C 27093 (Pages : 2) Name.....

Reg. No.....

EIGHTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION MAY 2012

CE 04 804 (A)—ADVANCED STRUCTURAL DESIGN—II

Time : Three Hours Maximum : 100 Marks

(IS: 2210-1990; IS: 1343 codes andSP 16 are permitted inside the examination hall)

I. (a) Briefly explain membrane theory related to circular cylindrical shells.

(b) What do you mean by 'Guass curvature' ?

(c) What are the different types of folded plates ?

(d) Briefly explain the principles of design of shear walls.

(e) What are the advantages and disadvantages of Composite construction ?

(f) What are the various types of shear walls based on their behaviour ?

(g) Differentiate between unpropped and propped construction in composite construction.

(h) What are the various structural systems commonly adopted in the case of tall buildings ?

(8 × 5 = 40 marks)

II. (a) A reinforced shell having semi circular directrix is freely supported at the ends

Radius of shell	=	10m
Length of shell (2L)	=	40m
Thickness of shell (t)	=	75 mm

Calculate the membrane forces at X = 0, 10, 20m and ϕ = 0, 30°, 60°, 90° under its own weight.

Or

(b) A reinforced shell having circular directrix has the following dimensions

Radius	=	6m
Span (2L)	=	40 m
Semi central angle (ϕ)	=	60°
Thickness (t)	=	50 mm

Calculate : (i) Maximum stress in the shell

(ii) Maximum bending moment and tension developed in the edge beam.

(20 marks)

III. (a) A V- shaped folded plate ABCDE spans over 10m between the transverse and the folds have a uniform thickness of 100 mm. The plates are inclined at 45° to the horizontal and vertica and horizontal projections of each of the plates is 3m. Edges B and D are the ridges and th edge C form the valley portion. Analyse the folded plate for an incidental live load of 0.75kN m^2 of covered area and draw the stress distribution diagram.

Or

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(b) Analyse the folded plate ABCDEF of span 8 m. The plates AB and EF are vertical, while the plate CD is horizontal. The plate BC and DE are inclined at 45° to the horizontal. All the plates are 100 mm thick and their widths are as follows:

AB and EF	=	1.00 m
BC and DE	=	3.8 m
CD	=	2.8m
Live load	=	0.5 kN/m^2 of covered area

Draw the stress distribution diagram for the plates.

(20 marks)

IV. (a) A precast beam of size 150 mm x 350 mm and prestressed to have an effective stress of 14 N/mm^2 at top and zero at bottom. The beam is erected over a simple span of 7m and a slab of size 350mm × 80 mm is cast over it by propping. If the grade of concrete is same, obtain the resultant stresses. The live load on the slab is 550 kPa.

Or

(b) A rectangular pretensioned concrete beam has a breadth of 100 mm and depth 260 mm. The beam is incorporated in a composite I beam by casting a top flange of breadth 300 mm and depth 50 mm. The prestress after all the losses at the top and bottom of the beam (web) portion is zero and 12 N/mm^2. Calculate the maximum uniformly distributed load that can be supported on a simply supported span of 6.0 m, without any tensile stress occurring if the slab is externally supported while casting.

(20 marks)