CMR Institute of Technology, Bangalore
DEPARTMENT OF CIVIL ENGINEERING
III - INTERNAL ASSESSMENT

Semester: 6-CBCS 2017

Subject: DESIGN OF STEEL STRUCTURAL ELEMENTS (17CV62)

Faculty: Ms Vibha N Dalawai

Date: 29 Jul 2021

Time: 09:00 AM - 10:30 AM

Max Marks: 50

Answer All Questions

Q.No		Marks	CO	PO	BT/CL
1	A column ISHB 350@661.2 N/m carries an axial compressive factored load of 1700kN. Design a suitable bolted gusset base. The base rests on M15 grade concrete pedestal. Use 24mm dia bolt and grade of 4.6 for making the connection. Assume Pitch as 60mm and edge distance as 39mm. Provide 16mm thick plate, gusset angle of 150X115X15mm	20	CO4	PO1,PO2,PO7	L5
2	A column section ISHB 300@618 N/m is to be spliced. the factored design loads are Axial load over the column 450kN Shear force 100kN Bending moment 30kNm a) Design the splice plate and bolted connection using bolts of grade 4.6. Assume Pitch as 60mm and edge distance as 35 mm and 20mm dia bolts of grade 4.6 b) Design HSFG bolts and revise the splice plate size if possible. Assume Pitch as 60mm and edge distance as 35mm. Also, consider M20 of 10.9S bolts for flange splicing and for web splicing M16 of 8.8S bolts	30	CO3	PO1,PO2,PO4,PO7	L5

Question number	Solution	Maks split up	Solution
Problem 1: A column ISHB 350@661.2 N/m carries an axial compressive factored load of 1700kN. Design a suitable bolted gusset base. The base rests on M15 grade concrete pedestal. Use 24mm dia bolt and grade of 4.6 for making the connection. Assume Pitch is 60mm and edge distance as 39mm. Provide 16mm thick plate, gusset angle of 150X115X15mm	Stress in concrete [Score]	1	6.75 N/mm2
	Width required for base slab [Score]	2	620 mm
	projection of base slab beyond base slab as per calculation [Scc	1	4 mm
	length of base plate [Score]	2	406.20 mm
	Size of base plate [Score]	1	620 X410 mm
	Actual bearing pressure of concrete [Score]	2	6.68 N/mm2
	Maximum moment [Score]	3	36125.44 Nmm
	Thickness of base plate [Score]	3	16 mm
	Design shear strength of bolt [Score]	5	65.21 kN
	Design bearing strength of bolt [Score]	2	157.44 kN
	No of bolts [Score]	1	14
	Direct load on each splice [Score]	1	112.5 k N
	Load on splice due to moment [Score]	1	98 kN
	Total load acting on splice [Score]	1	210.5 kN
Problem 2: A column section ISHB 300@618 N/m is to be spliced. the factored design loads are Axial load over the column 450kNShear force 100kNBending moment 30kNma) Design the splice plate and bolted connection using bolts of grade 4.6. Assume Pitch as 60mm and edge distance as 35 mm and 20mm dia bolts of grade 4.6b) Design HSFG bolts and revise the splice plate size if possible. Assume Pitch as 60mm and edge distance as 35mm. Also, consider M20 of 10.9S bolts for flange splicing and for web splicing M16 of 8.8S bolts	size of the flange splice plate [Score]	3	250 X 6mm
	size of the web splice plate [Score]	2	140 X140 X6mm
	Length of splice plate [Score]	2	380 mm
	Design shear strength of black bolt in flange splice [Score]	2	45.26 kN
	Design bearing strength of black bolt in flange splice [Score]	2	98.4 kN
	Design Shear strength of black bolt in web splice [Score]	2	90. 52 kN
	Design bearing strength of black bolt in web splice [Score]	2	96.0 kN
	Number of bolts in flange splice [Score]	1	6
	Number of bolts in web splice [Score]	1	2
	Design strength of HSFG bolt in flange splice [Score]	4	71.34 kN
	No of bolts in flange splice [Score]	3	4
	No of bolts in web splice [Score]	3	2