B. Tech Degree VIII Semester Examination, April 2008

CE 804 (A) ADVANCED DESIGN OF STRUCTURES

(1999 – 2001 Scheme)

Time : 3 Hours Maximum Marks : 100

I. Design and detail the interior panel of 5.50 m x 5.50 m size, flat slab. Columns are of 300 mm x 500 mm size with column heads of 500 mm x 700 mm size. No drop is provided. The slab has to carry a live load of 4.0 kN/m^2 and superimposed dead load of 2.25 kN/m^2 in addition to self weight. Use M20 grade concrete and Fe 415 grade steel. Storey height is 3.60 m. Use direct design method. (25)

OR

II. (a) Design an RC ribbed slab for a room of size 9.60 m x 9.60 m. The live load is 2.5 kN/m^2 with ribs spaced at 1.20 m c/c. Two adjacent sides of the slab panel are continuous over supporting walls of thickness 250 mm, and the other two sides are simply supported on walls. Use M20 grade concrete and Fe 415 steel. (13)

(b) Determine the thickness and reinforcements for a simply supported beam of length 3.50 m and depth of 2.0 m, to support a superimposed uniformly distributed load of 20 kN/m intensity. Use M25 concrete and Fe 415 steel. (12)

III. An RCC chimney of 66 m height and external diameter of 4 m throughout the height has a fire brick lining of 100 mm thickness provided up to a height of 42 m from ground level, with an air gap of 100 mm. The temperature of gases above the surrounding air is 200°C. Take coefficient of expansion of concrete and steel as 11×10^{-6} per °C, $Es = 2.05\times10^{5}$ MPa. The wind load is of intensity 1.4 kN/m^2 for 18 m from ground level, 1.6 kN/m^2 from 18 m to 42 m and thereafter 1.8 kN/m^2. Take thickness of concrete shell as 200 mm for the top 24 m; 300 mm for the next 24 m height and 400 mm for the bottom 18 m high portion. Check the stresses on sections at ground level, 18 m and 42 m height from ground level. Also provide reinforcements at these sections. Use M25 concrete and Fe 415 steel. (25)

OR

IV. Design a silo for storing maize, having unit weight of 7 kN/m^3 and angle of repose of 35°. The silo has 5 m internal diameter and 15 m height. Take $\mu = 0.53$ and $\mu' = 0.43$ (for filling and emptying). Assume conical bottom with 60 cm diameter opening. Use M20 concrete and Fe 415 steel. (25)

V. (a) Differentiate between thick and thin shells. (7)

(b) Design a spherical dome roof for a circular auditorium of 12 m diameter. Take rise of dome as 3.0 m. Take live load on roof including wind effect as 1.6 kN/m^2 and super-imposed dead load as 0.3 kN/m^2. Provide a opening at crown of 1.5 m diameter, with a lantern load of 20 kN along the circumference of the opening. Use M20 concrete and Fe 415 steel. (18)

OR

(Turn Over)

VI. (a) Analyse a simply supported single cylindrical shell roof with monolithic end diaphragms. Span = 26.00 m, Radius is 5.00 m, thickness = 100 mm, semi central angle = 40°. The shell has no edge beams. Shell is subjected to superimposed dead load due to surface finish equal to 6.25 kN/m^2 of surface area and live load and sum load put together at 0.70 kN/m^2 of projected horizontal area. Using beam method, compute stresses at 5° intervals of angle measured from crown. (20)

(b) Draw a sketch showing all the stress resultants (both in plane and out of plane) in a shell element. (5)

VII. (a) Explain : (i) Plate action (ii) Slab action (iii) Edge sheers with respect to the structural action of folded plates. (12)

(b) Explain Simpson's method of analysing folded plates. (13)

OR

VIII. Design the folded plate shown in figure below and sketch the reinforcement details using Whitney's method. Assume unit weight of concrete 24 kN/m^3, uniform live load of 74 Kg/m^2 of surface area. Use M20 grade concrete and Fe 415 steel.

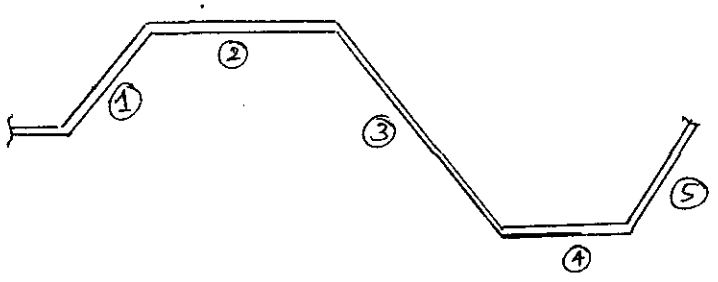

Plate No.	Width (m)	Horizontal Projection	Inclination to hor	Angle between previous to next	Thickness (cm)
1	0.62	0.108 m	80°	80°	9
2	1.105	1.105	0	40.59°	10
3	3.75	2.85	319.41°	319.41°	9
4	1.105	1.105	0	280°	10
5	0.62	0.108	80°	-	9

(25)

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