PAPER-II **TEXTILE DESIGNING AND PRINTING - I**

THEORY

Time : 2 Hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

- Origin, Historical Background and Characteristics of Traditional Indian Designs with Special References to Punjab.
- Sources of Inspirational Designs: Nature, Abstract, Geometrical and Mythology.
- Design: Definition, Classification (Structural and Applied), Principles and Elements.
- Colours: Light and Pigment theory of Colours, Colour Wheel, Primary, Secondary and Tertiary Colours, Colour Schemes and Qualities of Colour.
- Introduction to Textile Printing Materials used for Printing, Its Importance.
- Various Methods of Printing: Introduction to various methods of printing, Block Printing, Roller Printing, Screen Printing, Spray Printing/Stencil Printing and Transfer Printing.
- Elementary Study of Thickening Agents and Auxiliaries.
- Block Printing of Cotton Fabric with Aniline Black.
- Direct Method of Printing on Silk with Basic Dye.
- Introduction to Sublimation Printing.
- Pre treatments of Printed Fabrics.
- After treatment of Printed Fabrics
- Introduction to Printing paste and various ingredients used in it.

TEXTILE DESIGNING AND PRINTING - I

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Practice of mixing colours showing colour on colour wheel with varied values and hues showing various colour combinations.
- Preparing file with different designs suitable for textiles using soft pencil, crayon,pencil colours, sketch pens, coloured ink or watercolour.
- Preparing paper stencils for printing.
- Making of stencil design for saree border, handkerchief and pillow cover.
- Practice of painting with fabric colours on textiles.
- Practice of printing sulphur dye on cotton cloth with hand block.
- Making preparation of grey scale.
- Visit to museums, art galleries, craft melas and report writing of the craft appraisal.

PAPER-III **TEXTILE DYEING - I**

THEORY

Time : 2 Hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

- Brief Study of pH Value.
- Precautions to be Observed While Scouring, Bleaching and Dyeing.
- Scouring of Cotton and Wool, Polyester Fibres and Fabric.
- Bleaching of Cotton and Wool, Polyester Fibres and Fabric.
- Direct Dyes: Names, Identifications, Properties and Applications of on Cotton and after Treatment with Synthetic Fixing Agents.
- Properties, Names and Applications of Reactive Dyes, Vat Dyes.
- Estimation of Weight of Dyes for Laboratory Purpose.
- Determination of Chemical used for Dyeing Purpose in Laboratory.
- Dyeing of Wool Silk, Nylon with Acid Dyes and Metal Complex Dyes on Wool.
- A Brief Study of Long Bath, Short Bath, Neutral Bath, Standing Bath, Stripping, Leveling, Micro-Controller and

Sample Pot forDyeingMachine.

- Applications of Reactive, Vat, Dyes on Cotton and Viscose.
- Application of Sulphur Dyes on Cotton.
- Application of Direct Dyes on Viscose.
- Dyeing of Nylon with DirectDyes.

TEXTILE DYEING - I

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Practice of scouring and bleaching of cotton and wool.
- Practice of dyeing of cotton and jute with direct dye.
- Effect of time, temperature, water ratio and chemicals in dyeing.
- Practice of dyeing of cotton with reactive vat dyes.
- Practice of dyeing of woolen yarn/fabric with acid dyes, metal complex (Nealon) dyes.
- Practice of dyeing of cotton with ramazole dyes.
- Practice of dyeing of cotton with sulphur dyes.
- Practice of dyeing of cotton with direct dyes.
- Make an article using any one class of dye.

(iv)TRADE : TEXTILE WEAVING

PAPER-I **TEXTILE FIBER SCIENCE**

THEORY

Time : 2 hrs **Theory : 30 Marks**

CCE : 10 Marks

Practical : 50 Marks

Total : 90Marks

- Fibres - Introduction to Textiles Fibres, Classification and Description of Various Textile Fibres - Natural, Manmade and Synthetic.
- Identification of Textile Fibers by Microscopic, Chemical and Burning Test.
- Object of Ginning, its Importance and Need.
- Yarn - Types of Yarns - Simple, Novelty and Textured Yarns.
- Weaves - Introduction to Different Types of Weaves - Plain, Twill, Satin and Sateen.
- Different Varieties of Cotton and Wool, Grading of Cotton and Wool.
- Process and Flow Chart of Cotton and Woolen Finished Fibre.
- Finishes - Purpose, Types & Understanding the Effect of Some Common Finishes Used In Textile Industry Like Mercerisation, Sanforisation, Sizing, Crease Resistance, Calendering, Tentering and Embossing.
- Study of Various Kinds of Stains on Textile and Their Removal.
- Introduction to Different Types of Yarn Packages Like Hank, Bobbin, Cheese and Cone.

TEXTILE FIBER SCIENCE

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Identification of various textiles fibres by burning and microscopic method.
- Identification of various textiles fibres by chemical solubility method.
- Methods of washing, drying and ironing of various fabrics.
- Colour fastness test to heat, sunlight, gas fumes, perspiration, humidity, washing, crocking and Ironing on coloured natural fabrics.
- Identification of various types of vegetable, animal, chemical and mineral stains and their removal.
- Practice of winding - hank, bobbin and cone winding.
- Draw flow chart of cotton Fibre to Fabric processing.
- Draw flow chart of Wool fibre to fabric processing.
- Draw flow chart of polyester fiber to Fabric processing.
- 3D presentation of cotton fibre to fabric.

PAPER-II **YARN PREPARATION AND FABRIC STRUCTURE**

THEORY

Time : 2 hrs

Theory : 30 Marks

CCE : 10 Marks

Practical : 50 Marks

Total : 90Marks

- Spinning & its Types - A) Mechanical - Spinning of Cotton, Wool and Worsted,

B) Chemical - Melt, Dry & Wet Spinning.

- Terminology Related to Fabrication - Fabric, Warp, Weft, Weave, Repeat Pattern, Design, Draft Plan, Peg Plan, Texture Motif and Picks.
- Definition of Selvedge, Types of Selvedge and its Importance in Cloths, Importance of Monogram in Selvedge.
- Introduction to Yarn Preparation, Winding, Warping - Definition & Different Methods of Warping, Warping Calculations - No. of ends/ Inch, No. of Picks/ Inch, No. of Bobbins, No. of Sections, Width of Sections, Length of Warp on Bobbins, Total Length of Yarn, Weight of Yarn, Width of Cloth Including Selvedge, Sizing Beaming, Looming, Yarn Count, Reed Count and Count of Folded Yarn.
- Aims, Objective and Scope of Weaving.
- Use and Importance of Graph Paper for Different types of Weaves.
- Classification of Weaves - Elementary, Compound and Complex.
- Introduction to the Following Weaves Along With Their Draft Plan and Peg Plan : Plain Weave - Rib and Basket, Twill Weave - Regular, Pointed Honey Comb, Satin, Sateen, Pile Weave - Cut and Uncut.
- Introduction of Different Types of Fabrics Such as Suiting, Shirting, Dress Material, Blankets, Bed Sheet, Mulmul, Poplin, Cheese Cloths, Jean, Voil.
- Introduction to Computer Aided Weaving Design.

YARN PREPARATION AND FABRIC STRUCTURE

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Warp and Weft winding, Pirn winding, Bobbin winding and cone winding.
- Plain Weave - Preparation of warp, drafting, denting and drawing.
- Basket Weave - Preparation of warp, drafting, denting and drawing.
- Regular twill Weave - Preparation of warp, drafting, denting and drawing.
- Herringbone Twill - Preparation of warp, drafting, denting and drawing.
- Pile Weave - Preparation of warp, drafting, denting and drawing.
- Simple exercise on different types of knotting.
- Introduction in Computer Aided Weaving.
- Make a scrap file of different pattern of selvedges.
- Prepare sample of plain and matte weave.

PAPER-III **HANDLOOM MECHANICS AND OPERATIONS**

THEORY

Time : 2 hrs

Theory : 30 Marks

CCE : 10 Marks

Practical : 50 Marks

Total : 90Marks

- History of Weaving & its Importance in TextileCraft.
- Types and Parts of Warping Machine-CreelStand, Back Reed, Warp Reed, Guide Roller, Warping Drum, Warping Beam and Drawing Hooks and theirFunctioning.
- Types of Reed and Heald Wires.
- Types and Parts of Handlooms and Their Functioning, Harnessing of Handloom.
- Process of Handloom Fitting.
- Motions of the Handloom: Primary Motions - Shedding, Picking & Beating up, Secondary Motions - Taking up & Letting off.
- Checking of Handloom Before Operation and General Precautions.
- Different Methods of Drafting & Denting In Preparatory Process
- Types and Parts of Shuttle.
- Working of Dobby for Handloom.
- Working of Jacquard for Handloom.

