to internet

Navigation for information seeking on Internet

Browsing and downloading of information from internet

Sending and receiving e-mail

-Creating a message

-Creating an address book

-Attaching a file with e-mail message

-Receiving a message

-Deleting a message

Configuring MS-Outlook Express

## **Reference Books**

1. Fundamental of computer- V. Rajaraman

2. Computers today - SK Basanda

3. MS-Office 2000 for every one-Sanjay Saxena

4. Internet for everyone -Alexis Leon and Mathews

5. Computer Fundamentals - P.K.Sinha

6. Fundamental of information Technology-Leon and Leon

# WORKSHOP PRACTICE

## Rationale

Manual abilities to handle engineering materials with hand tools to be developed in the students. They will be using different types of tools/equipment in different shops for fabrication purposes. Besides developing the necessary skills the students will appreciate the importance of quality and safety measures.

## Detailed Contents

Following three Shops Are Being Proposed

1. Mechanical Work Shops
2. Electric shop
3. Electronics shop

### 1. Mechanical Work Shop

(1) Demonstration and practice in use of fitting tools & devices.

Introduction & Used use of measuring tools used in fitting shop like : Try square, Steel rule, measuring tape, outside micrometer, vernier caliper and vernier Height gauge

Job : Cutting & fitting practice on a square of 45X45mm form Ms flat

(ii) Exercise on assembling & disassembling of electronic and computer components.

(iii) Demonstration and use of various types of fastener devices.

(iv) Exercises :

- Making Sheet metal Joints
- Making a Sheet metal Tray or computer chases
- Preparation of other sheet metal jobs involving rolling, Shearing, creasing, bending and Cornering

(v) Exercise on soldering and brazing of at least two jobs.

(vi) Exercise on Gas welding of at least two jobs.

(vii) Exercise on painting & Etching.

### 2. Electric shop

- Demonstration of tools commonly used in electric shop.
- Safety precaution, electric shock treatment.
- Demonstration of common Electric material like: Wires, fuses, ceiling roses, battens, cleats and allied items
- Demonstration of voltmeter, ammeter, multi meter and Energy meter
- Job: wire in practice in batten wiring, plastic casing capping and conduit
- Job: Control of one lamp by one switch
- Job: Control of one bell by one switch
- Job: Assemble a type light
- Job: Dismantle study, find out fault, repair the fault, assemble and test domestic appliances like electric iron, Electric mixer, ceiling and table fan, tube-light, water heater (geyser) and desert cooler,
- Job: laying out of complete wiring of house (single-phase and Three-phase)

### 3. Electronic Shop

Identification, familiarization, demonstration and use of the following electronic instruments:

- \*Multi-meter digital
- " Single beam simple CRO, function of every knob on the front panel
- \*Power supply, fixed voltage and variable voltage, single output as well as dual output.
- \*Identification, familiarization and use of commonly used tools; active and passive components; color code and types of resistor and potentiometer.
- \* Cut, strip, join and insulate two lengths. of wires/cables (repeat with different types of cables/wires)
- \* Demonstrate and practice the skill to remove components/wires by unsoldering
- \*Cut, bend, tin component leads inserts Solder components eg. Register capacitor, diodes, transistor on a PCB.
- \*wiring of a small circuit on a PCB/tag strip involving laying, sleeving and use of identifier tags
- \*Demonstrate the joining (or connecting) methods/mounting and dismantling method, as well all uses )f the items mentioned below:
- \*Various types of plugs, sockets, connectors suitable for general purpose audio video use. Some of the such connectors e.g. 2 and 3 pin mains plug and sockets, banana plugs, sockets and similar male and female connectors and terminal strips.
- \*Various types of switches such as normal / miniature, toggle, slide, push button piano key, rotary SPST, SPDT, DPST, band Selector, multi-way Master Mains Swith.
- \*Exposure to modern soldering and desoldering processes (Field visits)
- \*De-solder pump, remove and clean all the components and wires from a given equipment, a PCB or a tag strip.

## Applied Maths - II

### Rationale

Applied mathematics forms the backbone of engineering discipline. Basic elements of differential calculus, integral calculus, differential equation and coordinate geometry have been included in the curriculum as foundation course and to provide a base for continuing education to the students.

