Roll No ....

MVSE-205

M.E./M.Tech. II Semester

Examination, June 2016

Theory of Plates and Shells

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

iii) Assume suitable data, if found missing.

1. a) Discuss in detail "Classification of plates".

   b) Derive the equations of equilibrium for small deflections of laterally loaded plates.

2. Show that the maximum deflection for cylindrical bending of uniformly loaded rectangular plates with built-in edges is given by

   $$w_{max} = \frac{ql^4}{384D} f_1(u)$$

   Where

   $$f_1(u) = \frac{24}{u^4}\left(\frac{u^2}{2} + \frac{u}{\sin hu} - \frac{u}{\tan hu}\right)$$

3. Describe in details

   a) Naviers approach for plates

   b) Exact theory of plates

4. Find the equation of equilibrium in case of shells in the form of a surface of revolution and loaded symmetrical with respect to their axis.

5. Prove that surfaces possessing the same lame parameters will have the same Gaussian curvature.

6. Find an analytical expression by Galerkins method for the deflection of a uniformly loaded (p = constant) rectangular plate with all edges clamped as shown in figure below:
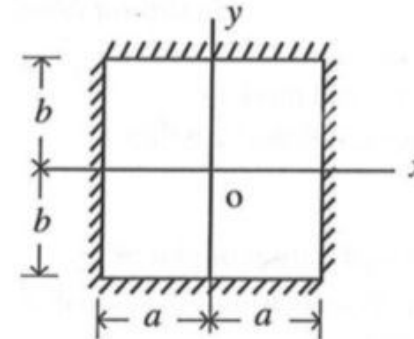
7. Show that the differential equation for a circular cylindrical shell of constant thickness when loaded symmetrically with respect to its axis is given by

   $$\frac{d^4w}{dx^4} + 4\beta^4 w = \frac{Z}{D}$$

   Where $\beta = \frac{Eh}{4a^2D} = \frac{3(1-u^2)}{a^2h^2}$

8. Write short notes on any four of the following:

   a) Spherical shells

   b) Membrane theory for parabolic shells

   c) Fourier loadings

   d) Gaussian curvature

   e) Moment curvature relationship for pure bending of plates

******