(Fitting/ Plumbing, Carpentry and Pattern making ,Welding ,Machine shop ,Sheet Metal/ Painting ,Black smithy , Foundry/ Moulding , Fitting ,Sheet Metal ,Mechanical Auto)

UNIT -I

Unit system and their conversion, forces, work energy power, concept of heat and temperature, electricity, current, voltage, power, resistance, conductors, insulator, Ohm' law, mensuration, volume and weight of simple solid bodies, perimeter, area, finding the capacity in liters of different vessels, finding lateral surface area of vessels, trigonometrical ratio, drawing instruments, letters, numbers and alphabets as per BIS, layout of drawing sheet and title block, drawing of straight lines, geometrical constructions, rectangles, circles, polygons etc., use of different types of lines and symbols for drawing, importance and dimensioning technique as per BIS, isometric views with dimensions such as cube, rectangular block, cylinder etc., orthographic projection in first angle and third angle as per BIS.

UNIT- II

Plant layout, shop layout, safety precautions, Metals and non-metals, their alloys, properties like ductility, plasticity, hardness etc., testing and inspection of metals like iron, steel, aluminum, copper etc., heat treatment of metal and alloys, calculation of stress and strain, Hook's Law and modulus of elasticity, Hot and cold working, and other metal forming and forging operations. Terms used in limit system, fits, types of fits, basis of limit system, Indian standard system of limit and fit, calculation of fundamental deviation for shafts and holes, surface roughness and its measurement, Classification of measuring instrument, types of measuring instruments like steel rule, calipers, divider, depth gauge, telescopic gauge, micrometers, depth gauge micrometer, inside and outside micrometer, Vernier caliper, Vernier height gauge, Vernier depth gauge, Vernier gear tooth caliper, protector, adjustable bevel, combination set, universal bevel protector, slip gauges, sine bar, try square, surface plate, angle gauge blocks, autocollimator, surface gauge, ring gauge, plug gauge, snap gauge, thread gauge, feeler gauge, screw pitch gauge, radius or fillet gauge, dial indicator.

UNIT- III

Timber, seasoning of timber, defects in timber, carpentry marking, measuring, testing, cutting, plaining, boring, striking, holding and other tools used in carpentry, pattern materials, pattern making tools, pattern allowances, types of pattern, core boxes, color coding for pattern.

Cleaning of metals and wooden surface for preventive coating, paint constituents, varnish, painting methods and equipment. Moulding materials, classification, properties, Moulding

processes, Moulding methods, foundry tools, equipment and metal casting, smithy and forging, forgeable materials, heating devices (hearths and furnaces), forging processes, blacksmith's hand tool and appliances, smith forging operations, different forging process like upset forging, drop forging etc., defects in forging.

UNIT-IV

Welded joints, edge preparation, welding symbols, welding positions, Gas welding, Gas cutting, gas welding tools and equipment, oxygen cylinder, acetylene cylinder, types of flames, filler rod, a.c and d.c arc welding, polarity, electrodes, arc welding equipment; metal inert gas welding (MIG), tungsten inert gas (TIG) arc welding, fluxes, welding technique, welding defects and testing, soldering, brazing.

Fitting and plumbing holding tools, measuring, marking, testing and cutting tools, dies, different type of pipes, classification of pipes, Indian standard specification for pipes, pipe fitting, taps and valves, symbols for pipe fitting and valves, pipe vice, wrenches, pipe cutting, pipe thread and thread cutting, pipe joints and bending of pipes.

Metals used in sheet metal work, sheet metal tools, sheet metal operations e.g. marking, cutting, notching, folding edges, blocking etc., sheet metals machines, laying out a pattern.

Rivets, material of rivets, types of rivets, method of riveting, terms used in riveted joints, screw threads, different. type of threads, designation of screw threads, types of screw fastenings, locking device, types of nuts and bolts, keys and cotters, studs.

UNIT-V

Lathe machine, principal parts of lathe, size and specification of lathe, types of lathe, lathe accessories and attachments, lathe operations, cutting tools, drilling, types of drill machine, drilling operations, specification of drilling machine, reamers, counter boring, counter sinking, tapping, lapping, honing, cutting fluids, lubricants, maintenance of machine.

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Analog & Digital Electronics: semiconductors, semiconductor diodes & Zener diode, Bi-polar junction transistor and their parameters, Transistor biasing, Multi-vibrators Boolean algebra, Logic gates Combinational and sequential digital circuits, K-map, flip-flop, Semiconductor memories, A/D & D/A converters, 8085 Microprocessor, Architecture, Programming and Interfacing, Number system and codes, elements of microprocessors & their important applications, Light-Emitting Diodes, Filters, Active and passive components, IC-555 and wave shaping circuits.

