

FURTHER DETAILS REGARDING MAIN TOPICS OF

PROGRAMME NO. 04/2016 (Item No. 10)

WORKS MANAGER

STATE WATER TRANSPORT

(CATEGORY No. 548/2014)

Part I

Module 1

Metallurgy and Material Science: Atomic structure:- Correlation of atomic radius to strength, electron configurations (basic only) - Primary bonds:- Covalent and Ionic bond: bond energy with strength, cohesive force, density, directional and non-directional bonding; Metallic bond: conductivity, ductility, opaque, lustrous, density, non directional bonding – Specific properties of bonding:- Deeper energy well bond and shallow energy well bond, melting temperature, modulus of elasticity, coefficient of thermal expansion and attributes of modulus of elasticity in metal cutting process - Secondary bonds:- classification, hydrogen bond, specific heat etc. Crystallography:- Crystal, space lattice, unit cell - BCC, FCC, HCP structures - short and long range order - Effects of crystalline and amorphous structure on mechanical properties - Determination of atomic packing factor of SC, BCC, FCC, coordination number; densities - Polymorphism and allotropy - Miller Indices:- slip system, brittleness of BCC, HCP and ductility of FCC - Modes of plastic deformation:- Slip, twinning, Schmid's law, correlation of slip system with slip in metals. **Classification of crystal imperfections:** - types of dislocation, source of dislocation, cross slip, climb, jog, kink, forest of dislocation, role of surface defects on crack initiation - Burgers vector - Correlation of dislocation density with strength and nano concept - Significance of Frank and Read source in metals deformation - Mechanism of crystallization: Homogeneous and heterogeneous nuclei formation, under cooling, dendritic growth, grain boundary irregularity - Effects of grain size, grain size distribution, grain shape, grain orientation on dislocation/strength and creep resistance - Hall - Petch equation; significance high and low angle grain boundaries on dislocation - – polishing and etching to determine the microstructure - crystal structure determination by X - ray diffraction method - Diffusion in solids, Fick's laws, mechanisms, applications of diffusion in mechanical engineering. **Phase diagrams:** - Limitations of pure metals and need of alloying - classification of alloys, solid solutions, Hume Rothery's rule - single phase, multi-phase equilibrium diagrams - lever rule and Gibbs's phase rule - Coring - Equilibrium diagrams reactions:- monotectic, eutectic, eutectoid, peritectic, peritectoid - Detailed discussion on Iron-Carbon equilibrium diagram with microstructure and properties changes in austenite, ledeburite, ferrite, cementite, interlamellar spacing of pearlite to strength etc, special features of martensite transformation, bainite, spheroidite etc.. Heat treatment:- Definition and necessity - TTT diagrams - critical cooling rate (CCT) - annealing, normalizing, hardening, spheroidizing - Tempering:- austempering, martempering and ausforming -

