

Enrollment No: \_\_\_\_\_

Exam Seat No: \_\_\_\_\_

# C. U. SHAH UNIVERSITY

## Winter Examination-2019

**Subject Name : Structural Design - I**

**Subject Code : 4TE07STD1**

**Branch: B.Tech (Civil)**

**Semester : 7**

**Date : 13/11/2019**

**Time : 10:30 To 01:30**

**Marks : 70**

Instructions:

- (1) Use of Programmable calculator & any other electronic instrument is prohibited.
- (2) Instructions written on main answer book are strictly to be obeyed.
- (3) Draw neat diagrams and figures (if necessary) at right places.
- (4) Assume suitable data if needed.

---

<b>Q-1</b>	<b>Attempt the following questions:</b>	<b>(14)</b>
	a) What is prying force?	01
	b) When a slab is continuous over several spans, negative bending moment is induced over the _____	01
	c) Give the poisson ratio's range for steel within elastic region.	01
	d) Maximum compressive stress in top most fibre of a simply supported rectangular beam is _____	01
	e) As per Indian standards, how many categories of rolled steel I-section?	01
	f) For a greater value of FOS, a _____ Cross section of the member has to be adopted.	01
	g) Why built up sections are provided in steel structure?	01
	h) Define the under reinforced section (URS).	01
	i) The moment of resistance of T-beam is found by multiplying the total _____ and the lever arm.	01
	j) Which common sections are used in lacing?	01
	k) In design of slab, the reinforcement in the short span is placed _____ the reinforcement in the long span.	01
	l) The weight of footing is assumed as _____ of the weight transferred to the column.	01
	m) What is fillet?	01
	n) As per IS 456:2000 Flexural strength of concrete is given by _____	01

**Attempt any four questions from Q-2 to Q-8**

<b>Q-2</b>	<b>Attempt all questions</b>	<b>(14)</b>
	(a) Explain the situations under which flat slab has to be provided. Write the	<b>07</b>



- limitations of direct design method used for the design of flat slab.
- (b) Find the maximum load inclined at  $60^{\circ}$  to the horizontal, which the bracket can transmit, if five bolts of grade 8.8 and 20mm diameter are used to connect 10 mm thick plates to the flanged of column. **07**
- Q-3 Attempt all questions (14)**
- (a) Write the design steps for design of base plate. **07**
- (b) Reinforce concrete beam  $250 \text{ mm} \times 500 \text{ mm}$  effective is reinforced with 4 No. of 20 mm dia of Fe415. The beam carries factored SF of 200 KN. Find the spacing of 8 mm dia-2 legged Fe250 stirrups. Use Concrete grade M20. **07**
- Q-4 Attempt all questions (14)**
- (a) Why limit state method is more desirable than working stress method? **07**
- (b) Determine the design shear strength of fillet weld of 8 mm size by shop welding and field welding. Grade of steel is Fe 410. **07**
- Q-5 Attempt all questions (14)**
- (a) The details of a column and pad footings are as under: **07**
- 1) Size of column  $400 \text{ mm} \times 400 \text{ mm}$
  - 2) Size of footing  $2500 \text{ mm} \times 2500 \text{ mm} \times 550 \text{ mm}$
  - 3) Factored soil pressure  $120 \text{ KN/m}^2$
  - 4) Reinforcement 15 Nos. of 12 mm diameter bars in both ways
  - 5) Effective cover 50 mm
  - 6) Concrete grade M20 and steel grade Fe 415
- Check the footing in one way shear.
- (b) From the data given in Q-5 (a), **07**
- Check the footing in two way shear as well as check for the development length of bar.
- Q-6 Attempt all questions (14)**
- Design a two way slab for a clear size  $3 \text{ m} \times 4 \text{ m}$  for a live load of  $3 \text{ KN/m}^2$  by limit state method. Use concrete grade M20 and Steel Fe-415. Wall thickness is 250 mm. Assume that the corners are held down. **14**
- Q-7 Attempt all questions (14)**
- (a) A simply supported reinforced concrete beam of size  $300 \times 500 \text{ mm}$  effective is reinforced with 4 Nos of bar with 16 mm diameter of Fe 415. Determine the anchorage length of the bars at simply supported end if it is subjected to factored shear force of 350 KN at the center of 300 mm wide masonry wall. Concrete grade M20 is to be used. **08**
- (b) Calculate compressive strength of a compound column consisting of ISHB 300@ 0.58KN/m with one cover plate of  $350 \times 20 \text{ mm}$  on each flange and having a length of 5.0 m. assume that the bottom of column is fixed and top is pinned. Take the  $f_y=250 \text{ MPa}$ . **06**
- Q-8 Attempt all questions (14)**
- (a) Calculate the moment carrying capacity of 3 m long ISMB 350 beam which has full torsional restraint and no warping restraint at ends only. **10**
- (b) An RCC beam, 300 mm wide and 460 mm effective depth is reinforced with 4 no of 12 mm diameter bars in tension. Findout the depth of neutral axis and state the type of beam. The materials are M20 grade of concrete and HYSD reinforcement of grade Fe415. **04**

