Reg. No. :

Question Paper Code : X10249

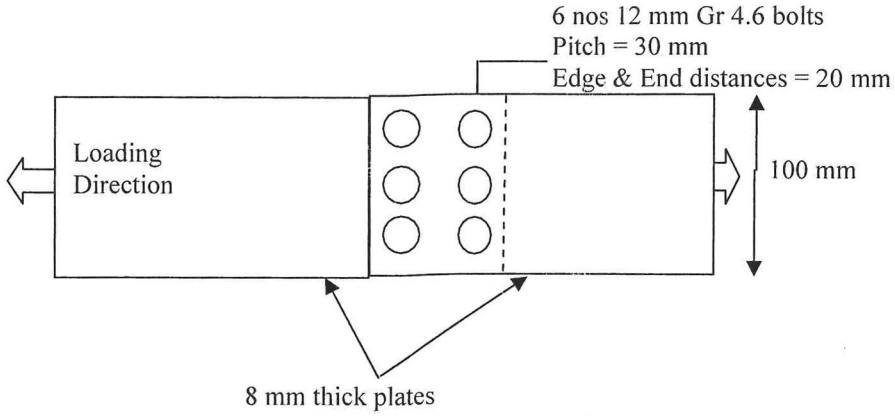
B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2021
Sixth Semester
Civil Engineering
CE 8601 – DESIGN OF STEEL STRUCTURAL ELEMENTS
(Regulations 2017)

Time : Three Hours | Maximum : 100 Marks

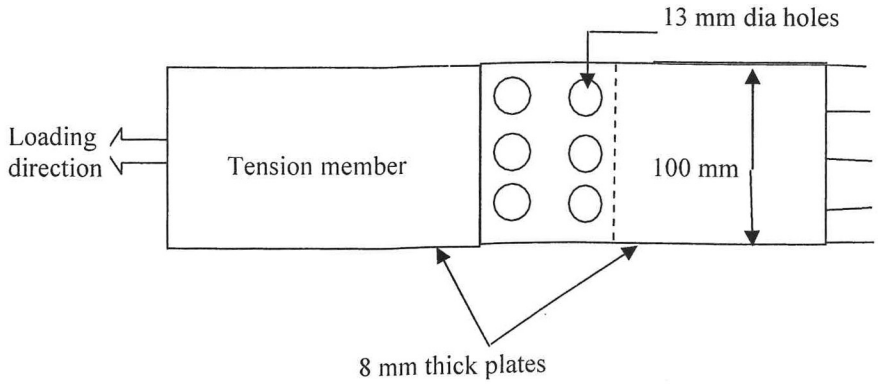
Answer ALL questions
Codes, Tables, Charts, to be Permitted. IS:800-2007, SP 6(1)-1964/Steel Tables.

PART – A **(10×2=20 Marks)**

1. Draw the stress-strain curve of mild steel and label the important points.
2. List three advantages of steel structures.
3. Differentiate between pitch and gauge.
4. Find the bearing strength of the bolted connection shown below :



5. An ISA 50 × 50 × 6 is to be used for tension member 4 m long. The member will always be in tension. Check whether the slenderness ratio satisfies the limit specified in code.
6. Find the net Section capacity of the tension member shown below :



7. How the failure of short steel columns differ from the failure of slender steel columns ?

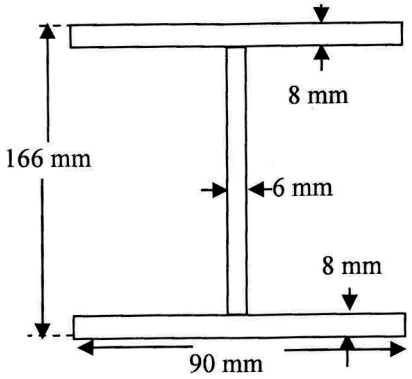
8. What is the purpose of imperfection factor 'a' given in code for design of compression members ?

9. Differentiate compact and semi-compact section.

10. What do you understand by laterally unsupported beam ?

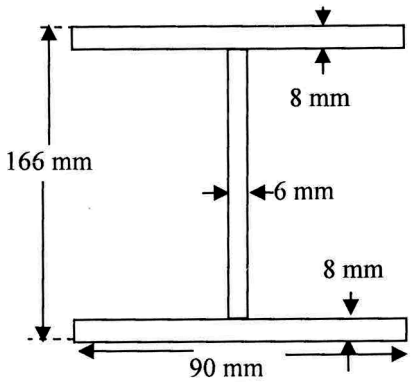
PART – B **(5×13=65 Marks)**

11. a) The welded section shown below is used as a column of 3.5 m height. Calculate the permissible compression load that can be applied, according to the allowable stress method of section 11 in the code.

