

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI  
Second Semester (2016-2017), Mid-Semester Examination  
Course: Theory of Plates and Shells (CE G553)

Date: 5<sup>th</sup> Mar. 2017(Room:2201)

Max. Marks: 50

Duration:11:00AM-12:30PM

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- Q.1. Find the deflection of a long rectangular plate, which is supported only on both long edges and subjected to a uniformly distributed load throughout. Both supports are fixed support. [10]
- Q.2. In a slightly bent plate find the slope and curvature in any axes system (n-t-z) knowing the slope and curvature in the x-y-z-axes system. Find the orientation of (n-t) w.r.t. x-y for zero slope and maximum slope. Also find the orientation of (n-t) w.r.t. x-y for maximum and minimum curvature. [10]
- Q.3. Taking an element, derive the bending equation of a thin elastic plate considering classical plate theory. Find the central deflection of a square plate, subjected to a uniformly distributed load in transverse direction. All four sides of the plate are simply supported. Find the curvatures of the deflected surface at the centre point of the plate. Find the shear forces and the transverse shear stresses at the edges. Take,  $a=b=1.0\text{m}$ ,  $h=0.01\text{m}$ ,  $E=200\text{GPa}$ ,  $\nu=0.3$  and  $\text{load}=2\text{ kN/m}^2$ . Use Navier's solution method. [20]
- Q.4. Find the 4<sup>th</sup> order ordinary differential equation for the derived equation in Q.3 considering Levi's solution method and find the general solution of this equation. [10]