## 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.

 $1 \times 12 = 12$ 

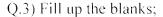
- a) Define under reinforced section.
- b) What do you mean by modular ratio?
- c) Write is shear reinforcement?
- d) Define doubly reinforced section.
- e) Write the expression of ultimate moment of resistance of a rectangular beam for under reinforced section.
- f) What is slenderness ratio?
- g) Define 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.
- 1) Define bond of a concrete.
- Q.2) Choose the correct answer:  $1 \times 6 = 6$ 
  - 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) 160

- 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



- 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  $\times$  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.
- Q.6) What is a compression member? Classify column based on slenderness ratio 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.

