Code: 9A21702

R09

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2017

VIBRATIONS & STRUCTURAL DYNAMICS

(Aeronautical Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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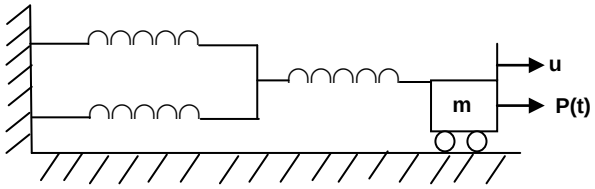
1 (a) Explain the D'Alembert's principle.

(b) Determine the effective stiffness of combined spring system shown in figure below and write the equation of motion for two spring mass system.



2 (a) Derive the equation of motion for un-damped free vibration.

(b) Explain the various devices for vibration measuring.

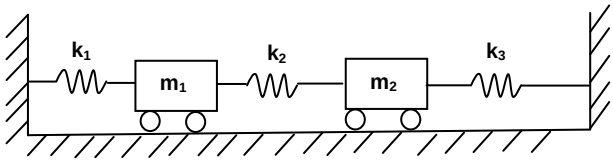
3 Derive the dynamic equation of general elastic bodies.

4 Derive the expression for the longitudinal vibration of a uniform bar of length 'L', one end of which is fixed and the other end is free and determine the fundamental frequency and draw the mode of vibration.

5 (a) Describe the whirling speed of light vertical shaft with single disc of without damping with a neat diagram.

(b) Describe the whirling speed of light vertical shaft with single disc of with damping with a neat diagram.

6 Determine the stiffness, max and damping matrices using Rayleigh Ritz method for the given system shown in figure below. Given $k_1 = 300$ N/m, $k_2 = 500$ N/m, $k_3 = 200$ N/m, $m_1 = 2$ kg and $m_2 = 1$kg.



7 Derive the global stiffness matrix for cantilever beam.

8 Using Fourier analysis, determine the discrete Fourier spectrum for triangular pulse.

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