

SC(MP)ACFTCE(09MY)

CIVIL ENGINEERING

Time Allowed : 3 hours

Full Marks : 100

*The figures in the margin indicate
full marks for the questions.
Answer any 10 (ten) questions
taking 5 (five) questions from each section.
Assume any missing data.*

SECTION A

Building Materials

1. (a) Discuss the operations involved in the manufacture of Bricks. **(6)**
(b) Explain briefly the following two tests for bricks:
 - (i) Compressive Strength test.
 - (ii) Water absorption test. **(2×2=4)**

2. (a) Write a note on important properties of various types of cement. **(6)**
(b) Explain briefly the following two tests for cements:
 - (i) Consistency test of cement.
 - (ii) Test for setting time of cement. **(2×2=4)**

(Contd. 2)

Solid Mechanics

3. (a) Define the following: **(3+3=6)**
- (i) Modulus of elasticity, modulus of rigidity.
 - (ii) Mohr's circle of stress, strains, plane strain.
- (b) Draw shear force and bending moment diagrams for following beams: **(2×2=4)**
- (i) A cantilever having a point load at the free end.
 - (ii) A simply supported beam carrying uniformly distributed load on the entire span.

Structural Analysis

4. (a) Discuss briefly the different steps of analysis of a continuous beam by slope deflection method. **(6)**
- (b) Discuss the Principle of Plastic Analysis. **(4)**

Design Of Steel Structures

5. (a) Define the following technical terms used in riveting: **(5×1=5)**
- (i) Lap Joint
 - (ii) Butt Joint
 - (iii) Nominal diameter
 - (iv) Pitch
 - (v) Gauge Distance

(Contd. 3)

- (b) Design a suitable fillet welded joint between two plates of size $160\text{mm} \times 8\text{mm}$ and $200\text{mm} \times 8\text{mm}$ to develop the full strength of the smaller plate in tension. Assume permissible tensile stress in plate = 1500 kg/cm^2 . **(5)**

Design of Concrete and Masonry Structures

6. Explain the following: **(2+3+5=10)**
- (a) Doubly reinforced Section.
 - (b) Advantages of R.C.C.
 - (c) Design of simply supported slabs.
7. What is Pre-stressed Concrete? Explain different methods of pre-stressing. **(2+8=10)**

Construction Practice, Planning and Management and Concreting Equipment:

8. (a) Define the following technical terms used in CPM analysis: **(5×1=5)**
- (i) Event
 - (ii) Activity
 - (iii) Dummy Activity
 - (iv) Early finish time
 - (v) Late start time
- (b) What are the main differences between PERT and CPM networks? **(5)**

(Contd. 4)

Hydrology

12. (a) Define unit hydrograph. State the assumptions of the unit hydrograph theory. (4)
- (b) Define the following and discuss how one differs from the other: (2+2+2=6)
- (i) Flood routing through reservoirs
 - (ii) Flood routing through Channel

Water Resources Engineering

13. (a) What is waterlogging? What are the causes of waterlogging? (4)
- (b) What are the different forces that may act on a gravity dam? Discuss with a sketch and write down the expressions of the forces. (6)

Environmental Engineering

14. (a) Explain various processes involved in sludge treatment and disposal. (5)
- (b) Define water-born Diseases. Write down the classification of water-born Diseases. (5)

(Contd. 6)

Soil Mechanics and Foundation Engineering

15. (a) Define the following terms: **(4×1=4)**
- (i) Porosity of soil mass
 - (ii) Permeability
 - (iii) Flow net
 - (iv) Bearing capacity
- (b) Write down the assumptions of Terzaghi's one dimensional Consolidation Theory. **(6)**

Surveying

16. (a) Draw neat sketches of the pattern of contours that show **(3×2=6)**
- (i) Area having flat slop
 - (ii) Area having uniform steep slop
 - (iii) A valley
- (b) How do you perform the following operations by a theodolite? **(2×2=4)**
- (i) Measurement of direct angles.
 - (ii) Measurement of deflection angles.

(Contd. 7)

17. (a) Fill up the blanks: **(5×1=5)**
- (i) In levelling, measurements are made in _____ plane.
 - (ii) A level surface to which elevations of different points are referred is called _____.
 - (iii) A relatively permanent point of reference, whose elevation with respect to any assumed datum is considered, is known as _____.
 - (iv) The point at which both back sight and fore sight readings are taken, is called _____.
 - (v) Levelling should always commence from a _____.
- (b) Define the following: **(5×1=5)**
- (i) The zenith
 - (ii) The nadir
 - (iii) The celestial equator
 - (iv) The observer's meridian
 - (v) The ecliptic

Transportation Engineering

18. Write notes on: **(5+5=10)**
- (a) Geometric Design of roads.
 - (b) Maintenance of Railway tracks.

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