AQ–2913

Faculty of Engineering & Technology

M.E. Civil (Structural Engg.) Semester—II (New-C.G.S.) Examination

THEORY OF PLATES AND SHELLS

Paper—2 SFES 3

Sections—A & B

Time : Three Hours] [Maximum Marks : 80

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer **THREE** questions from Section A and **THREE** questions from Section B.

(3) Assume suitable data wherever necessary.

(4) Illustrate your answers wherever necessary with the help of neat sketches.

(5) I.S.I. Hand book for structural Steel section, I.S. Code 800/1962 or 1964 I.S. 456 (Revised) I.S. 875 may be consulted.

(6) Use pen of Blue/Black ink/refill only for writing the answer book.

SECTION—A

1. (a) Write down the assumptions in theory of thin plates with small deflection. 4

   (b) Derive the relation between bending moment and curvature of plates. Also find twisting moment in terms of curvature. 10

2. Derive the governing differential equation for a circular plate of radius 'a' subjected to lateral load intensity 'q'. 13

3. Derive an expression for maximum deflection of simply supported rectangular plate carrying load, $q = f(x, y)$ using Navier solution. 13

4. Find the finite differential operator for deflection of plate, bending moment and twisting moment. 13

5. Derive governing differential equation of anisotropic plate using first principle. 13

SECTION—B

6. (a) Classify the shell surfaces. Give one example of each classification. 6

   (b) Derive the equation of following shell surfaces :

   (i) Semi ellipse

   (ii) Parabolic. 8

7. Using membrane theory of circular shells with circular directrix. Obtain the expression for stress under :

   (i) Deal load

   (ii) Snow load. 13

8. State the assumptions made in Finster Walder theory of cylindrical shells subjected to bending. Derive the 8th order differential equation for Finster Walder theory. 13

9. Derive an expression by using Scholer's theory of bending of cylindrical shell. 13

10. Write down step wise design procedure for a circular cylindrical shell using membrane theory. 13