Course Code: 20CE1013 **R20**

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
Siddharth Nagar, Narayanavanam Road – 517583
QUESTION BANK (DESCRIPTIVE)

Subject with Code: ADVANCED STEEL DESIGN (20CE1013) Course & Branch: B.Tech - SE

Regulation: R20 Year & Sem: I-M.Tech&II-Sem

UNIT –I
CONNECTIONS

1	Explain about types of welds and joints?	[L2][CO1]	[12M]
2	Explain about beam-column connections and its classification?	[L2][CO2]	[12M]
3	What are the classifications of bolted connection? Explain with neat sketch?.	[L2][CO1]	[12M]
4	What are the types of joints and explain with neat sketch.	[L2][CO1]	[12M]
5	(i) Briefly explain the difference between bolted and welded connections (ii) Distinguish the following: a) Factor of safety and partial factor for loads b) Characteristics loads and design loads.	[L2][CO1]	[12M]
6	Two plates of 10mm thickness & widh200mm are to be joined using high strength friction bolt (HSFG) of 20mm diameter.Design the joint for maximum strength given that 4.6 grade bolts& Fe 410 steel plate is used.	[L2][CO1]	[12M]
7	Two plates 10mm x 60mm are connected in lap joint with 5nos. 16mm ø bolt of grade 4.6 & grade plates are used .calculate the strength & efficiency of joint.	[L2][CO1]	[12M]
8	Find the maximum load the joint can resist provide that 4.6 grade 20mm daimeter bolt & Fe410 steel is given .assume the 2 cover plates act together	[L2][CO1]	[12M]
9	Design a double cover butt joint to connect two of 16mm &8mm thickness to take a tensile force of 500kN.	[L2][CO1]	[12M]
10	Explain about beam column connections subjected to eccentric shear.	[L2][CO2]	[12M]

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UNIT –II

ANALYSIS AND DESIGN OF INDUSTRIAL BUILDINGS

1 Briefly explain the various steps involved in the design of roof trusses. [L2][CO3] [12M]

2 Design member AB,AC,and joint A of a roof truss as shown in Figure 1 for the following data [L3][CO3] [12M]

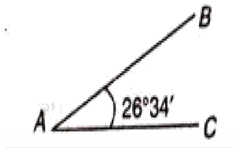


Figure 1

Member	Length	Compressive force	Tensile force
AB	2.3 m	60kN	55kN
AC	1.8 m	55kN	80kN

3 Design a purlin section for the following data [L3][CO4] [12M]

Spacing of roof trusses C/C =5m

Dead load of Roofing =kN/m

Live load on purlin =1.1kN/m

Wind load on Purlin=-1.5kN/m

4 Design joint A of a tubular roof truss and the member meeting at the joint A, the line diagram of which is shown in Figure 2. [L3][CO3] [12M]

Member	Length	Compressive force	Tensile force
AB	2.2 m	110kN	38kN
AC	2.8 m	32kN	87kN

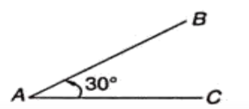


Figure 2

5 A tie member in a roof truss is connected to the principal rafter at an angle of 90 .Design the members and the connections for the following data. Use grade Y_{st}=240 tubes [L3][CO3] [12M]

S.No	Member	Length	Force
1	Principal rafter panel	2.6 m	85kN
2	Tie member	2.2 m	35kN

6 Design for wind action [L3][CO3] [12M]

a) Wind pressure on walls b) Wind loads on roof

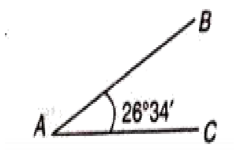
7 Explain about [L2][CO3] [12M]

a) Dead load b) wind load c)Live load d)Earth Quake load

8 a)Design wind speed and pressure [L2][CO3] [12M]

b)wind pressure on roofs

9 Design member AB,AC,and joint A of a roof truss as shown in Figure 1 for the following data [L3][CO3] [12M]



Member	Length	Compressive force	Tensile force
AB	2.2 m	110kN	38kN
AC	2.8 m	32kN	87kN