### Detailed contents

#### 1. Integral Calculus

- 1.1 Indefinite Integrals
- 1.2 Physical meaning of integration
- 1.3 Integration as inverse process of differentiation
- 1.4 Integration by substitution by parts and by partial fractions
- 1.5 Integration of rational and irrational quadratic, expression viz

$$\frac{dx}{ax^2+bx+c} \quad \frac{dx}{ax^2+bx+c} \quad (ax^2+bx+c) dx$$

- 1.6 Define Integrals
- 1.6.1 Evaluation of Definite Integrals
- 1.6.2 Simple problems of Integration

$$\int \sin^n x dx \quad \int \cos^n x dx$$

$$\int \sin^m x \cos^n x dx \text{ (without proof)}$$

- 1.6.3 Numerical Integration by Simpson's Rule.

#### 2. Fourier series

- 2.1 Periodic function. equation of waves.
- 2.2 Determination of Fourier coefficients expansion of a periodic function by Fourier series.
- 2.3 Function defined in two or more sub ranges.

### **3.Laplace Transform.**

- 3.1 Introduction.
- 3.2 Laplace transform.
- 3.3 Important Formulae.
- 3.4 Properties of Laplace Transforms.
- 3.5 Inverse Transform.
- 3.6 Laplace Transform of the Derivatives of  $f(t)$ .
- 3.7 Laplace Transform of Derivative of order  $n$ .
- 3.8 Laplace Transform of Integral of  $f(t)$ .
- 3.9 Laplace Transform of  $t^n f(t)$ .
- 3.10 Laplace Transform of  $1/t[f(t)]$ .

### **4. Set Theory.**

- 4.1 Sets.
- 4.2 Subsets.
- 4.3 Equality of two sets.
- 4.4 Notation for describing sets.
- 4.5 The Empty set.
- 4.6 Venn diagrams.
- 4.7 Union and Intersections.
- 4.8 Difference of sets.
- 4.9 Family of sets Indexed by a set.
- 4.10 Arbitrary union and intersection of sets.
- 4.11 Complement of a set.

### **REFERENCE BOOKS**

- 1 Integral Calculus-Shanti Naraynan
2. Laplace Transform-Schaum Series
3. Fourier series-Schaum Series
4. Set theory and Number System-R.S. Aggarwal
5. Applied Mathematics for polytechnic (8 the Ed.)-H.K. Dass

## **APPLIED PHYSICS (THEORY)**

### **1. MEASUREMENT**

#### **1.1 Unit and dimension**

##### **Fundamental and Derived Units:**

S.I Units. Dimensions of Physical quantity. Dimensional formula and Dimensional equation.

Principle of homogeneity of dimensions and application of homogeneity principle in:

- (i) Checking the correctness of Physical equation.
- (ii) Deriving relation among various physical quantity, and
- (iii) Conversion of numerical values of physical quantities from one system of units into others,

#### **1.2 Limitations of dimensional analysis.**

### **2. BASIC MECHANICS**

2.1 Newton's laws of motion and their application conservation of linear momentum. Circular motion, angular velocity, angular acceleration and centripetal force. Conservation of angular momentum. (only conceptual explanation of the of the physical parameters) Vector and scalar quantities addition, subtraction and multiplication of vectors (physical examples).

2.2 Concept of work, power and energy. Different forms of energy. Mass Energy relation.

### **3. PROPERTIES OF MATERIALS**

#### **3.1 Elasticity**

Elasticity, stress and strain, Hook's law, elastic limit, Yielding point and breaking point, Modulus of elasticity, Young's modulus, bulk modulus and modulus of rigidity.

#### **3.2 Surface Tension**

Introduction, cohesive and adhesive forces, Molecular theory of surface tension. Angle of contact. Application of surface tension.

#### **3.3 Viscosity**

Fluid motion, streamline and turbulent motion, viscous forces, co-efficient of viscosity, and its determination by Stoke's method and Poissuelle's method.

### **4. HEAT AND TEMPERATURE**

4.1 Concept of heat and temperature on the basis of Kinetic theory. Units of heat. Basic principles of measurement of temperature. Various thermometers like mercury thermometer thermocouples bimetallic thermometer, resistance thermometer, Pyrometers (Principle, construction and working). Criteria for the selection of a thermometer .

#### **4.2 Heat Transfer**

Model of heat transfer coefficient of thermal conductivity and its determination by (i) Searle's method for good conductor and (ii) Lee's method for poor conductors conduction of heat through compound media. Radiation of energy. Prevost's theory of heat exchange. Absorptivity and emissivity. Black body.

### **5. SIMPLE HARMONIC MOTION**

Periodic motion, characteristics of simple harmonic motion, equation of S.H.M. and determination of velocity and acceleration. Graphical representation. Simple pendulum. Derivation of their periodic time. Energy consideration in S.H.M. definition of free, forced, damped and resonant vibration.

### **6. WAVES**

Generation of waves by vibrating bodies. Progressive waves. Equation of wave. Super-position of waves and its applications to interference, beats and stationery wave-graphical method. Sound and light a s wave frequencies, wavelengths, velocity and nature.

