Code No: **R42019** **R10** **Set No. 1**

IV B.Tech II Semester Supplementary Examinations, April - 2018

ADVANCED STRUCTURAL ANALYSIS

(Civil Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any FIVE Questions
All Questions carry equal marks
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1 a) Establish the stress strain relationship for isotropic materials and hence the relation between the elastic constants. [8]
b) State and explain the generalized Hooke's Law. [7]

2 a) What is the importance of boundary condition for solving the elasticity problems? [8]
b) Derive the differential equations of equilibrium and compatibility equations? [7]

3 a) How do you solve 2D problems of elasticity using Airy's stress function? [8]
b) Write the solution of bi-harmonic equation using Fourier series. [7]

4 a) Develop the biharmonic equations in polar coordinate system and explain the procedure to solve them. [8]
b) Derive the stress equations for a thick cylindrical shell of inner radius "ri" and outer radius "ro" subjected to internal pressure "P" [7]

5 a) Distinguish between static and dynamic loads. Describe the various types of dynamic loads acting on the structures. [7]
b) A damper offers resistance of 0.08 N at a constant velocity 0.06 m/s. The damper is used with a spring of stiffness equal to 12 N/m. Determine the damping ratio and frequency of the system when the mass of the system is 0.3 kg [8]

6 a) A mass of 7 kg is attached to a spring with a stiffness of 4 N/mm. Determine the critical damping coefficient. [7]
b) Find the frequency of oscillation for the floating pole of the cross section area A having a mass M at one end and the density of the pole is ρ. [8]

7 A SDOF system is subjected to a harmonic loading defined by P(t) = 10 Sin ωt. Derive the expression for the dynamic displacement for the under damped vibrations. Sketch the response [15]

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8 a) Explain about Duhamel integral. [7]

b) The frame is subjected to an exciting force $F(t) = 200 \sin 20t$ as shown in figure. 8(b) below. Assuming 6% of critical damping. determine: (i) Steady state response vibration. (ii) Maximum dynamic stress in the columns

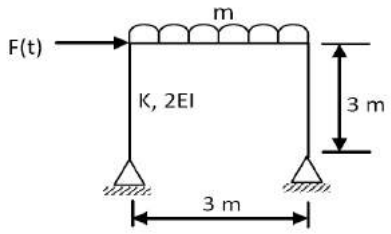

Figure.8(b) [8]