Hardenability, Jominy end quench test, applications – hardness and microhardness tests - surface hardening methods:- carburizing processes; Nitriding; Flame, induction, laser and electron beam hardening processes; applications - Types of Strengthening mechanisms:- grain size reduction, work hardening, Solid solution hardening, precipitation strengthening and over ageing, dispersion hardening - Cold working: Detailed discussion on strain hardening; recovery; recrystallization, effect of stored energy; reSyllabus - B.Tech. Mechanical Engineering. Mahatma Gandhi University crystallization temperature, effect of grain size; driving force for grain growth - hot working - Bauschinger effect and attributes in metal forming. **Alloy steels:-** Effects of alloying elements on: dislocation movement, polymorphic transformation temperature, formation and stability of carbides, grain growth, displacement of the eutectoid point, retardation of the transformation rates, improvement in corrosion resistance, mechanical properties – Nickel steels, Chromium steels etc. - Enhancement of steel properties by adding alloying elements:- Molybdenum, Nickel, Chromium, Vanadium, Tungsten, Cobalt, Silicon, Copper and Lead – High speed steels:- Mo and W types, effect of different alloying elements in HSS - Cast irons: Classifications, grey, white, malleable and spheroidal graphite cast iron, composition, microstructure, properties and applications – Principal Non ferrous Alloys: - Aluminum, Copper, Magnesium, Nickel, Titanium, study of composition, microstructure, properties, applications, reference shall be made to the phase diagrams whenever necessary. **Fracture:** – Brittle and ductile fracture - Griffith theory of brittle fracture - stress concentration, stress raiser – Effect of plastic deformation on crack propagation – transgranular, intergranular fracture - Effect of impact loading on ductile material and its application in forging etc.- Fatigue:- Stress cycles – Primary and secondary stress raisers - Characteristics of fatigue failure, S-N curve - Factors affecting fatigue strength: stress concentration, size effect, surface roughness, change in surface properties, surface residual stress -Ways to improve fatigue life – effect of temperature on fatigue, thermal fatigue and its applications in metal cutting – Mechanism of fatigue failure – structural features of fatigue:- crack initiation, growth, propagation – fatigue tests - Fracture toughness (definition only) - Ductile to brittle transition temperature (DBTT) in steels - Creep:- Creep curves – creep tests- Structural change:- deformation by slip, sub-grain formation, grain boundary sliding – Mechanism of creep deformation - threshold for creep - prevention against creep- Super plasticity: applications.

Manufacturing Process: Patterns: - types, allowances, color code – Molding sand:- constituents, types, properties, testing, types of mould, molding machines – Cores:- sands, types prints, machines, chaplets, forces acting on molding flasks - Gating system:- fluid flow and heat transfer in metal casting, elements and design of gating system, sprue, gating ratio, slag trap system – Riser:- riser design, chills, feeding devices - Cupola operation -pouring and cleaning of castings - defects in castings - inspection and quality control - Casting:- continuous, strip, shell mold, vacuum, investment, slush, pressure, die, centrifugal, precision investment, squeeze casting and semi solid metal forming, economics and surface finish obtainable - casting machines - comparison of casting with other production processes. (Include necessary figures and equations). **Welding:-** diffusion, definition of welding, metallurgy of welding, applications, classification, mechanism - welding design:- effect of weld parameters on weld quality, heat input, heat flow and distortions - Gas welding:- details, equipment, fluxes and filler rods – flame cutting - Arc welding:- applications, equipment, polarity, governing factor in fusion welding - electrodes and types – TIG - GMA - CO₂ process - Submerged arc, electroslag, plasma arc and flux cored arc welding - Resistance, thermit solid state welding - Electron and laser beam

welding – explosive welding - inspection and defects in welding - heat affected zone, grain size variations in joint strength - Brazing and soldering - adhesive bonding – Extrusion: Metal flow – mechanism and types – extrusion defects. **Rolling:-** principles - types of rolls and rolling mills - mechanics of flat rolling, roll pressure distribution - neutral point - front and back tension, roll forces in hot rolling, roll torque and power, friction, deflection and flattening - friction and lubrication in metal forming - defects - hot and cold rolling - rolling machines - strip velocity and roll velocity - roll and roll pass design - theories of rolling and effect of parameters - load calculation - rolling of tubes, wheels, axles, I-beam thread, gear rolling. **Forging:-** classification - open die forging, forces and work of deformation - Forging methods analysis:- slab method only, solid cylindrical, rectangular work piece in plane strain, forging under sticking condition - deformation zone geometry – die forging:- impression, close, Syllabus - B.Tech. Mechanical Engineering Mahatma Gandhi University coining, skew rolling etc. – defects in forging – forgeability tests – die design and materials – equipments - heating in forging - quality assurance for forging -non destructive testing - mechanics of rod and wire Drawing:- ideal deformation, ideal deformation and friction, drawing of flat strips etc – drawing defects – drawing practices. degrees of freedom - principle of clamping:- clamping types - work holding principle – Die cutting:- Different types - shearing - types of presses –cutting action in punch and die operations – die clearances – types of die:- progressive, compound, combination die – Bending dies:- bending methods, minimum bend radius, bendability, spring back, forces, bend allowances – Forming dies:- solid form, curling, embossing, coining, bulging dies - Shear and tube spinning - High energy rate forming:- need, energy sources - material behavior - pneumatic, mechanical, electro hydraulic, electromagnetic, and explosive forming – Deep drawing:- deep draw ability, punch forces. **CAD/CAM and CIM,**

