

SECTION A

PART I: Multiple Choice Questions (30 marks)

Choose the correct answer and write down the letter of your chosen answer in the Answer Booklet against the question number e.g. 31 (d). Each question carries ONE mark. Any double writing, smudgy answers or writing more than one choice shall not be evaluated.

1. Zero hardness of water is achieved by
 - a) using excess alum dosage.
 - b) ion exchange method.
 - c) excess lime treatment.
 - d) using lime soda process.

2. For an area developed in haphazard way, the type of layout of water distribution system preferred is
 - a) radial system.
 - b) ring system.
 - c) grid iron system.
 - d) dead end system.

3. Which one of the following is **NOT** a groundwater?
 - a) From riverside radial collector wells.
 - b) From infiltration galleries.
 - c) Water from natural springs.
 - d) Rooftop water stored in underground tank.

4. Cross staff is an instrument used for
 - a) measuring bearings of the lines.
 - b) measuring approximate horizontal angles.
 - c) setting out right angles.
 - d) None of the above.

5. In surveying principle "work from whole to part is recommended" since
 - a) it localizes error.
 - b) it leads to errorless maps.
 - c) there is no chance of omitting any required measurement.
 - d) it is easy to use measurements for plotting.

6. For hilly region, the ideal method of contouring is
 - a) radial line method.
 - b) method of squares.
 - c) direct method.
 - d) cross section method.

7. To obtain good bonding in brick masonry
 - a) first class bricks are used.
 - b) vertical joints in alternate courses are kept in plumb line.
 - c) bats are used where necessary.
 - d) All of the above.

8. The best irrigation method that suits area scarcity of irrigation water is
 - a) drip irrigation.
 - b) furrow irrigation.
 - c) check flooding.
 - d) sprinkler irrigation.

9. Water logging is due to
 - a) inadequate drainage.
 - b) over irrigation.
 - c) impervious obstruction.
 - d) All of the above.

10. Cavity wall is generally provided for
 - a) heat insulation.
 - b) sound insulation.
 - c) prevention of dampness.
 - d) All of the above.

11. Hydraulic jump is used for
 - a) reducing the energy of flow.
 - b) reducing the velocity of flow.
 - c) reducing the flow rate.
 - d) increasing the flow rate.

12. The most economical section for a compression member is
 - a) hollow circular.
 - b) circular.
 - c) i-shaped.
 - d) rectangular.

13. Which one of the following is **NOT** a type of culvert?
 - a) Slab culvert
 - b) Through culvert
 - c) Pipe culvert
 - d) Box culvert

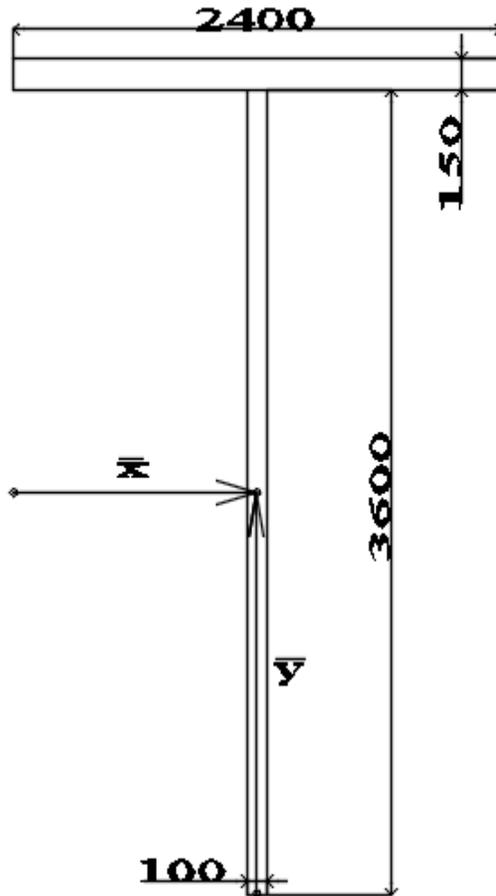
14. The limiting load beyond which the material no longer behaves elastically is known as
 - a) breaking load.
 - b) elastic load.
 - c) limiting load.
 - d) load bearing capacity.

