541

Register No.:

April 2019

Time – Three hours
(Maximum Marks: 75)

[N.B: (1) Q.No. 8 in PART – A and Q.No. 16 in PART – B are compulsory. Answer any FOUR questions from the remaining in each PART – A and PART – B

(2) Answer division (a) or division (b) of each question in PART – C.

(3) Each question carries 2 marks in PART – A, 3 marks in Part – B and 10 marks in PART – C.

(4) IS:800-2007 and steel tables are permitted

(5) Any missing data in the question may be assumed]

PART – A

1. When plastic hinge is formed in a flexural member?
2. How limit states are classified?
3. Write the expression for the design strength of tension members, due to yielding of gross section.
4. What are the advantages of lateral supports to steel beams?
5. What do you mean by interaction equations in the design of steel members?
6. Explain briefly the term "Beam-Column".
7. When a joint is termed as flexible connection?
8. What is the main difference between a lacing bar and a batten?

PART – B

9. Derive the shape factor of a circular section.
10. Briefly explain the different modes of failure of a tension member.
11. What are the functions of the different components of gusseted base?
12. How the design bending moment is determined for the purlins of a sloped roof?
13. Describe with a sketch the stress distributing in an I-section subjected to combined actions, a bending moment and an axial compression.

[Turn over....

14. Briefly explain the material failure and buckling failure of a steel section.

15. What are fasteners? Specify the minimum and maximum spacings and minimum edge distance of fasteners.

16. Specify the various serviceability requirements of a structural member.

PART – C

17. (a) A fixed beam of length 'l' is subjected to a central point load, 'W'. Determine the collapse load for the beam using (i)Statical method and (ii)kinematical method.

(Or)

(b) A symmetrical I-section has an overall depth 600 mm; width of flanges 250mm; thicknesses of flanges and web 23.6mm and 11.8mm respectively. The elastic section modulus of the section about horizontal axis (zz) is $3854.2 \times 10^3 mm^3$. Determine the plastic modulus and shape factor of the section (values shall not be taken from steel tables).

18. (a) Find the tension carrying capacity of a single angle ISA 130×130×10 mm connected to a 10mm thick gusset, by means of three 25mm dia. bolts at a pitch of 100mm C/C in one line. $f_y = 250\ Mpa;\ f_u = 410\ Mpa.$

(Or)

(b) Design a continuous double angle compression member to carry a design load of 275kN. The angles are to be placed back-to-back on each side of 8mm thick gusset. The lengths of member between centre-to-centre of connections are 2.75m.

19. (a) Describe with sketches the secondary effects like web buckling and web crippling of I-sections, when used as beams. How these failures can be avoided?

(Or)

(b) Explain with sketches how the compression flanges of beams are effectively supported laterally.

20. (a) A cantilever steel beam 2 metre long carries a design load of 200kN at its free end. Select a suitable section for the beam if $f_y = 250\ Mpa$.

(Or)

(b) A steel column of effective length 4 metre carries an axial of 500kN and a B.M of 50kN.m about its major axis. whether ISHB 300 @ 58.8 kg/m can safely used for the c Take $f_y = 250\ Mpa$ and ε=1.0.

21. (a) Explain briefly with neat sketches the different types of bolted and welded connections used in steel structures.

(Or)

(b) A steel beam ISCB 400 @56.9 kg/m has to be connected to the flange of a column ISHB 400 @ 77.4kg/m through a seat angle using fillet welds. The beam transmits a load of 120 kN to the column. Design a suitable connecti Take the permissible shear stress in fillet weld as 150 N/mm^2.