Conventional Machining Processes Turning machines:- Types - method of holding work and tool, accessories, attachments-operations and types of tools for each operation - tool room lathe - duplicating lathe - Capstan and Turret lathe – knurling - Drilling:- types of drilling machines - types of drills - nomenclature of drill point - drill wear - types of chip breakers - cutting forces in drilling - Boring:- types of boring machines, tool geometry - counterboring, spot facing, countersinking, trepanning – Reaming:- types of reamers - tool nomenclature - cutting forces - tool materials and surface roughness obtainable in each operations. Shaping, planing and slotting machines:- Types and specifications - quick return motion - hydraulic feed and its advantages - automatic feed-speed, feed and depth of cut -work holding devices - types of operation and examples of work done - shaping of V-blocks, planing of guide gibs, slotting of keyways – Broaching:- - basic process - different cutting elements – force required for broaching and strength of broach – tool materials and surface roughness obtainable in each operations. Milling operations:- different types milling machines - Different methods of milling - nomenclature of milling cutters – cutting forces in milling – different types of milling cutters – attachments for milling:-vertical milling and universal milling attachment, high speed milling attachment, rack milling and slot attachments, parking bracket, rotary table, universal dividing head, vices, arbors, adaptors and collet chucks – tool materials and surface roughness obtainable in milling – machining centers: applications and advantages - Grinding: - types of machines - Grinding mechanisms:- grinding debris, grinding force power, specific energy - Grinding wheels:- different types of abrasives, grain size, different types of bond, grade, structure – marking system of grinding wheels - Grinding fluids – Truing and dressing of grinding wheels - Grinding temperature, thermal damage and surface roughness obtainable. Honring: Types of machines,

methods of honing – types honing stones – honing conditions - cutting fluids - surface roughness obtainable - Lapping: - types of hand lapping - types of lapping machines - surface roughness obtainable – Burnishing:- processes and surface roughness obtainable. Gear cutting process: - Gear milling: - gear milling machines and different gear milling operations - Gear hobbing: - principle of the hobbing process and hobbing machines, basic types of hobbing machines, different hobbing techniques, nomenclature of hob, hob wear, spur gear hobbing, helical gear hobbing - gear shaping: - principle of gear shaping process - gear finishing - gear errors - Thread production process: - different thread production processes: screw cutting on lathe, thread milling, thread whirling, die threading, tapping, thread rolling, and thread grinding.

Engineering Metrology General measurements concepts:- Principles for achieving accuracy; methods for estimating accuracy and precision, precision Vs accuracy, systematic and constant errors; progressive, random, erratic, drunken errors - Fits and tolerances:- types of fits: hole and shaft basis system – limit gauges:- gauge tolerance, presentation of gauge tolerances – Taylor’s theory of gauging – limit gauges for screw threads - Design and operation of linear measurements:- Principle of alignment (Abbe’s), accuracy and precision etc. – Principle of kinematics: complete constraints, one degree of freedom – Gauge blocks:- gauge materials, accuracy and standards, effect of temperature, surface roughness and manufacturing of gauge blocks – Comparators:- mechanical, mechanical-optical, pneumatic and horizontal length comparator – Angle measurements:- three disc, sine bar and dial gauge – measurement of taper plug ring gauges and taper bores – Precision levels, clinometer – Optical instruments for angle measurements:- optical principles of projector, microscope, telescope, collimator, auto collimator - optical flat and optical parallel applications – auto collimator, angle dekkor, combination of angle gauges, optical flat.

