Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VIII (New) EXAMINATION – WINTER 2019

Subject Code: 2180610 **Date: 29/11/2019**

Subject Name: Design of Steel Structures

Time: 02:30 PM TO 05:30 PM **Total Marks: 70**

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Use of IS 800:2007,IS 1893,IS:875 and Steel table is permitted.**

Q.1	**(a)**	Explain Lateral load due to Wind and Seismic as per I.S. Standard.	**03**
	(b)	Explain effect of wind load on structure.	**04**
	(c)	A beam ISLB 300 is connected to a flange of column ISHB 300 to transmit end reaction of 150 kN due to factored loads. Design web angle connection using M 20 bolts of 4.6 grade and steel Fe 415.	**07**
Q.2	**(a)**	Explain the analysis of roof column in Industrial building.	**03**
	(b)	Enlist different types of connections and explain any one with sketches.	**04**
	(c)	A beam ISMB 400 transfers an end reaction of 160 kN (factored) to the flange of column ISHB 300 @577 N/m .Design an unstiffened welded seat connection.	**07**
		OR	
	(c)	Design a Stiffened seat for a section of 200 kN from beam of ISMB 300 . This beam has to be connected to a column of size ISHB 200 .Assume Fe 410 grade steel and shop welding.	**07**
Q.3	**(a)**	Explain the role of bracing in industrial buildings.	**03**
	(b)	Explain the design procedure for bearing bolts subjected to eccentric loading.	**04**
	(c)	Describe design procedure for Gantry girder.	**07**
		OR	
Q.3	**(a)**	Explain elastic buckling and bending in plane of web.	**03**
	(b)	Write various types of truss girder.	**04**
	(c)	A fixed beam of 6 m span carries a uniformly distributed load of 175 kN/m over the left half of the span. Determine the fully plastic moment for the beam. Also calculate plastic section modulus required fy=250 MPa.	**07**
Q.4	**(a)**	For analysis of Industrial building bends for column hinged at base, What are the assumption normally made.	**03**
	(b)	Define Shape factor and Collapse load.	**04**
	(c)	Design an angle section for a purlin having 3.0 m span . It carries design load (working) of 2.5 kN/m and supported on four supports. Angle of roof truss is 26^0.	**07**
		OR	
Q.4	**(a)**	What are the applications of plate girder.	**03**
	(b)	Explain pre -buckling and post -buckling behavior of web plate.	**04**
	(c)	A simply supported welded plate girder of span 25 m is subjected to service load of 60 kN/m UDL and two fixed point loads of of 250 kN each spaced at 8.5 m from each supports. Design stiffener under concentrated load for plate girder. Apply curtailment of flanges.	**07**
Q.5	**(a)**	Enlist advantages and disadvantages of steel structures.	**03**
	(b)	What are the components of Truss Girder Bridges?	**04**

(c) Provide a suitable section for following data for Gantry Girder. No need to carry out the checks. A simply supported gantry girder to carry two electric ally overhead crane travelling with following details. **07**

1.Crane capacity = 200 kN
2.Self weight of crane girder =180 kN
3.Wheel spacing =3.2 m
4.Weight of crab = 50 kN
5.Span of crane between rails = 16 m
6.Minimum edge distance =1.2 m
7.Minimum spacing between cranes = 2.0 m
8.Span of gantry girder = 8 m
9. Self weight of rail section= 0.5 k N/m
10.Height of rail section =75mm

OR

Q.5 **(a)** What is a foot bridge? What is the popular geometry of the foot bridge? **03**

(b) Draw sketches for any two forms of Gantry girder. **04**

(c) Analysis a steel foot bridge for the following data: **07**

Type of truss: Pratt
Span: 35 m
Width of walk way: 3 m,
Truss height = 3.5 m
Flooring: RCC slab 120 mm with finishing 20 mm thick.
Live Load: 5 kN/m^2
Assume Suitable data if required .