

CENTRAL PUBLIC WORK DEPARTMENT

DEPARTMENTAL EXAMS FOR AEE'S

Civil Engineering Paper – II
(With Books)

Time: 3 Hours

Maximum Marks: 100

Attempt all Questions

1. (a) What do you mean by leveling in surveying? What are methods of leveling, describe briefly. (5)

(b) The following staff readings were observed successively with a level, the instrument having been moved after 3rd, 6th and 8th readings (10)

2.228, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684

Enter the above readings in a page of level book and calculate RL of points if the first reading was taken at RL 432.384 m.

2. The radius of a horizontal circular curve is 100 m. The design speed is 50 Km/h and design coefficient of lateral friction is 0.15.

(a) Calculate the superelevation required if full lateral friction is assumed to develop? (3)

(b) Calculate the coefficient of friction needed if no superelevation is provided. (3)

(c) Calculate the equilibrium superelevation if pressure on outer and inner wheels should be equal. Comment on the result. (4)

3. Describe unconfined compression test for determination of Shear Strength of the soil. What are the merits and demerits of this test? (6+4)

4. (a) What are tolerances in Verticality and Alignment for structural design of masonry as per National Building code provisions? (5)

(b) A masonry retaining wall of trapezoidal section is 10 m high. It has a top width 1.5 m and bottom width of 6.5 m. The earth face of the retaining wall has a batter of 1 in 10. If the soil surface is level at top of the wall, find the maximum and minimum normal stresses at base. Masonry weigh 23000 N/cum and soil weighs 18000 N/cum. The angle of repose of soil is 30° . (10)

5. A reinforced concrete section 400 x 600 mm deep is reinforced with 6 Bars of 20 mm diameter placed at a cover of 40 mm from top edge and 6 similar bars at the same cover from the bottom edge. Determine the maximum thrust on the section which can be applied at a distance of 80 mm from the central line, if the compressive strength in the concrete is not to exceed 7 N/mm^2 . Take $m = 13.33$. (10)

6. Design a Cantilever slab to carry a live load of 3000 N/m^2 . The overhang of slab is 1.25 m. Use M_{20} concrete and Fe 415 steel. (10)

7. (a) What are the assumptions in the design of pre-stressed concrete? (5)

(b) A pre-stressed concrete beam 400 x 600 mm in section has a span of 6 m and subjected to uniformly distributed load of 16 KN/m including self weight of the beam. The pre-stressing tendons which are located along the longitudinal centroid axis provide pre-stressing force of 960 KN. Determine the extreme fiber stresses in concrete at mid-section. (10)

8. (a) Describe various points to be considered while selecting a suitable site for power station in water supply system. (5)

(b) Calculate the storage required to supply the demand shown in the following table, if the inflow of water of the reservoir is to be maintained at a uniform rate throughout 24 Hours. (10)

Time (Hours)	0 - 04	04 - 08	08 - 12	12 - 16	16 - 20	20 - 24
Demand in Million Litres	0.48	0.87	1.33	1.00	0.82	0.54