

# C. U. SHAH UNIVERSITY

## Winter Examination-2022

Subject Name : Structural Design-I

Subject Code : 4TE07STD1

Branch: B.Tech (Civil)

Semester : 7

Date : 21/11/2022

Time : 11:00 To 02:00

Marks : 70

**Instructions:**

- (1) Use of Programmable calculator and 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.
  - (5) IS 456:2000 and IS 800:2007 are allowed in the examination hall.
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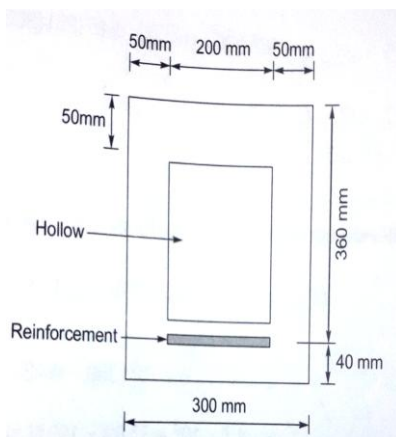
<b>Q-1</b>	<b>Attempt the following questions.</b>	<b>(14)</b>
a)	Give the definition the of following terms. (as per code provision)	10
	i. Brace member	
	ii. Discountinuity	
	iii. Prying force	
	iv. Sway	
	v. Partial safety factor	
	vi. Mill tolerance	
	vii. Short and long slots	
	viii. Development length	
	ix. Effective cover	
	x. Limit state of strength	
b)	Find the spacing of two leged 10mm, Fe-250 stirrups is used and $V_{us}/d$ is 270 kN/m.	01
c)	Draw sketch of six legged stirrups.	01
d)	Expand TMT	01
e)	Define Ductility	01

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

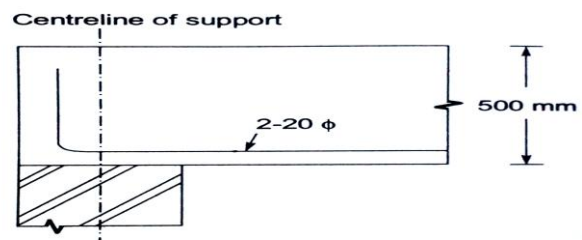
<b>Q-2</b>	<b>Attempt all questions</b>	<b>(14)</b>
A	Discuss the concept of plastic hinge. Obtain the shape factor for a circular section.	07
B	Determine the reinforcement required to resist a factored bending moment of 40kN-m acting on a beam of hollow cross section $A_s$ shown in fig-01, using M25 grade of concrete and Fe415 steel. Effective depth of beam is 360mm.	07
<b>Q-3</b>	<b>Attempt all questions</b>	<b>(14)</b>
A	Find tension and compression steel area required in R.C beam 300mmx600mm to resist factored B.M of 300kN-m. Take 50mm effective cover on both faces use M-20, fe-415.	07
B	Write Design step of Tension Member.	07



- Q-4      Attempt all questions      (14)**
- A**    Why limit state method is more desirable than working stress method?      **07**
- B**    Write the limitations of direct design method used for the design of flat slab.      **04**
- C**    Describe the behavior of bolted connections using black bolts under increasing load.      **03**
- Q-5      Attempt all questions      (14)**
- A**    Explain the importance of welded connection in building connection.      **03**
- B**    Explain the stress strain curve of concrete.      **04**
- C**    Write difference between one way slab and two way slab.      **07**
- Q-6      Attempt all questions      (14)**
- A**    Proportion and design a reinforced concrete isolated footing for a column of size  $450 \times 450$  mm transmitting an axial load of 1500 kN and uniaxial bending moment of 500 kNm at service state. the soil investigations at the site have indicated that the unit weight, safe bearing capacity and angle of repose of soil are  $25 \text{ kN/m}^3$ ,  $150 \text{ kN/m}^2$  and  $30^\circ$  respectively. M20 grade of concrete and FE-415 are used.      **10**
- B**    Write Design step of compression Member.      **04**
- Q-7      Attempt all questions      (14)**
- A**    Design a header plate connection for an ISMB 400 beam to carry a reaction of 140 kN due to factored loads. The connection is to flange of an ISSC 200 column. Use Fe 410 grade steel ( $f_y = 250 \text{ MPa}$ ) and M20 bolts of grade 4.6.      **10**
- B**    Explain the Limit state of Collapse in Flexure.      **04**
- Q-8      Attempt all questions      (14)**
- A**    A simply supported beam is  $25 \times 50$  cm deep and has 2-20mm Fe 415 grade mild steel bars going into the support shown in figure-02. If the shear force at the centre of support is 110 kN at service loads, determine the anchorage length. Assume M20 mix. Take clear cover to steel = 25 mm.      **07**
- B**    Write the design steps for design of base plate.      **07**



**Fig-01**



**Fig-02**