HANDLOOM MECHANICS AND OPERATIONS

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Winding of bobbins.
- Arrangement of bobbins in creel.
- Passing of threads through the back reed.
- Pirn winding and inserting.
- Fitting of handloom and maintenance.
- Harnessing of Handloom.
- Weaving of cloth - plain weave, Basket weave, twill weave and terry pile weave.
- Visit a handloom industry and make a report on working of different parts/ sections of industry.

(v)TRADE : KNITTING

PAPER-I **TEXTILE FIBRE AND TESTING**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Fibres

Introduction to Textiles Fibres, Classification and Description of Various Textile Fibres (Natural, Manmade and Synthetic), Physical and Chemical Properties of textile fibre, Identification of fibre using Physical and Chemical Methods.

Yarn

Types of Yarns, properties of Yarn for knitted Fabric Manufacturing.

Knitting-
Classification of Knitting, Product and its uses.

Dyes
Introduction, Classification – Natural and Synthetics Dyes, Direct, Acidic, Basic, Sulphur,

Reactive, Disperse, Dyes and Pigment Colors, Applications of Dyes on Cotton, Wool, Silk,

Acrylic and Polyester Yarn.

Finishes
Purpose, Types and Understanding the Effect of Some Common Finishes used in Textile Industry like Mercerisation, Sanforisation, Sizing, Crease Resistance, Calendering, Embossing, Dimensional Chaaracterstics, Sentering. Open width or Tubelar Compaction.

Stains
Study of Various Kinds of Stains on Textile and their Removal.

Quality Control
Introduction, Inspection of Yarn Fabric and Garment and Quality Control Procedure.

Colour theory
Primary, Secondary and Tertiory colours**.**

TEXTILE FIBRE AND TESTING

Time : 3 hrs **PRACTICAL** **Marks : 50**

- Identification of various textiles fibres by Physical (Burning and Microscopic) and Chemical (Solubility) methods.
- Methods of Washing, Bleaching, Starching, Drying and Ironing of various fabrics.
- Color fastness test to Sunlight, Perspiration, Washing, Crocking and Ironing on colourednatual fabrics.
- Identification of various types of stains and their removal.
- Identification of 'S' and 'Z' twist in yarn.
- Identification of Knitting fabric from samples.
- Quality control of the produced garments measurements, weight, minor and major inspection.

HAND FLAT KNITTING MECHANISM

PAPER-II

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

- Introduction of Knitting Industry.
- Classification of Weft Knitted Fabric- Single Faced, Rib, Purl, Interlock, Intarsia and pique Fabric.
- Different Parts of Flat Knitting Machine and their Functions.
- Basic Terminology Used in Knitting Such as Gauge, Wales, Course, Knitted Stitch, Needle Loop, Sinker Loop Etc.
- Diagrammatic Presentation of Latch Needle, Understanding Its Different Parts and their Functions.
- Diagrammatic Presentation of Loop Formation of Latch Needle.
- Diagrammatic Presentation of Weft Knitted Stitches Such As Plain, Rib, Tuck and Purl Stitch.
- Diagrammatic Presentation of Cam System of V Bed Hand Flat Knitting Machine.
- Operations and Function of Different Cams of V Bed Hand Flat Knitting Machine.
- Setting of Stitch Length on A Hand Flat Knitting Machine.
- Knitting Process of Welts and Function of Welts.
- Knitting Process of 1 X 1 Rib and Plain Fabric.
- Producing 1x1 and 2x2 Rib (Border) on Simple Flat Knitting Machine.
- Knitting Defects, their Causes and Remedies on Hand Flat Knitting Machine.

HAND FLAT KNITTING MECHANISM

Time : 3 hrs **PRACTICAL** **Marks : 50**

- Maintenance of Hand Flat Knitting Machine. Oiling and cleaning of knitting machine, Replacement of faulty parts.
- Adjustment of brushes, method of feeding yarn and setting of feeders on Flat Knitting Machine. Yarn passage in terms of tensions, feeder carriage etc.
- Description and diagrams of Cam set, different parts of Cam set and their functions. Setting of Stitch Quality or Stitch Length on Flat Knitting Machine. Adjustment to adjust stitch length.
- Identification and functioning of different parts of Hand Flat Knitting Machine.
- Method of putting and replacing of Needles, adjustments of needles.
- Jobbing On and Running On operation on Flat Knitting Machine.

- Knitting of plain fabric on Flat Knitting Machine.
- Knitting of 1 x 1 and 2 x 2 rib on Flat knitting Machine.
- Transferring of loops from one needle bed to another needle bed with the help of Decca and knitting of single bed fabric.
- Knitting of Decca design and Tuck design.
- Knitting of Half cardigan and Full cardigan fabric.
- Knitting of Half Milano and Full Milano fabric.
- Visit to reputed knitting industry/knitting technology institutes-craft fairs and report writing for the same.
- Setting of Stitch Quality or Stitch Length on Flat Knitting Machine.
- Knitting of 1 x 1 and 2 x 2 rib on Flat Knitting Machine.
- Transferring of loops from one needle bed to another needle bed with the help of Decca and knitting of single bed fabric.
- Knitting of Decca design and Tuck design.
- Knitting of Half cardigan and Full cardigan fabric.
- Knitting of Half Milano and Full Milano fabric.
- Maintenance of Hand Flat Knitting Machine.
- Visit to reputed knitting industry/knitting technology institutes-craft fairs and report writing for the same.

PAPER-III **HAND DRIVEN CIRCULAR KNITTING**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

- Classification of Knitting Industry
  - Socks Knitting Industry
  - Under Garments Knitting Industry
  - Outerwear Garments Knitting Industry.
- Socks Knitting Machine its Different Parts and their Uses.
- Cylinder Cam Set of Hand Driven Socks Machine, Explanation of Its Different Parts and their Functions with Diagram.
- Dial Cam Set of Hand Driven Socks Machine, Explanation of its Different Parts and their Functions with Diagram.

- Looping Elements-Needle, Sinker.
- Jobbing on, Running on Operation of Circular Knitting.
- Diagrammatic Presentation of Loop Formation of Latch Needle on Circular Knitting Machine.
- Showing Diagrammatically Different Parts of Socks (Welt, Rib Top, Leg Part, Heel Part, Foot Part and Toe Part).
- Method of Formation of Welt on Hand Socks Knitting Machine.
- Method of Knitting Rib with the Use of Dial.
- Method of Knitting Heel and Toe.
- Method of Making Complete Socks A with Elastic Rib Top and 1x1 Rib Top.
- Toe Closing (I) Linking (II) Over Locking.
- Defects That Occur During Circular Knitting and their Causes and Remedies.
- Different Types of Articles can be Produced on Hand Driven Knitting Machine Such as Mitins, Socks, Stockings, Gloves Etc.
- Power Socks Machine Parts and its Functioning.

HAND DRIVEN CIRCULAR KNITTING

Time : 3 hrs **PRACTICAL** **Marks : 50**

- Identification of various parts of socks machine.
- Tools and accessories used in circular knitting machines and their uses.
- Identification and function of cylinder cams.
- Identification and functions of dial-cams.
- Dissembling and assembling of the cam system of socks machine.
- Raising and Lowering of dial and time setting.
- How to adjust the stitch length and yarn guide of the machine.
- Method of starting machine with jobbing on method and running on method.
- Knitting of welt and 1 x 1 rib.
- Method of knitting heal and toe
- Knitting of full socks.
- Knitting of stockings.
- Method of linking of toe portion.
- Method of Pressing, Labeling, Folding and packing of finished product.
- Size chart of socks.

IV ENGINEERING & TECHNOLOGY GROUP

(i)TRADE : ELECTRICAL

PAPER-I **BASIC ELECTRICITY THEORY**

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Introduction

Electricity and its Types, Definition & Units of Resistance, Voltage, Current, Power, Energy, Resistor, Rheostat and Potential Divider, Resistance and its types and Colour Coding, Factors affecting Resistance of a Conductor, Temperature Coefficient of Resistance, Difference Between AC and DC Voltage, Advantages of Electric Energy over other types of Energy.

D.C. Circuits

Ohm's Law, Relation between Voltage and Current in a DC Circuit, Series and Parallel Resistance Circuits and their Equivalent Resistance, Series-Parallel Resistance Circuits and Calculation of Equivalent Resistance. Kirchhoff's Laws and its Applications.

Batteries

Primary Cell, Dry Cell, Battery, Series and Parallel Connection of Cells, Secondary Cells, Lead Acid Cell, Discharging and Recharging of Battery, Common Charging Methods- constant current method and constant voltage method, Care and Maintenance of Secondary Battery, Specifications of a Cell Battery, Silver Oxide Batteries and Lithium Polymer battery.

Capacitors

Capacitor Units and Capacity, Concept of Charging and Discharging of Capacitors, Types of Capacitors and their Use in Circuits, Series and Parallel Connection of Capacitors Energy Stored in a Capacitance.

