Subject Code: XXXXX

Roll No:

BTECH

(SEM-7) DESIGN OF STEEL STRUCTURES 2021-22

TIME:3 HOUR ***Total Marks: 100***

Instruction: Attempt the questions as per the given instructions. Assume missing data suitably.

SECTION - A

Attempt *All Parts* in Brief **2*10 = 20**

Q1	Questions	Marks
(a)	Write the advantages of steel structure.	2
(b)	What are the seismic forces?	2
(c)	How you classified the connections provided in steel structures ?	2
(d)	Draw the neat sketch of slot and plug welds.	2
(e)	What do you understand by block shear failure ?	2
(f)	Define shear leg.	2
(g)	What are the compression members ?	2
(h)	Define squashing.	2
(i)	What are the spandrel beams ?	2
(j)	What are the two important assumptions have to be made to achieve the ideal beam behavior?	2

SECTION - B

Attempt ***Any Three*** of the following		3*10 = 30
Q2	**Questions**	**Marks**
(a)	A tension bar 100 mm x 10 mm is to carry a load of 150 kN. A specimen of the same quality steel of cross section are 800 mm^2, was tested in workshop. The maximum load carried by the specimen was 400 kN. Find the ultimate tensile strength, factor of safety in the design and gauge length.	10
(b)	With neat sketch explain how force transfer of HSFG bolts.	10
(c)	Design a suitable angle section to carry a factored tensile force of 210 kN assuming a single row of M20 bolts. The yield strength and ultimate strength of the material is 250 MPa and 410 MPa, respectively. The length of the member is 3 m.	10
(d)	Determine the design axial load on the column section ISMB @710.3 N/m, height of column is 4 m and is pin-ended. Assume that f_y = 250 N/mm^2, E = 2 x 10^5 N/mm^2.	10
(e)	Write the design procedure of I-section purlins.	10

SECTION - C

Attempt ***Any One*** of the following		5*10 = 50
Q3	**Questions**	**Marks**
(a)	Explain cold formed light gauge sections and what are the problem associated with light gauge sections ?	10
(b)	A steel chimney 2.5 m diameter is situated in a region where the intensity of wind pressure is 1000 N/m^2. Assuming the wind pressure to be uniform, calculate the shear force due to wind load at a level 10 m below the top of chimney.	10
Q4	**Questions**	**Marks**
(a)	A tie member consists of 2 ISMC 250. The channels are connected on either side of a 12 mm thick gusset plate. Design the welded joint to develop the full strength of the tie. However, the overlap is to be limited 400 mm.	10
(b)	How you will be design of bearing bolts subjected to eccentric loading in the plane perpendicular to the groups of bolts.	10
Q5	**Questions**	**Marks**
(a)	Define lateral-torsional buckling with neat sketch and also write the assumptions.	10
(b)	A double angle section back-to-back 2 ISA 90 x 90 x 10 is riveted with 24 mm rivets to a 20 mm gusset plate on one side. Determine the section capacity in tension and also the number of rivets required for develop the 85 % tension capacity.	10

Q6	Questions	Marks
(a)	Design a built-up column consisting of two channels placed toe-to-toe. The column carries an axial factored load of 1500 kN. The effective height of the column is 10 m. Design the lacing also. Assume Fe 415 grade steel.	10
(b)	With neat sketches describe failure modes of an axially loaded column.	10
Q7	**Questions**	**Marks**
(a)	Design a simply supported beam of span 3.5 m subjected to a factored bending moment of 300 kN-m and factored shear of 140 kN. The beam is laterally unsupported. Steel grade of Fe 410.	10
(b)	A simply supported beam of span 4.5 m consist of rolled steel section ISLB 450 @ 640 N/m. The compressive flange is laterally unsupported. Determine the design bending strength of the beam.	10