R18

Reg. No:

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)
B.Tech III Year I Semester Supplementary Examinations August-2021
STRUCTURAL DESIGN
(Civil Engineering)

Time: 3 hours

Max. Marks: 60

PART-A
(Answer all the Questions **5 x 2 = 10** Marks)

1	a	Define effective depth and effective cover.	2M
	b	Write the formula for development length.	2M
	c	Define isolated footing.	2M
	d	What is Lug angle?	2M
	e	Define Plastic section modulus.	2M

PART-B
(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

2 A singly reinforced concrete beam 300x550mm is reinforced with 5 bars of 16mm **10M** diameter with an effective cover of 50mm.The beam is simply supported over a span of 5m. Find the safe uniformly distributed load the beam can carry use M20 grade concrete and Fe415 grade steel.

OR

3 Design a reinforced concrete beam of rectangular section of effective span 8m to **10M** support a design working live load of 30 KN/m. The overall size of the beam has to be restricted to 300mm x 650mm. Use M20 grade concrete and Fe415 grade steel. effective cover is 50mm.

UNIT-II

4 A reinforced concrete beam of rectangular section has a width of 250mm and an **10M** effective depth of 500mm. The beam is reinforced with 4 bars of 25mm diameter on the tension side. Two of the tension bars are bent up at 45o near the support section. In addition, the beam is provided with two legged stirrups of 8mm diameter at 150mm centers near the support. If fck= 25 N/mm2 and fy = 415 N/mm2, estimate the ultimate shear strength of the support section.

OR

5 Design a reinforced concrete slab to carry a live load of 3 KN/m2 on an effective span **10M** of 3.5 m. Use M20 grade concrete and Fe415 grade steel. Assume floor finish is 1 KN/m2.

UNIT-III

6 Design the longitudinal and lateral reinforcement in a rectangular reinforced concrete **10M** column of size 300mm x 400mm subjected to a design ultimate load of 1200 KN and an ultimate moment of 200 KNm with respect to the major axis. Use M20 grade concrete and Fe415 HYSD bars.

OR

7 Design a reinforced concrete footing of uniform thickness for a reinforced concrete column of 400mm x 400mm size carrying an axial load of 1200 KN. Use M20 grade concrete and Fe415 steel. The safe bearing capacity of soil is 220 KN/m2. **10M**

UNIT-IV

8 **a** Explain the various types of bolted connections with neat sketches. **5M**
   b Differentiate between black bolts and high strength friction grip bolts. **5M**

OR

9 Design a double angle tension member connected on each side of a 10mm thick gusset plate to carry an axial factored load of 375 KN. Use 20mm black bolts, Assume shop Connection. **10M**

UNIT-V

10 A column section ISHB 300 @ 577 N/m is carrying a factored load of 600 KN. A factored moment of 30 KN-m and factored shear force of 60 KN. Design a suitable column splice. Assume ends are milled. **10M**

OR

11 Design a simply supported I-section to support the slab of hall 9m x 24m with beam spaced at 3m centre to centre. Thickness of slab is 100mm. Consider floor finish load 0.5 KN/m2 and live load of 3 KN/m2. The grade of steel is E=250.Assume that adequate lateral support is provided to compression flange. **10M**

END