Registration No: | | | | | | | | | | |

Total Number of Pages: 04 **M.TECH.**
CEPC202

2nd Semester (Back) Examination 2016-17
Advance Reinforced Concrete Design
BRANCH: STRUCTURAL & FOUNDATION ENGG, STRUCTURAL ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE: Z347

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 is allowed for use. The question includes one extra page (Interaction Curve Sheet) for use during exam.

Q1 Answer the following questions: ***Short answer type*** **(2 x 10)**

a) Describe the behavior of under reinforced section.
b) What do you mean by *brittle shear failure* ?
c) How *flexure shear crack* differs from *diagonal tension crack* ?
d) What is the difference between *shear tension failure* and *shear compression failure* ?

e) What is *Equilibrium Torsion* ?

f) What do you mean by *member stability effect* in a slender column ?

g) Distinguish between *short term deflection* and *long term deflection* of RCC members.

h) What is *yield line* ?

i) What do you mean by *moment redistribution* in a RCC beam ?

j) What is *tension stiffening effect* ?

Q2 Design a rectangular beam section subjected to ultimate hogging bending moment of 175 kNm ,ultimate twisting moment of 160 kNm and an ultimate shear force of 110 kN for severe exposure condition using Fe 500 steel. **(10)**

Q3 Design the slab of clear span 3.5 mx 7.5 m supported on masonry walls of 230 mm width and calculate the long term deflection due to shrinkage and creep. Apply the code checks on the total deflection using the following data: **(10)**

ultimate shrinkage strain $\varepsilon_{cs}=0.0004$, ultimate creep coefficient $\theta=1.6$, fy=415 MPa, ,live load =4 kN/sqm, surface finish=1 kN/sqm, moderate exposure condition

Q4 Determine the maximum factored axial load carrying capacity of a braced column by additional moment method as given in IS code with the following data using the interaction diagrams: **(10)**

b= 350 mm
D=500 mm
Fy=415 MPa
Longitudinal Steel provided=6x25 mm dia.
Fck=25 MPa
Unsupported length=6.5 m
Kx=ky=0.85

Q5 **a)** By yield line theory, design a simply supported rectangular slab with unrestrained corners and clear spans of 3.5 and 5.5 m which is subjected to a live load of 4 kN/sqm. Consider Fe 415 steel and severe exposure condition . **(5)**

b) Calculate the maximum probable crack width for the one-way slab of clear span 4.5 m, simply supported on 230 mm thick masonry walls, subjected to a live load of 4 kN/sqm and surface finish of 1 kN/sqm by IS method with the following data: **(5)**

D =200 mm
Steel provided 10 mm dia @ 150 mm c/c
Fe 415 steel , fck= 25 MPa
Moderate exposure condition.

Q6 Design a three span continuous beam of equal spans 6.0 m (simply supported at both ends) subjected to self weight of 15 kN/m and live load of 15 kN/m by applying moment redistribution as per IS code. Take mild exposure condition and Fe 415 steel. **(10)**

Q7 Determine the maximum short term deflection due to live loads only for the doubly reinforced beam of size 250x400 mm and effective span 6 m carrying live load of 10 kN/m and dead load of 5 kN/m in addition to its self weight including a concentrated dead load of 25 kN at centre. Take Ast=1848 sqmm, Asc=942 sqmm, fck =30 MPa and fy=415 MPa **(10)**

Q8 **a)** By yield line theory, design a simply supported two way slab with unrestrained corners and clear spans of 3.5 and 5.5 m , subjected to a live load of 4 kN/sqm. Take Fe 415 steel and severe exposure condition . **(5)**

b) By yield line theory , design a square slab of 4.5 m clear span with unrestrained corners and fixed boundary , subjected to a live load of 3.5 kN/sqm. Take Fe 500 steel and moderate exposure condition . **(5)**

Chart 45 COMPRESSION WITH BENDING—Rectangular Section—Reinforcement Distributed Equally on Four Sides

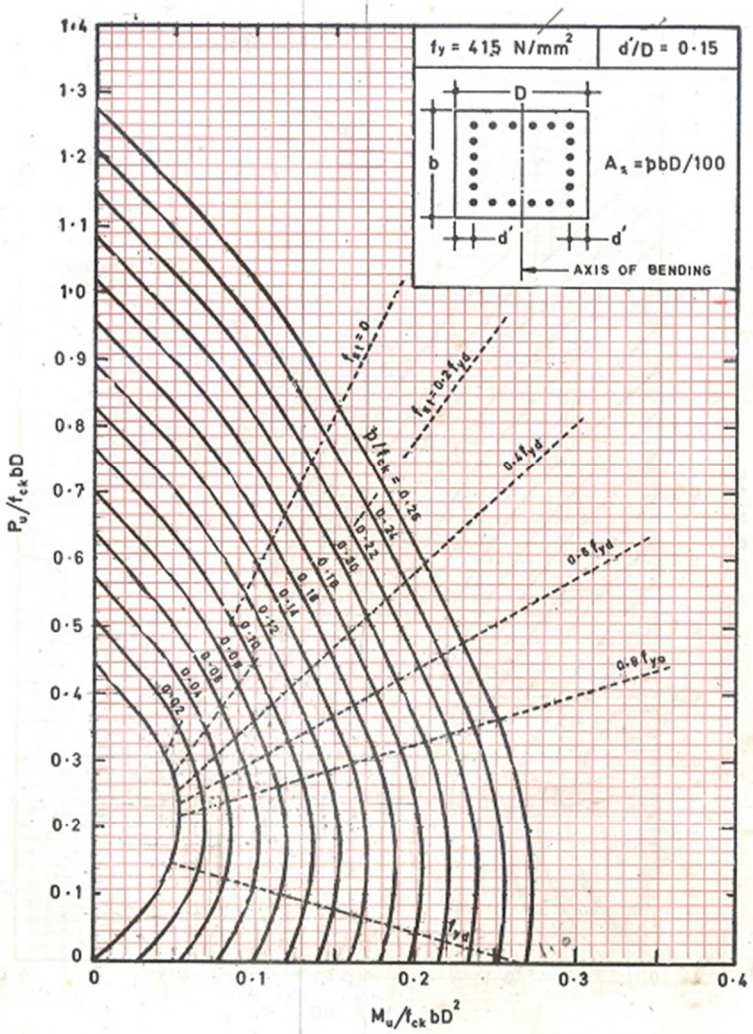

Chart 46 COMPRESSION WITH BENDING — Rectangular Section — Reinforcement Distributed Equally on Four Sides