BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(MID SEMESTER EXAMINATION SP/2024)

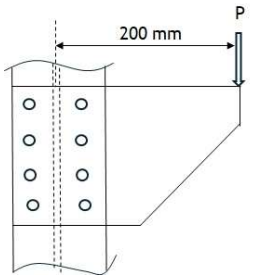
CLASS: BTECH/BARCH **SEMESTER : 6**
BRANCH: CIVIL & ENV. ENGG AND ARCHITECTURE & PLANNING **SESSION : SP/2024**

SUBJECT: CE308 STRUCTURAL DESIGN-II

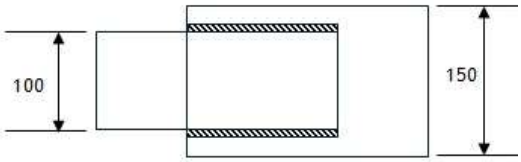
TIME: 02 Hours **FULL MARKS: 25**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 5 marks and total 25 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Tables/Data handbook/Graph paper etc., if applicable, will be supplied to the candidates**
5. IS-800 – 2007 may be used during examination.

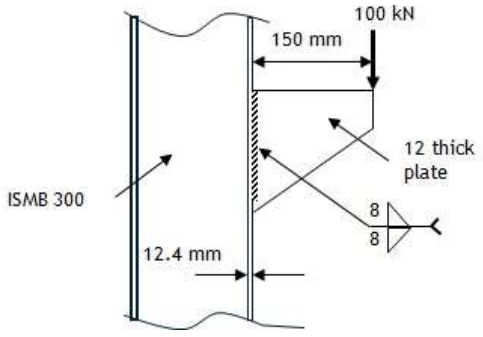
			CO	BL
Q.1(a)	Draw the stress-strain diagram for mild steel indicating all features.	[2]	1	K1
Q.1(b)	Compare ductile fracture with brittle fracture along with stress-strain diagram for ductile and brittle materials.	[3]	1	K2
Q.2(a)	Explain with sketches, the reduction factors for shear capacity of bolts,	[2]	2	K2
Q.2(b)	Find the safe load P, carried by the joint as shown below. M16 bolts of grade 4.6 are used at a pitch of 80mm and gauge 120. Thickness of the flange is 6.1mm and that of bracket plate is 8 mm. Grade of steel is E250.	[3]	3	K3



Q.3(a)	Two 10 mm thick mild steel plates are connected by 5mm fillet welds as shown below. Calculate the length of weld, if welding is to be done at field.	[2]	3	K3

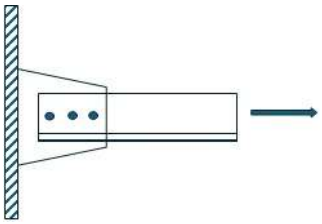


Q.3(b)	A 12 mm thick bracket is connected to the flange of the beam ISMB 300, with 8 mm fillet weld on both side, as shown below. Calculate the length of the fillet weld. Consider shop welding.	[3]	3	K3

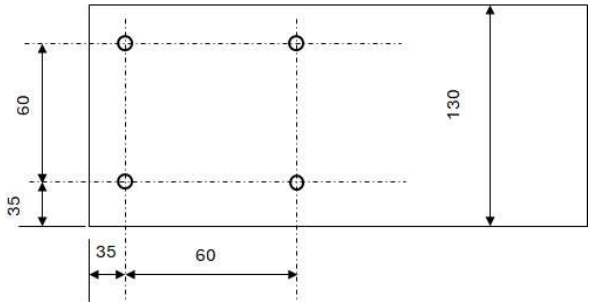


PTO

Q.4(a)	Explain why is fracture (& not yielding) the relevant limit state at the critical section for design of tension members connected by bolts? Describe in light of stress-flow diagram in a plate with circular hole.	[2]	2	K2
Q.4(b)	Explain the failure modes of a tension member connected by bolts. Draw the sketches for each type of failure. How to determine the design tensile strength?	[3]	2	K2
Q.5(a)	Calculate the design tensile strength of the angle ISA90x90x6 as shown in the figure given below. Angle material is E250 - C class. End distance and pitch is 40 and 60 respectively. Bolt used is M16, 4.6 grade. Cross-sectional area of the angle is 10.47 cm^2, distance of centre of gravity is 2.42 cm.	[3]	3	K3



Q.5(b)	Determine the design tensile strength of the plate 130 mm x 25 mm with the hole for M16 bolts as shown. Steel used is E250.	[2]	3	K3



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