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Total No. of Questions : 09] **Paper ID [CE307]** [Total No. of Pages : 03]

B.Tech. (Semester - 5th)

DESIGN OF CONCRETE STRUCTURES (CE - 307)

Time : 03 Hours   Maximum Marks : 60

Instruction to Candidates:

1) Section - A is **compulsory**.

2) Attempt any **Four** questions from Section - B.

3) Attempt any **Two** questions from Section - C.

Section - A

Q1)   (10 x 2 = 20)

a) What is the difference between the stress - strain curve of steel & concrete.

b) Write the basic principle of Limit state method.

c) Why curing of concrete required?

d) Name the various types of stair cases.

e) What do you understand the Flat Slab?

f) Draw the stress - distribution diagram for axially loaded column & eccentrically loaded column.

g) Draw the shear stress distribution for an - I - section.

h) When the beam section is designed as a balanced section. Explain.

i) What is Bond stresses. Explain.

j) What are the conditions to design a section as doubly reinforced sections. Explain.

Section - B

                                                              (4 x 5 = 20)

Q2) A singly reinforced rectangular beam is 400 mm wide. The effective depth of the beam section is 560 mm and its effective cover is 40 mm. A steel reinforcement consisting of 4 Hysd steel 18mm diameter has been used in the beam section. The grade of concrete is M20. Locate the neutral axis of the beam section.

J-89   **P.T.O.**

Q3) A singly reinforced beam 400 mm wide. The effective depth of beam is 560 mm, & cover is 40 mm. The steel reinforcement in the beam section consists of 4 Hysd steel bars., Fe 415, 18mm diameter. The grade of concrete is M20. Determine the flexuval strength of the beam.

Q4) Design a simply supported slab over a class room of size 5m x 10m. A finished surface of cement concrete of 20mm shall be provided over the slab. The slab shall be used as a class - room floor. M20 grade of concrete and mild steel reinforcement shall be used.

Q5) Write the short note on the calculation of crackwidth as recommended in IS-456-2000.

Q6) The steps of a stair of a residential building having rise of 160 mm and tread of 250 mm are supported at their ends by a wall on one side and a stringer beam on the other side. The distance between centre to centre of supports is 1.4 m. Design the stair slab. Provide M20 grade of concrete & Hysd steel bar of grade Fe 415.

Section - C

(2 x 10 = 20)

Q7) Design a bi-axially eccentrically loaded braced rectangular reinforced concrete column deformed in a single curvature for following data.

Ultimate axial load P_{cu} = 1000 kN.

Ultimate moment in longer direction at bottom

M_{cux_1} = 110kN-m and at top M_{cux_2} = 80kN-m

Ultimate moment in shorter direction at bottom

M_{cuy_1} = 40 kN-m & at top M_{cuy_2} = 30 kN-m

Size of column b x D = 300mm x 480mm

Unsupported length of the column l_u = 5.8 m

Effective length in the long direction = l_{ex} = 5.4m.

Effective length in short direction = 4.2 m = l_{ey}.

M20 grade of concrete & Hysd steel bars of grade Fe415 shall be used.

Q8) A stair with an open well consists of two flight and a span partly crossing at right angles. There are ten steps of rise 160mm & tread 250mm in each flight and six such steps in the cross span. The landing are supported on the walls at the ends. Design the stair slab. Provide M20 grade of the concrete & Hysd bars of grade Fe 415.

Q9) A doubly reinforced rectangular beam is 400mm wide. The effective depth of beam is 550mm & cover is 50mm. The tension & compression reinforcement consists of 4Nos 20mm diameter & 4 Nos 16 mm ϕ respectively. Locate neutral axis and moment of resistance of doubly reinforced beam. M20 grade of concrete & mild steel reinforcement is used.