GROUP-27

<u>Network Assistant/JTA/Store man (Level of Exam- Diploma in ECE)</u>

1) General awareness, Reasoning, Mathematics, Science, History including Haryana related history, current affairs, literature, Geography, Civics, Environment, Culture etc. -   (**Weightage 20%**)

2) Computer terminology, Fundamentals, word software, excel software, Power point, internet, web browsing, Communication, emails, downloading and uploading data on websites etc**.** -

(**Weightage 10%**)

3) Job Oriented syllabus-   (**Weightage 70%**)

Fundamentals of Communication

Concept and Process of Communication, Types of Communication (Verbal Communication), Barriers to Communication, Speaking Skill: Significance and essentials of Spoken Communication, Listening Skill: Significance and essentials of Listening.

Trigonometry

Concept of angle, measurement of angle in degrees, grades, radians and their conversions, T-Ratios of Allied angles (without proof), Sum, Difference formulae and their applications (without proof). Product formulae (Transformation of product to sum, difference and vice versa, Applications of Trigonometric terms in engineering problems such as to find an angle of elevation, height, distance etc.

Co-ordinate Geometry

Cartesian and Polar co-ordinates (two dimensional), Distance between two points, mid-point, centroid of vertices of a triangle, Slope of a line, equation of straight line in various standards forms (without proof); (slope intercept form, intercept form, one-point form, two-point form, symmetric form, normal form, general form), intersection of two straight lines, concurrency of lines, angle between straight lines, parallel and perpendicular lines, perpendicular distance formula, conversion of general form of equation to the various forms.

Geometry of Circle and Software

General equation of a circle and its characteristics. To find the equation of a circle, given: I. Centre and radius II. Three points lying on it. III. Coordinates of end points of a diameter.

MATLAB Or SciLab software – Theoretical Introduction, MATLAB or SciLab as Simple Calculator (Addition and subtraction of values –Trigonometric and Inverse Trigonometric functions) – General Practice.

Properties of Matter

Elasticity and plasticity- definition, deforming force, restoring force, example of elastic and plastic body, Definition of stress and strain, Hooke's law, modulus of elasticity, Pressure- definition, atmospheric pressure, gauge pressure, absolute pressure, Pascal's law, Surface tension- definition, SI unit, applications of surface tension, effect of temperature on surface tension, Viscosity: definition, unit, examples, effect of temperature on viscosity.

Heat and Temperature

Definition of heat and temperature (on the basis of kinetic theory), Difference between heat and temperature, Principle and working of mercury thermometer, Modes of transfer of heat- conduction, convection and radiation with examples, Properties of heat radiation, Different scales of temperature and their relationship.

Wave Motion and its Applications:

Waves: definition, types (mechanical and electromagnetic wave), Wave motion- transverse and longitudinal with examples, terms used in wave motion like displacement, amplitude, time period, frequency, wavelength, wave velocity; relationship among wave velocity, frequency and wave length, Simple harmonic motion (SHM): definition, examples, Cantilever: definition, formula of time period

(without derivation), Free, forced and resonant vibrations with examples, Sound waves: types (infrasonic, audible, ultrasonic) on the basis of frequency, noise, coefficient of absorption of sound, echo.

Optics

Reflection and refraction of light with laws, refractive index, Lens: introduction, lens formulae (no derivation), power of lens and simple numerical problems, Total internal reflection and its applications, critical angle and conditions for total internal reflection, Superposition of waves (concept only), definition of Interference, Diffraction and Polarization of waves, Introduction to Microscope, Telescope and their applications.

Electrostatics and Electricity: Electric charge, unit of charge, conservation of charge, Coulomb's law of electrostatics, Electric field, electric lines of force (definition and properties), electric field intensity due to a point charge, Definition of electric flux, Gauss law (statement and formula), Capacitor and capacitance (with formula and unit), Electric current and its SI Unit, direct and alternating current, Resistance, conductance (definition and unit), Series and parallel combination of resistances, Ohm's law (statement and formula).

