

**KAKATIYA UNIVERSITY, WARANGAL – 506009**  
**Ph. D. Entrance Test in CIVIL ENGINEERING**

**SYLLABUS**

**STRUCTURAL ENGINEERING:**

**Engineering Mechanics:**

Concurrent, Non Concurrent and parallel forces in a plane, conditions of equilibrium, Principle of virtual work, Area and Mass moment of Inertia, Static Friction, Kinematics and Kinetics of particle and rigid bodies.

**Strength of Materials:**

Simple Stress and Strain, Elastic constants, shear force and bending moment, theory of simple bending, shear Stress, deflection of beams, Torsion of Shafts, Columns

**Structural Analysis:**

Castigliano's theorems I and II, Slope deflection, moment distribution, rolling loads and Influences lines, Three hinged, two hinged arches, Matrix methods of analysis, Plastic analysis of beams and frames – Finite element Analysis – Theory of Elasticity and Plasticity – Structural dynamics

**Structural Steel Design:**

Riveted, bolted and welded joints, Design of tension and compression member, beams of built up section, plate girders, gantry girders, Trusses

**Building Materials:** Classification and testing of bricks, characteristics of good quality stones, IS specifications and tests on cement

**Concrete Technology:** Quality tests on cement and aggregates, Fresh and Hardened properties on concrete, durability of concrete, special concretes

**Design of Concrete Structures**

**Reinforced concrete:** Working Stress and Limit State method of design – Design of one way and two way slabs, stair-case, simple and continuous beams of rectangular, T and L Sections, Columns and footings, Retaining walls. Water tanks, redistribution of moments – Limit state of serviceability – Ductility considerations in Earthquake Resistant Design of Structures – Prestressed concrete – Composite materials



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**Construction Technology and Management:** Planning Monitoring and Execution, Scheduling, Bar Charts, CPM, PERT, Basics Concepts of Estimation, Tenders and Contracts

### **GEOTECHNICAL ENGINEERING**

**Soil Mechanics:** Origin of soils, soil classification, three – phase system, fundamental definitions, relationship and interrelationships, permeability & seepage, effective stress principle, consolidation, compaction, shear strength.

**Foundation Engineering:** Sub-surface investigations. Earth pressure theories, effect of water table, layered soils. Stability of slopes. Foundation types- foundation design requirements. Shallow foundations and Deep foundations.

### **WATER RESOURCES AND ENVIRONMENTAL ENGINEERING**

**Fluid Mechanics:** properties of fluids, principle of conservation of mass, moment urn, energy and Corresponding equations, potential flow, applications of momentum and Bernoulli's equation

**Water Resources:** Duty Delta Hydrograph, Irrigation channel hydraulics- Hydropower  
**Environmental Engineering:** Water Supply and sanitary aspects – quality and quantity assessment

#### **Transportation Engineering:**

**Highway Planning:** Geometric design of Highways, testing and specification of paving materials, design of flexible and rigid pavements.

**Traffic Engineering:** Traffic characteristic, Theory of Traffic flow, intersection design traffic signs and signal design, highway capacity.

  
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PHD ENTRANCE EXAMINATION  
CIVIL ENGINEERING  
MODEL QUESTION PAPER

Time : 2 hours]

[Max Marks 100

1) The strain energy stored due to bending of rectangular cantilever beam of span 'L', due to the concentrated load 'P' applied at the free end is (EI Constant)

a)  $\frac{PL}{3EI}$   
c)  $\frac{P^2L^2}{EI}$

b)  $\frac{P^2L^3}{6EI}$   
d)  $\frac{P^2L^3}{23EI}$

2) A sample of water from a surface stream is analyzed for the common ions:  $Ca^{2+} = 98$  mg/L;  $Cl^- = 89$  mg/L;  $HCO_3^- = 305$  mg/L;  $Mg^{2+} = 22$  mg/L;  $Na^+ = 71$  mg/L;  $SO_4^{2-} = 240$  mg/L. Determine the alkalinity of water as  $CaCO_3$ .

(a) 305 mg/L (b) 250 mg/L (c) 500 mg/L (d) 205 mg/L

3) As per Indian Railways, Cant deficiency recommended for BG track is

(a) 75 mm (b) 50 mm (c) 40 mm (d) 65 mm

4) For under-reamed piles of up to 0.3 m diameter, the maximum vertical spacing between two under-reams, of diameter  $D_u$ , as per IS: 2911 (Part III) - 1980 is

a)  $1.25 D_u$  b)  $1.5D_u$  c)  $2 D_u$  d)  $2.5 D_u$

5) A hydrograph is a plot of


- (a) Rainfall intensity against time  
(b) Cumulative rainfall against time  
(c) Stream discharge against time  
(d) Cumulative runoff against time

6) Match the given water properties in group I to the given titrants in Group II

Group I	Group II
P. Dissolved oxygen	1. N/40 $Na_2S_2O_3$
Q. Chloride	2. N/50 $H_2SO_4$
R. Alkalinity	3. N/50 EDTA
S. Hardness	4. N/71 $AgNO_3$

(a) P-1, Q-2, R-3, S-4  
(c) P-3, Q-4, R-1, S-2

(b) P-2, Q-1, R-4, S-3  
(d) None of the above

  
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