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SCHEME AND SYLLABUS FOR THE POSTS OF ASSISTANT EXECUTIVE ENGINEERS IN PUBLIC HEALTH & MUNICIPAL ENGINEERING AND I & CAD SERVICE

SCHEME

Degree Standard:

***PART-A* WRITTEN (OBJECTIVE TYPE) EXAMINATION**				
PAPER-1:	General Studies & Mental ability	150 Marks	150 Qns	150 Minutes
PAPER-2: (Subject)	Common for Civil & Mechanical Engineering	150 Marks	150 Qns	150 Minutes
PAPER-3: (Optional)	Civil OR Mechanical Engineering	150 Marks	150 Qns	150 Minutes
***PART-B**: INTERVIEW*		50 Marks		

SYLLABUS

PAPER-1 GENERAL STUDIES & MENTAL ABILITY

1. General Science – Contemporary developments in Science and Technology and their implications including matters of every day observation and experience, as may be expected of a well-educated person who has not made a special study of any scientific discipline.

2. Current events of national and international importance.

3. History of India – emphasis will be on broad general understanding of the subject in its social, economic, cultural and political aspects with a focus on AP Indian National Movement.

4. World Geography and Geography of India with a focus on AP.

5. Indian polity and Economy – including the country's political system- rural development – Planning and economic reforms in India.

6. Mental ability – reasoning and inferences.

PAPER-2: COMMON SYLLABUS FOR CIVIL & MECHANICAL ENGINEERING

PART – A:

STRENGTH OF MATERIALS:-

Simple stresses and Strains: Types of stresses and strains - Hook's Law, Stress-strain curve for mild steel working stress and factor of safety Posion ratio - State of simple shear, complementary - Shear Elastic constants and their relations - Compound bars - Thermal stress.

Compound stresses Mohr's circle of stress - Principal stresses and planes.

Shear force and bending moment diagrams: S.F.D. and B.M.D. for cantilevers, simply supported beams and over hanging beams subjected to point leads and uniformly distributed loads. Relations among load, shear force and bending moment.

Bending and shear stress: Basic equation; M/I = F/Y = E/R - Distribution of bending and shear stresses across various cross sections such as rectangular, circular, I and T sections, Torsion of Circular shafts - power transmission.

Columns and struts: Euler's theory and Rankine's Theory - Socant and Perry formulae for eccentrically loaded columns.

Deflections and slopes: Slopes and deflections in cantilevers simply supported beams; propped beams and fixed beams subjected to point leads and uniformly distributed loads.

PART - B:

FLUID MECHANICS AND HYDRAULIC MACHINERY:

Fluid statics: Hydrostatic force on a plane and curved area Centre of pressure and its applications to lockgates and dams Metacentric height.

Fluid Dynamics: Convective and local acceleration, Euler's equation of motion and its intergration, Bernoulli's equation motion and its application, flow in curved path. Free and forced vortex.

Flow measurements: Notches and weirs, venturimeters, pitot tube, nozzle meter, current meter.

Compressible Flow: Velocity of pressure wave, wave velocity for adiabatic and isothermal compression, Basic equations of one-dimensional flow continuity, energy and momentum equations.

Laminar and turbulant flow through pipes: Reynolds experiment significance of Reynold's number, formulae for laminar flow through circular pipes, Turbulant flow-Darcy Weisbsch equation, friction factor and Mody's diagram.

Turbines: Classification, specific speed velocity triangles Principles of design of reaction and impules Turbines, characteristic curves.

Pumps: Centrifugal pumps, velocity triangles, Work done and efficiency minimum starting speed, loss of head; specific speed and characteristic curves for centrifugal pumps.

PAPER – 3 : OPTIONAL – CIVIL ENGINEERING

1. BUILDING MATERIALS:

Timber: Different types and species of structural timber, density – moisture relationship, strength in different directions, defects, preservations, plywood.
Bricks: Types, Indian standard classification, absorption, saturation factor, strength in masonry, influence of mortar strength on masonry strength.
Cement: Compounds of different types, setting times, strength.
Cement mortar: Ingredients, proportions, water demand, mortars for plastering and masonry.
Concrete: Importance of w/c ratio, strength, ingredients including admixtures, workability, testing for strength, mix design methods, non-destructive testing.

2. STRUCTURAL ANALYSIS:

Analysis of determinate structures – different methods. Analysis of indeterminate skeletal frames – Moment distribution, Slope deflection, Kani's, Stiffness and force methods, Energy methods, Muller Breslan principle and application. Plastic analysis of indeterminate beams and simple portal frames – Shape factors.

