

PAR/CCM-14/13

CIVIL ENGINEERING

2014

SECOND PAPER

Full Marks : 200

Time : 3 hours

The questions are of equal value

A candidate shall answer questions only
from *any two* Parts

PART—A

(**Building Construction**)

Answer *any ten* questions

1. What are the physical requirements of common burnt clay building bricks? On what basis a brick is classified? Define modular brick.
2. State the basic differences among OPC-33, OPC-43, OPC-53 cement. How does water-cement ratio effect on workability of cement concrete?
3. What do you mean by building materials? Enumerate the materials used for building construction indicating the purpose for which they are specially used.

4. Differentiate between nominal mix and design mix. What is the principle of mix proportioning of concrete? What are the data required for mix proportioning?
5. Name various methods of artificial seasoning of timber and explain any two methods.
6. What is the difference between quick setting cement and rapid hardening cement? What do you understand by curing of concrete?
7. What are the factors considered for selection of a roof type? What is the roof type that will be preferred for Assam? Support your answer with a few points.
8. Enumerate different constituents of paint and discuss their functions. Also write briefly the preparations needed before painting on a brick wall.
9. What are the properties of plastics in general? Discuss their uses in building industry.
10. Explain the principles of comfort air-conditioning. How is it different from industrial air-conditioning?

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11. Estimate the quantities of brickwork and plastering required in a wall 5 m long, 3 m high and 15 cm thick having a window 1.5 m × 1.1 m. Consider a lintel of size 15 cm × 15 cm at the height of window throughout the wall. Calculate also the cost if the rate of brickwork is ₹ 5,000 per m³ and of plastering is ₹ 75.50 per sq. m.
12. What are the basic requirements of a building structure in design and performance? Discuss briefly.
13. How is waterproofing of flat RCC roof done in a place where rainfall is high? Also name the different waterproofing materials.
14. What are the different types of contract? Explain the suitability of each type.

PART—B

(Railway and Highway Engineering)

Answer any ten questions

15. What are the functions of sleepers? Name different kinds of sleepers and explain their relative utilities.

14T—100/88

(Turn Over)

16. A 6-degree curve branches off from a 3-degree main curve in an opposite direction in the layout of a BG yard. If the speed on branch line is limited to 35.5 km/hr, determine the speed restrictions on the main line. Given cant deficiency = 7.62 cm.

17. Mention the locations and functions of the following signals :

- (a) Fog signal
- (b) Outer signal
- (c) Disc signal
- (d) Coacting signal
- (e) Warner. signal

18. How are level crossings classified in India? Draw the sketch of any one of them.

19. Explain the following terms :

- (a) Packing of ballast
- (b) Blowing joint
- (c) Pumping joint
- (d) Riding joint

20. What is creep of rails? What are the probable causes of creep? What are the remedies and prevention of creep?
21. What are the various systems of controlling the movement of trains? Explain the working principle of one system, which is widely used in India.
22. What are different road patterns? What are their relative advantages and disadvantages?
23. What is traffic rotary? What are its advantages and limitations in particular reference to traffic conditions in India?
24. Determine the thickness of concrete pavement using Westerguard's corner load formula to support maximum wheel load of 4100 kg. Allow 10% for impact. Use the following data :
Tyre pressure = 5 kg/cm^2
Modulus of subgrade reaction = 6 kg/cm^2
Poisson's ratio = 0.15
25. Distinguish between camber and superelevation. How can you estimate superelevation? Is there any limit of superelevation?

26. Calculate the minimum sight distance required to avoid a head-on-collision of two cars approaching from the opposite direction, at 90 and 60 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and a brake efficiency of 50%, in either case.
27. Discuss how the results of the following tests on road aggregates are used in highway engineering :
- (a) CBR test
 - (b) Aggregate crushing value test
 - (c) Los Angeles abrasion test
 - (d) Penetration test of bitumen
 - (e) Flash and fire point test
28. Name the equipments used in construction of cement road pavement. Why are joint and curing necessary in cement concrete pavement?

PART—C

(Water Resource Engineering)

Answer any ten questions

29. The peak flood hydrograph due to a 3-hr duration isolated storm in a catchment area of 486 sq.km is 235 cumecs. The total depth of rainfall is 57.5 mm. Assuming an average infiltration loss of 2.5 mm/hr and a constant base flow of 10 cumecs, estimate the peak of the 3-hr unit hydrograph.

30. Draw a typical hydrograph and mark its salient point. How is it different from unit hydrograph?
31. Distinguish between the following :
- (a) Ripples and Dunes
 - (b) Reservoir routing and Channel routing
 - (c) Silting and Scouring
 - (d) Contact load and Saltation load
 - (e) Riverbank and Embankment
32. Draw Horton's curve for infiltration. Explain the factors affecting infiltration.
33. Enumerate the merits and demerits of proposed National River Linking Project.
34. How does flow at bend develop meander? Define the following terms :
- Meander belt; Meander length; Tortuosity;
 - Dominant discharge; Cut-off ratio
35. What is meant by 'design flood' and what is its importance? State and explain the 'rational method' for computing the peak discharge. What are the limitations?

36. Explain very briefly Muskingum method of flood routing and estimation of 'K' and 'x' in Muskingum equation.
37. Discuss the measures to be taken to reduce reservoir siltation.
38. The following are the rates of rainfall for successive 20 minutes period of a 140-minute storm :
2.5, 2.5, 10.0, 7.5, 1.25, 1.25, 5.0 cm/hr
Taking value of ϕ -index as 3.2 cm/hr, find the net run-off in cm.
39. Discuss the adverse effects of waterlogging.
40. What is canal lining? State the merits and demerits of canal lining.
41. Discuss possible measure of river training to encounter the problem of erosion in Majuli River Island.
42. Classify irrigation canal based on alignment. Draw sketches and explain any two of them.

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PART—D

(Sanitation and Water Supply)

Answer *any ten* questions

43. Indicate the permissible limits for the standards of drinking water for turbidity, pH, total hardness as CaCO_3 , chloride content and fluoride content as per IS or WHO.
44. Classify broadly the sanitary works. Waterborne system has taken over the conservancy system of waste disposal. Give reasons.
45. Describe dry conservancy and water carriage system of sewage disposal. What are their merits and demerits?
46. What are the chemicals used in wastewater treatment? What are the effectivenesses of these chemicals for sewage treatment?
47. Differentiate between combined sewerage system from separate system.
48. The measured pH values of incoming and outgoing waters of water treatment plant are 7.3 and 8.5. Determine the average pH of water assuming linear variation of pH with time.

14T—100/88

(Turn Over)

49. Define coagulation process. Discuss chemical reactions for alum, copper and sodium aluminate as common coagulants.
50. Give the various hydraulic formulae for design of sewers explaining their applicability.
51. Differentiate between BOD and COD.
52. "The definition of shallow well and deep well is not based on the depth of the well." Explain.
53. What are intakes? What are the points taken into consideration in selecting the site for an intake?
54. Draw a neat sketch of a sewage ventilator. What is necessity of ventilation of sewers?
55. List the physical and chemical tests that are to be conducted on water to be used for drinking.
56. Write short notes on the following :
 - (a) Oxygen sag curve
 - (b) Sewage farming