Module 2

Fluid Mechanics: Basic concepts-properties of fluids- Fluid statics: pressure-variation of pressure-absolute and gauge pressure- Pascal’s law, manometers- hydrostatic force on plane and curved surfaces-buoyancy and floatation- stability of submerged and floating bodies-metacentric height Euler’s momentum equation-Bernoulli’s equation and its limitations-momentum and energy correction factors-applications of Bernoulli’s equation-venturimeter, orifice meter, pitot tube, orifices and mouthpieces, notches and weirs-rotameter. Flow through pipes-laminar and turbulent flow in pipes-critical Reynold’s number- Darcy Weisbach equation-hydraulic radius-power transmission through pipes-losses in pipes-pipes in series pipes in parallel-hydraulic gradient line and total energy line-equivalent pipe-moody’s diagram-water hammer. Open channel flow-Chezy’s equation-most economical cross section-hydraulic jump. Fluid kinematics-Description of flow pattern-stream lines, path lines, streak lines, stream tubes-velocity and acceleration in fluid flow-continuity equation. Ideal fluids-rotational and irrotational flow-circulation and vorticity-potential function and stream function, basic flow fields-uniform flow. Source, sink, doublet, vortex, spiral flow, flow past a cylinder with circulation-Magnus effect-Joukowski theorem. Boundary layer theory- -boundary layer separation-methods of controlling-wake-drag force on a rectangular plate-pressure drag-friction drag-total drag streamlined body-bluff body, lift and drag force on an aerofoil-characteristics-work done. Hagen-Poiseuille equation.

Hydraulic Machines Principles: Energy transfer between fluid and rotor, classification of fluid machinery, dimensionless parameters, specific speed, applications, stage velocity triangles, work and efficiency for compressors, rotodynamic pumps and turbines and performance characteristics. Impulse Momentum equation- applications- reaction principle – propulsion of ships. Basic equation of energy transfer in rotodynamic machines components of energy transfer- **Pumping machinery**: Rotodynamic pumps - construction features- classification -working of centrifugal pumps, Euler's head equation –performance pump characteristics: - selection of pumps from performance curves – NPSH required– NPSH available– multistage pumps – pumps in parallel & series operation- propeller pumps.– model studies. Non dimensional numbers (Reynold's number, Froude's number, Euler's number, Weber's number and Mach's number) Non dimensional parameters for incompressible flow machines –Capacity coefficient, Head coefficient, Power coefficient, Reynolds number, shape number, specific speed – Non dimensional performance curves for pumps- effect of change of outlet vane angle, impeller diameters and speed–Principle of similitude Cavitation in fluid machines –factors affecting cavitation in pumps and turbines – Positive displacement pumps: reciprocating pump, pump characteristics – applications.

Module 3

Industrial Hydraulics: introduction to hydraulic/ pneumatic devices. Symbols and nomenclature. Power transmission, Hydraulic pumps-classifications, characteristic Comparison of electric, hydraulic and pneumatic devices. Hydraulic accumulators. . Pumps and motors: Principle of working. Hand pumps-single acting, double acting, multi- displacement. Gear pumps- internal, external and gear ring. Screw, vane, piston pumps – axial piston pump, swash pump, bent axis pump radial and series pumps. Types of hydraulic motors, gear motors, vane motors, piston motors- radial piston, rolling vane, ball piston, oscillating motor-characteristics. Telescopic cylinder, cylinder cushion.