3. DESIGN OF STEEL STRUCTURES:

Principles of working stress method. Design of connections, Simple members, Built-up sections and Frames, Design of industrial roofs. Principles of ultimate load design. Design of simple members.

4. DESGIN OF CONCRETE AND MASONRY STRUCTURES:

Limit state design for bending, Shear, Axial compression and combined forces. Codal provision for slabs, Beams, Columns and footings. Working stress method of design of R.C. members. Principles of pre-stressed concrete design, Materials, Methods of pre-stressing, losses. Design of simple members and determinate structures. Design of brick masonry as per IS codes.

5. CONSTRUCTION PLANNING AND MANAGEMENT:

Bar chart, Linked bar chart, Work break down structures, Activity – on – arrow diagrams. Critical path, Probabilistic activity durations, Event based networks. PERT network: Time-cost study, Crashing, Resource allocation.

6. HYDROLOGY AND WATER RESOURCE ENGINEERING:

Hydrological cycle, Precipitation and related data analysis, Unit hydrographs, Evaporation and transpiration. Floods and their management, Stream gauging, Routing of floods, Capacity of reservoirs. Multi purpose uses of water: Soil-plant – Water relationships, Irrigation systems. Water demand assessment: Storages and their yields. Ground water yield and well Hydraulics. Water logging and drainage design. Design of rigid boundary canals, Lacey's and tractive force concepts in canal design, Lining of Canals, Sediment transport in canals, Non-overflow and overflow dams and their design, Energy dissipators, Design of head works, Distribution works, Falls, Cross-drainage works, Outlets, River training.

7. ENVIRONMENTAL ENGINEERING:

a. Water Supplying Engineering: Sources of supply, Yields, Design of intakes and conductors, Estimation of demand. Water quality standards, Control of water borne diseases. Primary and secondary treatment. Conveyance and distribution systems of treated water, Leakages and control. Rural water supply. Institutional and industrial water supply.
b. Waste Water engineering: Urban rain water disposal, Systems of sewage collection and disposal. Design of sewers and sewerage systems, Pumping. Characteristics of sewage and its treatment. Disposal of products of sewage treatment. Plumbing systems. Rural and semi-urban sanitation.
c. Solid Waste Management: Sources and effects of air pollution, Monitoring of air pollution, Noise pollution, Standards, Ecological chain and balance. Environmental assessment.

8. SOIL MECHANICS AND FOUNDATION ENGINEERING:

Properties and classification of soil, Compaction, Permeability and Seepage, Flow nets, Inverted filters, Compressibility and consolidation. Shearing resistance, Stresses and failure. Soil testing in laboratories and in-situ, Earth pressure theories, Stress distribution in soils, Soil exploration, Samplers, Load tests, Penetration tests. Types of foundations, Selection criteria, Bearing capacity, Settlement, Laboratory and field tests, Types of piles and their design and layout. Foundations on expansive soils, Swelling and its prevention, Foundation on swelling soils.

9. SURVEYING AND TRANSPORT ENGINEERING:

Classification of surveys, Scales, Accuracy, Measurement of distances, Direct and indirect methods, Optical and electronic devices, Measurement of directions, Prismatic compass, Local attraction, Theodlytes, Types, Measurement of elevations, Spirit and trigonometric leveling, Contours, Digital elevation modeling concept, Establishment of control by triangulations and traversing, Measurement and adjustment of observations, Computation of coordinates, Field astronomy, Concept of global positioning system, Map preparation by plane tabling and by photogrammetry, Remote sensing concepts, Map substitutes. Planning of Highway systems, Alignment and geometric design, Horizontal and vertical curves, Grade separation, Materials and construction methods for different surfaces and maintenance. Principles of pavement design, Drainage. Traffic surveys, Intersections, Signaling, Mass transit systems, Accessibility, Networking.

PAPER-3 : OPTIONAL : MECHANICAL ENGINEERING

1.THERMODYNAMICS:

Basic concepts, Open and closed systems. Heat and work, Zeroth, First and second law, application to flow and non-flow processes. Entropy;, Availability, Irreversibility, T-S relations, Clapery on and real gas Equations. Properties of ideal gases and vapours. Air standard cycles, Two stage air compressor, CI and SI engines, Valve travel diagram, Pre ignition, Detonation and Diesel knock, Fuel injection, Carburetion, Super charging, Turbo prop and Rocket engines. Cooling, Emission and Control. Measurement of calorific value of fuels. Conventional and Nuclear fuels.