### **7. GEOMETRICAL OPTICS**

Defects in image formulation (qualitative) Microscope (simple and compound) and telescope (Astronomical terrestrial theodolite) and their magnifying powers. Optical projections principles. Epidiascope and overhead projector.

### **8. WAVE OPTICS**

Interference of light waves. Young's experiment, Applications of interference (planeness testing measurement of small thicknesses) Diffraction of light wave. Polarization of light and its engineering applications. Simple concept of electromagnetic spectrum.

### **9. ATOMIC STRUCTURE**

Atomic structure, Bohr's theory, energy level diagram, excitation, ionization, de-excitation and radiation. Quantum numbers  $n, l, m, s$ . Pauli's principle Bonds in molecules and solids

### **10. SEMICONDUCTOR PHYSICS**

Energy band formation. Band structure of conductors insulators and semiconductors, Intrinsic and extrinsic semiconductors. Effect of temperature.

### **11. NUCLEARPHUSICS**

Binding energy mass defect, energies of nuclear reactions. Nuclear instability radioactive emission. Radiation damage. Nuclear fission and fusion. Nuclear reaction and their applications.

## LIST OF EXPERIMENTS

1. Use of vernier callipers, screw gauge and spherometer measurement.
2. Determination of centripetal force.
3. Verification of law of conservation of energy.
4. Determination of 'Y' (Young's Modulus) by Searle's method. .
5. Study of vibration of simple pendulum.
- 6\* Determination of surface tension by capillary rise method.
- 7\* Determination of coefficient of viscosity (Stoke's method).
- 8\* Study of interference of sound waves by Quinke' s tube and determination of wavelength.
9. Combination of suitable lenses to form a telescope and determine its magnifying power.
10. Measurement of small thickness by interference method.
11. Measurement of thermal conductivity of a good conductor by Searle's method.
12. Measurement of conductivity of a poor conductor by Lee's method.
13. Combination of suitable lenses to form a compound microscope and determine its magnifying power.
14. To study Newton's ring experiments and determine the wavelength of sodium light.

**NOTE :** At least 10 experiments must be done by a student. These could be taken as optimal experiment.

\* These experiments are optional.

## BASIC ELECTRONICS

### Rationale

This subject gives the knowledge of fundamental concept of basic electronics for effective functioning in the field of electronics service industry.

### DETAILED CONTENTS

#### 1. INTRODUCTION

- Definition of electronics, application of electronics,
- Introduction to active and passive components.
- Circuit control and protective devices.
- Voltage and current source,

#### 2. SEMICONDUCTOR PHYSICS

- 2.1 Intrinsic semiconductor: conductivity, atomic and crystal structure of germanium and silicon, covalent bonds generation and recombination of carriers, effect of Temperature on conductivity of intrinsic semiconductor.
- 2.2 Extrinsic semiconductor: Doping of impurity P& N type semiconductors and their Conductivity ,minority and majority carriers, drift and diffusion currents
- 2.3 Hall effect

#### 3. SEMICONDUCTOR DIODES

- 3.1 P-N junction diode: Formation of depletion layer in the P-N Junction. P-N junction as forward bias and as reverse bias
- 3.2 Semiconductor diode characteristics, static and dynamic resistance their Calculation from diode characteristic.
- 3.3 Diode as rectifier: half wave, full wave, bridge rectifiers, ripple factor and its value for half and full wave rectified output. Calculation of DC voltage output, RMS voltage and efficiency,
- 3.4 Filter circuits: capacitor input filter, choke input filter, LC filter, RC filter and PI filter.
- 3.5 Brief idea and applications of power diodes, zener diode, and varactor diode.

#### 4. INTRODUCTION TO THE BIPOLAR TRANSISTORS AND FETS

- 1.1 Concept of bipolar transistor as to junction three terminal device, PNP and NPN transistors their symbols and mechanism of current flow , explanation of fundamental current relations concept of leakage current, effect of temperature on leakage current.
- 4.2 CB, CC & CE configuration: input and output characteristics, determination of the transistor. parameters current amplification factor.
- 4.3 transistor as an amplifier in CE configuration, DC load line, concept of power gain.
- 4.4 JFET: construction, operation characteristic JFET parameters.
- MOSFET: introduction, theory of operation MOSFET parameters applications
- Comparisons between BJT and FET

- basic BJT and FET amplifier
- Introductory idea of single stage, multistage and feedback, amplifiers.

