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**23378**

M.Tech. 1st Semester (Civil Engg.)  
Examination, March-2021

**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 any *five* questions. All questions carry equal marks.

1. (a) What are the assumptions in pure bending ?  
(b) Derive the differential equations for plate subjected to cylindrical bending.  $10 \times 2 = 20$
2. Derive the differential equations of cylindrical bending of uniformly loaded rectangular plates with built in edges.  $20$

3. Derive the general solution for simply supported rectangular plates. Obtain the maximum deflection. What happens if the plate is square of side  $a$  ?  $20$
4. (a) Explain about the various types of shells with neat sketches.  
(b) Explain about the advantages and disadvantages of the shells.  $10 \times 2 = 20$
5. A rectangular plate  $a \times b$  simply supported at the edges is subjected to sinusoidal loading. Using the Navier solution, obtain the general expressions for deflection and bending moment.  $20$
6. Derive the governing differential equation for the membrane analysis of shells of double curvature.  $20$
7. Find the equations of equilibrium in case of shells in the form of a surface of revolution and loaded unsymmetrically with respect to their axis.  $20$
8. Derive the membrane differential equation for the rotational paraboloid.  $20$