Electromagnetic Effects

Permanent Magnets and Electromagnets, Their Construction and use, Properties of an Electromagnet and Rules for Finding them, Faraday's Laws Of electromagnetic Induction and Applications, Dynamically Induced E.M.F - Magnitude and Direction, Static

E.M.F. - Magnitude and Direction, Static Induction, Self Induced M.F. - Magnitude and Direction, Inductance and its Unit, Mutually Induced E.M.F. - Magnitude and Direction.

A.C. Circuits

Principles of Generation of A.C. Voltage and Wave Shape Cycle, Frequency, Peak Value, Average Value, Instantaneous Value, R.M.S. Value, Introduction to Resistance, Capacitance and Inductance, Inductive Reactive and Capacitive Reactance, Phase Difference, Power Factor - Leading and Lagging, Impedance, Poly phase and Generation of 3 Phase - Delta and Star Connections.

Measuring Instruments

Working Principles of Moving Iron and Moving Coil Voltmeters and Ammeters, Range Extending of Ammeter, Voltmeter, Megger and Induction Type Energy meter, their Circuit Connection and Application for Measurement of Electrical Quality, Multimeters and its Types.

Earthing

Need of Earthing, Types of Earthing - Plate Earthing, and Pipe Earthing, Procedure and Application.

Solar Electricity

Need of Solar Energy, Solar Photovoltaic (SPV) Technology, Advantages of SPV System, Solar Constant, Formation of Solar Cells, SPV Module, Array and Applications of Solar Photovoltaic System.

BASIC ELECTRICITY

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Measurement of current, voltage and resistance with the help of multimeter.
- Verification of Ohm's Law.
- Measurement of equivalent resistance of series combination of resistors.
- Measurement of equivalent resistance of parallel combination of resistors.
- Measurement of equivalent resistance of series-parallel components of resistors.
- To verify Kirchhoff's current laws (KCL).
- To verify Kirchhoff's voltage laws (KVL).
- Charging a lead acid battery and to test its state of charge.
- Study of series and parallel capacitor circuits.
- Study of series and parallel resistor circuits/lamps.
- Connections of Ammeter, Voltmeter and Wattmeter in an A.C. circuit of resistive load.
- To test a single phase energy meter with the help of standard wattmeter and stop watch with resistive load.
- Controlling low voltage lamps in series.
- Controlling lamps from two or three places.
- Drawing schematic diagram of single phase supply to consumers.
- Drawing schematic diagram of three phase supply to consumers.
- Practice on CTS/TRS (Batten) wiring with 2 fans, 4 lamps, 2 tubes and 4 plug points.
- Practice on conduit wiring.
- Polarity (means phase and neutral testing) test of wiring installation.
- Measurement of insulation resistance of wiring installation by megger.
- Testing of wiring installations with the help of megger.
- Installation of pipe earthing for wiring installation.
- Study of plate earthing for wiring installation.

- Testing faults of wiring installation and rectification.
- Installation of a sub-meter between a given electrical wiring.
- Measurement of open circuit voltage and short circuit current of a PV Module.
- To study /install a Solar Street Light System.

PAPER-II ELECTRICAL DOMESTIC APPLIANCES

- I THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90 Marks

Introduction

Introduction to Phase, Neutral, Earth, Voltage between Phase and Neutral, Phase and Earth Common Faults – (i) Open Circuit, (ii) Short Circuit (iii) Earth Fault, Series Testing Board and its Uses.

Electric Room Heater

Construction and Working Principle of Reflector type Room Heater, Common Defects, Testing and Repairs.

Electric Iron

Types - Ordinary type and Automatic/ Thermostat Control type, Steam Iron, Constructions and Working Principles of Electric Irons, Common Defects, Testing and Repairs.

Electric Stove

Types - Coiled Types, Oven, Construction and Working Principles of Electric Stoves, Induction Plates - Merits and Demerits, Common Defects, Testing and Repairs.

Electric Toaster

Types - Ordinary and Automatic, Construction and Working Principles, Common Defects, Testing and Repairs.

Immersion Heater and Geyser

Construction, Working Principle, use of Immersion Heater, Common Faults and Causes, Testing and Repairs, Construction, Working Principles and use of Geyser, Common Defects and Causes, Testing and Repairs, Testing and Installation of Geyser, Precautions in using Immersion Heater and Geyser.

Electric Kettle

Construction, Working Principle and use of Electric Kettle, Common Faults and Causes.

Illumination

Joul's Laws of Electric Heating and its Domestic Applications, Heating Efficiency, Lighting Effect of Electric Current, Constructions, Working Principles and uses of Table Lamp, Night Lamp and Tube Light, Common Faults and Causes, Testing and Repair, Study of CFL and LED – Construction working principle, fault and causes, testing and repair.

Electric Bell, Buzzer and Door Chimes

Constructions, Working Principles and uses of Electric Bell, Buzzer and Door Chimes, Common Faults and Causes, Testing and Repair.

ELECTRICAL DOMESTIC APPLIANCES - I

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Fabrication of a control panel board with meters and series test lamp for testing of electrical appliances.
- Fabrication of a mains lead with three pin plug and iron connector.
- Dismantling and reassembling of reflector type room heater.
- Testing and repairing of reflector type room heater.
- Dismantling and reassembling of electric iron - ordinary type, automatic/ thermostat control type.
- Testing and repairing of electric iron - ordinary type, automatic/ thermostat control type.
- Dismantling and reassembling of electric stove - coiled type, oven.
- Testing and repairing of electric stove - coiled type, oven.
- Dismantling and reassembling of electric toaster – ordinary, automatic.
- Testing and repairing of electric toaster – ordinary, automatic.
- Dismantling and reassembling of geyser.
- Testing and repairing of geyser.
- Dismantling and reassembling of electric kettle.
- Testing and repairing of electric kettle.
- Connections of a fluorescent tube.
- Testing and repairing of (i) table lamp (ii) night lamp (iii) tube light (iv) CFL
- Testing and repairing of (i) electric bell (ii) buzzer (iii) door chimes.
- Fabrication of an extension cord for three plug points with independent controls.
- Dismantling and reassembling of induction plate.
- Construct and test decorative running LED lamp assembly

PAPER-III MARTERIALS AND WORKSHOP PRACTICE - I

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Safety Precautions and Shock Treatment

Familiarize the Students with Shop Discipline, Layout of Shops, Safety Precautions, use of Fire Fighting Equipment, First Aid Practice, Causes of Electric Fire and Electric Shock, Precautions to Avoid Electric Fire and Electric Shock, Procedure for Removal of Person from Contact of Live Wire, Treatment of Electric Shock and Burns as per IEI Rules.

Common Tools

Familiarize the Students with Common Tools, Safe use of Tools, their Specification and Applications.

Conducting Materials

Copper and Aluminum as Low Resistivity Materials, their Electrical Characteristics and Applications, Electric Resistance Materials, Materials for Lamp Filaments and Brushes. Tungsten, Ni-chrome, Selenium and Carbon as High Resistivity Materials, their Electrical Characteristics and Applications.

Insulating Materials

Distinction between Conductor, Insulator and Semi Conductor, Insulation Resistance, Dielectric Strength, Breakdown Voltage, Mechanical and Physical Properties and Classification of Insulating Materials, Paper, Plastic Coated Paper, Empire Cloth Leatheroid, Cotton and Silk, Rubber, PVC Porcelain, Bitumen, Micro, Bakelite, Ebonite, Marble, Glass Asbestos, Fiber Glass - uses and Applications, Insulating Tapes, Sleeves, Insulating and Impregnating Varnishes and Paints- uses and Applications.

Magnetic Materials

Classification, Properties and uses of Materials - Ferromagnetic Materials, Soft and Hard Magnetic Material, Mild Steel, Silicon Steel, Mu-Metal, Permalloy, Alnico as Magnetic Materials.

Structure Materials

Iron Steel, Brass, Gun Metal and Aluminum as Structural Materials, their Properties and Applications.

Fuse and Soldering Materials

Silver, Copper, Lead, Tin and Alloys as Fuse Material, their Properties and Applications, Soldering & Brazing Materials and Tools, Procedure of Soldering & Brazing, Precautionary Measures.

Wiring Materials

Types of Wiring - Introduction to Conduit Wiring, Procedure Systems, Factors for Selection Of a Particular Wiring System, Importance of Switch, Fuse, Change Over Switch and Earthing of Wiring System, Types of Faults, Causes and Remedies, Methods of Finding Numbers of Circuits and Circuit Distribution By Distribution Board System, Indian Electricity Rules (IER) related to Wiring, Introduction to Sub-meters and their Installation in Inverter Wiring. ICTP and ICDP Main Switches, Distribution Boards, Bus Bar, Conduit Fittings and Pipes, Board, Switches Lamp Holders, Ceiling Roses, Plugs, Sockets, Wires, etc. used for Different Wiring.

Lubricants

Solid, Semi - Solid and Liquid Lubricants, Uses and Applications.

Corrosion Protective Paints

Application of Paint for Corrosion Protection and Precautions in Painting.

