

Code No: C0410

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

M.Tech I - Semester Examinations March/April-2011

STRESS ANALYSIS AND VIBRATION

(CAD/CAM)

Time: 3hours

Max.Marks:60

Answer any five questions

All questions carry equal marks

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1. (a) State the assumptions in two dimensional elasticity theory. (6)  
(b) Explain stress analysis in rotating discs. (6)
2. (a) Derive expressions for bending of circular plate with constant thickness  
(b) Explain shell theory with assumptions if any (6+6)
3. (a) Define vibration isolation and transmissibility. (4)  
(b) In a single-degree damped vibrating system, a suspended mass of 8 kg makes 30 oscillations in 18 seconds. The amplitude decreases to 0.25 of the initial value after 5 oscillations. Determine (i) the stiffness of the spring (ii) the logarithmic decrement (iii) the damping factor, and (iv) the damping coefficient. (8)
4. A steel bar 22 mm wide and 45 mm deep is freely supported at two points 800 mm apart and carries a load of 180 kg midway between them. Determine the natural frequency of the transverse vibrations, neglecting the weight of the bar. Take  $E = 250 \text{ GN/m}^2$ . (12)
- 5.. A simply supported bridge of span 20m,  $EI = 8 \text{ GN m}^2$  and weight is 20000 kg/m is subjected to a load of  $P \sin 2\pi ft$ , which moves with a velocity 20 m/s. If natural frequency is 5 Hz, what is the largest amplitude of vibration in the bridge? (12)
6. (a) Explain principle of orthogonality.  
(b) What is significance of modal analysis? (6+6)
7. Derive Lamé's equations for thick cylinders and state the assumptions. (12)
8. Write short notes on the following (12)  
(a) Contact Stresses  
(b) Stress Concentration  
(c) Logarithmic decrement

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