

Government of India  
Central Public Works Department  
Departmental Examination for Assistant Executive Engineers (Civil)

Civil Engineering Paper – II (December 2022)  
(With Books)

Instructions: Attempt all questions. Marks have been indicated against each question.

Maximum Marks -100

Time: 3 Hours

1. A rectangular plot of land of CRPF Camp measures 20cm×30cm on a map drawn to a scale of 100m to 1cm. Calculate its area in hectares. If the plot is redrawn on a topography sheet to a scale of 1km to 1cm, what will be its area on the topography sheet? Also, determine the Representative Fraction of the scale of the colony map as well as on the topography sheet.

(10 Marks)
2. The soil from borrow pit has a natural water content of 10% and a bulk density of 1800 kg/m<sup>3</sup>. The soil is used for filling under floors to be compacted at 18% moisture content to a dry density of 1850 kg/m<sup>3</sup>. How many cubic meters of excavation is required for 50 m<sup>3</sup> of compacted filling under floors? Determine the amount of water to be added to borrowed soil.

(10 Marks)
3. A tube well is driven in a confined aquifer of 25 m thickness located 20 m below the ground surface. The water table is 15 m below the ground surface. Consider radius of influence as 300 m and  $k = 3 \times 10^{-4}$  m/sec. what should be diameter of tube well to get discharge of 0.05 m<sup>3</sup>/sec when the depression head is 10 m.

(10 Marks)
4. Discuss the situation where a well foundation is more suitable than the other types of foundation. Draw a schematic drawing of well foundation and name various components of well foundation on drawing.

(10 Marks)
5. What are basic Principles of Water Supply Distribution System. State the methods of water distribution system and explain any one in detail with sketch.

(10 Marks)
6. Design a reinforced concrete slab to carry load of 6 KN/m<sup>2</sup> inclusive of its own weight on an effective span of 4 meter simply supported. The maximum allowable stress for concrete is 5 MPa and for steel is 140 MPa,  $m = 18$ .

(10 Marks)



7. A circular column has 5 meter effective height and 0.3 m diameter. Design reinforcement, if column has to carry an axial load of 400 KN. Consider maximum allowable stress for concrete is 25 MPa and for steel is 230 MPa.

(10 Marks)

8. What is plate load test? How it is carried out?

(10 Marks)

9. What is pre-tensioning and post-tensioning in pre-stressed concrete? What are popular methods of post tensioning? Briefly describe about any one method.

(10 Marks)

10. Write short notes on

(5 X 2 Marks)

- (i) Aerial photogrammetry
- (ii) Rigid Pavement
- (iii) Slenderness ratio
- (iv) Void ratio
- (v) Compaction factor