Electrical Symbols

Electrical Symbols and Blue Print Reading, Simple Domestic Electric Circuit Drawing.

Bimetallic Relays

Construction and Application of Bimetallic Relays and Thermo-Couple for Control of Temperature and Current.

MCB

Introduction To Miniature Circuit Breaker (MCB), MCB DP and Earth Leakage Circuit Breaker (ELCB), Specifications and Their use in Electrical Circuits.

MARTERIALS AND WORKSHOP PRACTICE - I

Time: 3 hrs **PRACTICAL** **Marks : 50**

- First aid box practice.
- Identification of common tools.
- To form two identical coils using insulated Copper wire and Aluminum wire of same gauge and same number of turns and compare their resistance.
- To make coils of Nichrome and Eureka wires of equal lengths and gauge and measure resistance, current and power at a given voltage.
- Identification of different insulating materials.
- Practice on insulating - slots, cores of motors.
- Insulating the coil winding with varnish.
- Replacing a blown fuse of standard current rating.
- Study the relationship between wire diameter and fusing current for instantaneous fusing.
- Soldering practice.
- Lubricating technique practice.
- Study of thermo coupled oven to control temperature.
- Application of bimetallic relay to control temperature.
- Use of MCB, MCB DP in an electrical circuit.
- Use of an ELCB in on electrical circuit.

(ii)TRADE :ELECTRONICS

PAPER-I

BASIC ELECTRONICS

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Basic Electricity

Electricity & its sources, AC and DC concept of Phase, Frequency, Graphical representation of AC and DC. Batteries, Need of power supply, Cells and Batteries. Charging & discharging of cell. Resistors, Capacitors Inductor and their types. Component ratings and color order of Resistors and Capacitor, Relationship between voltage and current. Ohm's law, Kirchhoff's Laws and their applications. Faraday's law.Magnetism, Definitions of Electromagnatization electromagnetic induction, flux, permeability.Transformers; concept working principle and application.

Circuits

Series and Parallel combination of Resistors.Series and Parallel combination of Capacitors.Series, parallel combination circuits of resistors, capacitors and inductors, RC, RLC, LC circuits and their applications.

Tools

Common Tools used in Servicing and Maintenance in Electronic Shop, Various Types of Soldering Iron proper use and maintenance, Desoldering Tools.

Printed Circuit Board

PCB,Different Types of PCB-Single side PCB, Multipurpose PCB.

Meter

Meter, Types of Meters-Deflection Meter, Recording Meter, Indicating Meter, Principle, Uses and Applications of Voltmeter, Ammeter and Multimeter.

BASIC ELECTRONICS

Time : 3 hrs **PRACTICAL** **Marks : 50**

- Drawing of Electronic/Electrical Symbols.
- Freehand sketching of Electronic Components.
- Colour coding of resistors.
- Study and use of series and parallel Circuit of resistance.
- Study and use of series and parallel Circuit of Capacitor.
- Verification of Ohm's Law (Relationship between Voltage and Current).
- Verification of Kirchhoff's Laws.
- Verification of Faraday's Laws.
- Study of series and parallel Resonant circuits.
- Make series & parallel connection of batteries
- Study of series and parallel Resonant circuits.
- To check a transformer for primary and secondary voltages.
- Fabrication of an extension board for Power supply and use of Line Tester.

PAPER-II **ELECTRONICS CIRCUITS**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Semiconductor Physics

Atomic Structure, Conductors, Insulators, Semiconductors, P and N Type Materials, Their Principles and Properties, Diode and its working, Transistors, Working of Transistor, Zener Diode Symbols, Functioning and their properties.

Rectifiers and Filters :

Rectifier, Half Wave, Full Wave and Bridge Types and their Working, Filters, Capacitors as a filters, Shunt capacitor filter, Series Inductor filter, T AND PIE Filter concept and working. Power Supply Regulators, Zener Regulation, Series and Shunt Regulator, Voltage Double and Triple circuits.

Transistor as a Amplifiers :

Transistor Biasing, Selection of operating point, Cut off Region, Active Region, Saturation Region, Transistor Configurations, Common Base Configuration, Common Emitter Configuration, Common Collector Configuration, Audio Amplifier, RF Amplifier

Transistor as an Oscillator :

Feedback, Positive Feedback, Negative Feedback, Sinusoidal Oscillator, Damped Oscillations, Undamped Oscillations, Oscillatory Tank Circuit, Positive feedback Amplifier as an Oscillator.

ELECTRONICS CIRCUITS

Time : 3 hrs **PRACTICAL** **Marks : 50**

- Testing of Diode, Transistor and Zener Diode with the help of a Multimeter.
- Graded exercises on soldering practice viz. tinned wire, PCB, lugs, connectors etc.
- Fabrication of 3/6/9 volt simple DC power supply using half wave rectifiers. [Battery Eliminator]
- Fabrication of 3/6/9 volt simple DC power supply using Centre Tapped Full wave rectifiers. [Battery Eliminator]
- Fabrication of 3/6/9 volt simple DC power supply using Full wave Bridge rectifiers. [Battery Eliminator]
- Fabrication of T and PIE Filter.
- Fabrication of a zener regulated DC Power supply.
- Fabrication of DC stabilized supply using series and shunt pass transistors.
- Study the Voltage Double and Triple Circuits.
- Demonstration and study of Audio Frequency Amplifiers.
- Demonstration and study of Radio Frequency Amplifiers.
- Study the Oscillatory Tank Circuit.

PAPER-III **AM/FM RADIO RECEIVER AND FAULT ANALYSIS**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Communication

Basic concepts of Communication, Modulation,Need of Modulation,Types of Modulation, AM Modulation, FM Modulation, Transistor AM Modulator, Limitations of AM Modulation, Advantages and Disadvantages of FM Modulation, Block Diagram of Amplitude Modulated Transmitter, Block Diagram of Frequency Modulated Transmitter, Demodulation or Detection,Requirements of Demodulation, Diode Detector, Different modes of wave propagation.

AM Radio Receivers

Basic principles and block diagram of AM receivers and Stages. Sensitivity, Selectivity, Fidelity, Heterodyning,

FM RadioReceiver

Basic principles and block diagram of FM receivers and Stages, Difference between FM and AM receivers.

Fault Analysis of Radio Receiver

Introduction to systematic fault finding techniques, Sectionalization and signal injection and other such techniques.Typical case histories and exercises.Mechanical fixtures-Typical troubles and their remedy.

AM/FM RADIO RECEIVER AND FAULT ANALYSIS

Time : 3 hrs **PRACTICAL** **Marks : 50**

- Study the Basic Concept of Communication system.
- Draw and Explain Block diagram of AM Radio Receiver.
- Draw and Explain Block diagram of FM Radio Receiver.
- Study the Amplitude Modulation with wave diagram.
- Study the Frequency Modulation with wave diagram.
- Draw and Explain Demodulator circuit
- Assembling a medium wave transistor/radio receiver.
- Measuring voltages at different test points of a transistor/radio receiver.
- Check waveforms at input and output parts of different stages with the help of CRO.
- Alignment of IF stages.
- Alignment of RF stages.
- Fault finding in Mechanical fixtures viz. Dial Cord, Volume control, loud speaker etc.
- Tracing the circuit of a given transistor/radio receiver

(iii)TRADE : ARCHITECTURE

PAPER-I **ENGINEERING DRAWING - I**

THEORY

Time :2hrs

Theory : 30Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90 Marks

Introduction

Introduction and Scope of Civil Engineering/Architectural Drawing, Instruments and Material used in Engineering Drawing - Drawing Board, Drawing Sheet, Tee Square, Set Square, Parallel Bar, Protector, Scale, Rubber, French Curve , Drawing Pencil, Drawing Instrument Box, Sand Paper, Drawing Pin/ Clips, Duster, Drawing Ink etc, Drawing Machine (Mini Drafter) and its Uses, Precautions in use of Drawing Instruments.

Planning and Layout of Drawings

Need for Planning of Drawing Sheet, Standard Sizes,Margins, Size and Purpose of Title Blocks, Maintenance of Drawing Sheet, Format (With Title, Subject Name, Scale , Orientation etc.)

Free Hand Sketching.

2D Shapes, 3D Shapes, Different Types of Lines, Landscapes/ Building Views.

Lines, Lettering and Dimensions

Point and Lines (Introduction), What is Line, Types of Line, Lines Used in Engineering, Line Weights, Drawing, Lettering (Introduction), Types of Letter - Single Stroke, Double Stroke, Roman Letter, Free Hand Letter, Dimensioning - Types of Dimension, Important Dimensioning Rule, Need, Principles and Different Systems of Dimensioning, Arrangement of Dimensions.

Geometrical Construction:

Procedure of Drawing Plane Geometrical Figures - Triangle, Square, Parallelogram, Rhombus, Hexagon, Pentagon, Kite, Circle and Regular Polygon, Angles (Acute Angle, Right Angle, Obtuse Angle), Bisection and Trisection of Angle.