FUNDAMENTALS OF IT

Basics of Computer: Brief history of development of computers, Definition of Computer, Block diagram of a Computer, Hardware, Software, Booting: Cold and Hot Booting, Interaction between the CPU and Memory with Input/Output devices, Function of CPU and major functional parts of CPU. Memory, Bit, Nibble, Byte, KB, MB, GB, TB, PB, Functions of memory, Use of storage devices in a Computer, List types of memory used in a Computer, Importance of cache memory, CPU speed and CPU word length.

Basic Internet Skills: Understanding browser, Introduction to WWW, efficient use of search engines, awareness about Digital India portals (state and national portals) and college portals. Advantages of Email, Various email service providers, Creation of email id, sending and receiving emails, attaching documents with email and drive. Effective use of Gmail, G-Drive, Google Calendar, Google Sites, Google Sheets, Online mode of communication using Google Meet & WebEx.

Basic Logic building: Introduction to Programming, Steps involved in problem solving, Definition of Algorithm, Definition of Flowchart, Steps involved in algorithm development, differentiate algorithm and flowchart, symbols used in flowcharts, algorithms for simple problems, flowcharts for simple problems, Practice logic building using flowchart/algorithms.

Office Tools: Office Tools like LibreOffice/OpenOffice/MSOffice. OpenOffice Writer – Typesetting Text and Basic Formatting, Inserting Images, Hyperlinks, Bookmarks, Tables and Table Properties in Writer Introducing LibreOffice/OpenOffice Calc, Working with Cells, Sheets, data, tables, using formulae and functions, using charts and graphics. OpenOffice Impress – Creating and Viewing Presentations, Inserting Pictures and Tables, Slide Master and Slide Design, Custom Animation.

Use of social media: Introduction to Digital Marketing – Why Digital Marketing, Characteristics of Digital Marketing, Tools for Digital Marketing, Effective use of social media like LinkedIn, Google+, Facebook, Twitter, etc.: Features of social media, Advantages and Disadvantages of social media.

FUNDAMENTAL OF ELECTRICAL ENGINEERING

Electrical Fundamentals: Nature of Electricity, Charge, free electrons, Electric current, Electric potential and potential difference, Electric current, Electrical Energy, Electrical power and their unit, Resistance: Definition, Unit, Laws of resistance, conductivity and resistivity, Effect of temperature on resistance, Temperature coefficient of resistance, Types of resistance & their applications, Colour coding of resistance, Inductors and capacitors with their wattage consideration, Factors affecting capacitance of a capacitor. Capacitors in series and parallel.

DC Circuits & Theorems: Ohm's law and its verification, Kirchhoff's current law and Kirchhoff's voltage law, Star – Delta connections, Voltage and current source, symbol and graphical representation, characteristics of ideal and practical sources, Mesh and Loop analysis, Thevenin's theorem, Norton's theorem, Superposition Theorem, Maximum Power Transfer Theorem.

AC Circuits: AC Fundamentals: Cycle, frequency, time period, amplitude, difference between AC and DC, instantaneous value, average value, r.m.s. value, maximum value, form factor and peak factor, Concept of conductance, susceptance, admittance, impedance and concept of inductive and capacitive reactance,

RL-RC Circuits, Introduction to series and parallel resonance and its conditions, Power in pure resistance, inductance and capacitance, power in combined RLC circuits, Power factor, active and reactive power: Definition and their significance.

Electro Magnetic Circuit: Concept of electro-magnetic field produced by flow of electric current, magnetic circuit, concept of magneto-motive force (MMF), flux, reluctance, permeability, analogy between electric and magnetic circuit, Faraday's laws of electro-magnetic induction, principles of self and mutual induction, self and mutually induced emf, Energy stored in an inductor, series and parallel combination of inductors.

Batteries: Basic idea of primary and secondary cells, Construction, working principle and applications of Lead-Acid, Nickel-Cadmium, Li-Ion batteries, Series and parallel connections of batteries, Introduction to maintenance of free batteries, Disposal of batteries, General idea of solar cells, solar panels and their applications.

ELECTRONIC DEVICES AND CIRCUITS

Semiconductor Physics: Review of basic atomic structure and energy levels, concept of insulators, conductors and semiconductors, atomic structure of Germanium (Ge) and Silicon (Si), covalent bonds, Concept of intrinsic and extrinsic semiconductor, process of doping, Energy level diagram of conductors, insulators and semiconductors; minority and majority charge carriers, P and N type semiconductors and their conductivity, effect of temperature on conductivity of intrinsic semiconductors.