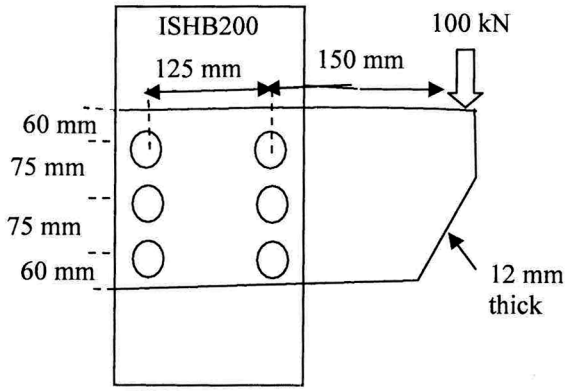


(OR)

b) The welded section shown below is used as a laterally supported beam. Calculate the permissible UDL that can be applied, according to the allowable stress method of section 11 in the code. The beam is simply supported.

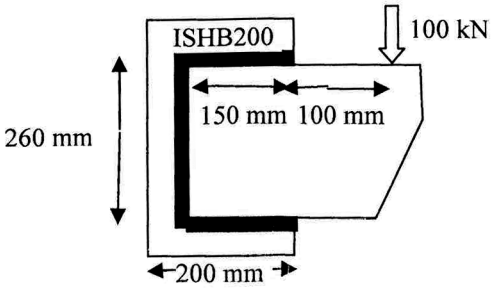


12. a) Given the bracket connection shown, with 24 mm Gr 4.6 bearing bolts, is the bolt pattern adequate for the given factored load ? Assume threads intercept the shear planes.

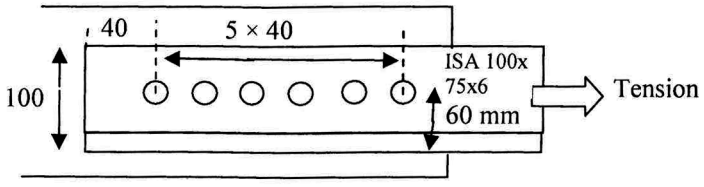


(OR)

b) A bracket plate is welded to the flange of a column ISHB200 as shown. Calculate the size of the weld required to support a factored load of 100 kN.



13. a) A single unequal angle ISA 100 × 75 × 6 is connected to a 10 mm thick gusset plate at the ends with six 18 mm diameter holes (for bolts) to transfer tension. Determine the block shear strength of the angle specimen assuming 100 mm leg is connected to gusset plate.



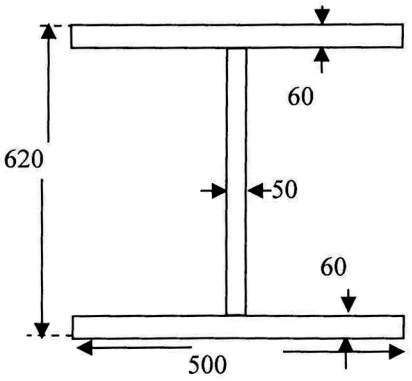
(OR)

b) Select a suitable angle section to carry a factored tensile force of 170 kN assuming a single row of M20 bolts. Show all the checks including block shear.

14. a) Calculate the compressive resistance of a ISA 200 × 200 × 20 angle loaded through only one leg when it is connected by two bolts at the ends considering as fixed.

(OR)

b) A heavy column is required to its support a gantry girder and a H-section is to be fabricated as shown. Check is suitability to support a factored compression load of 11,000 kN assuming both ends are pinned and the length is 8 m. (All dimensions in mm).



15. a) Calculate the moment carrying capacity of a laterally unrestrained ISMB400 member of 3 m length.

(OR)

b) Check whether an ISMB200 section can be used a laterally unrestrained beam of length 1.5 m (simply supported) to carry a factored UDL of 50 kN/m.

PART – C **(1×15=15 Marks)**

16. a) An industrial roof system requires purlins to be designed. The purlins of 5 m length are to be spaced 1.275 m apart and the roof pitch is 11.3 degrees. If the live load is 0.4 kN/m^2, dead load is 0.21 kN/m2 and wind pressure is 2.6 kN/m^2, check if ISMC150 section is suitable for the purlin.

(OR)

b) Design a laced column 10 m long to carry a factored axial load of 1100 kN. Design the column using ISMC300s toe-to-toe. The lacings are connected to the channels by bolts. No need to design the bolt connections.