Projections of Solids

Description of Solids - Cube, Prism, Pyramids, Tetrahedron, Cones and Cylinders.

Section of Solids

Need for Sectioning, Sectional Views when Solids Rest on Base, Procedure of Drawing Sectional Solids - Cube, Prism, Pyramid, Cylinder, Cone.

Symbols and Conventions

Necessity of Symbols &Conventions ,Hatching, Conventions for Symbols Related to Building Construction - Bricks Work, R.C.C., Stone , Wood, Earth, Rock, Plaster, Glass, Fiber

Board, Doors, Windows, Fencing, Building, Symbol Related to Water Supply and Sanitation - Water, Urinal ,Bath Tub, Indian Type WC, Kitchen Sink ,Rain Water Outlet, Water Meter, Dam, River, Canal, Man Hole , Pump, Symbol Related to Road and Railway - Railway Line Single, Railway Line Double, Road Over Railway , Road under Railway, Metelled Road, Non Mettled Road, Electric Line, Bridge, District Boundary, State and International Boundary, Other Important Symbol - Building, Grass, Temple/ Church, City/ Town, Tree, Lake,Well.

Development of Surface of Solids

Importance of Development, List out the Applications Where Developed Surfaces are Used, Differentiate between Parallel Line and Radial Line Development, Selection of Proper Methods of Development, Procedure for Drawing the Development of Simple and TruncatedSolids,DevelopmentoftheSurfaceofCube,Prism,Pyramid,Cone,Cylinder.

Time:3hrs **PRACTICAL** **Marks :50**

- Draw the diagram of different instruments used in engineering drawing.
- Layout of the drawing sheet with proper margin and with title block.
- Draw the drawing sheet of different types/ methods of dimensioning.
- Draw the drawing sheet of different types of engineering lines used in engineering drawing.
- Draw the drawing sheet about the different technique of Letter writing (Free hand and with scale).
- Draw the drawing sheet of different degree of angles.
- Draw the drawing sheet of Bisection and Trisection of different degree angles.
- Draw the drawing sheet of plane geometrical figures like triangle, square, parallelogram, Hexagon, Pentagon, Kite, Circle and regular Polygon.
- Draw the drawing sheet of solids like cube, prism, pyramids, tetrahedron, cones and cylinders.
- Draw the drawing sheet of different civil engineering symbols.
- Draw the drawing sheet about the Development of the surface of cube, prism, pyramid, cone, and cylinder.

PAPER-II WORKSHOP PRACTICE - I THEORY

Time :2hrs

Theory : 30Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Units of Measurement and Calculation:

Definition of Plane and Solid Figures - Triangle, Square Quadrant, Circle, Cube, Cylinder, Cone, Pyramid, Prism and their Application, Calculation of Weight of Various Products of Related Cost, Unit of Weight Length, Time and Temperature, M.K.S., E.P.S and S.I Units and their Conversion.

Simple Machines

Introduction, Principle of Working, Advantage, Types - Lever, Pulley, Pulley & Wheel, Screw Jack, Calculation of Mechanical Advantage, Velocity Ratio and Efficiency of Simple

Machines.

Handling of Basic Masonry Tools

Introduction, Uses, List of Important Tools - Trowel, Plumb Bob, Spirit Level, Square, Line and Pin, Brick Hammer, Pick Axe, Chisel, Spade, Wooden Float, Metal Float, Racking Needle, Scratcher ,Pointing Tool, Mortar Pan, Curing Pipe, Threads, Precautions for using and Storing DifferentTools.

Riveted and Welding Joint

Introduction, Types of Rivet, Types of Riveted Joint - Lap and Butt Joint according to ISICode, Advantages and Disadvantages of Riveted Joint, Introduction of Welding, Types of Welding - Electric Arc Welding and Gas Welding, Advantage and Disadvantage of Welding.

Walls andPillars

Partition Wall/ Boundary Wall, Load Bearing Wall - One Brick, One and a Half Brick and two Bricks, Pillars - One Brick and on E and A Half Brick.

Structure of Building

Coping, Parapet, Drip Course Line Gola, Terrace, Cornice, Slab, R.C.C. Lintel, R.C.C. Chhajja, Plinth Level, Plinth Course, Plinth Protection, D.P.C., Footing, Trench Plan, Offset, Foundation, Basement, Ground floor, 1st Floor, 2nd Floor.

Layout of Building

Introduction, Tool and Material Required, Procedure, Precautions In Layout of Building, Usage of Scale in Preparation of Layout.

WORKSHOP PRACTICE - I

Time:3hrs **PRACTICAL** **Marks :50**

- Calculate the area and volume of triangle, circle. Square, cube, cylinder, quadrant and prism.
- Calculate the mechanical advantage, velocity ratio and efficiency of simple machines.
- Identify the different masonry tool at construction site / school workshop.
- Draw the diagram of different masonry tools used in construction works.
- Note down the prices of each masonry tool used in construction works.
- Draw different types of rivets used in riveting.
- Draw the different types of riveted joints - lap joint and butt joint.
- Draw the symbols of different welding joints.
- Draw the diagram of different size of pillars.
- Draw the diagram of section of wall to show the different elements of building - Base of foundation, ground level, Plinth Level, Plinth Protection, D.P.C., Sill Level, Lintel Level, Slab/ Beam, Parapet , Coping, PCC Gola, Plaster, Tile Terracing.
- Measure and note down in tabular form the different items of single room with steel tape.
- Mark the layout of foundation of the one/two room building.
- Model Making of Basic 3Ds Like Cube, Cuboids, Cylinder, Prism and Pyramid.

PAPER-III BASICS OF BUILDING CONSTRUCTION

THEORY

Time :2hrs

Theory : 30Marks
CCE :10Marks
Practical : 50 Marks
Total : 90Marks

Building Layout

Introduction of Building Construction, Classification of Building, Briefly Write about the Sequence of Civil Works for Building Construction, Basic Elements of Building - Foundation, Plinth, Plinth Course, Column, Floor, Roof, Parapet,Coping.

Foundation

Introduction, Purpose, Formula to Design the Width and Depth of Foundation.

Brick and Stone Masonry

Introduction, Advantages of Brick Masonry over Stone Masonry, Mortar of different ratios and types of Mortar used in Brick and Stone Masonry, General Principle for Brick and Stone Masonry.

Damp and Damp Prevention

Introduction, Effects of Dampness on Building, Methods to Prevent Dampness in Building by Treatment of - Foundation, Walls, Coping and Parapet,Roof.

Doors and Windows

Introduction, Technical Term - Frame, Sill, Lintel, Vertical Post, Leaf, Styles, Top Rail, Bottom Rail, Rebate, Horns, Hold Fast, Points to be Considered While Making and Fixing Doors and Windows, Types of Door - Battened Door , Paneled Door, Paneled and Glazed Door, Flush Door, Wire Gauged Door, Rolling Steel Door, Collapsible Doors, Types of Windows - Dormer ,Corner, Sky Light Window, Clear Storey Window, Metal Windows , Fittings of Doors and Windows.

Floors

Introduction, Component of Floor, Classification - Mud Floor, Brick Floor, Flag Stone Floor , Cement Concrete Floor, Tile Floor, Terrazzo Floor, preparation of Floor Base.

Stairs

Introduction, Technical Term - Tread, Riser, Nose, Step, Fight, Landing, Soffit, Newels, Hand Rail, Staircase, Types of Stairs - Straight Stair, Open Well, Bifurcated, Spiral, Circular, Steel and R.C.C

Stair.

Roofs

Introduction, Sloping Roofs - Lean to Roof, Couple Roof, Couple Closed Roof, FlatRoofs - Thatch Roof, Tiles or Bricks Roofs, Reinforcement Concrete Roof.

Reinforced Cement Concrete (R.C.C.)

Introduction- Cement , Fine aggregate, Coarse Aggregate, Cement Mortar, Advantages and Disadvantages, Technical Term - Span, Effective Span, Hook, Overlap Joint, Cover, Cranked Bar, Straight Bar, Uses of R.C.C.

Water Supply and Sewerage System

Introduction, Sources of Water , Conveyance of Water, types of water supply system – Continuous & Intermittent, Pipe and their Types, Pipe Joints, System of Sewerage, Types of Sewerage systems - Separate, Combined ,Partial, Drains and Sewers, Manhole, Septic Tank, Soak Pit.

Plaster, Pointing, White and Color Washing

Introduction, Advantages, Types of Plaster, Introduction of Pointing, Advantages of Pointing, White Washing, Snowcem Washing, Distempering.

BASICS OF BUILDING CONSTRUCTION

Time:3hrs **PRACTICAL** **Marks :50**

- Drawing of different types of coping.
- Drawing of doorframe. (Wooden, Aluminum, Steel)
- Drawing of different DPC (damp proof course)
- Drawing of different types of door.
- Drawing of different types of window.
- Drawing of different fittings of doors and windows.
- Drawing of different types of floor (Plan & Section).
- Draw different types of roof.
- Drawing of different types of stairs & members of stair case.
- Draw plan and section of main hole
- Draw plan of septic tank and soak pit.
- Site Visits.

