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# P.E.S. College of Engineering, Mandya - 571 401
### *(An Autonomous Institution affiliated to VTU, Belagavi)*
### Second Semester, M. Tech - Civil Engineering (MCAD)
### Semester End Examination; June - 2017
## Analysis of Plates

*Time: 3 hrs*                                                               *Max. Marks: 100*

**Note**: i) Answer **FIVE** full questions, selecting **ONE** full question from each unit.
   ii) Assume suitable data, if any.

## UNIT - I

1 a.  List the assumptions made in the small deflection theory of plates.                    4

 b.  Show that the direction of zero slopes and the direction of maximum slope are at right angles to each other.    8

 c.  Determine the deflection and stresses in a very long and narrow rectangular plate, if it is simply supported at edge $y = 0$ and $y = b$ and carries a non uniform loading of $q = q_0 Sin\dfrac{\pi y}{b}$, where $q_0$ represents the load intensity along the line passing through $y = \dfrac{b}{2}$ and parallel to $x$-axis.    8

2.  Show that, in case of circular plate subjected to concentrated load at the centre the ratio of maximum deflection for simple support to that of fixed support is given by,

$$\frac{(W_{max})\text{ simple support}}{(W_{max})\text{ fixed support}} = \frac{3+\mu}{1+\mu}.$$    20

## UNIT - II

3 a. Derive the deflection equation of the plate in the form of $\nabla^4 w = \dfrac{q}{D}$, with usual notations.    10

 b.  Determine the maximum deflection of a simply supported rectangular plate under sinusoidal load given by,

$$q = q_0 \sin\frac{m\pi x}{a}. \, Sin\frac{n\pi y}{b}.$$    10

4.  Using Navier's solution, obtain the expression for maximum deflection for a simply supported rectangular plate subjected to hydrostatic load '$q_0$' per unit length.    20

## UNIT - III

5.  Using Levy's solution, obtain the expression for maximum deflection in case of simply supported rectangular plate subjected to $w = \sum\limits_{m=1}^{\infty} y_n \sin\frac{m\pi x}{a}.$    20

6.  Find the deflection of rectangular plate *a* x *b* subjected to symmetric moments distributed along the edge $y = \pm \dfrac{b}{2}$.                                                                                              20

## UNIT - IV

7.  Derive the approximate formula for uniformly loaded circular plate with large deflection.                              20

8.  Obtain the solution for large deflection of a rectangular plate with simply supported edge subjected to uniformly distributed load.                                                                                              20

## UNIT - V

9.  A fixed plate of size 4h x 4h is subjected to uniformly distributed load '$q_0$' over the entire surface, taking grid size as h x h determine :

    i) Deflection at the centre of the plate

    ii) Moments at the centre of the plate taking $\mu = 0.3$.                                                              20

10. Analyse a simply supported plate of size 4h x 4h which is subjected to uniformly distributed load '$q_0$'. Take grid size h x h and determine :

    i) Central deflection

    ii) Moments at the centre if $\mu = 0.3$.                                                                              20

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