

**CENTRAL PUBLIC WORK DEPARTMENT**  
**DEPARTMENTAL EXAMS FOR AEE'S**

**July 2018**

Civil Engineering Paper-II

(With Books)

Time: 3 Hours

Maximum Marks: 100

**Attempt all questions**

1. Explain general principle of surveying. (5)
2. What do you understand by Bench-mark(BM) and also explain various types of BM. (5)
3. During a fly levelling operation, the following readings were observed - (5+5)

Backsight- 0.650, 2.155, 1.405, 2.655, 2.435 m

Foresight- 2.455, 1.305, 0.555, 2.405 m

The first backsight was taken on a BM of RL 90.500m. From the last position of the instrument, four pegs at 30 m intervals are to be set out on a uniformly falling gradient of 1 in 100. Find staff readings and RLs of these four pegs.

4. Explain with diagram coordinate method of finding area. The following perpendicular offsets were taken from a chain line to a hedge- (10)

Chainage (m) -0-5.5-12.7-25.5-40.5.

Offset (m) -5.25-6.5-4.75-5.20-4.20

Calculate the area between the chain line and the hedge by the coordinate method.

5. The radius of a horizontal circular curve is 400 m. The design speed is 100 kmph. Calculate the super elevation to be provided. Comments on the results. (5+5)
6. Describe shear box test (direct shear test) of determination of soil strength. (10)
7. What are the advantages of California Bearing Ratio Test? Write following Indian soils in increasing order of CBR values - (5+5)  
(a) Black cotton soil (b) Well graded sand (c) Silty clay (d) Dune sand

8. Compute the eccentricity and initial force of pre-stress if the permissible stress at top fibre is  $5 \text{ N/mm}^2$  (tension) and permissible stress at bottom fibre is  $20 \text{ N/mm}^2$  (compression). The width of the section is 250mm and depth is 300mm.

(10)

9. What do you understand by softening? Describe lime process of water softening.

(5+5)

10. Using the formula  $R=76.2/(t+10)$ , find out the runoff in l/s if the time of concentration of 8 hectares area is 20 minutes and the coefficient of runoff of the catchment is 0.5.

(5)

11. Write short note on flushing devices.

(5)

12. A masonry retaining wall with a vertical face, is 5m high. Its width at top is 1.0 m and at base 3.0 m. Weight of masonry is  $20 \text{ KN/m}^3$ . Up to what height a soil weighing  $15 \text{ KN/m}^3$  can be retained by this wall so that the maximum pressure at the base will be 1.2 times the minimum pressure at base? Angle of repose of soil is  $30^\circ$ .

(10)