

CSM - 19/18
Civil Engineering
Paper - II

Time : 3 hours

Full Marks : 300

The figures in the right-hand margin indicate marks.

Candidates should attempt Q. No. 1 from Section - A and Q. No. 5 from Section - B which are compulsory and three of the remaining questions, selecting at least one from each Section.

SECTION - A

1. Answer any **three** of the following :
- (a) Describe any three types of seasoning of timber. How preventive treatment can be accomplished after seasoning. 20
 - (b) Differentiate between confined and unconfined aquifers. Find out the expression for coefficient of permeability (K) for a well laid unconfined aquifer. 20

- (c) Give a brief idea about the working principle of trickling filter. 20
- (d) Explain the following :
- (i) Explain, in brief, the various systems of Tachometric Survey. 10
 - (ii) Describe Lehmann's method of plain table survey in detail. 10
2. (a) Draw a GANTT bar chart of a project indicating excavation, foundation concrete, masonry, wood work, roof construction, plastering, flooring, electricity, water and sanitary fittings. Consider reasonable time step in weeks for each item of work as above so that the building can be completed in 6 months. Also, indicate estimated and actual time in the bar chart. 40
- (b) Prepare the boards for straight line camber and parabolic camber of WBM village road in areas of light rainfall. 20

3. (a) Explain the following three types of estimates of building with example :

(i) Plinth area method. 5

(ii) Supplementary and revised estimation. 10

(iii) Annual repair and maintenance estimation. 5

(b) What do you mean by radio-active wastes? Discuss about their safe disposal to reduce their impact on environment. 10

(c) A first class building is situated on a main road of a city, having plot area 600 sq. m. The covered area is 50% of the plot. All amenities such as water supply, sanitary and electricity are provided. The age of the building is 20 years. The assumed plinth area rate at the time of construction was ₹ 2500/- per sq. m. Assume life of building as 20 years and cost of the land as ₹ 7000/-per sq. m. Find total value of the property. Take percentage of depreciation as 1 for the building. 30

4. (a) A loamy soil has field capacity of 25% and permanent wilting percentage of 10%. The dry unit weight of soil is 1.5 gm/cc. If the depth of root zone is 0.75m, determine the storage capacity of soil. Irrigation water is applied when moisture content drops to 14%. If the water application efficiency is 75%, determine the water depth required to be applied in the field. 30
- (b) Describe, briefly, the desirable physical, mechanical and weathering properties of stones. 30

SECTION - B

5. Answer any three of the following :
- (a) Design five slow sand filter beds from the following data for the water works of a town having population 1 lakh. Per capita water demand can be taken as 270 l/day and rate of filtration as 210 l/hr/m². Assume maximum demand as 1.5 times the average demand. Out of 5 units one is to be kept as stand by and used while repairing other units. 20

- (b) What are the different types of track resistance ? Discuss the formulae to calculate them. Calculate resistances due to rising gradient 1 in 250 if the weight of train is 50t. 20
- (c) What is the shortcoming of bar chart vis-a-vis the CPM ? Indicate the advantages and disadvantages of CPM and PERT. 20
- (d) Explain the following :
- (i) Derive an equation for seepage per meter length in an anisotropic soil. 10
- (ii) What are the different methods of irrigation ? Which of them are more effectively used ? 10
6. (a) What do you mean by low cost housing ? Discuss four types of alternate building materials for low cost building. 30
- (b) Derive a relation between super-elevation, coefficient of friction and centrifugal ratio for a road project. 15

(c) Determine the following for a road on a horizontal curve of radius 500m. The design speed is 100 km/hr and the coefficient of lateral friction can be taken as 0.15: 15

(i) Super elevation when lateral friction comes into play.

(ii) Coefficient of friction when no super-elevation is provided.

7. (a) Answer the following :

(i) Derive an expression for BOD remaining at any time t in terms of initial amount of organic matter present in sample of water (L_0). 15

(ii) A town with a population 1,00,000 has a supply of water @ 200 lpcd . The source of water is 8 km away from the town. The elevation difference from source and supply is 10 km. Find the diameter of the conveying pipe if friction factor is 0.01.

15

- (b) An irrigation canal is to be provided in alluvial soil of average soil particle size 0.39 mm, with side slope as 0.5H: 1V. The canal supplies water to field of total area of 40,000 ha where a certain crop is to be grown. The duty of the crop is 800 ha/cumec. Design the canal by Lacey's Silt Theory. 30
8. (a) Explain the following terms with respect to construction management: 30
- (i) Event
 - (ii) Activity
 - (iii) Critical path
 - (iv) Float
- (b) Under what condition we use high strength concrete and light weight concrete ? Write the process for preparation of those two types of concrete and their important properties. 15
- (c) What are the different types of brick masonry ? Explain with sketch. 15