10 Design a purlin for a roof truss having the following data: [L3][CO4] [12M]

Spacing of Purlin = 2m c/c

	Wind pressure = 2.5 kN/m, Roof coverage= AC Sheeting weighing 700N/m Live load on purlin=1.4 kN/m			

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UNIT –III
DESIGN OF STEEL TRUSS GIRDER BRIDGES

1	Explain different types of truss bridges	[L2][CO5]	[12M]
2	a) Explain about design of compression chord member. b) Explain about design of tension chord member	[L2][CO5]	[12M]
3	Explain detail design procedure for Gantry Girder	[L2][CO5]	[12M]
4	Eaplain about the component parts of truss bridge	[L2][CO5]	[12M]
5	Determine the tensile strength of the 12 mm thick plate shown in Fig 9.1. Rivets used for the connection are 20 mm diameter. Allowable tensile stress is 150 N/mm^2	[L2][CO5]	[12M]
6	Write step by step design procedure of Gantry Girder	[L1][CO5]	[12M]
7	Find the strength of the 12 mm thick plate shown in Fig. 9.2. All the holes are 21.5 mm as gross diameter. Take ft=150 N/mm^2	[L2][CO5]	[12M]
8	The tension member of a roof truss carries a maximum axial tension of 250 kN. Design the section. Diameter of connecting rivets = 20 mm. Safe stress in tension = 150 N/mm^2 .	[L2][CO5]	[12M]
9	The tie of a truss carries an axial tension of 225 kN. Design the section of the member and also the connection of the member to 10 mm thick gusset plate. Use 20 mm diameter rivets.	[L2][CO5]	[12M]
10	The tie in a bridge truss carries an axial tension of 350 kN. The member is to consist of two channels connected back to back on either side of a gusset plate. The diameter of rivets used for the connection is 16 mm. Two rivets are likely to appear in section. Design the member. Safe stress in tension is 150 N/mm	[L2][CO5]	[12M]

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UNIT –IV
PLASTIC ANALYSIS AND DESIGN

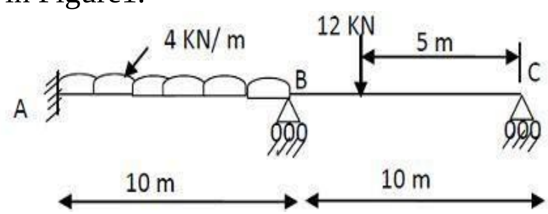
<table>
<tr><td>1</td><td>A continuous beam ABCD is loaded Span AB length=6m and UDL=20KN/m Span BC length=10m and UDL=25KN/m Span CD length=6m and UDL= 20KN/m. Determine the continuous beam providing most economical section. The yield stress for mild steel is 250N/mm^2</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>2</td><td>A simply supported beam of span 6m is subjected to UDL of 20 KN/m. Design a steel beam by plastic design using a combined load factor of 1.7</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>3</td><td>A portal frame ABCD with hinged foot has stanchions 4 m high and beam of 6 m span. There is horizontal point load of 40 kN at B. Whole the beam carries a point load of 120 kN at mid span. Using load factor of 1.5, establish collapse mechanism and calculate the collapse Moment</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>4</td><td>a) Explain about Idealized stress-strain curve for mild steel
b) Explain fully plastic moment capacity</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>5</td><td>a)Explain plastic hinge.
b)Determine shape factor for triangular section with base width ‘b’ and height ‘h’
c) Determine shape factor for Hollow tube section with its external diameter ‘D’ and internal diameter ‘d’</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>6</td><td>a) Derive the moment curvature relationship in plastic analysis.
b) Calculate the plastic moment capacity required for the continuous beam with working loads shown in Figure1.