2. HEAT TRANSFER:

Modes of heat transfer. One-dimensional steady and unsteady conduction. Composite slab and equivalent resistance. Heat dissipation from extended surfaces. Heat exchangers, Over all heat transfer coefficient, Empirical correlations for heat transfer ;in laminar and turbulent flow, Heat transfer in free and forced convection. Thermal boundary layer over a flat plate. Fundamentals of diffusive and convective mass transfer. Black body and fundamental concepts of radiation. Shape factor, Network analysis.

3. REFRIGERATION AND AIR CONDITIONING:

Heat pump, Refrigeration cycles and systems, Refrigerants, Condensers, Expansion devices, Psychrometry, Charts and application to air conditioning, Sensible heating and cooling. Effective temperature, Comfort indices, Load calculations. Solar refrigeration, Duct design.

4.STEAM GENERATORS AND TURBINES:

Fire tube and water tube boilers. Binary vapour system. Flow of steam through nozzles and Diffusers. Dryness fraction, Condensation. Various types of turbines, Compounding, Velocity triangles, Partial admission, Reheat, Regeneration, Efficiency and Governance. Gas Turbines, Role of Mach number.

5.THEORY OF MACHINES:

Kinematic and DYNAMIC ANALYSIS OF PLANAR MECHANISMS CAMS Gears and Gear trains. Fly wheels, Governors, Balancing of rotating masses, Balancing of single and ;multi cylinder engines. Linear Vibrations of mechanical systems, Transmissibility and Vibration Isolation. Critical speeds. Two rotor and Three rotor systems. Automatic controls - Order and Type of system, 2^{nd} order system and its characteristics. Frequency analysis. Stability, Routh-Hurwitz criterion, Nyquist criterion.

6.MACHINE DESIGN:
Theories of failure, Design of Cotter joint, Keys, Splines, Welded Joints, Threaded fasteners, Bolt of uniform strength, Screw Jack. Design of Bearings, Couplings, Clutches, BELT DRIVES and Spur gear system. Hydrodynamic and Antifriction bearings. Design of shafts for combined loads. Helical and Leaf Springs. Thin and Thick walled pressure vessels.

7. ENGINEERING MATERIALS:
Basic concepts of structure of solids. Crystalline Materials. Defects in Crystalline materials. Alloys and Binary Phase diagrams. Structure ;and properties of common Engineering Materials. Heat treatment of Steels. Plastics, Ceramics and Composite materials. Common applications of various materials.

8. PRODUCTION ENGINEERING:
Metal Forming: Basic principles of Forging, Drawing and Extrusion. High energy rate forming. Powder Metallurgy.
Metal Casting: Die casting, Investment Casting, Shell molding, Centrifugal casting, Gating and Rising design, Melting furnaces.
Fabrication processes: Principles of Gas, Arc and Shielded Arc welding. Advanced welding processes. Weldability, Metallurgy of Welding.
Metal cutting: Turning, Methods of Screw production, Drilling, Boring, Milling, Gear Manufacturing, Production of Flat surfaces, Grinding and Finishing processes. Computer controlled manufacturing systems-CNC, DNC, FMS, Automation and Robotics.
Cutting Tool Materials, Tool geometry, Mechanism of Tool Wear, Tool Life and Machinability. Measurement of Cutting Forces. Economics of Machining. Uncoventional Machining processes. Jigs and Fixtures. Fits and Tolerances. Measurement of Surface texture. Comparators Alignment Tests and Reconditioning of Machine Tools.

9. INDUSTRIAL ENGINEERING:
Production planning and Control: Forecasting, Moving Averages, Exponential Smoothing, Operations, Scheduling, Assembly line balancing. Product Development, Break-even analysis, Capacity Planning, PERT and CPM.
Control Operations: Inventory Control, ABC analysis, EOQ model, Material requirement Planning. Job Design, Job standards, Work Measurement, Quality Management, Quality Analysis and Control.
Operations Research: Linear Programming – Graphical and simplex methods. Transport and Assignment Models. Single server Queuing Model.
Value Engineering: Value analysis for Cost value.

10. ELEMENTS OF COMPUTATION:
Computer Organization, Flow charting, Features of Common Computer Languages – FORTRAN, d Base III, Lotus1-2-3,C and Elementary Programming.

Place : Hyderabad, Sd/- Secretary,