(iv)TRADE : MECHANICAL

PAPER-I **LATHE MACHINE AND OPERATIONS**

THEORY

Time : 2 Hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Introduction to Basics

Simple Sketches of Mechanical Hand Tools, Brief Description of Machine Tools and Equipments, Different Types of Operations by Different Types of Machine Tools (Only Name and Diagrams), Safety Precautions In Using Machine Tools.

Introduction to Lathe

Lathe, Centre Lathe, General Purpose Lathe Machine, Types, Specification, Safety Rules of the Workshop. Principle of Lathe.

Lathe Machine Parts

Study of Various Lathe Parts and Sub Assemblies of Lathe & their Functions, Description and Sketches of Accessories - Lathe Centers, Face Plate, Dressing Plate, Angle Plate, Three Jaw Chuck, Four Jaw Chuck, Collet Chuck, Mandrel, Steady Rest, Moving Rest, Tail Stock, Taper Turning Attachments.

Cutting Tools

Cutting Tools Geometry of Single Point Cutting Tool, Various Angles and their Values for Cutting Different Metal Jobs, Classification of Cutting Tools, Special Purpose Tools

- Facing Tool, Parting off Tool, Threading Tool, Boring Tool, Knurling Tool, Tool Material - Classification, Composition, Properties and Applications of High Carbon Steel, High Speed Steel, Carbide, Ceramic and Diamond.

Lathe Machine Terminology

Taper, Taper Turning, uses of Taper, Explanation of Taper, Calculations for Taper, Conicity - Speed, Feed, Depth of Cut.

Lathe Operations:

Centering, Simple Turning, Step Turning, Facing, Drilling, Boring, Tapering, Knurling, Parting off, Taper Turning , Chamfering, Finishing.

Calculations for Thread Cutting

Explanation of Simple Gear Train and Compound Gear Train, Calculation for Change of Wheels for Metrics Thread on English Lead Screw, Cutting Multiple Threads, Brief Description with Dies, Feed Gear Box.

CNC Machine

Introduction, Applications, Uses, Advantages and Disadvantages

LATHE MACHINE AND OPERATIONS

Time: 3 Hrs **PRACTICAL** **Marks : 50**

- Holding of job in four jaw chuck, centering with the help of check method, scriber and cutting tool.
- Setting the tool in tool post, plain turning, facing and parting off on M.S rod as per dimensions given by teacher .
- Step turning on M.S. Bar as per dimensions given by teacher.
- Grinding of single point cutting tool according to specific geometry.
- Taper turning and knurling and chamfering, threading.
- Drilling and Boring.
- Dismantling and assembling of different accessories and care & maintenance of lathe machine.

PAPER-II **ENGINEERING MATERIAL**

THEORY

Time : 2 Hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Introduction

Materials Classification - Metals, Ferrous and Non Ferrous, Metals and Non Metals, Different Non - Metals, Plastic, Rubber and Wood.

Properties of Materials

Physical and Mechanical Properties, Physical Properties - Colour, Weight etc, Mechanical Properties - Strength, Elasticity, Plasticity, Ductility , Brittleness, Malleability, Hardness, Toughness, Technological Properties - Machinability, Formability, Weldability, Measurement of Hardness - Brinell and Rockwell.

Ferrous Metals

Mineral Ores, Different types of Ores, Metallurgical Definitions, Description of Pig Iron, Process, Working of Blast Furnace, Types of Cast Iron, Wrought Iron - Composition, Properties and uses, Steel - Composition, Properties and uses.

Steel and Alloy steel

Introduction, Composition of MS in %age of Properties, Uses of Steel, Manufacturing of Carbon Steel, Basic Constituents of Steel, Composition, Properties and Uses of Special Alloy Steel - Chromium, Nickel, Stainless Steel, High Carbon Steel, High Speed Steel, Molybdenum, Tungsten and Vanadium Steel.

Mechanical Working of Metals

Introduction, Mechanical Working (Process), Hot Working, Principle Methods of Hot Working - Rolling (Hot and Cold), Drawing, Extracting and Forging (only Drop Forging).

Sheet Metals and Pipe Fittings

Introduction, types of Sheets, Thickness of Sheet Metals – in MM, Gauge No. Uses of Sheet Metal, Layout of Sheet Metals, 4 No.S- Pipe Fittings (only Description).

Solar Gadgets

Working Principles, Introduction, Types and Uses of - Solar Cookers, Solar Water Heaters, Solar Photovoltaic Panels and Solar Dryers etc, Components of Solar Cookers - Reflector, Boxes, Insulation, Adjustment/ Orientation/ Alignment of Solar Gadgets for Efficient Uses, Common Faults and Corrective Measures, Safety and Precautions in use of Solar Gadgets.

Biogas Plant and Appliances

Working Principles, Commonly used Substance for Biogas Production, Introduction - KVIC, Fixed Dome Type Bio Gas Plants, Appliances - Burners, Lantern, Engines and Uses, Main Components of Biogas Plants - Digester, Inlet, Outlet, Gas Holder/ Dome

and their Functions, Gas Conveyance Pipe Lines and Water Draining Devices, Installation and Commissioning of Biogas Plants and Appliances, Repair and Routine Maintenance of Biogas Plants.

Non Ferrous Metals and Alloys

Introduction, Properties and Uses of Copper and Aluminium.

Other Important Engg. Materials

Rubber, Plastic, Properties and Application of Thermoplastic and Thermo Setting Plastic, Applications of Rubber, Ceramics, Wood.

Quality Concept

Definition of Term "Quality", Introduction to Quality Standards according to BIS - ISO 14000 and ISO-9000.

ENGINEEING MATTERIAL

Time: 3 Hrs **PRACTICAL** **Marks : 50**

- To identify and distinguish between different engineering materials based on observations, physical properties - Make a write up.
- To distinguish between mild steel, cast iron and high speed steel by spark pattern test on a grinder.
- To make a funnel and weld/ solder its joint.
- Practice on cutting of pipes and make joint of two pipes by socket.
- At least two visits to selected industry to give the practical, exposure to students.
- Familiarization and identification of different parts of components of commonly available solar cooker, solar water heater, solar photovoltaic and solar dryers, function of different parts and adjustment for their efficient use.
- Familiarization and identification of different components of biogas plants and appliances, function of different parts, routine repair and maintenance of biogas appliances.

PAPER-III **MECHANICAL DRAWING - I**

THEORY

Time : 2 Hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90Marks

Mechanical Drawing & Engg. Drawing

Introduction , Artistic and Engg. Drawing, Civil, Electrical, Mechanical Engg. Drawing.

Geometrical Drawing

Introduction, Plane and Solid Geometrical Drawing.

Drawing Instruments

Drawing and Uses of Engg. Drawing Instruments.

Title Block

Meaning and Details, Maintenance of Drawing Sheet.

Geometrical Construction

Point, Straight Line, Angle, Acute Angle, Right Angle, Obtuse Angle, Straight Line Angle, Complete Angle, Reflect Angle.

Plain Figure

Circle , Arc, Chord, Centre, Diameter, Radius, Tangent Line, Segment, Sector.

Triangle

Introduction, types of Triangles - Scalene, Equilateral, Isosceles, Acute, Obtuse, Right Angled Triangle.

Quadrilaterals

Introduction, Square, Rectangle, Rhombus, Parallelogram, Trapezium, Difference between Square and Rhombus.

Solid Geometry

Introduction, Types - Prism, Pyramid, Cube, Cylinder, Cone, Sphere.

Polygons

Pentagon Figure / Construction, Hexagonal, Octagonal.

Lines, Lettering and Dimensions

Introduction, Definition, Types, Uses and Important Rules.

MECHANICAL DRAWING - I

Time: 3 Hrs **PRACTICAL** **Marks : 50**

Geometrical Constructions

- Introduction, definition of points, lines, angles.
- Size of sheet and layout of sheet, Standard sizes of drawing sheets, margin, title block etc.
- Review of geometrical constructions - dimensions of straight line and angle, triangle, quadrilateral, polygon, circles.
- Draw parallel lines, perpendiculars, different patterns, tangents.

Lines, Lettering, Dimensions and Conventions

- Lines, materials, solids, breaks, conventional representation used in engineering.
- Standard practice for writing single stroke and double stroke in 7:4. (Note - metal stage graph paper may be used after some practice, student should be able to draw graph).
- Standard practice for numerals ,dimensioning.

Scales

- Representative factor, simple, reduced & enlarged scale, plane and diagonal scale.

Free Hand Sketching

- Lines, circles, squares, rectangles, areas and curves.
- Diagram of solids - round, cube, rectangular block, cylindrical block, cone, prism, hexagonal etc.
- Free hand sketch of locking devices - washer, spring washer, keys etc.

