



Printed Pages : 4

CE – 041

(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 0040**

Roll No.

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## B. Tech.

(SEM. VIII) EXAMINATION, 2006-07

### PLASTIC DESIGN OF STEEL STRUCTURES

Time : 3 Hours]

[Total Marks : 100

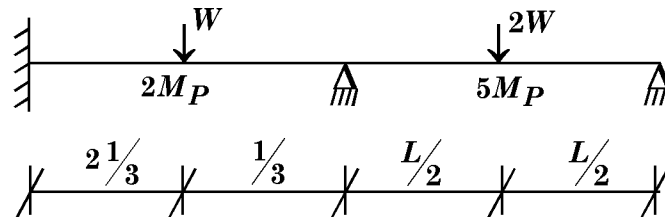
*Note :* Attempt **all** questions. All questions carry equal marks. IS : 800 and steel table can be used.

1. Attempt any **four** parts of the following : **5×4=20**

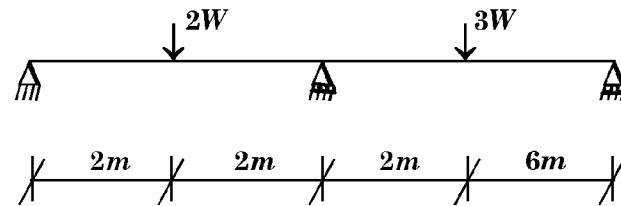
- Explain shape factor ?
- Explain different methods of plastic analysis ?
- Draw stress stain curve for mild steel
- Differentiate between real and plastic hinge.
- Calculate shape factors of a circle.
- Define load factor.

2. Attempt any **two** parts of the following : **10×2=20**

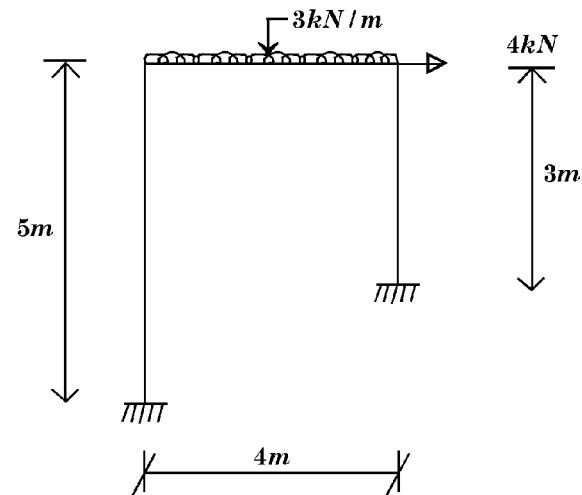
- Calculate ultimate load  $W_u$  for the two span beam with  $M_p$  values given below.



(b) Find collapse load for the beam shown below :



(c) For the frame shown below find the value of fully plastic moment required if all members have same value of  $M_p$ .



3. Attempt any **two** parts of the following : **10×2=20**

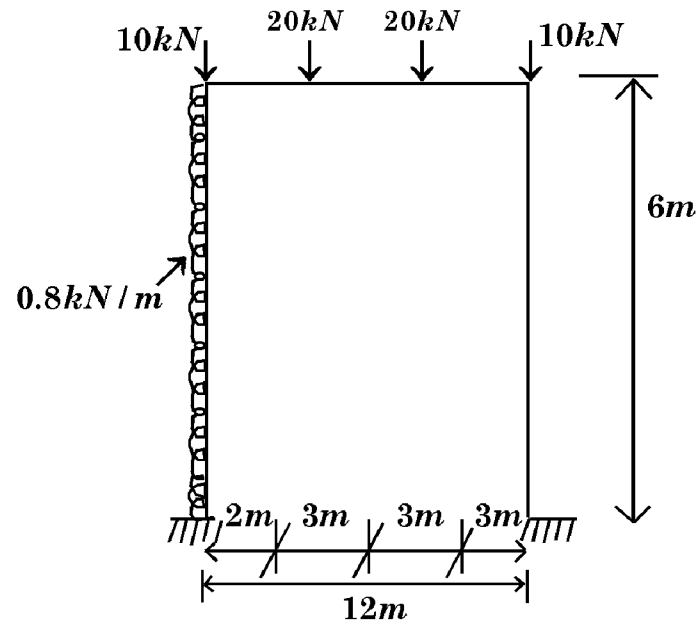
- Write design steps for plastic design of steel structures.
- Show the effect of axial force on fully plastic moments.
- Explain how the plastic moment capacity is affected by shear force.

4. Using plastic design concept, design the following : 20×1=20

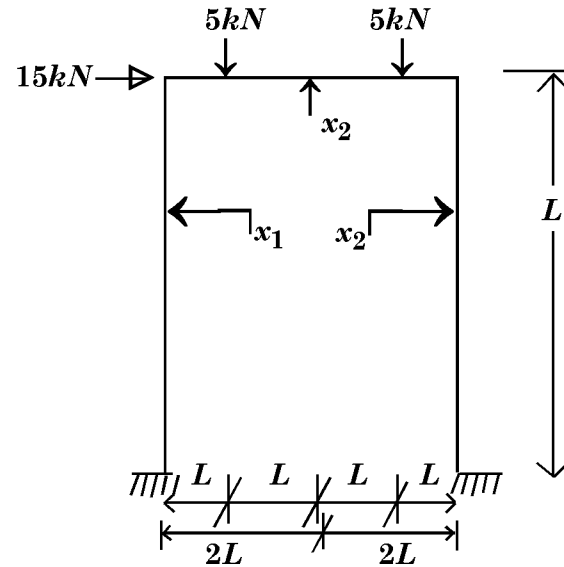
A continuous beam of uniform section is required over four span of 8 m each. The working load is 20 kN/m including self weight of the beam. Determine a suitable section for the beam.

**OR**

A building consists of uniform portal frames with fixed bases having 12 m span and 6 m height. The frames are spaced 4 m apart. The roof consists of beams and concrete slab such that the load on the frame is shown below. The wind load on side may be taken as 1.2 kN/m<sup>2</sup>. Design the portal frame. Assume the frame to be laterally supported and use a uniform load factor of 1.7.



5. Attempt any **two** parts of the following :
- Describe different methods of solution of minimum weight design.
  - Explain minimum weight theorem and its application.
  - Figure given below shows a frame with loading.



Assuming members of uniform sections with plastic moments  $x_1$  and  $x_2$  as shown design the frame for minimum weight.