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ABP/CCM-12/XIV

2015

CIVIL ENGINEERING

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 five** questions.*

1. (a) What are the properties of good building stone?

   (b) What are the constituents of good bricks earth? Explain their functions.

   (c) Name the different tests to which bricks and building stone are generally subjected. 6+8+6=20

2. Sketch and state the uses of the following :

   (i)   Stretcher bond

   (ii) English bond

   (iii) Flemish bond

   (iv) Queen closer.   4×5=20

3. (a) What are the constituents that cause soundness in cement ?

   (b) Write down the properties of Ferro cement.

   (c) Explain in details the non-destructive testing of concrete using Rebound Hammer.   5+5+10=20

4. (a) What are the preservatives generally used for preservation of timber ?

   (b) Differentiate between :

       (i)   Mortar and concrete

       (ii) Cast iron and steel

       (iii) Bitumen and tar

   (c) Explain the different defects occur in timber due to seasoning.   5+9+6=20

5. (a) What are the ingredients of paints ? Mention the functions of main ingredients of paint.

(b) Describe briefly the wet process of manufacturing of Portland cement. 5+10+5=20

6. Explain water absorption test for acceptance of first class bricks. What is efflorescence in bricks ? What are its causes and remedies ? 12+3+5=20

7. What is M-15 cement concrete and mention its nominal mixing ratio. Explain the test in brief for workability of cement concrete. 10+10=20

8. (a) What are the requirements of a staircase in residential and public buildings ? Draw a section through RCC staircase showing the component parts.

   (b) Define
      (i) landing
      (ii) Nosing
      (iii) Winders
      (iv) Stringer
      (v) Newel
      (vi) Handrail.

   (c) How are treads and risers proportional ? 10+6+4

PART-B

(Railway and Highway Engineering)

Answer any five questions.

9. (a) Name the different components of a railway track and discuss the function of each component.

   (b) Draw a typical single railway track in cutting and embankment showing full details.

   (c) Differentiate between the following :

   (i) Railway track and tram line

   (ii) Rail head and rail base.

   8+8+4=20

10. Find the stopping sight distance for a design speed of 65 *kmph*. What are sight distance requirements at gradient *i* in 40 ? Take reaction time = 2·5 seconds and design co-efficient friction as 0·36. Any other data not supplied.

    8+12=20

11. (a) Find the total width of a pavement on a horizontal curve of National Highway to be aligned along a rolling terrain with ruling minimum radius. Use the following data :

    Design speed = 80 *kmph*, Normal pavement width = 7*m*, Number of lanes = 2, wheel base of truck = 6*m*, Max^m. value of super-elevation = 0·07, skid resistance = 0·15.

(b) Explain briefly the objects and scope of traffic engineering.　　10+10=20

12. (a) Explain the different types of surveys to be carried out in the case of a new railway project.

(b) Draw a neat sketch of a left-hand turnout showing the component parts.

(c) What factors govern the length of rails ?
　　　　　　　　　　　　10+6+4=20

13. Name the equipment used in the construction of cement concrete pavement. Why are joint and curing necessary in cement concrete pavement ?　　6+14=20

14. (a) How are signals classified ? Explain with sketches the working of Semaphore signals.

(b) Write a note on Buffer stop.
　　　　　　　　　　　　5+10+5=20

15. (a) What is O-D study ? What are the specific uses of the information gathered from this study.

(b) Classify the types of roads based on the method of construction. Describe construction procedure of low cost road.

(c) Enumerate the design methods of flexible pavement. 5+10+5=20

16. (a) Explain the desirable properties of aggregates to be used for road construction.

(b) Mention the names of three routine laboratory tests for asphaltic materials and discuss briefly the significance of each.

(c) Distinguish among asphalt cement, cut-back and emulsion. 8+6+6=20

PART-C

(Water resource Engineering)

*Answer **any five** questions.*

17. (a) Describe Log-Pearson Type-III distribution for flood frequency analysis.