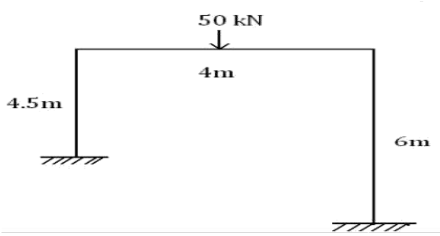
Figure 1</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>7</td><td>Explain fully plastic moment and determine the fully plastic moment required for the frame shown in Figure 2 , if all the members have the same value of Mp.


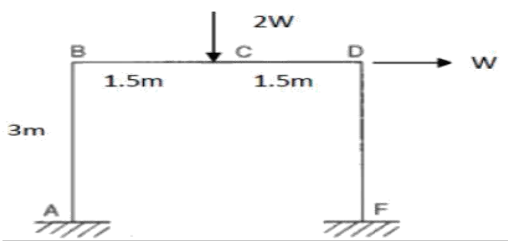
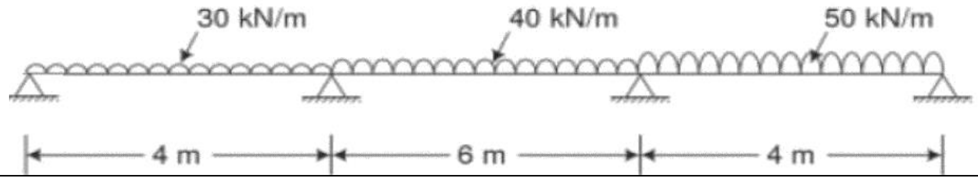
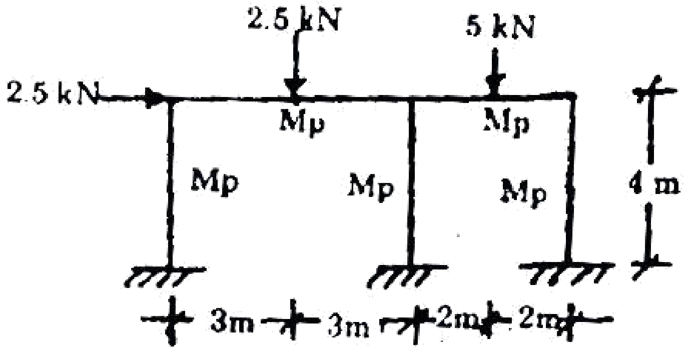
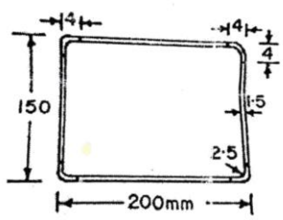
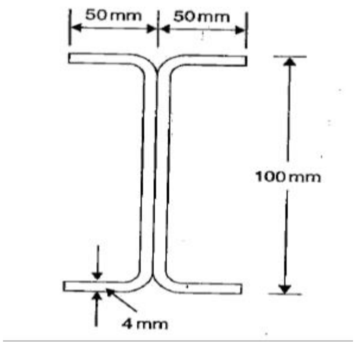
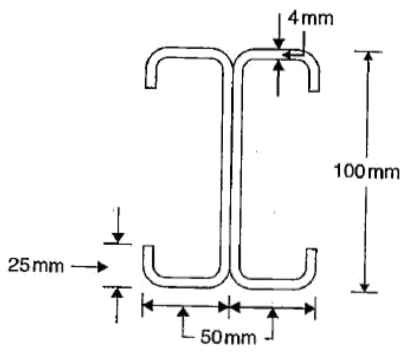
Figure 2</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>8</td><td>Calculate the collapse load for frame as shown in the Figure 3


