

[01 - 3212]

III/IV B.E. DEGREE EXAMINATION.

Second Semester

Civil Engineering

STEEL STRUCTURES — II

(Common for Civil and Civil Environmental Engineering)

(Effective from the admitted batch of 2006–2007)

Time : Three hours Maximum : 70 marks

Answer question No. 1 is Compulsory and any other FOUR questions from remaining.

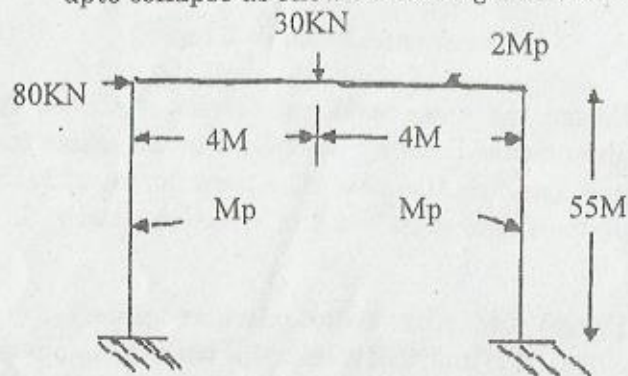
All questions carry equal marks.

Any data missing may be assumed suitably.

Use of IS 800-2007 and steel tables is allowed.

1. (a) Give the expression for the ECONOMICAL depth of plate girder. (2)
- (b) Write the functions of a bearing stiffeners. (2)
- (c) Differentiate through Type bridge from a deck type bridge girder. (2)

7. (a) A beam of rectangular cross section bxd is subjected to a bending Moment $0.8M_p$. find out the depth of the elastic core. (7)
- (b) Calculate the plastic section modulus, shape factor and plastic moment of ISMB 200 having the properties $I_{xx} = 2235.4\text{cm}^4$, $Z_{xx} = 223.5\text{cm}^3$, $A = 32.33\text{cm}^2$, thickness of web = 5.7mm. thickness of Fange = 108mm, take $f_y = 250\text{N/mm}^2$. (7)
8. Find the value of M_p for the portal and loaded upto collapse as shown in the figure below. (14)



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- (d) What are Components of through type bridge? (2)
- (e) What are different types of forces the staging of tanks are Subjected to? (2)
- (f) Evaluate shape factor for square of side a with diagonal parallel to the XX axis. (2)
- (g) Write various types of mechanism used in plastic analysis? (2)
2. Design the maximum section of a plate girder for a live load of 80KN/m, longer than the span and a dead load of 40KN/m, the girder is Simply Supported over an effective span $1L$ of 12m. Take impact factor $i = 20/(14+L)$. (14)
3. A plate girder Simply Supported over a span of 12m carries a total uniformly distributed load of 500KN, inclusive of its own weight the plate girder is built up from a web plate with clear depth of 2400mmx12mm thick with two ISA 200x150x15mm angles and 500mmx12mm cover plates in each flange. The long legs of the flange are placed horizontally. Design the vertical stiffeners. (14)

4. Design the stringers for a beam to carry a single track B.G (revised) loading for the following data:
- (a) Effective span = 40m
- (b) Centre to centre spacing of stringers = 1.9m
- (c) Sleepers and their spacing = 250mmx150x2.8m@0.4mC/C.
- (d) Density of timber = 8.4/KN/ m³.
- (e) Weight of stock rails = 0.44KN/m.
- (f) Weight of guard rails = 0.26 KN/m.
- (g) Weight of fastenings Etc. = 0.28 KN/m of track.
- (h) Spacing of cross beams = 6.5m. (14)
5. Design the cross sectional details of a deck type plate girder Railway Bridge for broad gauge main line loading. Also show the curtailment of Flange plates Clear span = 2.9m; effective span = 3.0m. (14)
6. Design the ring beam (circular girder) for an elevated cylindrical steel tank with hemispherical bottom for 1,60,000 litres capacity. The tank has conical roof. The ring beam of the tank is at a height of 10m from the ground level. The tank is to be built at Delhi. Take $f_y = 250\text{N/mm}^2$ and built with 6 columns. (14)