PAPER ID-310268

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B. TECH
(SEM-VII) THEORY EXAMINATION 2020-21
DESIGN OF STRUCTURE III

Time: 3 Hours ***Total Marks: 70***

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

SECTION A

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

a.	Define the limit state method.
b.	Explain limit state of serviceability.
c.	What do you mean by web buckling and web crippling?
d.	What do you mean by prying forces?
e.	What is the difference between pitch and staggered pitch?
f.	What is tension splice?
g.	Define effective length of column and net effective area of column?

SECTION B

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

a.	Calculate the efficiency of the joint for single bolted lap joint for plate 10 mm thick. Use 4.6 grade of bolt of diameter 16mm and Fe-410 grade of steel.
b.	Calculate the strength of a 20 mm diameter bolt of grade 4.6 for the single cover butt joint: the cover plate being 10 mm thick. The main plates to be jointed are 12mm thick.
c.	Design a suitable angle section to carry factored tensile force of 250 kN. Use bolted connection. Use steel of grade Fe410 and bolts of grade 4.6.
d.	Determine the design axial load on the column section ISMB 350. Given that the length of column is 4.0 m, the column is pin ended. Use steel of grade is Fe 410. Take E=2x10^5 $N/_{mm^2}$.
e.	A simply supported beam ISMB 400@603.68 $N/_m$ has an effective span of 5.5m. find the design bending strength of the beam if the compression flange of beam is laterally unsupported. Use fy=250 $N/_{mm^2}$.

SECTION C

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

(a)	Define the stress strain diagram for mild steel with neat sketch.
(b)	Determine the strength of a 6mm fillet weld per mm length, if the overlap of the plate is 150mm and when placed (i) shop and (ii) at site.

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

(a)	Determine the tensile strength of a roof truss diagonal made of 100x75x10 mm angle section connected to the gusset plate by 4 mm fillet size filled weld and 140 mm long on one end and 310 mm long on another end. Use steel of grade Fe 410.
(b)	Design a tension member of roof truss subjected to working loads of 90 kN (DL) and 140 kN (LL). Use double angle section connected back to back on either side of gusset plate of 8mm thick. Use bolted connection. Take f_u =410 $N/_{mm^2}$ and fy=250 $N/_{mm^2}$ for both member and bolt material.

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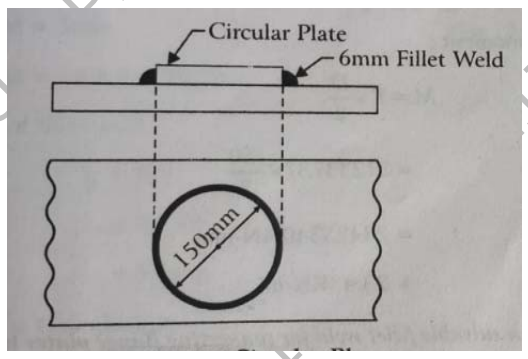
5. Attempt any *one* part of the following: 7 x 1 = 7

(a)	A single angle section ISA 60mmx60mmx8mm, 4.0 m long, is used strut. The ends are welded to the gusset plates. Determine the design compressive strength and service load that can be applied.
(b)	Design a steel column carrying a factored axial load of 1250 kN. The length of the column is 4.5m and it is restrained at both ends. Only I-sections are available.

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

(a)	Design a laterally supported beam for a 4m span loaded for a factored concentrated load of 400 kN at mid span. The load is transferred through base plates of 200mm length to the supports. Design a check for deflection using ISMB 400 section which is available. Use steel of grade is Fe 410.
(b)	

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

(a)	Design a simply supported beam of effective span 4.2m carrying a reinforced concrete floor in which top compression flange is embedded. Beam is carrying 20 $^{kN}/_{m^2}$ dead load and 20 $^{kN}/_{m^2}$ imposed load. Assume steel of grade Fe 410.
(b)	A circular plate, 150mm in diameter is welded to another plate by means of 6mm fillet weld as shown in fig. calculate the greatest twisting moment that can be resisted by the weld. Use steel of grade Fe 410 and site welding. 

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