15. Maximum bearing capacity of soil is that of
 - a) fine sand.
 - b) sand clay mixture.
 - c) soft rock.
 - d) coarse sand.

16. Fire resistance is highest in case of
- brick masonry.
 - timber structure.
 - stone masonry.
 - RCC works.
17. Very commonly used covering materials for steel trussed roof is
- AC sheets.
 - GI sheets.
 - Tiles.
 - Shingles.
18. External walls should have a minimum thickness of plaster
- 12 mm
 - 15 mm
 - 20 mm
 - 25 mm
19. To improve earthquake resistance of a building, provide _____.
- roof band
 - lintel band
 - plinth band
 - All of the above
20. A green building is the
- structure that aims to reduce negative environmental effects.
 - building surrounded with garden.
 - one with green colour.
 - All of the above.
21. Suitable foundation for steel column is _____.
- grillage footing
 - strap footing
 - combined footing
 - mat foundation
22. PVC pipes loosely fixed to walls
- to allow longitudinal expansion.
 - to allow lateral expansion.
 - since tight fitting may damage them.
 - All of the above.
23. Development of fine wire cracks in plastered surface is known as
- blistering.
 - cracking.
 - crazing.
 - flaking.

24. Expansion joints in masonry walls are provided if length exceeds
- 10 m
 - 20 m
 - 30 m
 - 40 m
25. Roof in which slab is directly supported by column is known as
- flat slab.
 - two way slab.
 - grid floor.
 - beam and slab floor.
26. In cantilever retaining walls
- toe slab bends up and heel slab bends down.
 - toe slab bends down and heel slab bends up.
 - both toe and heel slabs bend up.
 - both toe and heel slabs bend down.
27. IS 456-2000 recommends that the unsupported length of any column should not exceed _____ times the least lateral dimension of the column.
- 20
 - 40
 - 60
 - 70
28. Advantage of pre-stressed concrete member over equivalent strength RCC member is
- more durable.
 - deformation is much less.
 - dead weight is less.
 - All of the above.
29. For water retaining structures, minimum grade of concrete to be used is
- M 15
 - M 25
 - M 30
 - M 35
30. The ratio of voids to total volume of soil mass is called
- water content ratio.
 - degree of saturation.
 - Porosity.
 - void ratio.

4. Determine the cross-sectional area and the values \bar{x} and \bar{y} to locate the position of the centroid for the sections shown in the figure below. Assume the origin of the coordinate system to be at the bottom left hand corner for each section.

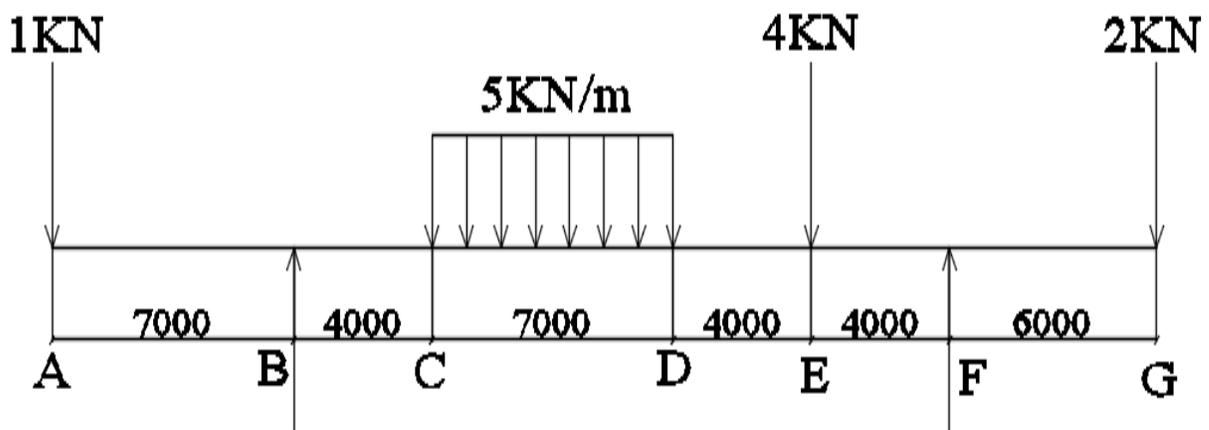


SECTION B: Case Study [50 marks]

Choose either CASE I OR CASE II from this section. Each case study carries 50 marks. Mark for each sub-question is indicated in the brackets.