Orthographic Projections

- Concept of projections, first angle and third angle projections, simple examples of orthographic projections of point, line & planes where the lines are parallel to one of the plane.
- Sketching orthographic views from pictorial views, orthographic projections of simple figures.
- Orthographic projections of nut & bolt (square as well as hexagonal).

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(v)TRADE : COMPUTER SCIENCE

PAPER-I **COMPUTER FUNDAMENTALS**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total : 90 Marks

Introduction to Computers

Historical evolution of computers, Generations of computers, Classification of computers - based on size, processor, Usefulness of Computers. Applications of computers, Block Diagram along with its components and characteristics, function of CPU and major functional parts of CPU. State the relevance of speed and word length for CPU Performance, Recognize the current family of CPUs used in Computers,

Data Representation

Definition Of Information, difference between data and information ,importance of Binary Number System, various number systems, Conversion from Decimal to Binary, Conversion from Binary to Decimal, binary number into hexadecimal number, hexadecimal number into binary number System, Data Representation within Computer - Bits, Bytes, Kilobytes, Gigabytes, Terabytes, Petabytes, Memory, Primary memory - RAM, ROM, Secondary memory with respect to structure and file organization - Hard disk, CD-R,CD-RW, DVD, Zip Drive, Pen Drive, Memory Card.

Input/ Output Devices

Input Devices - Keyboards, Mouse, Touch Screen, Scanner, Joystick, Microphone, Web Camera, Digitizer, OMR, MICR, Bar Code Reader.

Output Devices - VDU, Printers (Dot Matrix Printer, Inkjet Printer, Laser Printer), Plotter, Speaker.

Operating Systems

DOS & Windows Operating Systems, Hardware and Software, Introduction and need of operating system, Types of operating system, DOS operating system, Types of DOS Commands, operating system as a resource manager; BIOS; System utilities - Editor, Loader, Linker, File Manager. Concept of GUI and CUI standards. Directories and files , wild cards, autoexec.bat, config.sys.

MS-Window Latest Version

Introduction to Windows, features of Window desktop, components of Window, Installing/ Removing Windows Application, Control Panel, System Settings, method of starting a program using start button, Understand maximize, minimize, restore down and close button, uses of file and folder, method of viewing the contents of hard disk drive using explore option, control panel,disk

defragmentation installation and un installation of the application software.

Backup and Restore, Disk Defragmentation, System Restore, Connecting to a Network, Using Media Player, Photos and Movies, Common Complaints with Windows and their Fixes, Upgrading Windows.

Internet

What is Internet, Connection Methods, Types of Connections, role of the modem in accessing the internet, installation procedure of a modem using control panel, purpose of web browser software, LAN, MAN, WAN, Topology, Internet, Intranet, Extranet, internet service provider and its relevance, Internet Configuration, Browsers - Microsoft Internet Explorer, Netscape Navigator, Google Chrome, Opera, Internet Applications - Voice Mail, Chatting, Discussion Forums, Newsgroup, Entertainment, Information searching, Online education, e-Goverence, search engines, social network sites, internet security, Firewall, Cloud Computing and its services, IP address and its format, MAC Address, DNS.

e-mail

What is e-mail? Advantages and Disadvantages, Sending and Receiving Messages, Checking Mail, Reading Mail, Replying Mail.

COMPUTER FUNDAMENTALS

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Familiarization with Computer System and its peripheral devices
- Installation of latest version of windows.
- Practice of internal and external commands of DOS.
- Working practice on windows operating system : creating file, folder. Copying, moving, deleting file, folder
- Installing and uninstalling of new software using control panel.
- Installation and uninstallation of new hardware drivers using control panel.
- Disk defragmentation using system tool
- Procedure of disk partition and its operation (Shrinking, Extending, Delete, Format).
- Changing resolution, colour, appearances, and screensaver option of the display.
- Changing System Date and Time.
- User Account creation and its feature on Windows Operating System.
- Email Account creation, reading, writing and sending emails with attachments.
- Internet browsing using browsers.
- Using of Search Engine to get information from internet

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PAPER-II **PROGRAMMING IN C**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks

Total : 90Marks

Fundamental of C Programming

History of C, Structure of a C Program, Writing and executing the first C program, Data types - int, float, char, double, void, Constant and Variables, Variable Declaration - integer, real/float, character, logical variable, string variable, Constants.

Operators and Expressions

Arithmetic operators, Relational operators, Logical operators, Expressions, Bit operation,

? operator, & operator, *operator, Type casting, type conversion

Decision Making and Looping Statements

Introduction, decision making with IF – statement, IF – Else and Nested IF, Ladder if-else, Loop: While, do-while, for, Break, Continue, goto and switch statements

Arrays and Functions

Introduction to Arrays, Arrays Declaration, One and Two Dimensional Arrays, Manipulating array elements, Single and Multidimensional Array, Arrays of characters, Introduction to functions, Global and Local Variables, Function Declaration, Function Call and Return, Types of Functions, Standard functions, Parameters and Parameter Passing, Call - by value/reference, recursive function, function with array, Passing an array to function, Introduction of Strings, String declaration and definition, String Related function i.e. strlen, strcpy, strcmp

Structured Programming

Declaration of structures, Accessing structure members, Structure Initialization, array of structure variable, Pointer to a structures, Union, Declaration of Union, Control structures, Break and Continue, Exit ( ) function, Go to and Label.

Pointers

Introduction to pointers, Static and dynamic memory allocation, Address operator and pointers, Declaring and initializing pointers, Single pointer, Pointers to an array

Basic I/O

File Handling, Basics of File Handling, opening and closing of File, reading and writing character from a file, File Assessing Functions - fopen, fclose, putc, getc, fprintf, C pre- processor, # decline, # include, # undef, # Conditional Compilation Directives - #if, #else, #elif, #endif, #ifdef and #ifendef, C Standard Library and Header Files - stdio.h, ctype.h, string.h, stdlib.h, time.h etc, Standard Library Functions, String Functions, Mathematical Functions, Variable Argument, List Functions, Utility Functions, Character Class Test Functions.

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PROGRAMMING IN C

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Programming exercises on executing and editing a C program.
- Programming exercises on defining variables and assigning values to variables.
- Programming exercises on arithmetic, logical and relational operators.
- Programming exercises on arithmetic expressions and their evaluation.
- Programming exercises on formatting input/output using printf and scanf and their return type values.
- Programming exercises using if statement, using if – Else.
- Programming exercises on switch statement, while and do – while statement, for – statement.
- Simple programs using functions and recursive function.
- Programs on one-dimensional array, two-dimensional array.
- Programs for concatenation two strings together, comparing two strings.
- Simple programs using pointers, using structures, using union.
- Simple programs for File Handling

Paper-III **Basic of Web Designing**

Time : 2 hrs. **THEORY** **Theory : 30 Marks**

Syllabus **CCE : 10 Marks**

Practical : 50 Marks

Total : 90 Marks

Web Design Principles:

Basic principles involved in developing a web site - Planning process, Five Golden rules of web designing, Designing navigation bar, Page design, Home Page Layout, Design Concept.

Basics in Web Design

Brief History of Internet, What is World Wide Web, Why create a web site, Web Standards, Audience requirement.

Introduction to HTML

What is HTML, HTML Documents, Basic structure of an HTML document, Creating an HTML document, Mark up Tags, Heading-Paragraphs, Line Breaks, HTML Tags.

Elements of HTML

Introduction to elements of HTML, Working with Text, Working with Lists, Tables and Frames, Working with Hyperlinks, Images and Multimedia, Working with Forms and controls.

Introduction to Cascading Style Sheets(CSS)

Concept of CSS, Creating Style Sheet, CSS Properties, CSS Styling - Background, Text Format, Controlling Fonts, Working with block elements and objects, Working with Lists and Tables, CSS Id and Class.

Introduction to Web Publishing or Hosting

Creating the Web Site, Saving the site, Working on the web site, Creating web site structure, Creating Titles for web pages, Themes - Publishing web sites

Practical Syllabus:

- Acquaintance with elements, Tags and basic structure of HTML files.
- Develop the concept of basic and advanced text formatting.
- Practice the use of multimedia components in HTML documents.
- Designing of webpage-Document Layout, Working with List, Working with Tables.
- Practice Hyper linking, Designing of webpage-Working with Frames,Forms and Controls.
- Prepare creating style sheet, CSS properties, Background, Text,Font and styling etc.
- Working with List, HTML elements box, Positioning and Block properties in CSS.
- Designing with cascading style sheet-Internal and External style sheet.

(vi)TRADE : AUTOMOBILE ENGINEERING

PAPER-I **ENGINEERING DRAWING**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total :90Marks

Equipments

Introduction, Care and Use of Drawing Instruments and Material, List of Equipments - Mini Drafter, Drawing Board, T- Square, Set Square, Protractor, Pencil, Compass, Drawing Paper or Drawing Sheet, Eraser, Drawing Pins, Adhesive Tape, Engineering Scales, Sand Paper, French Curves, Instrument Box.

