

Roll No.

23378

**M. Tech. 1st Semester (Civil Engg.)
Examination – February, 2022**

ANALYSIS AND DESIGN OF PLATES AND SHELLS

Paper : CE-613

Time : Three Hours]

[Maximum Marks : 100

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt/five questions in all, selecting *one* question from each Section. Question No. 1 is compulsory. All question carry equal marks.

1. Describe the following : 4 × 5 = 20
- (a) Boundary condition for cylindrical shells
 - (b) Circular shell Elliptic paraboloid
 - (c) Cylindrical shell
 - (d) Circular shell
 - (e) Pure bending of plate

23378-306(P-3)/(Q-9)(22)

P. T. O.

SECTION - A

2. (a) Explain how shells are classified according to Gaussian curvature? 10
- (b) Explain the characteristics and behavior of a true membrane 10
3. (a) Explain how cylindrical shells are classified as long and short shells? 10
- (b) Explain the beam theory for analyzing cylindrical shells including its validity and advantages. 10

SECTION - B

4. Analyze an electrical paraboloid for the given data.
Surface equation $x^2/48.2 + y^2/50$
 $a = 11000$ mm, $b = 12250$ mm, $h_s = 2400$ mm, $h_p = 3000$ mm, $t = 100$ mm, $w = 2500$ N/m² 20
5. Design a hypothetical paraboloid of inverted umbrella type to cover an area of 10 m x 10 m. Use M30 concrete. Draw structural detailing. 20

SECTION - C

6. (a) Explain different types of conoids with neat sketches. 10

23378- (P-2)(O-2)(22) (2)

- (b) What are the advantages of folded plates over shells? 10

7. (a) Explain in detail stepwise procedure of analyzing folded plates using Whitney's method 10
- (b) Obtain the general equation for hyperboloid of revolution. 10

SECTION - D

8. Design a hyper shell roof of inverted umbrella type to suit the following data: 20
- Area covered in plain = 18 m x 15 m
- Use M25 concrete and Fe415 grade steel
- Sketch the details of reinforcement in the shell and edge beam.
9. Analyze a parabolic conoid of type 1 for a span of 30 m chord width is 50 m, the rise at the end is 10 m, thickness of the shell is 12 mm. Live load may be ignored. 20

23378- (P-3)(O-3)(22) (3)