Reg. No. : | | | | | | | | | | |

Question Paper Code: 52612

M.E. DEGREE EXAMINATION, NOV 2016

First Semester

Structural Engineering

15PSE102 - CONCRETE STRUCTURES

(Regulation 2015)

Duration: Three hours Maximum: 100 Marks

Answer ALL Questions

(IS456-2000, IS875 (1-5) 1987, SP (16) - 1980 and IS13920- 1993 are permitted)

(5 x 20 = 100 Marks)

1. (a) Design a reinforced concrete beam of rectangular section the effective span is 5*m*, overall size of beam is 250*mm* x 500*mm*, is subjected to service load is 40 *kN/m* including self-weight. The effective cover used as 50*mm* and adopt M_{20} and Fe_{415} grades. (20)

Or

(b) A simply Supported one way slab 3.5*m* span carries live load of $4kN/m^2$ and floor finish of $1.5kN/m^2$. The total depth of the slab is 160 *mm* with a clear cover of 30*mm*. The steel consists of 8*mm* diameter 90*mm* c/c. Assume permanent load equal to dead load plus 20% of live load. Calculate the total deflection. Use M25 concrete and Fe415 steel. (20)

2. (a) Design the longitudinal steel for a 500*mm* x 300*mm* column with ultimate loads P_u = 2300 *kN*, M_{ux} = 300 *kN-m* and M_{uy} = 120 *kN-m*. Assume that M30 and Fe 415 grades and that the column is short column. (20)

Or

(b) Design a corbel to carry a factored load of 500 *kN* at a distance of 250*mm* from the centre of longitudinal reinforcement. The dimensions of the column is 300*mm* x 300*mm*. Assume flexible pads and adopt M_{30} and Fe_{415} grades. (20)

3. (a) Design the exterior panel of a flat slab floor system for a warehouse 24*m* x 24*m* divided into 4 panels each of 6*m* x 6*m*. The live load is $5kN/m^2$ and the column size is 400*mm* diameter. Use M20 grade of concrete and Fe 415 grade of steel. Sketch the reinforcement details in the interior panel of the flat slab. (20)

Or

(b) Using yield line theory, derive an expression for the collapse load of a square slab simply supported on all edges. (20)

4. (a) Explain the moment curvature relation and explain the simplified moment curvature curve for an under reinforced beam with neat sketches. (20)

Or

(b) A reinforced concrete slab is 150*mm* thick with 20*mm* cover to center of steel. If the positive steel reinforcement is 500 mm^2/m. Determine the approximate moment curvature. Determine the ductility factor assuming M30 concrete and Fe250 steel for reinforcements. (20)

5. (a) A circular column is 350*mm* in diameter. Find the diameter and spacing of hoop to be used for confinement. What will be the lateral ties if the column is rectangular in cross section 550*mm* x 650*mm*. Use M20 grade of concrete and Fe 415 grade of steel. (20)

Or

(b) Discuss briefly the effect of high temperature on steel and concrete and also on different types of structural members. (20)

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