Engineering Drawing

Introduction to Engineering Drawing, Free Hand Lettering on Graph Paper, Layout of Drawing Sheet, Margin, Borderline, Title Block, Technical Lettering, Convention for Lines, Different types of Engineering Lines as per ISI Specifications, Practice in Free Hand Sketching of Vertical, Horizontal, Inclined Lines, Geometrical Figures : Triangle, Rectangles, Circles, Polygon, Ellipse, Parabola and Involutes of a Circle.

Material Representation

Conventional Representation of Different Material in Sections: Shaft, Hollow Pipe, Rectangular, Square, Angle, Channel, I-Section etc.

Dimensioning

Necessity of Dimensioning, Method and principles of dimensioning, Notation of Dimensioning, System of Placing Dimensions - Aligned System, Unidirectional System, Scales, Sizes of Scales.

Workshop Practice

- Description of Hand Tools used in Automobile Workshop, Precautions observed in a Workshop.
- Drawing Sheets of 1st Angle and 3rd Angle Projections of Solids.
- Introduction to Rivets and its Types.
- Concepts of AutoCAD (Computer Aided Design).
- Description of Measuring Tools and Instruments like Outside Caliper, Inside Caliper, Vernier Caliper, Outside Micrometer, Inside Micrometer, Dial Gauge, Marking Block

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and Gauge, Try Square, Bevel Protector, Bench Centre,Depth Gauge, Compression Gauge, Pressure Gauge.

- Surface Plate, Use of Open End Spanner, Ring Spanner, Box Spanner,Sockets, Torque, Wrenches, Adjustable Wrench, Allen Key.
- Introduction to Paints commonly used in Automobile.

ENGINEERING DRAWING

Time: 3 hrs **PRACTICAL** **Marks : 50**

- Use of the hand tools, measuring tools and measuring instrument used in workshop.
- To practice efficient use of files by producing plane surfaces, straight edges of right angle, fillets and round corners.
- To learn efficient and accurate use of hacksaw cutting.
- Fitting a square hole in a M.S.flat.
- Extraction of a broken stud.
- Use of hand tools and equipment used in painting and denting.
- Visit to a nearby mechanical workshop.
- Exercise to learn fixing and setup of mini drafter making margin on drawing sheet and making of title box.
- Practice of letter writing in freehand and Roman.
- Use of hammer (wooden, plastic, and metal) fordenting.
- Use of vernier caliper, calculation of least count and knowing accuracy of instrument.
- Use of micro meter for accurate sizes.
- Use of hand tools pliers, screw driver, spanner, file and dot punch etc in workshop.

PAPER-II **AUTOMOBILE ENGINE**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total :90Marks

Technical Terms

Define Automobile Engine, Power: H.P., B.H.P.,I.H.P., Carnot Cycle, Diesel Cycle, Otto Cycle, Stroke, TDC, BDC, Compression Ratio, Engine Capacity, Clearance Volume, Swept Volume, Engine Torque, Pressure, Heat, Temperature.

Engine

Classification of Engines as per stroke, cycle, fuel, ignition, cooling, speed and number and arrangement of cylinders, Principle, Basic Engine Operations, 4-Stroke, 2-Stroke Engine & their difference, Spark & Compression Ignition and their difference.

Engine Construction & Mechanism

Cylinder Block, Crank Case, Cylinder Liner, Cylinder Head, Manifolds, Piston, Piston Pin, Piston Ring, Connecting Rod, Crankshaft, Cam Shaft, Flywheel and Valves.

Ignition System

Battery - Construction, Working and Principle, Concept of Ignition System, Types of Ignition System : Magneto, Battery Ignition & their difference, Capacitor Discharge Ignition System, Distributor, Ignition Coil, Spark Plugs, Ignition Timing, Firing Order.

Fuel System

Types of Fuel Feed System: Gravity and Pump Feed, Petrol: Fuel Line Diagram, Carburetor - Types of Carburetor: Solex and Amal Carburetor, Function and Working Principles of Carburetors, Air Filter, Fuel Gauge, Inlet and Exhaust Manifold, Introduction to MPFI System (Multi Point Fuel Injection Systems), Advantages and disadvantages of MPFI.

Diesel: Fuel Line, Diagram, Fuel Injection Pump, Fuel Feed Pump, Pressure Pipe, Fuel Injector. Introduction to CRDI (Common Rail Direct Injection System).

Engine Cooling System

Cooling Requirement, Cooling Systems, Air Cooling and Liquid Cooling, Advantages and Disadvantages of Air Cooling and Water Cooling System, Water Jacket, Coolant Pump, Cooling Fan, Radiator, Pressure Cap, Anti Freeze Solution, Introduction to Thermostat.

Lubrication System

Necessity of Lubrication System, Principles, Functions, Properties of Lubricating Oil, Classification and Service Range of Lubrication Oil, Introduction to SAE Rating, Lubricating System, Oil Filter, Oil Pump: Gear type and Electrical, Oil Pressure Gauge.

AUTOMOBILE ENGINE

Time: 3 hrs **PRACTICAL** **Marks : 50**

- To study the construction and working of a two stroke single cylinder air - cooled petrol engine using a sectional model.
- To study the construction and working of a four stroke single cylinder air - cooled petrol engine using a sectional model.
- To study the construction and working of a two stroke single cylinder air - cooled diesel engine using a sectional model.
- To study the construction and working of a four stroke single cylinder air - cooled diesel engine using a sectional model.
- To study the construction and working of; Fuel Feed Pump, Fuel Injection Pump, Diesel Injector.
- To study the construction and working of: mechanical fuel pump, electric fuel pump, carburetor.
- To study the construction and working of lubricating oil pump.
- To study the construction, working and details of maintenance of distributor assembly.
- Batterytesting; Electrolyte Testing by Hydrometer and High Rate Discharge Test.
- Spark plug cleaning and adjusting its gap.
- Carburetor servicing.
- Removal, cleaning & refitting of air cleaners.
- Replacement of cylinder head gasket.
- Practice in Piston Ring Removal.
- Cleaning of fuel tank and oil sump and refilling.
- Check engine compression.
- Precautions to be observed before and after starting the engine.
- To check the thermostat working.

PAPER-III **TRANSMISSION SYSTEM**

THEORY

Time : 2 hrs

Theory : 30 Marks
CCE : 10 Marks
Practical : 50 Marks
Total :90Marks

Classification of Automobile

Chassis Layout of Conventional Motor Vehicle, Front and Rear - Wheel Drive, Rear Engine Vehicle, Four Wheel Drive.

Clutch

Function of Clutch and its Principle of Working, Types of Clutch, Constructional Details of Single Plate and Multi - Plate Clutches, Centrifugal Clutch, Fluid Coupling, Trouble Shooting of Clutch and its Adjustments.

Propeller Shaft & Universal Joints

Propeller Shaft, Function of Propeller Shaft, Constructional Details of Propeller Shaft, Universal Joints, Function of Universal Joints, Constructional Details of Universal Joints, Types of Universal Joint.

Gearbox

Necessity of a Gear Box, Types of Gears Used, Types of Gear Boxes - Sliding Mesh, Constant Mesh, Synchro Mesh, Constructional Details of Gearbox, Gear Selector Mechanism, Trouble - Shooting of Gearbox and its Adjustments, Introduction to Continuous Variable Transmission (CVT), Automatic Manual Transmission (AMT), Dual Clutch Transmission (DCT).

Differential

Function of Differential, Constructional Details, Working Principles of Differential, Trouble - Shooting of Differential, Adjustments.

Rear Axle

Function of Rear Axle, Types, Constructional Features,Trouble -Shooting, Adjustments.

TRANSMISSION SYSTEM

Time: 3 hrs **PRACTICAL** **Marks : 50**

- The dismount of single plate dry friction clutch from a vehicle, dismantle, clean the components, inspect report on the condition, repair, reassemble, adjust and remount on the vehicle.
- To dismount the propeller shaft assembly with universal joints from a vehicle, dismantle, clean, inspect report on the condition, repair, reassemble and remount on the vehicle.
- To study the chassis layout of two wheeler, three wheeler and fourwheeler.
- Flushing and refilling of transmission oil.
- To dismount and dismantle the gears of a constant mesh gear box from a vehicle, clean, inspect report on the condition, repair, reassemble, remount and adjust.
- To dismount the rear axle shafts from a four wheel drive, dismantle wheel bearings, oil seals, clean, inspect report on a condition, repair, reassemble, carryout pre - loading adjustment and complete the assembling of oil the components removed.
- To lift the vehicle with the help of jack.
- To identify the cracks on defective chassis frame.
- To study the tightening & loosening of clutch.
- To study the overhauling rear axle of four wheeler.
- Greasing of wheel bearing of four wheeler.