5th Semester (Retest) Examination- March, 2022

Course Code: CT-504

Subject- Design of RCC Structure. Full Marks-70

Time – 3 Hours Pass Marks- 28

Part A: 25 marks.

Q.1) Answer the following questions in brief. 1 x 12 =12

a) Define under reinforced section.
b) What do you mean by modular ratio?
c) Write is shear reinforcement?
d) Define doubly reinforced section.
e) Write the expression of ultimate moment of resistance of a rectangular beam for under reinforced section.
f) What is slenderness ratio?
g) Define development length.
h) What do you mean by two way slabs?
i) What do you mean by bleeding of concrete?
j) What do you mean by partial safety factor?
k) Show with diagram longitudinal and transverse reinforcement of a beam.
l) Define bond of a concrete.

Q.2) Choose the correct answer: 1 X 6 =6

a) The moment of resistance of an under-reinforced section is
i) Equal to balance section ii) Less than balanced section
iii) More than balanced section iv) Less than under reinforced section.

b) The neutral axis of a T beam exists in

i) Within the flange, ii) at the bottom edge of the slab,

iii) below the slab, iv) all the above.

c) Spacing of stirrups in a rectangular beam, is

i) Kept constant throughout the length. ii) decreased towards the centre of the beam,

iii) increased at the ends, iv) increased at the centre of the beam.

d) Hanger bars do not qualify as compression reinforcement in doubly reinforced beams, when its area is less than or equal to
i) 0.2% ii) 1.0% iii) 1.2% iv) 1.5%

e) The anchorage value of a 90 degree hook is

i) 12Ø ii) 8Ø iii) 15Ø iv) 16Ø

f) The maximum strain in concrete at the outermost compression fibre is taken as..... in bending:

i) 0.0032 ii) 0.0035 iii) 0.0037 iv) 0.0038

Q.3) Fill up the blanks; 1X 7= 7

a) In R.C.C., steel reinforcement takes up..... stresses.
b) Concrete is graded on the basis of .....
c) The modulus of elasticity of steel is taken as ..... MPa.
d) The distance from the centre of the bar to the extreme bottom fibre of a beam section is known as.....
e) The area of stress block as per IS 456 is.....
f) Shear reinforcement, provided in the form of vertical bars is known as.....
g) If two way slab has torsion reinforcement at the corners it is called as.....

Part B: 45 marks.

Answer any 5 (five) Questions.

Q.4) Differentiate working stress method and limit state method. A reinforced concrete beam section of size 250 mm X 500 mm effective depth is reinforced with 4 numbers of 20 mm diameter bars. Assuming M20 grade concrete and Fe 415 steel, determine i) allowable moment of resistance and ii) ultimate moment of resistance 3+6 = 9

Q.5) Define doubly reinforced beam section. A beam section of size 300 mm X 500 mm total depth is reinforced as 4- 25 Ø as tensile reinforcement and 3-20 Ø as compression reinforcement. Assuming M20 grade concrete and Fe 415 steel, ultimate moment of resistance of the beam section. 9

Q.6) What is a compression member? Classify column based on slenderness ratio and and define them. Define effective length and unsupported length. 1+4+4=9

Q.7) Define Development length. What is its significance? Define one way and two way slabs. What are the types of two way slabs? Explain them. 1.5+1.5+3+3=9

Q.8) Define shear reinforcement along with figure. A reinforce concrete beam of size 250 mm X 500 mm effective depth is reinforced with 4 nos. of 20 mm diameter bar as tensile reinforcement. The shear reinforcement consists of 2 legged 8 mm diameter stirrup @ 150 mm c/c spacing. Estimate the shear capacity of the section for M25 grade concrete and Fe 415 steel. 3+6=9

Q.9) A simply supported RCC beam over an effective span of 8 m carrying an imposed load of 30 kN/m. Design the beam using M20 concrete and Fe415 steel. Show the sketch showing arrangement of reinforcement. 9