

SCHEME AND SYLLABUS FOR THE RECRUITMENT TO THE POST OF ASST ENGINEERS IN A.P. PUBLIC HEALTH & MPL. ENGINEERING SUB-SERVICES

SCHEME

| <u>PART-A WRITTEN (OBJECTIVE TYPE) EXAMINATION</u> | | | | |
|---|--|-----------|---------------|-------------|
| PAPER-1 | General Studies | 150 Marks | 150 Questions | 150 Minutes |
| PAPER-2 | Subject:- (Common) (Diploma Standard) | 150 Marks | 150 Questions | 150 Minutes |
| <u>PART-B:</u> | <u>ORAL TEST (INTERVIEW)</u> | 30 Marks | | |

SYLLABUS

PAPER-1 GENERAL STUDIES

General Science.

Current Events of National and International Importance.

History of India and Indian National Movement, India and World Geography.

Indian Polity and Economy.

General Mental Ability.

Questions on General Science will cover General appreciation and understanding of science 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 particular scientific discipline. In current events, knowledge of significant national and international events will be tested. In History of India, emphasis will be on broad general understanding of the subject in its social, economic and political aspects. Questions on Indian National Movement will relate to the nature and character of the nineteenth century resurgence, growth of Nationalism and attainment of independence. In geography emphasis will be on geography of India. Questions on geography of India will relate to physical, social and economic geography of the country, including the main features of the Indian agricultural and natural resources. On general mental ability, the candidates will be tested on reasoning and analytical abilities.

PAPER-2: (COMMON FOR ALL BRANCHES)

SOLID MECHANICS:

Forces: Different types of forces, gravitational, frictional, axial, tensile or compressive. Law of Parallelogram and triangle of forces, polygon of forces, problems.

Friction: Statical friction, limiting friction, simple problems.

Centre of gravity and moment of inertia. Simple plane figures.

Simple machines, law of machine, Mechanical advantage, velocity ratio and efficiency, wheel and axle, pulleys and simple screw jack-problems

Simple Stresses and strains: Different types of stresses and strains, stress-strain diagram for ductile materials. Factor of safety, ultimate strength and working strength, elastic constants, poisson ratio. Deformations, volume changes. Relations between elastic constants. Hooke's Law. Compound rods, temperature stresses, strain energy, proof resilience, impact loading.

Riveted and welded joints, different modes of failures, efficiency of joints, thin cylindrical shells, longitudinal and circumferential stresses and volume changes.

Shear force and bending moment diagrams for simply supported, over hanging and cantilever beams. Relation between intensity of loading, shear force and bending moment. Economical length of overhanging beams.

Theory of simple bending: Assumptions, basic flexure formula, bending stresses, modulus of section, moment of resistance. Circular bending. Distribution of shear stress in common structural sections.

Deflection in cantilever and simply supported beams under simple loading-propped cantilever beams subjected to simple loading, determination of reaction. SF and BM diagrams.

Torsion: Assumptions, basic formula of torsion, power transmission by shafts of uniform circular sections close-coiled springs, strain-energy in simple beams and shafts, sudden and impact loading. Principal stresses and principal planes. Mohr's circle of stress.

Thin cylinders under internal pressure stresses and volume changes.

Columns and struts: Direct and bending stresses, core of section. Short and long columns under axial loading-various end-conditions. Euler and Rankine formulae, Slenderness ratio, simple built-up columns.

Simple plane and pin-jointed trusses: Stresses by method of joints and method of sections.

FLUID MECHANICS:

Introduction: Scope of hydraulics in Engineering. Definition and properties of fluid.

Fluid pressure and its measurement: Atmospheric pressure, Gauge pressure and absolute pressure. Piezometer, Manometer-U-tube, Inverted U-tube, and differential manometers.

Pressure on plane surface immersed in liquid-Horizontal, vertical and inclined plane surface.

Flow of fluids: Type of flow-uniform flow, non-uniform flow, streamline flow, Turbulent flow, steady flow and unsteady flow, Energies in fluid motion-Datum head, pressure head and velocity head. Total energy of fluid in motion - Bernoulli's theorem. Practical application of Bernoulli's theorem - pitot tube venturimeter - Orificemeter - problems.

Flow through orifices and Mouth Pieces: Definition of orifice, types of orifices, Vena contracta, coefficient of velocity, coefficient of contraction, coefficient of discharge. Submerged and partially submerged orifices. Flow through orifices under variable heads - Time of emptying a rectangular tank through orifices. Mouth pieces - different types of problems.

Notches and Weirs: Definition of notch, types of notches - Rectangular notch, Triangular notch and trapezoidal notch. Discharge over a rectangular, triangular and a trapezoidal notches.

Flow through pipes: Major and minor losses - Loss of head at entrance, loss of head due to sudden enlargement, due to sudden contraction, loss of head at exit of the pipe. Frictional loss in pipe-Chezy formula and Daycy's formula.

Hydraulic gradient and total energy line. Discharge through parallel pipes and branched pipes connected to a reservoir. Flow through syphon pipe.

Hydraulic transmission of power-flow through nozzle at the end of a pipe line-diameter of nozzle for Max H.P. available. Water hammer and its effect. Laminar and turbulent flow in pipes-Critical velocity and Reynold number.

Measurements: Measurement of velocity - Current meter surface floats and weighted rods. Determination of discharge from velocity readings.

Impact of jets: Formulae for the force of jet on a fixed vertical flat plate, fixed inclined flat plates, moving flat plates, series of flat plates fixed on the rim of a wheel. Force of jet striking at the centre and at the top of a fixed curved blade and moving curved blade, velocity triangles. Work done, power and efficiency in the above cases. Simple problems. Water turbines: Introduction to water turbines. Use of water turbines in Hydroelectric power stations line sketch showing layout of hydro-electric power plant with head race, dam, sluice gate, pen stock turbine, generator and tail race. Classification of turbines - impulse and reaction turbines brief sub-classification of axial, radial and tangential flow type. Pelton wheel, Francis turbine and Kaplan turbine, Governing of waster turbines. Simple problems on power and efficiency.

Centrifugal pump: Installation, mountings and other accessories. Priming of centrifugal pump. Efficiency, cavitation. Simple problems on work, power and efficiency.