Total number of printed pages: 01 **D/6th/DCE602**

2024

Design of steel Structure

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1.	a)	What are the different types of bolt? Write a detailed note on high strength friction grip bolts. What are the advantages and disadvantages of such type of bolts?	2+3+5 =10
	b)	Two plates of 16 mm thick are to be joint by using M24 bolts of grade 4.6 in i) Lap joint, ii) Double cover Butt joint. Determine the bolt value in each case	10
2.	a)	Why are minimum pitch values specified in the code? Two plates 10 mm and 18 mm thick are to be jointed by a double cover butt joint. Assuming Fe 410 plate and grade 4.6 bolt, design the joint to transmit a factored load of 400 kN.	2+8=10
	b)	Write notes on eccentric bolted connection. Design a bolted connection for a bracket carrying an eccentric load of 250 kN at a distance of 250 mm from the centre line of an ISHB 350 @ O.588 kN/m. The thickness of the plate is 14 mm. Assume grade 4.6 bolt and Fe 410 steel. Take pitch = 55 mm and edge distance = 35 mm. Assume any missing datas.	2+8 = 10
3.	a)	What do you mean by groove weld? What do you mean by partial penetration and full penetration groove weld? Which one is preferred and why? An ISMC 350 is used to transmit a factored force of 750 kN. The channel section is connected to a gusset plate of 14 mm thick. Design the fillet weld if the overlap is limited to 250 mm. Use slot welds if required	2+2+1+5 = 10
	b)	What are the advantages and disadvantages of a welded connections? Design a suitable longitudinal fillet weld to connect 160 X 10 mm plate to 180 X 12 mm plate to transmit a pull equal to the full strength of the small plate. Assume welding is to be done in the field. Use Fe 410 grade steel.	5+5=10
4.		Write short notes on block shear failure in plates and angles. The single angle ISA 100758 is used as a tension member. It is connected to 1 10 mm gusset plate and arrange with 5 numbers of 20 mm diameter bolts at a pitch of 60 mm and end distance of 30 mm. Calculate the design strength of the	5+15 =20.

		angle when it is connected to i) the long leg, g = 60mm ii) the short leg, g = 40mm.	
5.		Define effective length, buckling and slenderness ratio of a compression member. Determine the design axial load on the column section ISHB 300 @ 63 kg/m. Given that the height of the column is 3.3 m and that one end of the column is fixed and the other end is hinged. Assume Fe 410 grade steel and E = 2 X 10^5 MPa. Also determine the design axial load from table 9 of IS 800 :2007 and compare the result.	5+15=20
6.	a)	Write short notes on : a) Symmetrical and unsymmetrical welded joint, b) Single shear and Double shear, c) Design strength due to rupture of critical section, d) Plug and slot weld	2.5 x 4 =10
	b)	In a roof truss a tie member ISA 130 130 10 carries a pull of 250 kN and is connected with a gusset plate of 10 mm thick. Design the unsymmetrical welded joint for both side and end fillets. Use Fe 410 steel.	10

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