Semiconductor Diode: PN junction diode, mechanism of current flow in PN junction, forward and reverse biased PN junction, potential barrier, drift and diffusion currents, depletion layer, concept of junction capacitance in forward and reverse biased condition, V-I characteristics, static and dynamic resistance and their value calculation from the characteristics, Application of diode as half-wave, full wave and bridge rectifiers. Peak Inverse Voltage, rectification efficiencies and ripple factor calculations, shunt capacitor filter, series inductor filter, LC and π filters, Types of diodes, characteristics and applications of Zener diodes. Zener and avalanche breakdown, Introduction to Clipping and Clamping Circuits.

Introduction to Bipolar-Transistors: Concept of a bipolar transistor, its structure, PNP and NPN transistors, their symbols and mechanism of current flow; Current relations in a transistor; concept of leakage current; CB, CE, CC configurations of a transistor; Input and output characteristics in CB and CE configurations; input and output dynamic resistance in CB and CE configurations; Current amplification factors, relation between α, β and γ. Comparison of CB, CE and CC Configurations; Transistor as an amplifier in CE Configuration; concept of DC load line and calculation of current gain and voltage gain using DC load line.

Transistor Biasing Circuits: Concept of transistor biasing and selection of operating point. Need for stabilization of operating point. Different types of biasing circuits. Single stage transistor amplifier circuit, concept of dc and ac load line and its use. Explanation of phase reversal of output voltage with respect to input voltage.

Field Effect Transistors: Construction, operation and characteristics of FETs and their applications, Construction, operation and characteristics of a MOSFET in depletion and enhancement modes and its applications, Comparison of JFET, MOSFET and BJT.

Statistics and Software

Statistics: Measures of Central Tendency: Mean, Median, Mode, Measures of Dispersion: Mean deviation, Standard deviation.

Software: SciLab software – Theoretical Introduction, Basic difference between MATLAB and SciLab software, Calculations with MATLAB or ScilLab - (a) Representation of matrix (2×2 order), (b) Addition, Subtraction of matrices (2×2 order) in MATLAB or SciLab.

Classification of Materials and their Properties

Definition of energy level, energy bands, Types of materials (conductor, semiconductor, insulator and dielectric) with examples, intrinsic and extrinsic semiconductors (introduction only), Introduction to magnetism, type of magnetic materials: diamagnetic, paramagnetic and ferromagnetic materials with examples, Magnetic field, magnetic lines of force, magnetic flux, Electromagnetic induction (definition).

Modern Physics

Laser: introduction, principle, absorption, spontaneous emission, stimulated emission, population inversion, Engineering and medical applications of laser, Fibre optics: introduction to optical fibres (definition, principle and parts), light propagation, fibre types (mono-mode, multi-mode), applications in medical, telecommunication and sensors 5.4 Nanotechnology: introduction, definition of nanomaterials with examples, properties at nanoscale, applications of nanotechnology (brief).

ELECTRONIC INSTRUMENTS AND MEASUREMENT

Basics of Instruments and Measurements: Measurement, method of measurement, types of instruments, Specifications of instruments: Accuracy, precision, sensitivity, resolution, range, errors in measurement, sources of errors, limiting errors, loading effect, importance and applications of standards and calibration.

Voltage, Current and Resistance Measurement Moving Coil and Moving Iron Instruments

a. Principles of measurement of DC voltage, DC current, AC voltage, AC current, b. Principles of operation and construction of permanent magnet moving coil (PMMC) instruments and Moving iron type instruments, VOM Meter.

Cathode Ray Oscilloscope: Construction and working of Cathode Ray Tube (CRT) Block diagram description of a basic CRO and triggered sweep oscilloscope, front panel controls Specifications of CRO and their Applications Measurement of current, voltage, frequency, time period and phase using CRO, Lissajous pattern for phase measurement. Digital storage oscilloscope (DSO): block diagram and working principle.

Impedance Bridges, Q Meter and Function Generator: a. Wheat stone bridge b. AC bridges: Maxwell's induction bridge, Hay's bridge, De-Sauty's bridge c. Block diagram and working principle of Q-meter. Explanation of block diagram, specifications of low frequency and RF generators, pulse generator, function generator.