Hydraulic valves: Directional control valve, shuttle valve, pressure control valve Stop valve- non return valve-relief valve-sequence valve-counter balance valve- pressure reducing valve – flow control valve –direction control valves- throttling, non throttling- open centre and closed centre and tandem centre valves- their principle of operation. Hydraulic Circuits and Circuit fundamentals. Flow divider and combiner. Piping terminology, control terminology, flow control of hydraulic pump, velocity control- characteristics. Different types of switching and its merits Meter in and meter out. Applications of unloading valve. Application of pressure reducing and pressure sequence valve. Properties of commonly used hydraulic fluids-Typical hydraulic circuits used in machine tools –Rivetter- pneumatic Hammer, hydraulic press, and power steering

Module 4

Different types of Hull: Various terms used in boat construction. Classification of ships/ boats. Water tight integrity of vessels. General layout. Passenger boats and cargo vessels. Geometry of ships and hydrostatic calculations. Trim and stability booklet. Inclining experiment. Free surface effect. Propeller types- Fixed, Variable pitch, Kort nozzle. Rudder.

Registration of boats/ ships. Merchant Shipping Act, Inland Vessel Rules, River Sea Vessels Rule, Harbour Craft Rules, Canal Rules. **Manning of boats /Ships. Safety equipments on board:** Life saving appliances, fire appliances, Light and sound signals.

Module 5

Mechanics of Materials Basic equations of Elasticity, Stress at a point with respect to a plane - normal and tangential components of stress - stress tensor - Cauchy's equations - stress transformation - principal stresses and planes - strain at a point - strain tensor - analogy between stress and strain tensors - constitutive equations - generalized Hooke's law - relation among elastic constants - equations of equilibrium - strain-displacement relations - Compatibility conditions - boundary conditions - Saint Venant's principle for end effects - uniqueness condition. 2-D problems in elasticity. Plane stress and plane strain problems - Airy's stress function - solutions by polynomial method - solutions for bending of a cantilever with an end load and bending of a beam under uniform load. Equations in polar coordinates - Lamé's problem - stress concentration problem of a small hole in a large plate. Axisymmetric problems - thick cylinders - interference fit - rotating discs. Special problems in bending: Unsymmetrical bending - shear center - curved beams with circular and rectangular cross-section Energy methods in elasticity: Strain energy of deformation - special cases of a body subjected to concentrated loads, due to axial force, shear force, bending moment and torque - reciprocal relation - Maxwell reciprocal theorem - Castigliano's first and second theorems - virtual work principle - minimum potential energy theorem - complementary energy Torsion of non-circular bars: Saint Venant's theory - Prandtl's method - solutions for circular and elliptical cross-sections - membrane analogy - torsion of thin walled open and closed sections- shear flow.

Kinematics of Machinery - Basic kinematic concepts and definitions - Degree of freedom, Mobility - Kutzbach criterion, Gruebler's criterion - Grashof's Law - Kinematic inversions of four-bar chain, slider crank chains and double slider crank chains - Limit positions - Mechanical advantage - Transmission Angle - Coupler curves - Description of some common Mechanisms - Quick return mechanisms, Straight line generators, Dwell Mechanisms, Ratchets and Escapements, Universal Joint, steering mechanisms Displacement, velocity and acceleration analysis of simple mechanisms - Graphical method - Velocity and acceleration polygons - Velocity analysis using instantaneous centers - Kennedy's theorem, kinematic analysis by complex algebra methods - Vector approach - Computer applications in the kinematic analysis of simple mechanisms - Coincident points - Coriolis component of Acceleration. Kinematic synthesis (Planar Mechanisms) - Tasks of kinematic synthesis - Type, Number and dimensional synthesis - Precision points - Graphical synthesis for four link mechanism Function generator - 2 position and 3 position synthesis - Overlay Method - Analytical synthesis techniques Cams and Followers: types-follower motion-SHM-uniform velocity and acceleration Cycloidal - displacement, velocity and acceleration curves-Cam profile-Reciprocating and oscillating followers-Tangent cams-Convex and concave cams with footed followers. Introduction to Polynomial cams. Law of toothed gearing - Involute and cycloidal tooth profiles - Spur Gear terminology and definitions - Gear tooth action - contact ratio - Interference and undercutting - Non-standard gear teeth - Helical, Bevel, Worm, Rack and Pinion gears [Basics only] Gear trains - Speed ratio, train value - Parallel axis gear trains- Epicyclic Gear Trains - Differentials.