## 5. TRANSISTOR BIASING & STABILISATION OF OPERATING POINT

- the DC operating points and load line.
- Stability factor, factors affecting stability of Q-point.
- Conditions for proper biasing of the transistors.
- 5.4 Methods of transistor biasing: base bias, ammeter feedback bias, collector feedback bias, voltage divide bias.
- 5.5 Hybrid parameters: Introduction, h-parameters of linear circuits. hybrid equivalent circuit of a transistor, approximate hybrid formula for transistor amplifier.

## 6. INTEGRATED CIRCUITS

- Integrated circuits, analysis of principle of analog integrated circuits and digital integrated circuits
- Ideal OPAMP, parameters of OPAMP, inverting, non-inverting, OPAMP as summer, subtractor, or differentiate and integrator, voltage follower.

## 7. OPTOELECTRONICS DEVICES

- 7.1 Working principles and characteristics and applications of photo diode, photo transistor, photo voltaic cells, LEDs, LCDs and opto couplers.

## 8. POWER AMPLIFIERS

- 8.1 Thyristors: Introduction to the thyristor family, SCR theory of operation characteristics, applications of SCR.
- 8.2 UJT: Basic theory of operation, characteristics and structure, applications.

### List of Practical

1. Familiarization with operation of following instruments (A) Multimeter (B) C.R.O (C) Signal Generator (D) Regulated Power Supply
2. Plot V-I Characteristics for P-N Junction diode & Zener diode.
3. Observe the) wave shape of following rectifier circuits
  - a. Half Wave rectifier
  - b. Full Wave rectifier
  - c. Bridge rectifier
4. Plot the wave shape of full wave rectifier with
  - a. Shunt capacitor filter.
  - b. Series inductor Filter.
  - c.  $\pi$  Filter
5. Plot input and output characteristic and calculate parameters of transistors in CE & CB configuration.
6. Plot V-I characteristic of FET amplifier.
7. Measure the Q-point and note the variation of Q- point.
  - a By increasing the base resistance in fixed bias circuits.
  - b By changing out of bias resistance in potentials divider circuit.
8. Measure the voltage gain input output impedance in single state CE amplifier circuit.
9. Study of Opamps as.
  - (a) ADDER (b) SUBTRACTOR (c) INTEGRATOR (d) DIFFERENTIATOR.

### REFERENCE BOOKS

1. Basic Electronics and Linear circuit- N.N.Bhargava and Kulshreshta.
2. Integrated circuits and semi conductor device. by Deboo Burrous.
3. Electronics devices - Flayd.
4. Applied Electronics - R.S. Sedha.

## ELECTRICAL ENGINEERING

### Rationale

This course will enable the students to understand the basic concepts and principles of d.c and a.c fundamentals a.c circuits. batteries, electromagnetic induction e.t.c including constants voltage and current sources. A diploma holder may be involved in various jobs ranging from preventive maintenance of electrical installation to local faults location e.t.c . In addition he may be working in testing laboratories where he uses measuring instruments. To carry out these similar jobs effectively knowledge of basic concepts, principles and their application is very essential



## Detailed contents

### 1. DC Circuits

- Nature of electricity, basic terms- Current, Voltage Potential difference, Power Energy & Heating Effect of electric Current.
- Ohm's Law, Concept of resistance, Resistivity and Conductance.
- Effect of temperature on resistance, Resistance in series and parallel.
- Kirchoff's current Law and Voltage Law and their application in Simple DC Circuit Conversion from Star to Delta and Delta to Star.

### 2. Network theorems

Superposition theorem, Reciprocity theorem, Thevenin's theorem, Norton's theorem & maximum power transfer theorem.

### 3. Electrostatic

- Static electricity - absolute & relative permittivity of medium, Laws of electrostatics,
- Concept of electric field, electric flux, electric field intensity, electric flux density, Gauss's theorem (definition only), Coulomb's Law.
- Potential, Potential at a point, potential of a charged sphere, equipotential surface. potential and electric intensity inside a conducting sphere. Concept of Breakdown voltage and Dielectric strength.
- Capacitor, capacitance, cylindrical and spherical capacitor, energy stored in J capacitor, parallel plate capacitor, series & parallel combination of capacitor .

### 4. Magnetism and Electromagnetism

- Absolute and relative permeability, Coulomb's law, Magnetic Field Strength. Magnetic Flux and Flux density, Intensity of Magnetization.
- Analogy between Electric and Magnetic Circuit.
- Magnetic field around a current carrying conductor and circular loop, Force between two parallel current carrying conductor.
- Faraday's Law, Lenz's Law, Self & Mutually induced EMF.
- Energy stored in a Magnetic Circuit.

