PAPER ID-310983

Subject Code: RCE701

Roll No: | | | | | | | | | | | | | |

BTECH
(SEM VII) THEORY EXAMINATION 2023-24
DESIGN OF STRUCTURE-III

TIME: 3 HRS **M.MARKS: 70**

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.
IS 800:2007 ALLOWED

SECTION A

1. Attempt *all* questions in brief. 2 x 7 = 14

a.	What is the load combination for design purposes?
b.	Write disadvantages of steel as a structural material.
c.	What is shear lag effect?
d.	How the riveted joints fail?
e.	What is the permissible stress in bending for rolled steel I-section beam?
f.	What are the different parts of roof truss?
g.	What are the effects of holes in beams?

SECTION B

2. Attempt any *three* of the following: 7 x 3 = 21

a.	A tension bar 100 mm x 10 mm is to carry a load of 150 kN. A specimen of the same quality steel of cross-sectional area 800 mm 2 was tested in workshop. The maximum load carried by the specimen was 400 kN. Find the ultimate tensile strength, factor of safety in the design and the gauge length.
b.	Design a lap joint connecting two plates 120 mm x 6 mm to transmit a factored load of 150 kN. Use 16 mm diameter black bolts of grade 4.6 and steel having f u =410 N/mm^2.
c.	With neat sketches describe failure modes of axially loaded columns.
d.	Write the design steps of gantry girders.
e.	Design a simply supported beam of span 3.5 m subjected to a factored bending moment of 300 kNm and factored shear of 140 kN. The beam is laterally unsupported. Steel grade of Fe410.

SECTION C

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

(a)	Write the advantages of Limit State method over ultimate load method.
(b)	The yield strength for a mild steel specimen was found to be 250 N/mm ^{2}. Taking a factor of safety of 3, Find out working stress.

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

(a)	Two plates 180 mm x 10 mm are to be connected in a lap joint , the connection being made by teraservers fillet weld and necessary plug welds. Design the connection, use 6 mm welds.
(b)	What do you understand by moment resistant connection on welds? Find out the expression for direct shear in plane of moment at right angle to the plane of weld.

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

(a)	The bottom chord tension member of a structure is 3 m between panel points and carries an axial load of 400 kN.the member has to carry , in addition , a vertical point load of 20 kN acting at the middle point of the panel. The member consists of two channels placed back to back with a space between them to receive a gusset plate. At the section where the maximum bending moment is a maximum two bolts 14 mm diameter occur, these being placed at 30 mm on either side of horizontal axis of symmetry of the gross section. Design the member , Permissible stresses may be taken as follows: Permissible axial tensile stress=150 N/mm^2,Permissible bending stress in tension=165N/mm^2 .
(b)	Define lateral-torsional buckling with neat sketch and also write the assumptions.

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

(a)	Design a built-up column consisting of two channels placed toe-to-toe. The column carries an axial factored load of 1500 kn. The effective height of the column is 10 m. Design the lacing also. Assume Fe415 grade steel.
(b)	An ISHB 250 @ 536 N/m columns carrying a factored axial load 900 kN. The column ends of machined. Design the splice connection. Use M16 bolts.

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

(a)	Describe with neat sketches (a) Plate girder with flange angles (b) plate girder with welded connection.
(b)	The section of a welded plate girder consists of flange plates 600 mm x 40 mm and web plate 1800 mm x 12 mm. Determine the moment capacity of the section, and the shear resistance corresponding to web buckling. Intermediate stiffeners are not provided.