Registration no: | | | | | | | | | | |

Total Number of Pages: 2 **M.TECH**
CEPC202

2ndSemester Regular/BackExamination – 2015-16
ADVANCED REINFORCED CONCRETE DESIGN
BRANCH(S):STRUCTURAL ENGINEERNG,
STRUCTURAL AND FOUNDATION ENGINEERING

Time: 3 Hours
Max marks: 70
Q.CODE:T210

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
(Use of IS 456-2000 and SP-16 is allowed)

Q1 Answer the following questions: (2 x 10)

a) State some advantages of limit state method.
b) What is 'shear span'?
c) In which situations doubly reinforced beams are required?
d) Why the short span is considered for bending moment calculations in two way slabs?
e) Why cover to reinforcements is required in RCC structures?
f) What is the purpose of taking minimum eccentricities in column design?
g) State the assumptions in yield line theory.
h) Draw a typical bar bending schedule format.
i) Showing the curtailment and also bent up bars, draw the reinforcement detailing of a continuous beam.
j) Draw figures showing different modes of shear cracking in RCC beams.

Q2 a) A simply supported beam is of effective span 4.0 m. whose depth is limited to 350mm. The live load on the beam is 20 KN/m. There is one concentrated load of 20KN at mid span. Design the flexural reinforcements taking M_{25} concrete and Fe_{415} steel with mild exposure conditions. (5)

b) Perform usual checks as per IS code for the above beam. (5)

Q3 Determine the reinforcements required for a column of size 350mm x 450mm which is restrained against sway, bent in double curvature and there is equal distribution of reinforcement on all sides using the following data: Effective lengths in x and y directions are 4m and 3.8m. Unsupported length is 5m.Factored Load is 1500 kN. Use concrete grade M_{25} and steel Fe_{415}.Factored moment in the direction of larger dimension: 30 kN-m at top and 27 kN-m at bottom. Factored moment in the direction of shorter dimension: 29 kN-m at top and 21 kN-m at bottom. (10)

Q4 a) Discuss several factors influencing crack width of RCC members. (5)

b) Differentiate between one way shear and two way shear with examples. (5)

Q5 a) Design the shear reinforcement of the beam in Q. No. 2(a) assuming Fe_{415} steel for shear reinforcement. Provide adequate curtailment of bars. (5)

b) Apply necessary checks for the above shear design. (5)

Q6 a) A rectangular beam of 300mm wide and 600mm deep is subjected to an ultimate twisting moment of 130kN-m combined with an ultimate (hogging) bending moment of 160 kN-m and an ultimate shear force of 110 kN. Design the torsional reinforcements. Assume M_{25} concrete, Fe_{415} steel and severe exposure conditions. (5)

b) Perform checks as usual for the above beam. (5)

Q7 a) Design a simply supported rectangular slab of side 3m x 4m to carry a service load 4 kN/m^2. Use yield line theory, M_{20} concrete and Fe_{415} steel. (5)

b) Draw the reinforcement details as per codal requirements. (5)

Q8 Write Short Notes (Any two) (5 x 2)

a) Difficulties in accurate prediction of deflections
b) Tension stiffening effect
c) Equilibrium method for limit analysis
d) Member stability effect in columns