Register Number: ……..

B.E DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Sixth Semester

CIVIL ENGINEERING

CEE121: Design of Reinforced Concrete Elements

(Use of IS456 – 2000 and SP – 16 are permitted)

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. A beam of reinforced concrete ,when loaded ,can fail due to
   a) excessive tension in concrete b) excessive compression in steel
   c) shearing of rods d) excessive tension in steel
2. The ratio of compressive strength of concrete to the tensile strength is usually
   a) 5 b) 1/5
   c) 10 d) 1/10
3. In ordinary constructions, the factor of safety applied to the stress in steel is usually about
   a) 2 b) 3
   c) 4 d) 5
4. A doubly reinforced beam is used
   a) when extra safety factor is used b) depth and breath of a beam is restricted
   c) when breath of the beam is more than depth d) to resist large moment
5. The co - efficient of linear expansion of steel is in the order of
   a) 0.098 cm/^{o}C b) 0.0098 cm/^{o}C
   c) 0.00098 cm/^{o}C d) 0.000098 cm/^{o}C
6. In two way slab the lifting of corners occurs due to
   a) heavy shear load at mid span b) zero moment at the centre
   c) torsional moment d) unbalanced moments on the slab
7. The slenderness ratio of a reinforced concrete column is generally taken as
   a) length /breath b) length/width
   c) length / diameter d) length/least lateral dimension
8. The effective length of column which is effectively held in position and restrained against rotation in both ends is
   a) 0.65L b) 1.00 L
   c) 0.80 L d) 2.00 L
9. In case of RC footings it is usual to keep a minimum overall depth at the edges equal to
   a) 100 mm b) 150 mm
   c) 200 mm d) 250 mm
10. In case of combined footing for two columns carrying loads P1 and P2,the maximum BM will occur at
    a) under the heavier loaded column b) under the lighter loaded column
    c) middle of two columns d) the point where shear is zero

PART B (10 x 2 = 20 Marks)

11. Define partial safety factor.
12. Differentiate between WSD and LSD.
13. What is the purpose of providing distribution reinforcements in RC slabs?
14. Differentiate between two way slab and one way slab.
15. Define safe bearing capacity of soil.
16. What are the governing factors to decide the depth of RC footing?
17. State any two reasons for providing a combined footing.
18. Differentiate long column and short column.
19. What is over reinforced, under reinforced and balanced sections?
20. What are the types of reinforcements used to resist shear and write down the expression for shear resistance offered by each type.

PART C (5 x 14 = 70 Marks)

21. a) i) Find the neutral axis constant for M25 and Fe415 by deriving the equation (7)
    ii) Find the moment of resistance of 450 mm x 700 mm RC beam reinforced with 6 nos of 20 mm dia steel. The stress in steel and concrete are not to exceed 230 N/mm^2 and 7 N/mm^2. m=13.33 (7)

(OR)

b) A beam of 225 mm width and 450 mm effective depth is simply supported over a span of 5m is reinforced with 4 nos of 20 mm dia mild steel bars. Determine the stresses developed in steel and concrete if the beam carries 9kN/m UDL including self weight. m=13.

22. a) Design a simply supported RC slab for a roof of a hall 4m x 4m (inside dimension) with 230 mm wall all round.Assume live load of 4000 N/mm2 and finishes 1000 N/mm^2.Use M25 and Fe500.

(OR)

b) Calculate the area of steel of grade Fe415 required for a section of 250 x 500 mm with eff.depth 450mm in M20.The limit state moment to be carried by the beam section is 100 kNm. (7)

Design a single flight stair to cover a horizontal span of 4.5 m if the total vertical rise is 3.6m. There are 18 steps to rise .Tread =250mm.Live load 3000 N/mm^2 .Use M20 and Fe415. (7)

23. a) A simply supported beam with a span of 5 m, width =300mm and eff.depth 460 mm,carries a Vu=300 kN.It is reinforced with 4 nos.of 25mm dia rods. Design the shear reinforcement .Use M20 and Fe 500.

(OR)

b) A RC beam of 300 mm x 300mm is subjected to a limit state shear of 40 kN, BM =20kNm and torsional moment of 4kNm. Design the torsional reinforcement. Use M25 and Fe415.

24. a) Determine the reinforcement to be provided in a circular column with the following data :
Diameter=450 mm.M20 and Fe250 are used. Factored load=1500kN. Factored moment =105kNm.Use helical ties.

(OR)

b) Determine the reinforcement to be provided in a short column subjected to biaxial bending with following data:
Size=300 x 600 mm M20 and Fe415 are used. Pu=1200kN, Mux=150kNm,Muy=90 kNm,

25. a) A masonry wall 300 mm thick carries a load of 175 kN per metre length. Design a RC footing for this wall if the bearing capacity of the soil is $110kN/m^2$.Use M25 and Fe415.

(OR)

b) Design a RC footing for a column of size 225 x 450 mm carrying an axial load of 1000kN. The bearing capacity of the soil is $110kN/m^2$. Use M20 and Fe500.

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