Printed Pages:02 Sub Code:KCE075

Paper Id: 2 3 1 3 4 1 Roll No. | | | | | | | | | | |

B.TECH.
(SEM VII) THEORY EXAMINATION 2022-23
DESIGN OF STEEL STRUCTURES

Time: 3 Hours *Total Marks: 100*

Note: Attempt all Sections. If require any missing data; then choose suitably.
IS800: 2007 & Steel Table Allowed

SECTION A

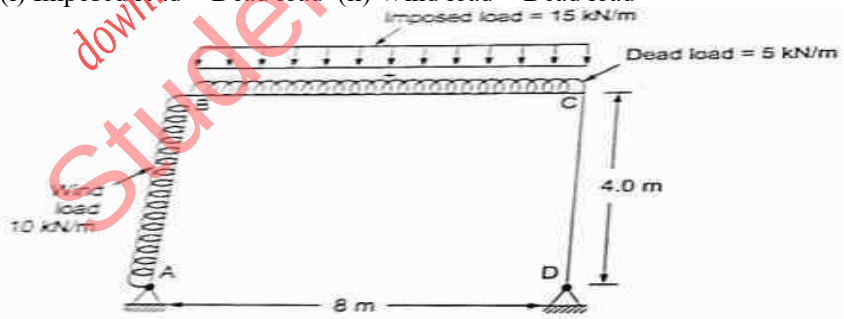
1. Attempt *all* questions in brief. 2 x 10 = 20

(a) Give the five name of types of steel structure.
(b) How you will be calculate wind load?
(c) Draw pattern of riveted joint.
(d) Write the assumptions of design of bearing type connections.
(e) Which angle section are used in roof truss and why?
(f) How efficiency can be increased in a tension member?
(g) What assumptions made while designing a compression member?
(h) Define lattice column with neat sketch
(i) What do you know about slender cross section?
(j) Define rafter.

SECTION B

2. Attempt any *three* of the following: 10 x 1= 10

(a) A frame shown in fig. is loaded by a dead load of 5 kN/m, imposed load of 15 kN/m and wind load of 10 kN/m. Calculate the greatest value of load for design of frame for the following conditions :
(i) Imposed load + Dead load (ii) Wind load + Dead load



(b) Explain with neat sketches define types of butt weld . Also draw figure of typical fillet weld.
(c) A single angle member carries a factored axial force of 400 kN. Design the member and the connections with a gusset plate and a lug angle. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa, respectively.
(d) Determine the design load on the column section ISMB450 @710.3 N/m, height of column to 4 mand it is pin-ended . Assume that f_y = 250 N/mm^2, f_u = 410 N/mm^2 , E= 2 X 10^5 N/mm^2 .
(e) Explain with neat sketch recommended position of purlins.

SECTION C

3. Attempt any *one* part of the following: 10 x 1= 10

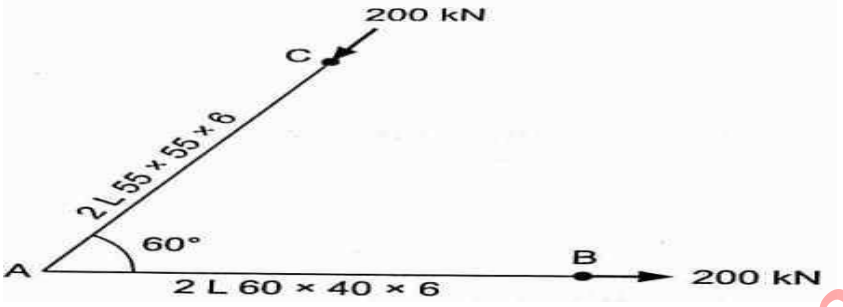
(a) Write short notes on the following: (i) Notch toughness (ii) Fatigue strength (iii) Corrosion resistance
(b) A tension bar 100 mm x 10 mm is to carry a load of 150 kN. A specimen of the same

quality of steel of cross sectio9nal area 800 mm ^{2} was tested in the workshop. The maximum load carried by the specimen was 400 kN . Find the ultimate strength, factor of safety in the design and the gauge length.

4. Attempt any *one* part of the following: 10 x 1= 10

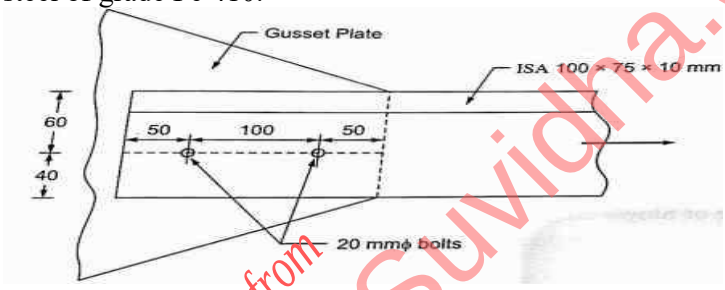
(a) Explain with neat sketch failure of bolted joint.

(b) Design a bolted connection of a truss joint as shown in figure. Using M16 black bolts of 4.6 grade and steel having $f_u = 410$ N/mm^2 . Use 10 mm thick bolt.

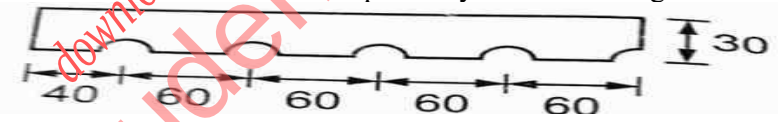


5. Attempt any *one* part of the following: 10 x 1= 10

(a) Determine the block shear strength of the tension member as shown in fig. Use the steel of grade Fe 410.



(b) Design a suitable single section to carry a factored tensile force of 210 kN assuming a single row of M20 bolts. The yield strength and ultimate strength of the material is 200 MPa and 410 MPa respectively . The lengthof the member is 3 m.



6. Attempt any *one* part of the following: 10 x 1= 10

(a) Find the expression for elastic buckling of slender compression member.

(b) Find the design compressive strength of two channels toe to toe. The column carries an axial factored load of 1500 kN. The effective height of the column is 10 m. Assume Fe415 grade steel .

7. Attempt any *one* part of the following: 10 x 1= 10

(a) Design a laterally supported simply supported beam of 4 m span, loaded for a concentrated load of 400 kN at mid span. The load is transferred through base plates of 200 mm length to the supports . Design a check for deflection using ISMB 400 section which is available.

(b) A simply supported beam of span 4.5 m consists of rolled steel section ISLB 450 @ 640 N/m. The compression flange is laterally unsupported. Determine the design strength of the beam.