

University of Mumbai

Examination First Half 2022 under cluster __ (Lead College: _____)

Examinations Commencing from 17th May 2022 to 31st May 2022

Program: _Civil Engineering_

Curriculum Scheme: Rev2016

Examination: TE Semester-VI

Course Code: _CEC602_ and Course Name: _Design and Drawing of Steel Structures_

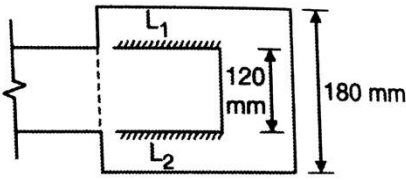
Time: 2 hour 30 minutes

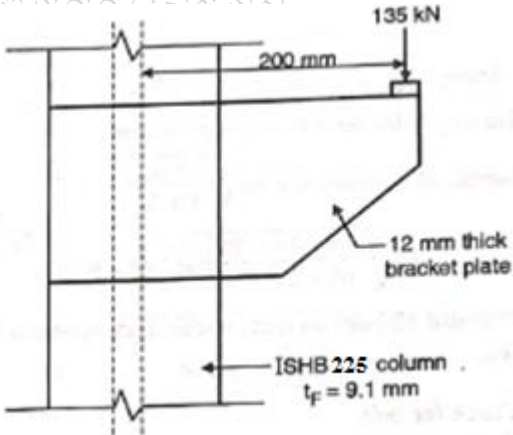
Max. Marks: 80

Q1.	Choose the correct option for following questions. All the Questions are compulsory and carry equal marks
1.	The section which is well suitable in steel design is
Option A:	Slender Section
Option B:	Compact Section
Option C:	Semi- compact section
Option D:	Plastic section
2.	Which of the following is a disadvantage of Steel?
Option A:	High strength per unit mass
Option B:	High durability
Option C:	Susceptible to fire and corrosion
Option D:	Reusable
3.	Lacing shall be designed to resist a total transverse shear equal to ____ of axial force in member
Option A:	5%
Option B:	1%
Option C:	4 %
Option D:	2 %
4.	Effective slenderness ratio of battened column shall be ____ of actual slenderness ratio of column
Option A:	0.5 times
Option B:	1.1 times
Option C:	2 times
Option D:	2.5 times
5.	The bearing pressure of concrete while designing the column base is taken as
Option A:	0.6 fck
Option B:	0.8 fck
Option C:	0.45 fck
Option D:	0.87 fck
6.	The design nominal strength of fillet weld is given by _____
Option A:	f_u
Option B:	$\sqrt{3} f_u$
Option C:	$f_u/\sqrt{3}$
Option D:	$f_u/(1.25 \times \sqrt{3})$
7.	The purpose of stiffeners in a plate girder is to:
Option A:	Prevent buckling to web plate
Option B:	Reduce the shear stress

Option C:	Take care of bearing stress
Option D:	Increase the moment carrying capacity of the girder
8.	In an eccentric connection, when the axis of load is lying in the plane of bolted joint, the bolts are subjected to
Option A:	Only shear stresses
Option B:	Only tensile stresses
Option C:	Both tensile and shear stresses
Option D:	Tensile, shear and bending stresses
9.	Generally the purlins are placed at the panel points so as to avoid
Option A:	Axial force in rafter
Option B:	Shear force in rafter
Option C:	Deflection in rafter
Option D:	Bending moment in rafter
10.	What is the type of forces observed when connection is designed as an eccentrically bracket type
Option A:	only the normal shear
Option B:	only the force due to moment
Option C:	both due to normal shear and moment
Option D:	due to flexure and torsion

Q2	Solve any Two Questions out of Three 10 marks each
A	<p>A truss as shown in figure is used for an industry situated in Mumbai. The truss is covered with AC sheet 170 N/m^2. Calculate panel point dead load, live load and wind load. Assume $K_1 = 1$, $K_2 = 0.99$, $(C_{pe} - C_{pi}) = -0.9$, $K_3 = 1$, self-weight of purlin is 200 N/m and spacing of truss is 3 m and find the force in member LoL_1, LoU_1</p>
B	Design a laterally supported beam of effective span 5 m for the following data, Grade of steel – Fe 410, Factored maximum BM = 180 kN-m , Factored maximum shear force = 220 kN , Also check the beam for deflection.
C	Design a slab base for a column ISHB 300 @ 58.8 Kg/m subjected to a service load of 1500 kN . The grade of concrete pedestal is M20 and Soil Bearing Capacity of soil is 180 kN/m^2 , Design a slab base and concrete base by Welded connection

Q3	Solve any Two Questions out of Three 10 marks each
A	A column ISHB 350 at 661.2 N/m carries compressive factored load is 1400kN. Design suitable bolted gusset base. The base rests on M15 grade concrete pedestal. Use 24mm diameter bolts of grade 4.6 for making the connection. The SBC of soil is 180 kN/m ² . Sketch plan, elevation and side view of the gusseted base which is designed.
B	A batten column of 10-m long is carrying a factored load of 1150 kN. The column is restrained in position but not in direction at both ends. Design a built-up column using channel sections placed back to back. Design batten plates using bolted connection.
C	<p>Determine the length of 10 mm size fillet weld to connect two plate 120 mm X 10 mm and 180 mm X 10 mm in Fig.. The load to be carried is 300 kN. Consider grade of plates Fe410 and welds are to be made in workshop. Also enlist the advantages of welded connections</p> 

Q4	Solve any Two Questions out of Three 10 marks each
A	Compute the size of web and size of flange for plate girder of simply supported bridge deck beam with clear span 24m, Subjected to D.L. of 20kN/m (excluding self-weight), L.L. 10 kN/m and two concentrated loads 200 kN each at 6 m from each end. Assume that the top compression flange of Plate Girder is restrained laterally and prevented from rotating. Use Fe-415 grade of steel. Design as an unstiffened plate girder with thick web
B	<p>Design a bracket connection using 4.6 black bolt of suitable size to transmit a factored load of 135 kN (applied on a 12 mm thick bracket plate) to the flange of a column ISHB 225. The load eccentricity is 200 mm measured from the column axis as shown in figure</p> 
C	An ISLB 350 @486 N/m used to design a laterally unsupported beam with length of 3.0m, determine design bending strength (Md) by using IS code table. Also, explain the modes of failure of beams.