(b) Describe Muskingham method of flood routing and explain for computing the co-efficients. 10+10=20

18. A canal was designed to supply the irrigation needs of 1200 *hectare* of land growing rice of 140 days base period and having a delta of 134*cm*. If the same canal water is used to irrigate wheat of base period 120 days and having delta of 52 *cm*, find the area of land that can be irrigated. 20

19. Name different methods of irrigation based on applying water and explain *any two* of them. 20

20. (a) The average annual rainfall depths (in *cm*) at four existing rain gauge stations in a basin are 105, 79, 70 and 66 respectively. Estimate the additional rain gauge stations necessary in case the average depth of rainfall in the basin is to be estimated within 10% error.

(b) The total observed run off volume during a 6 hour storm with a uniform intensity of $1\cdot5 cm/hour$ is $21\cdot6 \times 10^6 m^3$. If the area of the basin is $300 km^2$, find the average infiltration rate for the basin.

$$10+10=20$$

21. (a) The mean annual flood-peak at a river site is $906 m^3/sec$ and the standard deviation of the flood peaks is $170 m^3/sec$. Find the magnitude of a 50- year return period flood at the river site. Assume that the flood peak flow Gumbel distribution (EV-I).

(b) How many times will a 5-year flood occur, on the average, in a 10-year period? What is the probability that a 5-year flood will occur exactly 4 times in a ten year period?

$$10+5+5=20$$

22. (a) What are the basic differences between foreway and surge tank? Discuss about different types of surge tank giving illustrative sketch.

(b) Water Resource Engineering aims at 'Control' of water, 'Utilization of water' and 'Water quality management'. Express your view on the above statement.

$$10+10=20$$

23. (a) What is cross-drainage work ? Name different types. Discuss *any one* of them.

(b) Classify irrigation canal based on alignment. Draw sketches and explain, merits and demerits of different canals. 10+10=20

24. The discharge available from a tubewell is $120 m^3/hour$. Assuming 3200 hours of working of tubewell for a year and average depth of water for Rabi and Kharif crop is $48 cm$, estimate CCA. Also find culturable area if the intensity of irrigation is 50%. 20

PART-D

(Sanitation and Water Supply)

Answer **any five** questions.

25. (a) What do you understand by terms 'Self cleaning velocity' and 'Limiting velocity' in sewers ?

Derive the Shield's expression for Self cleaning velocity.

(b) What do you mean by self purification property of a stream ? Explain factors affecting the property. 2+10+8=20

26. (a) Explain with the help of the flow diagram the sequence of operations and theory of activated sluge process.

(b) A sanitary sewer is to be laid to serve a community of persons 150 per *hectare* in a district of 40 *hectares*. The average sewage contribution is 150 *l.p.c.d.* and average ground slope is 1 in 900. Find the diameter of the sewer to carry the sewage, when running half-full. Take Manning's $N = 0.015$.   8+12=20

27. (a) What are different systems of pipe networks layout? Describe Hardy-Cross method of pipe network analysis.

    (b) Briefly describe the method of sampling and bacteriological analysis of water.   14+6=20

28. (a) What are ecological pyramids? How many types of pyramids are commonly used in ecology? Discuss.

    (b) List the different sources from which sulphur dioxide is emitted as pollutant.

    (c) Describe the harmful effects of sulphur dioxide on plants, human health and materials and belongings.   8+4+8=20

29. What are the various methods of disinfection of water by chlorine? What factors affect the efficiency of disinfection process and to what extent they can be controlled?

     8+12=20

30. Design secondary sedimentation tank required for an activated sludge plant for treating 6 million litres of sewage per day.

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31. Explain pollution and contamination of water. Name various tests that are to be carried out during examination of water before treatment.

8+12=20

32. *(a)* Write down the factors that influence flow of sewage in sewers. Mention the significance of 'Time of Concentration' in the design of storm water drains.

(b) Write down the advantages of sanitary landfills.

8+7+5=20

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