Digital Instruments: a. Comparison of analog and digital instruments b. Block diagram and working of a digital multi-meter c. Applications and Limitations of digital multi-meters. d. Working principle of logic probe, logic pulser.

ENGINEERING GRAPHICS

Introduction to Engineering Drawing and Graphics: Introduction to use and care of drawing instruments, drawing materials, layout and sizes of drawing sheets and drawing boards, Symbols and conventions. a) Conventions of Engineering Materials, Sectional Breaks and Conventional lines. b) Civil Engineering Sanitary fitting symbols c) Electrical fitting symbols for domestic interior installations, Geometrical construction-geometrical figures such as triangles, rectangles, circles, ellipses and curves, hexagons, pentagons bisecting a line and arc, division of line and circle with the help of drawing instruments.

Technical Lettering of Alphabet and Numerals, Dimensioning, Scales, Orthographic Projections, Sectioning,Introduction of projection of right solids such as prism & pyramid, Introduction of sections of right solids,Development of Surfaces, Isometric Views, Introduction to AutoCAD.

Printed Circuit Board (PCB)

Introduction: What is PCB, Difference between PWB and PCB, Types of PCBs: Single/Double Sided and Multi-Layer PCBs, PCB Layer Masks: Top Layer Mask, Bottom Layer Mask, Solder Mask, Legend Print or Silk screen Mask, Hand-Taping Vs CAD PCB Materials: FR-2 and FR-4 material advantages and disadvantages, PCB Design Rules.

Computer Aided Design:

Brief History of EDA, Latest Trends in Market, How it helps and Why it requires, Different EDA Tools (Licensed like Orcad or Free Open Source Software like Circuit Maker or Dip Trace or Eagle etc.), Schematic Entry, Net listing, Electrical Rule Check (ERC), PCB Layout Designing, Auto and Manual Routing, Design Rule Check (DRC), Gerber Generation, Creating Library, Creating component, Symbols and Footprints for components.

Fabrication: Photo Processing for Pattern Transfer, Etching, Drilling, Component Mounting, Soldering and De-soldering, PCB Testing, PCB design and fabrication of Basic Analog Electronic Circuits, Power Supplies, 555 Based circuits etc.

ENVIRONMENTAL STUDIES AND DISASTER MANAGEMENT

Introduction: Basics of ecology, eco system- concept, and sustainable development, Sources, advantages, disadvantages of renewable and non-renewable energy, Rain water harvesting, Deforestation – its effects & control measures.

Air and Noise Pollution: Air Pollution: Source of air pollution. Effect of air pollution on human health, economy, Air pollution control methods, Noise Pollution: Source of noise pollution, Unit of noise, Effect of noise pollution, Acceptable noise level, Different method of minimizing noise pollution.

Water and Soil Pollution: Water Pollution: Impurities in water, Cause of water pollution, Source of water pollution. Effect of water pollution on human health, Concept of DO, BOD, COD. Prevention of water pollution- Water treatment processes, Sewage treatment. Water quality standard, Soil Pollution :Sources of soil pollution, Effects and Control of soil pollution, Types of Solid waste- House hold, Industrial, Agricultural, Biomedical, Disposal of solid waste, Solid waste management E-waste, E – waste management.

Impact of Energy Usage on Environment: Global Warming, Green House Effect, Depletion of Ozone Layer, Acid Rain. Eco-friendly Material, Recycling of Material, Concept of Green Buildings, Concept of Carbon Credit & Carbon footprint.

Disaster Management: Different Types of Disaster: Natural Disaster: such as Flood, Cyclone, Earthquakes and Landslides etc. Man-made Disaster: such as Fire, Industrial Pollution, Nuclear Disaster, Biological Disasters, Accidents (Air, Sea Rail & Road), Structural failures (Building and Bridge), War & Terrorism etc., Disaster Preparedness: Disaster Preparedness Plan Prediction, Early Warnings and Safety Measures of Disaster Psychological response and Management (Trauma, Stress, Rumour and Panic).

 Important Note: The Weightage as mentioned against the syllabus is tentative & may vary.