C 5243 (Pages : 2) Name.....

Reg. No.....

EIGHTH SEMESTER B.TECH. (ENGINEERING) DEGREE EXAMINATION JUNE 2010

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

Time : Three Hours Maximum : 100 Marks

(IS : 2210—1990 ; IS : 1343 codes and SP 16 are permitted inside the examination hall.)

1. (a) Write briefly about the membrane theory.

(b) Classify the various types of shell structures according to its shape.

(c) Name the various components of a cylindrical shell roof.

(d) What do you understand by the term plate action and slab action ?

(e) What are the assumptions made in folded plates ?

(f) Distinguish between unpropped and propped construction in composite construction.

(g) Draw the various types of folded plates.

(h) What are the main forces acting on the anchorage zone, explain those forces showing in a neat sketch ?

(8 × 5 = 40 marks)

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

Radius of shell = 9.5 m.

Length of the shell (2 L) = 40 m.

Thickness of shell (t) = 75 mm.

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

Or

(b) A reinforced concrete shell of circular in cross-section has the following particulars :—

Radius = 6 m.

Span (2L) = 30 m.

Semicentral angle = ϕ = 60°.

Thickness (*t*) = 75 mm.

Calculate the maximum stress due to self weight only in the shell by beam theory and compare the values with the result of the membrane theory.

(20 marks)

Turn over

III. (a) Explain in detail on :

(i) Coupled shear walls.

(ii) Cantilevered shear walls.

(iii) Design of shear walls.

Or

(b) Analyse the folded plate ABCDEF. 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 12 cm thick and their widths are as follows :

AB and EF	= 1.5 m.
BC and DE	= 4 m.
CD	= 3.2 m.
Live load	= 0.75 kN/m^2 of covered area
Distance between the transverse	= 12.5 m.

Draw the stress distribution diagram for the plates.

(20 marks)

IV. (a) A precast beam of size 175 × 350 mm. and prestressed to have an effective stress of 12.5 N/mm.^{2} at top and zero at bottom. The beam is erected over a simple span of 8 m and a slab of size 350 × 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 585 kPa.

Or

(b) A prestressed concrete beam 100 mm × 300 mm in section is prestressed with a straight cable at an eccentricity of 50 mm. The effective prestressing force is 75 kN. The span of the beam is 6 m. and the total load on the beam including the self weight is 2.4 kN/m. Determine the pressure line at quarter span and midspan sections.

(20 marks)