### 5. AC theory

Concept of alternating voltage and current, Difference between AC and DC, Concept of Cycle, Frequency, Time period, Amplitude, Instantaneous value, Average Value, rms value, Form Factor (Definition only).

### 6. Measuring Instrument

- Working Principles & Construction of Moving Coil and Moving Iron instrument. Extension of their range.
- Principle & Working of Wattmeter (Dynamometer type)
- Energy Meter (Induction type)

### 7. Transformer UPS

- Principle, operation and constructional features of single phase transformer core-type, shell type.
- Isolation transformer
- Brief study of various types of power problems Use of UPS and CVT their working.

## LIST OF PRACTICAL

1. Verification of Kirchoff's Current and Voltage Law in a DC Circuit.
2. Prove the series combination of Resistance  $R_{eq} = R_1 + R_2 + R_3$
3. Prove the parallel combination of Resistance  $1/R_{eq} = 1/R + 1/R_2 + 1/R_3$
4. Verification of Thevenin's Theorem, Superposition theorem and Maximum power transfer theorem.
5. Determine the Iron and Copper losses by performing open and short circuit test on single phase transformer
6. Conversion of Galvanometer into Ammeter and Voltmeter.
7. Measurement of single phase power in a.c. Circuit using wattmeter.
8. Measurement of energy of a given load by single phase K WH meter.

## Reference Books

1. Electrical Technology - B.L. Theraja
2. Electrical Technology - J.B. Gupta
3. Basic Electrical & Electronics Engg. - L.K. Sahdev
4. Principle of Electrical Engg. - V.K. Mehta

## **PROGRAMMING IN C**

### **Rationale**

In order to enable the student's use of computer effectively in problem solving, this course offers the ' model programming language along with exposure to various application of computer. The knowledge of C language will be reinforced by the practical exercises

### **Detailed contents**

1. Introduction of 'C' language- Structure of a 'C' program, some simple c programs, procedure to execute a 'C' program. Data type, constants and variables
2. C Character sets, Identifiers and keywords, Date type constants, variables, expression, statement, symbolic constants.
3. Operators and expressions  
Arithmetic operators, Relational and logical operators, Unary Operators, Assignment operators. Conditional operators.
4. Data Input and output  
Library functions, unformatted input output-getchar, putchar, gets, puts, getch and getche. Formatted input output-Scanf, printf
5. Control statements and loop structure  
Branching: The if-else statement, looping: while, do-while for. Nested control structure. switch statement. break. continue, exit. Comma operator. jumping: go to statement.
6. Function  
Inductions to function, need of functions, function defination, function declaration and prototype, passing arguments to function. passing arguments by value, recursion.
7. Arrays  
Introduction to Arrays. array declaration, single and multidimensional array Examples: array order reversal, removal of duplicates from an ordered array, binary search, matrix multiplication.
8. Strings  
Introduction to strings, string constants, variables, input, output of string date, standard library string function strlen (), strcat () strcpy () strcmp ()
9. Pointers  
Introduction to pointers, address operator and indirection operator, declaring and initialize pointers, pointers in parameter passing , call by reference, pointers and one dimensional array, operation on pointers and one dimensional arrays, dynamic memory location malloc, calloc.
10. Structures and unions  
Introduction to structures, declaration of structure, accessing structure, members initialization Arrays of structure, user defined data type (typedef), Introduction to unions.
11. Files  
Introduction to file handling-fopen, fclose, fscanf, fprintf, getc, putc Additional feature of c: Enumerations, macro, c pre-processor.

### **LIST OF PRACTICALS**

1. Programming exercises on executing and editing c programs.
2. Programming exercises on defining variables and assigning values to variables.
3. Programming exercises on arithmetical, relational operators.
4. Programming exercises on arithmetic expression and their evaluation.
5. Programming exercises on formatting input/out using printf and scanf.
6. Programming exercises using if-statement.
7. Programming exercises using if-else statement.
8. Programming exercises on switch statement.
9. Programming exercises on do-while statement.
- 10 Programming exercises on for statement.
11. Programs on 1 dimensional array.
- 12 Programs on 2 dimensional arrays.
13. Programs on strings.
  - Programs for putting two strings together.
  - Programs for comparing two strings.
14. Simple programs using pointers.
15. Simple programs using structures.
16. Simple programs using files.

**Reference books**

1. Programming with C - Byron c. Gottfried
2. Let us C - Yashwant Kanetkar
3. Sprit of C - Moolish Cooper
4. Teach yourself C - Herbert Schildt
5. Programming in C -Stephen G. Kochan
6. C Programming language -Kerning & Ritchie
7. Ansi C - Balaguruswamy