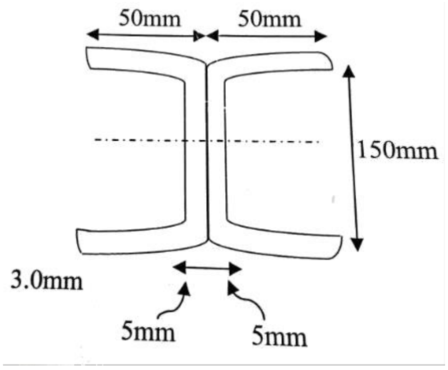
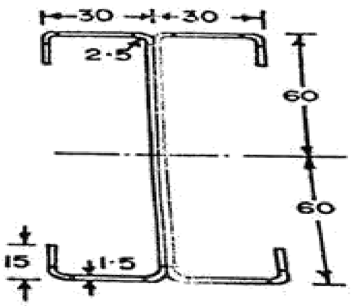
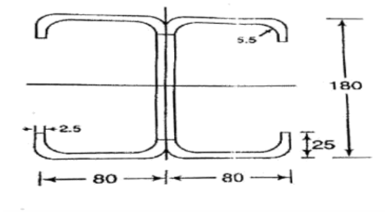
Figure 3</td><td>[L2][CO6]</td><td>[12M]</td></tr>
<tr><td>9</td><td>Design the continuous beam with the service load as shown in the Figure 4. The load factor may be assumed as 2. Provide a uniform cross section throughout the beam</td><td>[L2][CO6]</td><td>[12M]</td></tr>
</table>

				
10	Determine the plastic moment for the two bay portal frame to carry working load as shown in Figure 5Take load factor as 1.5 	[L2][CO6]	[12M]	

UNIT –V

DESIGN OF LIGHT GAUGE STEEL STRUCTURES

1	A hat of 100mm x 80mm x 5mm section with a 30 mm lip is to be used as concentrically loaded column of effective length 4.0 mm. Determine the allowable load. Take fy =235 N/mm^2 .	[L2][CO1]	[12M]
2	Find the allowable axial load for a column section shown in Figure1. Effective length of the column is 3.6 m. Take fy =235 N/mm^2 	[L3][CO1]	[12M]
3	Find the permissible load on the column shown in the Figure2. The effective length of the column is 3m 	[L3][CO1]	[12M]
4	Calculate the permissible load on the column section shown in Figure2. The effective length of the column is 3m 	[L3][CO1]	[12M]
5	Two channel sections without bent lips 150 mm x 50 mm as shown in Figure 4 are connected with webs to act as a beam. The thickness of channel is 3.0 mm. The effective span of simply supported beam is 5.0 m. Determine the maximum uniformly distributed load inclusive of self weight. Which can be supported by the beam. The beam is laterally supported throughout the span.	[L2][CO1]	[12M]

			
6	The Figure 5 below shows the section of a beam which is laterally supported at an interval of 1.5 m. Taking C_b=1.0, Determine the allowable bending moment for the section. Take fy=235N/mm^2 and E= 2 X 10^5 N/mm^2 	[L2][CO1]	[12M]
7	Two channels of 180mm X 80 mm sections with bent lips as shown in Figure 6 are connected with webs to act as a laterally supported beam. The thickness of plate is 2.5 mm and the depth of the lip is 25 mm. The beam has an effective span of 4.0 Determine the allowable load per metre run on the beam. Also Determine the deflection at the allowable load Take fy=235N/mm^2 and E= 2 X 10 N/mm^2 	[L2][CO1]	[12M]
8	Design a hat section for a simply supported beam of effective span 2.5m.The superimposed load is 2KN/m.Yield strength of steel is f_y=235MPa	[L3][CO1]	[12M]
9	A hat of 100mm x 100mm x 5mm section with a 30 mm lip is to be used as concentrically loaded column of effective length 4.0 mm. Determine the allowable load. Take fy =235 N/mm^2 .	[L2][CO1]	[12M]
10	Write about a)Types of sections used in light gauge steel structure b)Local buckling of elements and post buckling of elements	[L2][CO1]	[12M]

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