

7E7062

Roll No. _____

Total No of Pages: 4

7E7062

B. Tech. VII Sem. (Main) Exam., Nov.-Dec.-2016
Civil Engineering
7CE2A Design of Steel Structures - I

Time: 3 Hours

Maximum Marks: 80

Min. Passing Marks Main : 26

Min. Passing Marks Back: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

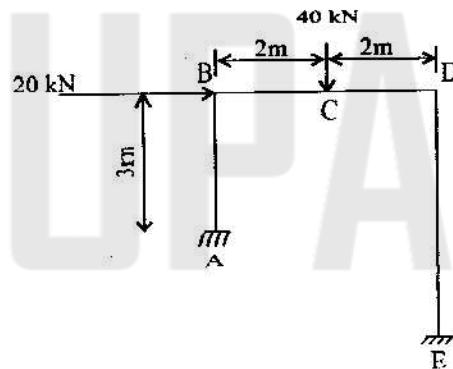
Use of following supporting material is permitted during examination.

(Mentioned in form No. 205)

1. IS - 800 - 2007.
2. Steel table
3. IS handbook for structural engineering

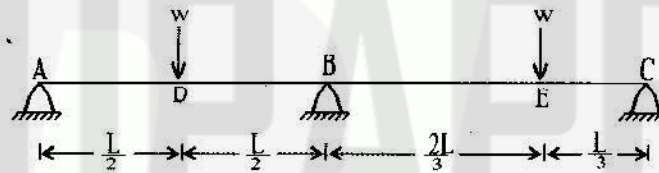
UNIT - I

- Q.1 (a) Find shape factor for a circular section. [4]
- (b) Find out the fully plastic moment in the portal frame shown in figure of uniform cross section through out. [12]



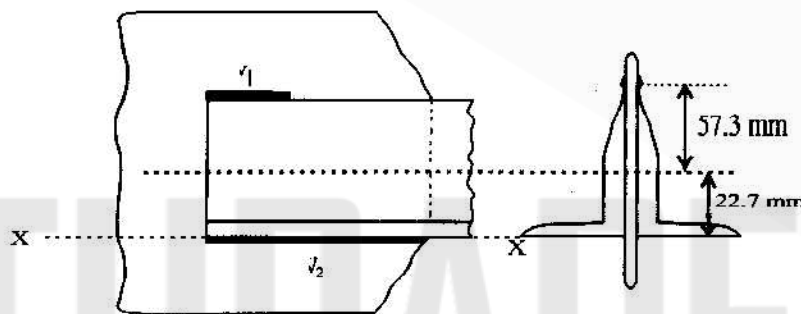
OR

- (a) What are the three conditions to be satisfied for the plastic method of analysis? [4]
- (b) Find out the collapse load for a continuous beam of uniform cross section. [12]



UNIT - II

- Q.2 (a) A tie member of a truss consists of double angle section, each 80mm X 80mm X 8mm welded on the opposite side of a 12 mm thick gusset plate as shown in figure. Design a fillet weld for making the connection in the work shop. The factored tensile force in the member is 300 kN. [12]



- (b) Enumerate advantages of welded joints over bolted joints. [4]

OR

- Q.2 (a) Design a bridge truss diagonal subjected to a factored tensile load of 300 kN. The length of diagonal is 3.0 m. The tension member is connected to a gusset plate 16 mm thick with one line of 20 mm diameter bolts of grade 8.8. [8]
- (b) Two plates 10 mm and 18 mm thick are to be joined by a double cover butt joint. Assuming cover plates of 8 mm thickness, design the joint to transmit a factored load of 500 kN. Assume Fe-410 plate and grade 4.6 bolt. [8]

UNIT - III

- Q.3 Design a double angle discontinuous strut to carry a factored load of 175kN. The length of the strut is 3.0m between intersections. The two angles are placed back to back and are tack bolted. Consider the following cases -
- (a) Angles are placed on the same side of the gusset plate.
- (b) Angles are placed on opposite sides of the gusset plate.
- (c) Two angle in star formation.
- Assume grade Fe- 410 steel with $f_y = 250$ MPa. [16]

OR

- Q.3 Design a built-up column 9 m long to carry a factored axial compressive load of 1100kN. The column is restrained in position but not in direction at both the ends. Design the column with connecting system as battens with bolted connection. Use two channel sections back to back. Use steel of grade Fe 410. [16]

UNIT - IV

- Q.4 Determine the design bending strength of ISLB 350 @ 486 N/m considering the beam to be - [16]
- (a) Laterally supported
- (b) Laterally unsupported
- The design shear force V is less than the design shear strength. The unsupported length of the beam is 3.0m. Assume steel of grade Fe 410.

OR

- Q.4 A beam of effective span 6m is simply supported at the ends. It is subjected to a dead load (including self wt) of 20 kN/m and live load of 30 kN/m over the whole span. Design the beam as laterally supported. [16]

UNIT - V

- Q.5 A column ISHB 350 @ 661.2 N/m carries an axial compressive factored load of 1700kN. Design a suitable welded gusset base. The base rests on M-15 grade of concrete. [16]

OR

- Q.5 (a) What are column bases? Discuss their functions. [4]
- (b) Design a grillage foundation for a column ISHB 450@ 87.2 kg/m carrying a factored axial load of 2000 kN. The allowable bearing pressure on soil is 160 kN/m². The base plate has size 800 mm x 700 mm whose larger dimension is placed parallel to the web of I section. [12]