Force analysis of machinery - static and dynamic force analysis of plane motion mechanisms principle of superposition –matrix methods - method of virtual work. Governors: - effort and power-controlling force diagram-quality of governors-effect of friction in sensitiveness-stability-inertia governors- governor speed, torque characteristics of an engine-governor and flywheel. Turning moment diagram and Flywheel: turning moment diagrams for I.C. engines. Gyroscope: - Principle-Angular acceleration-Effect of gyroscopic couple on bearings, airplanes, and ships-stability of automobile and two wheel vehicles-Gyroscopic stabilization of sea vessels and grinding mills-Rigid disc at an angle fixed to a rotating shaft

Brakes and clutches: Shoe, double block, long shoe, internally expanding shoe, band, band & block, hydraulic, mechanical, air and power brakes-braking of a vehicle-cone, single plate, multiple, centrifugal clutches.

Dynamometers: Pony brake. rope brake, epicyclic train, belt transmission and torsion dynamometers-effort and power.

Shafts and axles design- stresses- causes of failure in shafts - design based on strength, rigidity and critical speed- design for static and fatigue loads- repeated loading- reversed bending-Design of couplings - Rigid and flexible couplings - design of keys and pins. Design of riveted joints- Design of welded joints

Module 6

Basics of thermodynamics, I. C. Engines & Combustion. -Working of two stroke and four stroke engines and valve timing diagrams of – Petrol and diesel engine. Fuel air cycles. Ignition systems- Battery and magneto systems- ignition timing and spark advance. Fuels – Qualities, rating of fuels - Octane and Cetane numbers. Alternative fuels. Types of engines - Wankel engine,- Stirling engine - Stratified charge engine - VCR engine - free piston engine. Fuel injection systems in SI and CI engines - Fuel injection pumps.- nozzle- direct and indirect injections. MPFI systems and GDI engines. CRDI technology. Lubrication systems- types – properties of lubricants. Flash point, fire point and viscosity index. Thermodynamics of combustion. Combustion reaction of common fuels. Exhaust gas composition. Flue gas analysis. Air fuel ratio from exhaust gas composition. Variation of specific heats- heat losses- Dissociation. Engine cooling systems- Air and liquid system- Super charging and turbo charging .Combustion in SI engines- P- θ diagram- Stages of combustions- Ignition lag. Flame propagation – Abnormal combustion – detonation effects. Combustion in CI engines, P- θ diagram - Ignition delay, diesel knock- controlling methods. Air motion- Squish, tumble, swirl motions. Different types combustion chamber for SI and CI engines. Pollutants in SI and CI engines. NO_x, CO, unburned hydrocarbons ,smoke and particulate. Measurement of exhaust emission. (HC, CO, NO_x and smoke intensity) Exhaust gas treatment.- Catalytic converter – Thermal reaction - Particulate trap. Testing of IC engines - Indicated power – Brake Power - Volumetric efficiency - Heat balance test - Morse test.

Principles of refrigeration: Thermodynamics of refrigeration – Carnot, reversed carnot cycle, heat pump, and refrigerating machine- coefficient of performance -unit of refrigeration - refrigeration methods -conventional refrigeration systems.

