B.E.(CC) VII and Theory of RCC 20/12/07

5. (a) A rectangular beam section of 250 mm width and 450 mm effective depth is reinforced with 4 bars of 18 mm diameter. Determine the shear reinforcement using LSM to resist shear force of 150 kN at service state. Adopt M20 and Fe 415 steel. 8

P_t%	0·15	0·25	0·50	0·75	1·0	1·25	1·50
τ_c N/mm^2	0·28	0·36	0·48	0·56	0·62	0·67	0·72

Table – 1

(b) A rectangular beam of 250 mm width and 450 mm effective depth is reinforced with 6 bars of 18 mm diameter out of which 3 bars have been bent at 45° at a section. Determine the shear resistance of the bent up bars and additional shear reinforcement required if it is subjected to ultimate shear force of 250 kN. Adopt M20 and Fe 415. Use LSM and **Table – 1** for design. 12

6. (a) Explain the advantages and disadvantages of prestressed concrete. 4
(b) A rectangular beam of size 300 mm x 800 mm is prestressed with a sloping tendon having a linear profile. The eccentricity at the mid-span is 180 mm and zero at the end. It is prestressed with a 1600 kN force. Determine the distribution of longitudinal stress in concrete at midspan and at the end due to prestress and self weight. What uniform load can it support over a simple span of 10 m. ? If the permissible stress in concrete in compression and tension are 13 N/mm^2 and 2N/mm^2 respectively. Assume 20% loss of prestress at the stress transfer. 16

7. (a) Explain pre-tensioned and post-tensioned method of pre-stressing in brief. 8
(b) Explain losses in pre-stress dye to – 12
(i) Creep of Concrete
(ii) Shrinkage of Concrete
(iii) Elastic Shortening of Concrete.

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Library B.E. (Civil) VII (OLD) 20/12/07

Theory of R.C. & Prestressed Concrete

Con/5733–07. (OLD COURSE) CD–6816

(3 Hours) [Total Marks : 100

MASTER

N.B. : (1) Question No. 1 is **compulsory**.
(2) Attempt any **four** questions out of remaining **six** questions.
(3) Assume **suitable** data if **necessary** and state it **clearly**.

1. (a) Explain over reinforced, under reinforced and balanced reinforced section using L.S.M. 6
(b) Explain serviceability limit state requirements for deflection. 4
(c) Explain various detailing provisions for longitudinal and transverse reinforcement made in IS code for columns. 6
(d) Explain the reasons for using high strength concrete and high strength steel for prestressed concrete. 4

2. (a) Design a doubly reinforced beam to carry a superimposed load of 60 kN/m. The overall depth and width of the beam are restricted to 840 mm and 300 mm respectively. The beam has a clear span of 5 m and a bearing of 50 cm on each end. Consider grade of concrete and steel as M20 and Fe 250 respectively. Use W.S.M. for design. Draw details of reinforcement. 12
(b) Design a sloped footing for a rectangular column 400 mm x 500 mm carrying an axial load of 800 kN. SBC of soil is 150 kN/m^2. Adopt m20 and Fe 415. 8

3. (a) Design a rectangular beam 230 mm x 500 mm subjected to an ultimate moment of 200 kN/m. Adopt M20 and Fe 415; f_{sc} = 355 N/mm^2. 10
(b) Design a rectangular column subjected to an axial load of 1000 kN. Adopt M20 and Fe 415. Use L.S.M. for design. Effective length of column is 4 m. 10

4. (a) Determine ultimate moment of resistance for a section 250 mm x 450 mm (effective). The reinforcement consist of 3 bars of 20 mm diameter. Adopt M20 and Fe 415. 8
(b) Design a R.C. slab for a room of size 4 m x 5 m from inside. Consider Live Load as 2 kN/m^2 and finishing load as 1 kN/m^2. Adopt M20 and Fe 415. The slab is simply supported at all the four edges, with corners free to lift. Consider thickness of supporting wall as 300 mm. Use α_x = 0·086, α_y = 0·058 and LSM for design. Draw sections along short and long spans. 12

[TURN OVER