QPC: RJ20MTECH035 AR 19 Reg. No

GIET UNIVERSITY, GUNUPUR – 765022

M. Tech (First Semester – Regular) Examinations, June – 2021

MPCMD 1020 – MACHINE VIBRATION

(Machine Design)

Time: 2 hrs Maximum: 50 Marks

The figures in the right hand margin indicate marks.

PART – A **(2 x 10 = 20 Marks)**

Q.1. Answer ***ALL*** questions

a. State the importance of vibration isolation.
b. Define transmissibility ratio and what is its role in vibration analysis?
c. List few instruments for displacement measurement in vibration.
d. What is a vibration absorber?
e. What do you mean by the property orthogonality of mode shapes?
f. Define principal or natural coordinates.
g. Explain about Rayleigh method.
h. What is continuous system?
i. The frequency of transverse vibrations in a stretched string is 200 Hz. If the tension is increased four times and the length is reduced to one-fourth the original value, find the frequency of vibration.
j. A shaft of 100 mm diameter and 1 m long is fixed at one end and the other end carries a flywheel of mass 1 tonne. The radius of gyration of the flywheel is 0.5 m. Find the frequency of torsional vibration, C= 80 GN/m^2.

PART – B **(6 x 5 = 30 Marks)**

Answer ***ANY FIVE*** questions Marks

2. A machine of mass 100 kg is supported on a structure having a total stiffness of 800 kN/m and has a rotating unbalanced element which results in a disturbing force of 400 N at a speed of 3000 rpm. Assuming a damping ratio of 0.25, determine the amplitude of vibrations due to unbalance. 6
3. Prove that an undamped measuring instrument will show a true response for frequency ratio $(\omega/\omega_n) = \frac{1}{\sqrt{2}}$ 6
4. Use Lagrange's equation and derive the equations of motion for the system shown in Fig.1 6

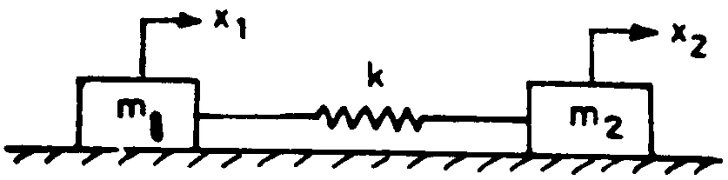

Fig.1

5. Three rail bogies are connected by two springs of stiffness $40x10^5$ N/m each as shown in Fig.2. The mass of each bogey is $20x10^3$ kg. Determine the frequencies of vibration. Neglect friction between the wheels and rails. 6

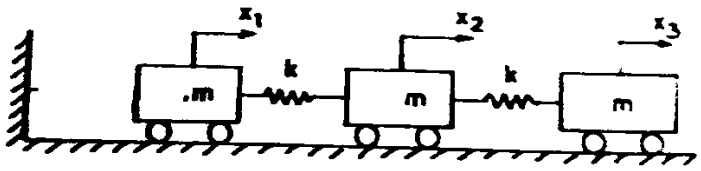

Fig.2

6. What is semi-definite system? Explain in detail. 6
7. Determine the normal functions for free longitudinal vibration of a bar of length l and uniform cross-section. One end of the bar is fixed and the other free. 6
8. Explain how Rayleigh's method is used to find the frequency of continuous system. 6

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