Module 7

Electrical System: Fundamentals of DC Circuits Introduction to DC and AC circuits, Active and passive two terminal elements, Ohms law, Voltage-Current relations for resistor, inductor, capacitor, Kirchoff's laws, Mesh analysis, Nodal analysis, Ideal sources –equivalent resistor, current division, voltage division. **AC circuits:** Sinusoids, Generation of AC, Average and RMS values, Form and peak factors, concept of phasor representation, J operator. Analysis of R-L, R-C, R-L-C circuits. Introduction to three phase systems - types of connections, relationship between line and phase values. **Generator & Alternator, Starting Motors:** Constructional details of D C Generators fitted with Engines-special features, Output regulators. Constructional details of Alternators fitted with Engines -special features, Electronic Voltage regulators.

Starting Motor construction and its drive Mechanisms-Starting of I C Engine (Petrol & Diesel)-Motor Characteristics. **Lighting System & other Electrical Accessories:** Head Lights-Reflectors Lenses and Bulbs, Wiring circuit, Sound signals (Types). Electrical gauges such as Engine Temperature Gauge, Oil pressure gauge, Fuel level indicator. **Navigational lights.**

Module 8

Industrial Management: Materials Planning and Control Objectives of materials-the function of purchasing and material management significance of specification standardization-make or buy decision, buying process. Material forecasting-selection inventory control-Spare parts management-Inventory systems-lead time analysis, administrative lead time, supplier lead time, transport lead time and inspection lead time-flow charting techniques to reduce various types of lead time- materials requirement planning- aggregate inventory management. Codification of materials-storage design-stores layout-storage systems and equipment-stores preservation-stores procedures-stock valuation and verification ware housing and distribution management.

Inventory Management and Work Study Inventory control-Cost-Procurement and consumption cycle -Purchasing methods -Procedure-Records used in stock control - Warehousing, Method study-Definitions, Means of increasing productivity, Role of work study, human factors in work study, Factors affecting work-study, objectives-Basic procedure for method study-Charts and diagrams used in method study, work measurement - objective and techniques of work measurement - Job Evaluation -objectives - methods-Factors affecting wages structure – components - Types of wages-methods of wage system -Characteristics

Quality Management Quality management systems –Factors controlling quality –Impact of poor quality –Challenges - Quality Cost- Quality Assurance - Quality circle- Statistical process control (SPC) - Control Charts - Total Quality Management -Just in Time-Six Sigma-Maintenance management, Types, Effects of maintenance, - Reliability -Replacement

Human Resource Development: Strategic framework for HRM and HRD - Vision, Mission and Values -Importance - Challenges to Organisations - HRD Functions - Roles of HRD Professionals - HRD Needs Assessment - HRD practices - Measures of HRD performance -

Links to HR, Strategy and Business Goals - HRD Program Implementation and Evaluation - Recent trends - Strategic Capability , Bench Marking and HRD Audit.

e- Employee profile- e- selection and recruitment - Virtual learning and Orientation - e- training and development - e- Performance management and Compensation Career Concepts - Roles - Career stages - Career planning and Process – Career development Models- Career Motivation and Enrichment -Managing Career plateaus-Designing Effective Career Development Systems - Competencies and Career Management - Competency Mapping Models - Equity and Competency based Compensation.

Employee Coaching and Counseling: Need for Coaching - Role of HR in coaching - Coaching and Performance - Skills for Effective Coaching - Coaching Effectiveness- Need for Counseling - Role of HR in Counseling - Components of Counseling Programs - Counseling Effectiveness - Employee Health and Welfare Programs - Work Stress - Sources - Consequences –Stress Management Techniques.- Eastern and Western Practices - Self Management and Emotional Intelligence.

Part II : General Knowledge, Current Affairs & Renaissance in Kerala

Salient Features of Indian Constitution

Salient features of the Constitution - Preamble- Its significance and its place in the interpretation of the Constitution.

Fundamental Rights - Directive Principles of State Policy - Relation between Fundamental Rights and Directive Principles - Fundamental Duties.

Executive - Legislature - Judiciary - Both at Union and State Level. - Other Constitutional Authorities.

Centre-State Relations - Legislative - Administrative and Financial.

Services under the Union and the States.

Emergency Provisions.

