

RAJASTHAN PUBLIC SERVICE COMMISSION, AJMER

SYLLABUS FOR COMPETITIVE EXAMINATION FOR THE POST OF LECTURER IN CIVIL ENGINEERING FOR TECHNICAL EDUCATION DEPARTMENT

PAPER - II

- A. FLUID MECHANICS:** Fluid properties, types of flow, Fluid statics, forces on fully and partially submerged bodies, stability of floating bodies. Fluid kinematics, acceleration of fluid particle, velocity potential and stream function, irrotational flows, ideal fluid flow, Bernoulli's, Navier Stokes, Reynold's equations, application. Flow measuring devices.

Momentum and angular momentum principles as applied to fluid in a control volume, applications to jets. Introduction of viscous flow, concept of drag. Flow through pipes, Laminar and turbulent.

- B. SURVEYING:** Distance Measurements: Use of steel and metallic tapes, application of corrections, measurement of base line, errors in base line measurements, reduction to mean sea level, specifications for base line measurements, optical measurements of distances, use of substance bars.

Angle Measurements: Principles of theodolite constructions, temporary and permanent adjustment, precision in relation to nature of work, compass, varieties, limitations. Traverse adjustments.

Vertical Measurements: Use of leveling instruments of level, level tubes, estimation of sensitivity, optics, care and maintenance, parameters to define quality of telescope, leveling instruments and theodolites, methods of records and reducing, stadia reductions, use of level rods, contouring, drainage and watershed lines.

Methods of filling in details: Chain and compass, plane table and traverse surveys. Principles and adjustments of closed traverse, determination of missing data, solution of two point and three point problems.

- C. CONSTRUCTION MATERIALS:**

- (i) Building Materials: building stones, building bricks, steel (Plain, Tor, High-tensile and Structural), Timber, lime, cement, sand, surkhi, cinder, stone slabs and lintels, aggregates for cement concrete, paints, distempers, use of pozzolana manufacturing of lime concrete, cement concrete for plain, reinforced and pre-stressed concrete work.

(ii) Road Materials: Coarse aggregate, screenings and binding materials for WBM. Bricks for soling. Coarse and fine aggregate for bituminous roads, IRC standard size aggregates, Tars and Asphalt. Asphaltic concrete, Asphaltic emulsions, Mastic Asphalt and Minerals fillers.

(iii) Constructions Stone Masonry: Ashlar, course rubble, random rubble, stone pillar, dry stone and arch masonry

Bricks Masonry: Types and their uses, hollow and reinforced brickwork. Wood work: doors and windows.

Steel works: Structural steel work, metal doors and windows.

Roofing: Stone slab roofing, G.C. Steel sheet roofing, Asbestos cement sheet roofing, jack arch roofing, tile and thatch roofing.

Flooring: Cement concrete flooring, flag stone flooring, terrazzo mosaic flooring, Terrazzo file flooring, Brick on edge flooring, timber Granolithic floor finish, linoleum and other floorings.

Plastering: Lime plaster, cement sand plaster, composite, plaster, rough coat plaster, plastering with Gypsum, Plaster of Paris, painting.

D. HYDROLOGY AND WATER RESOURCES ENGINEERING: Engineering Hydrology: Hydrologic cycle, precipitation, evaporation, evapo-transpiration and infiltration. Estimation of dependable runoff factors effecting runoff. Rainfall runoff relationship, flood/drought estimation using frequency analysis and unit hydrograph methods. Groundwater hydrology, aquifers, steady flow towards fully penetrating wells confined and unconfined aquifers.

Crop water requirements: consumptive use of water. Water depth and frequency of irrigation. Soil moisture and its variation in the root zone. Wilting point. Field capacity. Different methods of irrigation and irrigation efficiency. Duty, delta and outlet factor.

Canals: Lined and unlined canals. Lacey's and Kennedy's theories, Tractive force approach. Types of lining and its selection criteria.

Lift Irrigation from Canals and Wells

Ground water availability in unconfined aquifers. Safe yield formulae, construction and maintenance of wells. Relative merits of lift irrigation and flow irrigation.

E. TRANSPORT AND TRAFFIC ENGINEERING: Survey, investigation and preparation of road project. Highway standard classification, land width, building line center line, formation width, terrain classification, pavement width, Camber, longitudinal gradients, sight distance, horizontal curve, super elevation, vertical

curve, lateral and vertical clearances.

Design of Pavement: Flexible pavements.

Pavement Construction: Sub-base, base course and shoulder stone/kankar brick soling, WBM courses, shoulders. Granular sub-base, stabilized soil roads, cement/lime stabilized sub-base, sand bitumen base course, crushed cement concrete base/sub-base course.

Bituminous Course: Prime and tack coats, surface dressing, open graded premix carpet, semi dense carpet, built-up spray grout base course, bituminous base binder course. Asphaltic concrete seal coats, mixed seal surfacing. Penetration macadam base/binder course, full and semi grouts.

Traffic Engineering: Traffic characteristics, road user characteristics, vehicular characteristics, volume, speed and delay studies origin and destination study, traffic flow characteristics, traffic capacity and parking studies, traffic regulation, traffic control devices, Intersection control. System approach in traffic management.

F. WATER AND WASTE WATER ENGINEERING:

Water Engineering: Quantitative requirements of water supply for urban and rural areas. Variation in demand. Forecast of population. Drinking water standard for water. Analysis of water quality. Water treatment, sedimentation, coagulation, filtration and disinfection, water softening and aeration of water. Water distribution system and their design and analysis.

Waste water Engineering: Characterization of Sewage; Physical, chemical and biological analysis, self purification of streams. Sewage treatment, Physical treatment, screening, skimming tanks, Grit chamber, settling tanks. Secondary (biological) treatment, trickling filters and high rate bio filters. Activated sludge and accelerated aeration plants. Secondary, settling tanks, sludge digesters and sludge drying. Final disposal, Low cost waste water treatment oxidation ponds, oxidation ditches, aerated lagoons, septic tank, anaerobic lagoons. Dry refuse disposal.

Note :- Pattern of Question Paper

- 1. Objective type paper**
- 2. Maximum Marks: 75**
- 3. Number of Questions: 150**
- 4. Duration of Paper: Three Hours**
- 5. All questions carry equal marks.**
- 6. Medium of Competitive Exam: English**
- 7. There will be Negative Marking.**