Total No. of Questions :10] *[Total No. of Printed Pages : 4*

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AU/ME - 703

B.E. VII Semester

Examination, December 2012

Mechanical Vibration & Noise Engineering

Time : Three Hours

Maximum Marks : 100 ***Minimum Pass Marks :35***

Note: Attempt *One* question from each unit
All questions carry equal marks.
Assume missing data if any.

Unit - 1

I. (a) Explain the various elements of vibration system? 6

(b) Find the Fourier series expansion for a forcing function, expressed by a halfsine wave.

$$P = P_o \sin\left(\frac{wt}{2}\right)$$

during the time interval $0 < wt < 2\pi$ and is repetitive from theron 14

OR

II. A spring - mass system with mass 'M' and stiffness 'k' has a natural frequency of 'f' determine the value of stiffness k' of another spring which when arranged in connection with spring k in series, will lower the natural frequency by 20% and in parallel, will raise the natural frequency by 20%. 20

Unit - 2

III. (a) Show that for viscous damping, loss factor is independent of the amplitude and proportional to frequency. 10

(b) For the system having viscous damping, plot a curve for the number of cycles elapsed for the amplitude to decay to 50% of the initial valve, against the damping factor. 10

OR

IV The disc of a torsional pendulum has a moment of inertia of 600 kg–cm^2 and is immersed in a viscous fluid. The brass shaft attached to it is of 10c.m diameter and 40c.m long. When the pendulum is vibrating the observed amplitudes on the same side of the rest position for successive cycles are 9^0, 6^0 and 4^0. Determine

(i) logarithmic decrement

(ii) damping torque at unit velocity

(iii) periodic time of vibration 20

Unit - 3

V A vibrating system having mass 1 kg is suspended by a spring of stiffness 1000 N/M and is put to harmonic excitation of 10N. Assuming viscous damping, determine

(a) the resonant frequency

(b) the phase angle

(c) the amplitude at resonance

(d) the frequency corresponding to peak amplitude.

(e) damped frequency

take c = 40 N-S/M

OR

VI The rotor of a turbo supercharger weighing 88.3 N is keyed to a centre of 25mm diameter steel shaft 40 cm between bearing. Determine

(a) critical speed

(b) The amplitude of vibration of rotor at a speed of 3200 rpm. if the eccentricity is 0.015 mm

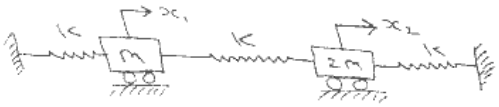
(c) vibratory force transmitted to the bearing at this speed. 20

Unit - 4

VII A machine runs at 5000 rpm. Its forcing frequency is very near to its natural frequency. If the nearest frequency of the machine is to be atleast 20% from the forced frequency, design a suitable vibration absorber for the system. Assume the mass of machine as 30 kg. 20

OR

VIII Find the natural frequency or amplitude ratio of system shown in figure. 20



Unit - 5

IX (a) Explain the following terms 10

(a) Sound spectra

(b) One octave band

(c) One third octave band analysis

(d) why do we need octave bands

(b) An octave band analysis on an automatic wood lathe in operation . It was found that the octave band sound pressure level here 93 dB at 250Hz, 94 dB at 500Hz, 96 dB at 1000Hz, 96 dB at 2000Hz, 94 dB at 4000Hz and 93 dB at 8000Hz . What is total Mear square pressure? 10

OR

X (a) Discuss various methods used in controlling industrial noise. 10

(b) Explain the term "loudness". How does it vary with the frequency ? How this variation is taken into account in the subjective assessment. 10

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