

MG-557 Seat No. _____
Second Year B. Sc. (Fire) Examination
April / May – 2003
Mechanics of Structure & Town Planning

Time : Hours]

[Total Marks :

Instructions:

1. All five questions are compulsory.
2. Figures to the right indicate full marks of the questions.
3. Non-programmable Scientific calculators are permitted.
4. Assume suitable additional data that may be necessary.
5. Use of IS: 456, IS: 800, SP: 16 & Steel Table is permitted.

Q: 1 [A] Fig. 1 shows a three-hinged arch consisting of two quadrantal parts AC and CB of radii 2 m and 4 m respectively. For the load system acting on the arch, calculate the support reactions and the bending moments under the loads. **(08)**

[B] A horizontal girder of steel having a uniform section is 14 m long and is simply supported and loaded as shown in Fig. 2. Find the slope at the supports and deflections under the loads using '*Conjugate Beam Method*'. **(06)**

OR

Q: 1 [A] Define: 1. Stiffness, 2. Distribution Factor **(02)**

[B] Determine support moments for the continuous beam shown in Fig. 3 using '*Moment Distribution Method*'. Also, draw *Bending Moment Diagram*. **(12)**

Q: 2 [A] Enlist basic assumptions made in the design of flexural members for the limit state of collapse. **(06)**

[B] A rectangular beam section of 30 cm × 60 cm size resists a factored moment of 250 kN.m. Determine the number of 16 mm diameter bars required as tension reinforcement. Use M20 grade of concrete & Fe 415 grade of steel. Provide 20 mm clear cover to reinforcement. **(08)**

OR

Q: 2 [A] Define: 1. Characteristic Strength, 2. Characteristic Load **(02)**

[B] Answer the following questions: **(04)**

1. What is '*Limit State*'?
2. What is the value of partial safety factor for concrete?
3. What is the meaning of M25?
4. In the absence of test data, how to determine the value of modulus of elasticity for concrete?

[C] A 15 cm thick one way reinforced slab is resisting a factored moment of 16.5 kN.m per metre width of slab. Determine the main and distribution steel reinforcement required. Use M20 grade of concrete. Use Fe 415 grade of steel as main reinforcement and Fe 250 grade of steel as distribution reinforcement. Provide 15 mm clear cover to reinforcement. **(08)**

Q: 3 [A] Enlist properties of ideal structural connection. **(05)**

[B] An angle section ISA 90 * 60 * 10 mm is welded to a gusset plate of 12 mm thickness through the longer leg. It carries an axial load of 200 kN acting along the centroid of the section. Design the connection using shop fillet weld. **(09)**

OR

Q: 3 [A] Enlist advantages of welded joints over riveted joints. **(05)**

[B] Design unstiffened seated connection for a beam ISMB 250 @ 37.3 kg/m transmitting end reaction of 85 kN to flange of column ISHB 200 @ 37.3 kg/m. Clearance between end of the beam and face of the column is 10 mm. Power driven shop rivets are used for this connection. **(09)**

- Q: 4 [A] Classify & explain urban roads in detail. (07)
 [B] Enlist forms of planning. Explain any two of them. (07)
 OR
- Q: 4 [A] Write short note on 'Group Housing'. (08)
 [B] Explain briefly the importance of National Building Code. (06)
- Q: 5 [A] Write short note on Intakes. (07)
 [B] Explain Fire Hydrants with neat sketch. (07)
 OR
- Q: 5 [A] Explain in detail types of pipes. Also give the name of the materials from which pipes are made. (07)
 [B] Explain the important factors for the selection of source of water supply. (07)

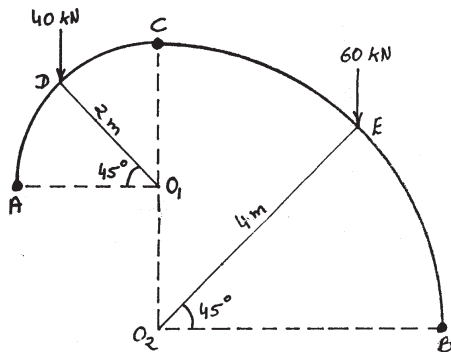


Fig. 1

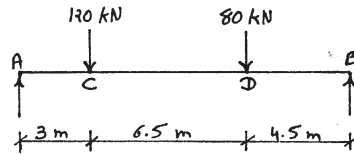


Fig. 2

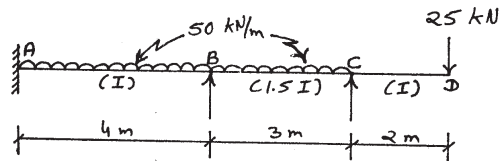


Fig. 3