Industrial Electronics: Various power semiconductor devices, Characteristics of Thyristor, Triac, GTO, MOSFET, IGBT, UJT, choppers and converters, Thyristor & its protection and series-parallel operation, Single-phase rectifier, D.C. regulated power supplies, A.C. voltage regulators.

Communication System: Amplitude, Frequency and Phase modulation and their comparison, Generation and detection of amplitude, frequency, phase and pulse modulated signals, Noise problems, Sound and vision broadcast, transmitting and receiving systems, Antennas and feeders, Fiber optics and optical communication systems and losses, Digital communications, pulse code modulation, amplitude, phase and frequency shift keying (ASK, PSK, FSK), Computer communication system- LAN, ISDN.

Consumer Electronics: Microphones and Loudspeakers, Sound Recording, VCD and DVD Player systems, Television, LCD, led, Consumer Appliances.

Fundamental of Electrical Engineering: Basic concepts, Electrical circuit elements (R, L and C), Concept of active and passive elements, voltage and current sources, concept of linearity and linear network, unilateral and bilateral elements, Kirchhoff's laws, Loop and nodal methods of analysis, Star-delta transformation, Magnetism, and Electromagnetism, Electromagnetic Induction.

AC Fundamentals & circuits: Average and effective values, Form and peak factors, Analysis of single-phase AC Circuits consisting of R, L, C, RL, RC, RLC combinations (Series and Parallel), Apparent, active & reactive power, Power factor, power factor improvement, Concept of Resonance in series & parallel circuits, bandwidth and quality factor.

Batteries: Basic idea about primary and secondary cells, working and applicants of Lead-Acid, Nickel-Cadmium and Silver oxide batteries, Capacity and efficiency of lead acid battery Charging methods used for lead-acid battery (accumulator), Care and maintenance of lead-acid battery, Series and parallel connections of batteries, Testing of lead acid battery for fully charged condition and their specification, Application of lead acid battery, Introduction to maintenance free batteries.

Material Science: Theory of Semiconductors, Conductors and insulators. Superconductivity, Various insulators used for Electrical and Electronic applications. Different magnetic materials, properties and applications, Hall Effect.

Electrical & Electronic Measurement & Instrumentation: Basic methods of Measurement, Error analysis, Electrical Standards, Measurement of voltage, current, power, energy, power-factor, resistance, inductance, capacitance, frequency and loss angles. Indicating instruments, DC- Bridges, Electronic measuring instruments, Multi-meter, digital

voltmeter, frequency counter, Q-meter, oscilloscope, Transducers and their classifications, Thermo-couple, thermistor, RTD, LVDT, strain-gauges.

Electrical Installations: Components of LT Switchgear, circuit breakers and relays, isolators, Switch Fuse Unit (SFU), MCB, ELCB, MCCB, Types of Wires and Cables, Importance of earthing, calculations for energy consumption and savings, Introduction to Earthing and Electrical Safety, Need of Earthing of equipment and devices, important electrical safety issues, Symbols and sign conventions of domestic & industrial installations, Utilization of Electrical Energy, Electrical wiring and lighting, Air conditioning and electrical installations in building, Illuminations.

Electrical Machines: D.C. Machines: commutation and armature reaction, Applications, starting and speed control, Synchronous generators: Armature reaction, voltage regulation, parallel operation. Single-and Three-phase Induction motors, Principle of operation, performance characteristics, Synchronous Motors, Principle of operation, performance analysis, Hunting, Transformers: Construction, equivalent circuit.

Control Engineering: Open and close loop system, Transfer function.

Electric Drives: Fundamentals of electric drive, Rating estimation, Electric braking, Electric Traction, Various Systems of track electrification and their comparison.

Power System and Protection:

Types of Power Station. Selection of site. General layout of Thermal, Hydro, Non-conventional energy sources. Generation, Transmission and Distribution: A.C. and D.C. Transmission systems, Insulators, Corona and its effects, Radio interference, underground cables, Switchgear & Protection: Classification of circuit breakers, Relaying Principles: Primary and back-Up relaying, over-current, differential, impedance, and direction relaying principles, Constructional details and Protection schemes for transmission line, transformer, generator.

PLC and Microcontroller: Introduction to PLC, Working of PLC, Instruction Set, Ladder Diagram Programming, Applications of PLCs and Microcontroller.