Total No. of Questions : 8] *[Total No. of Printed Pages : 2*

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MVSE - 201

M.E./M.Tech., II Semester

Examination, June 2016

Structural Dynamics

Time : Three Hours

Maximum Marks : 70

Note : i) Attempt any five questions.
ii) All questions carry equal marks.
iii) Assume suitable data wherever necessary.

1. a) Discuss Step, Ramp and Pulse excitations.
   b) Derive the solution of harmonic vibration of undamped SDOF systems for initial conditions u_o and $\ddot{u}_o$ of displacement and velocity respectively. Plot the response.

2. Derive an equation of motion for a single degree of freedom vibration with viscous damping due to a pulsating load "F sinwt" acting as the vibrating agent.

3. Discuss:
   a) Time stepping methods
   b) Analysis of Non-linear response

4. a) Discuss the D'Alembert's principle.
   b) As shown in figure 1 show a simple oscillator used and which is acted upon by the periodic force shown in figure 2. Apply Fourier series in determining the terminating response of a system to a periodic loading, consider the undamped simple oscillator.

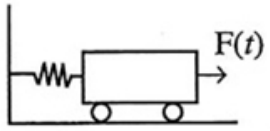

Fig. 1

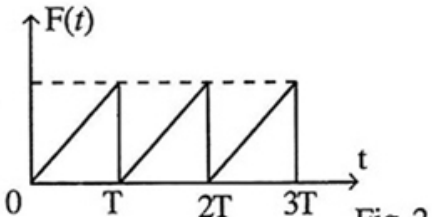

Fig. 2

5. Explain 'Logarithmic decrement' and Duhamel's integral for undamped system.

6. a) State and explain the orthogonality principle of normal modes.
   b) Explain the method of matrix iteration.

7. A massless cantilever beam of length L supports two lumped masses $\frac{mL}{2}$ and $\frac{mL}{4}$ at the mid point and free end as shown in figure 3. The Flexural rigidity of the uniform beam is EI with the four DOFs chosen as shown in figure 4 and the applied forces $p_1(t)$ and $p_2(t)$. Formulate the equations of motion of the system.

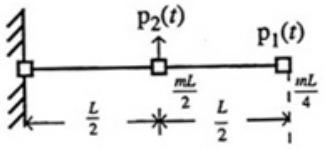

Fig 3

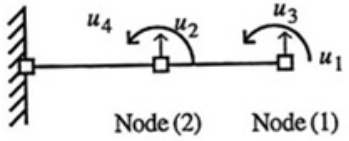

Fig 4

8. Explain any two of the following:
   a) Steady state vibration
   b) Critical damping
   c) Matrix formulation.

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