Amendment Provisions of the Constitution.

Social Welfare Legislations and Programmes

Social Service Legislations like Right to Information Act, Prevention of atrocities against Women & Children, Food Security Act, Environmental Acts etc. and Social Welfare Programmes like Employment Guarantee Programme, Organ and Blood Donation etc.

RENAISSANCE IN KERALA

Towards A New Society

Introduction to English education - various missionary organisations and their functioning- founding of educational institutions, factories, printing press etc.

Efforts To Reform The Society

(A) Socio-Religious reform Movements

SNDP Yogam, Nair Service Society, Yogakshema Sabha, Sadhu Jana Paripalana Sangham, Vaala Samudaya Parishkarani Sabha, Samathwa Samajam, Islam Dharma Paripalana Sangham, Prathyaksha Raksha Daiva Sabha, Sahodara Prasthanam etc.

(B) Struggles and Social Revolts

Upper cloth revolts, Channar agitation, Vaikom Sathyagraha, Guruvayoor Sathyagraha, Paliyam Sathyagraha, Kuttamkulam Sathyagraha, Temple Entry Proclamation, Temple Entry Act, Malyalee Memorial, Ezhava Memorial etc.

Malabar riots, Civil Disobedience Movement, Abstention movement etc.

Role Of Press In Renaissance

Malayalee, Swadeshbhimani, Vivekodayam, Mithavadi, Swaraj, Malayala Manorama, Bhashaposhini, Mathnubhoomi, Kerala Kaumudi, Samadarsi, Kesari, AI-Ameen, Prabhatham, Yukthivadi, etc

Awakening Through Literature

Novel, Drama, Poetry, Purogamana Sahithya Prasthanam, Nataka Prashtanam, Library movement etc

Women And Social Change

Parvathi Nenmenimangalam, Arya Pallam, A V Kuttimalu Amma, Lalitha Prabhu, Akkamma Cheriyan, Anna Chandi, Lalithambika Antharjanam and others

Leaders Of Renaissance

Thycaud Ayya Vaikundar, Sree Narayana Guru, Ayyan Kali.Chattampi Swamikal, Brahmananda Sivayogi, Vagbhadananda, Poikayil Yohannan(Kumara Guru) Dr Palpu, Palakkunnath Abraham Malpan, Mampuram Thangal, Sahodaran Ayyappan, Pandit K P Karuppan, Pampadi John Joseph, Mannathu Padmanabhan, V T Bhattathirippad, Vakkom Abdul Khadar Maulavi, Makthi Thangal, Blessed Elias Kuriakose Chaavra, Barrister G P Pillai, TK Madhavan, Moorkoth Kumaran, C. Krishnan, K P Kesava Menon, Dr.Ayyathan Gopalan, C V Kunjuraman, Kuroor Neelakantan Namboothiripad, Velukkutty Arayan, K P Vellon, P K Chathan Master, K Kelappan, P. Krishna Pillai, A K Gopalan, T R Krishnaswami Iyer, C Kesavan. Swami Ananda Theerthan , M C Joseph, Kuttippuzha Krishnapillai and others

Literary Figures

Kodungallur Kunhikkuttan Thampuran, KeralaVarma Valiyakoyi Thampuran, Kandathil Varghese Mappila. Kumaran Asan, Vallathol Narayana Menon, Ulloor S Parameswara Iyer, G Sankara Kurup, Changampuzha Krishna Pillai, Chandu Menon, Vaikom Muhammad Basheer. Kesav Dev, Thakazhi Sivasankara Pillai, Ponkunnam Varky, S K Pottakkad and others

GENERAL KNOWLEDGE AND CURRENT AFFAIRS

General Knowledge and Current Affairs

NOTE: - It may be noted that apart from the topics detailed above, questions from other topics prescribed for the educational qualification of the post may also appear in the question paper. There is no undertaking that all the topics above may be covered in the question paper.