CASE I

Determine the values and draw the diagrams for shear force and bending moment due to the imposed load on overhanging beam shown in the figure below and find the position of point of contra-flexure, if any.



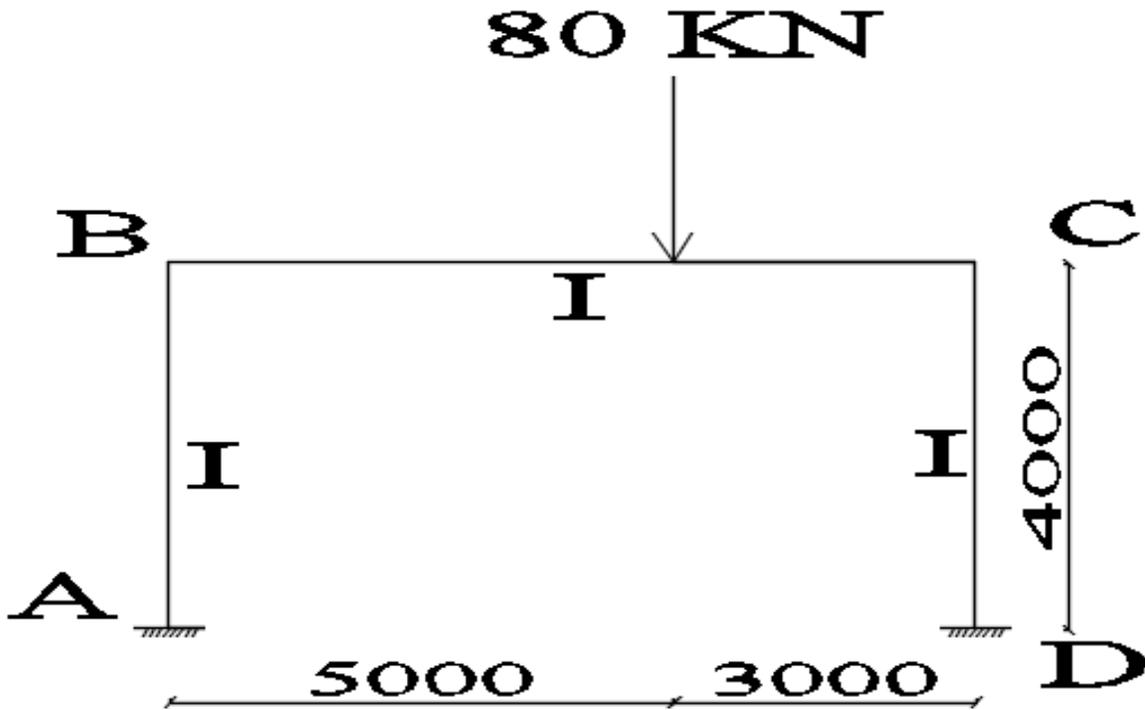
All distances in mm

Compute to arrive at the following:

1. Find Support Reactions V_B and V_F . [10 marks]
2. Shear Force Diagram. [15 marks]
3. Bending Moment Diagram. [15 marks]
3. Points of contra-flexure between BC and EF. [10 marks]

CASE II

Determine the values and draw the bending moment diagram



All dimensions in mm

Compute the following:

1. Analyze the portal frame [20 marks]
2. Find the reactions at V_A and V_D [15 marks]
3. Draw the bending moment diagram [15 marks]

TASHI DELEK