Curriculum Scheme: Rev2019 _ 'C'-Scheme
Examination: Third year Civil Semester -VI

Course Code: CE-C601
Course Name: Design and Drawing of Steel Structures

Time: 2 hour 30 minutes

Max. Marks: 80

	NB 1. Attempt **all four questions** each carrying weightage of 20 marks. 2. Use of IS 800 & steel table **is permitted** during the exam. 3. Draw **neat sketches** wherever necessary. 4. Assume suitable data **if needed** & justify the same.
Q1.	Choose the correct option for the following questions. All the questions are compulsory and carry equal marks
1)	An ISMC 300 @ 0.363 KN/m is connected to a 12mm thick gusset plate. The size of the weld is 6 mm. Assume site welding. The strength of the weld is nearly......
Option A:	600 N/mm
Option B:	750 N/mm
Option C:	663 N/mm
Option D:	450 N/mm
2)	Calculate the net area of an angle ISA 90×90×8 which is connected to the gusset plate through a single leg. Bolts used are M20 grade 4.6. (Assume standard clearance)
Option A:	1200 mm^2
Option B:	1100 mm^2
Option C:	1000 mm^2
Option D:	1500 mm^2
3)	The shear lag width for ISA 75X75X10 connected by the bolt is....................... (Assume gauge distance = 40 mm)
Option A:	100 mm
Option B:	105 mm
Option C:	150 mm
Option D:	120 mm
4)	An ISA 150×75×10 is connected to a gusset plate of thickness 12mm by four M18 bolts of grade 4.6. The tensile strength governed by yielding of gross section of the angle if gusset is connected to the longer leg is.........................
Option A:	450 kN
Option B:	250 kN
Option C:	390 kN
Option D:	490 kN
5)	An ISMB 300 is to be used as a compression member. Considering the buckling about y-y axis, the corresponding buckling class as per IS 800: 2007 will be..........
Option A:	a
Option B:	b
Option C:	c
Option D:	d

6)	A column section with buckling class 'c' has a minimum radius of gyration of 32 mm. The effective length of the column is 3200 mm. The design compressive stress for fy = 250 MPa (as per IS 800: 2007) will be.............
Option A:	102 N/mm²
Option B:	104 N/mm²
Option C:	105 N/mm²
Option D:	107 N/mm²
7)	A steel column in a multi-storied building carries an axial load of 250 KN. It is built up of two ISMC 350 channels connected by lacing. The lacing carries a load of ....
Option A:	5 kN
Option B:	6.25 kN
Option C:	12.50 kN
Option D:	18.75 kN
8)	The design shear strength of beam of section ISWB 300 @ 48.1 kg/m is...
Option A:	390.8 kN
Option B:	490.2 kN
Option C:	270.5 Kn
Option D:	291.3 kN
9)	What is the maximum distance between two consecutive bolts (in tension) if the plate thickness is 10 mm?
Option A:	160 mm
Option B:	200 mm
Option C:	250 mm
Option D:	180 mm
10)	A 20 mm diameter bolt of grade 4.6 is in double shear, the shearing strength of the bolt will be............................... (assume threads in the shear planes)
Option A:	45.25 kN
Option B:	70.5 kN
Option C:	90.5 KN
Option D:	135.8 kN

Q 2	Solve any Two Questions out of Three	10 marks each
A	Two ISA 75×50×8 are connected to a gusset plate of thickness 10 mm on the same side by four M18 bolts of grade 4.6. Find the design tensile strength of the angle if (i) the gusset is connected to the longer leg (ii) the gusset is connected to the shorter leg.	
B	Design a laced column 10.5 m long to carry the factored axial load of 1000 KN. The column is restrained in position but not in direction at both ends. Provide a single lacing system. Use 2 channel sections placed as back-to-back. Assume steel of grade Fe 410 and bolts of grade 4.6.	
C	Design a welded plate girder of span 18 m and laterally supported throughout. It supports a UDL of 85 KN/m (excluding of self-weight) throughout the span. Design central	

section of plate girder for bending and shear. Use Fe 410

Q 3	Solve any **Two** Questions out of **Three** 10 marks each
A	Design a slab base for a column ISHB 300 @ 618 N/m subjected to a factored axial compressive load of 1200 KN when the load is transferred to the base plate by the direct bearing of column flanges. The base rests on a concrete pedestal of grade M20
B	Design a laterally supported beam of effective span 6 m subjected to a maximum bending moment of 150 KN.m and maximum shear force of 210 KN for the following data. Use steel of grade: Fe 410 (Check for deflection is not required)
C	Design a strut of length 2.235 m in a roof truss. It is subjected to a factored compressive force of 50 KN (due to D.L and L.L) and factored tensile force of 17.80 KN (due to D.L and W.L). Use Fe 410, 4.6 as bolt grade. Use 20 mm Bolt diameter.

Q 4	Solve any **Two** Questions out of **Three** 10 marks each
A	Design a column using ISHB Section. The column is of length 3.5 m and supports factored load of 550 KN, the column is effectively restrained in position and direction at both the ends. Use Fe 410.
B	A tie member consists of a double angle section, each 80 mm x 80 mm X 8 mm welded on the opposite side of a 12 mm thick gusset plate. Design a fillet weld for making the connections. The factored tensile force in the member is 300 KN. Draw a sketch showing the details.
C	Design a bolted bracket connection to transfer an end reaction of 300 KN with an eccentricity of 170 mm. The steel used is of grade Fe 410. Use 20 mm diameter bolt of grade 4.6. The thickness of the bracket plate is 10 mm and the column section is ISHB 200 @ 365.91 N/m.