MANIPAL INSTITUTE OF TECHNOLOGY

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MANIPAL INSTITUTE OF TECHNOLOGY FIFTH SEMESTER B.TECH. (CIVIL ENGINEERING) END SEMESTER EXAMINATION, NOV 2023 BASIC STRUCTURAL STEEL DESIGN (CIE 3152)

(04 - 12 - 2023)

TIME: 3 HRS.

MAX. MARKS: 50

Note: 1. Answer all questions.

2. Any missing data may be suitably assumed. If not specified assume Fe410 steel with fy 250 N/mm²

3. Use of IS 800:2007 code and SP 6 handbooks are permitted

Q.	QUESTION	MARKS	CO	BL
NO 1A	Determine the adequacy of the connection shown in figure. The bolts used are M20 and grade 4.6. The shear capacity of the bolt (Vdsb) is 45.27 kN and tension capacity of the bolt (Tdb) is 68.54 kN. $ \begin{array}{c} & & & \\ &$	5	1	3
1B	A double cover butt joint is made up of two lines of bolts on each side of the connection as shown in figure. The bolts are 16 mm diameter and grade 4.6. The plates are E250 grade. Determine the strength of the joint.	5	1	3
	6 mm cover plates F 12 mm 12 mm 50 60 50 mm mm mm			



3 C	Discuss laterally supported and unsupported beams.	2	5	2
4 A	Determine size of a slab base plate for a column ISMB 200 @ 25.4kg/m carrying axial	5	4	3
	factored force 800 kN. The grade of concrete used for foundation is M30.			
4B	Calculate the design bending strength of a simply supported beam ISMB 600@122.6	5	4	3
	kg/m, where compression flange is laterally supported if $V_u = 400$ kN and $V_d = 944.75$			
	kN.			
5A	Determine the moment carrying capacity of a laterally unsupported beam ISMB	5	5	3
	150@14.9 kg/m. The beam is of 3 m length and simply supported with the ends fully			
	restrained against torsion and both flanges are fully restrained against warping.			
5B	A welded plate girder is simply supported over a span of 20 m and carries a factored	5	5	3
	superimposed load of 80 kN/m. Assume the compression flange of I section as			
	laterally restrained and prevented against rotation. Consider flanges of size 400 mm \times			
	40 mm and web of size 16 mm \times 1100 mm. Check the shear capacity of the section			
	and determine size and spacing of fillet weld connected between flange and the web.			
	Draw a neat sketch showing details of the weld.			