I D NO.	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 40 % Max Marks: 80 Max Time: 2 hrs. 10 May 2018, Thursday

ENDTERM FINAL EXAMINATION MAY 2018

Even Semester 2017-18 Course: **MEC 212 Mechanical Vibration** VI Sem. Mechanical

---

Instructions:

(i) Read the question properly and answer accordingly.

(ii) Question paper consists of 3 parts.

(iii) Scientific and Non-programmable calculators are permitted

---

Part A

(5 Q x 4 M = 20 Marks)

1. What is the importance of vibration measurement?
2. Explain with neat sketch the working principle of piezoelectric transducer
3. Determine the influence coefficient of the system shown in the figure.1

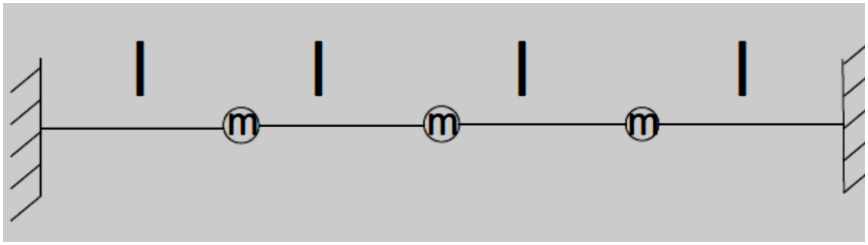


Figure.1

4. Find the lower natural frequency of vibration for the system shown in fig.2 by Dunkerley's
   Method. Take E= $2x10^{11}$ N/m^2 and I = $4x\ 10^{-7}$ m^4

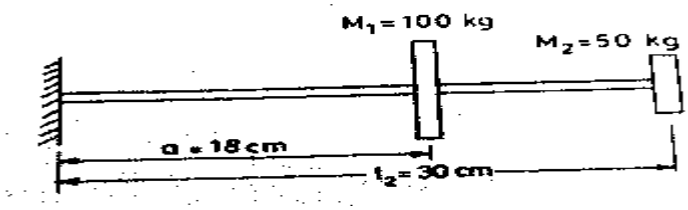


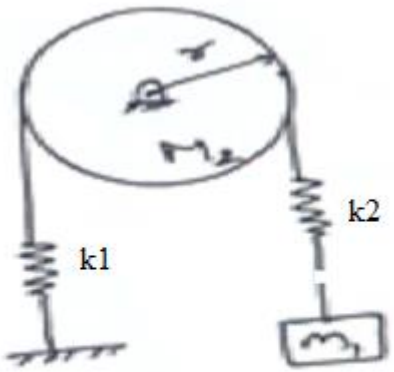
Figure.2

5. A vibrometer gives a reading relative displacement 0.5 mm .The natural frequency of vibration is 600 rev/min and the machine runs at 200 rev/min. determine the magnitude of displacement, velocity and acceleration of the vibrating machine part.

Part B

(3 Q x 10 M = 30 Marks)

6. Find the natural frequencies of the system shown in fig.3



m1= 2 kg, m2= 10 kg
k1= 40 N/m k2= 60N/m

Figure.3

7. Using Stodala method determine the fundamental frequency of the system shown in fig.4

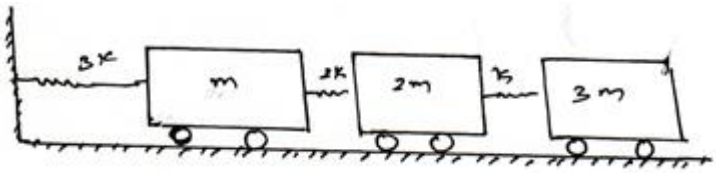


Figure.4

8. Explain the experimental modal analysis and necessary basic equipment.

Part C

(2Q x 15 M = 30 Marks)

9. Determine the natural frequencies of the system shown in fig.5 using Holzer's method.

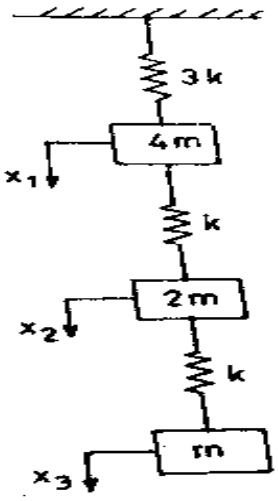


Figure.5

10. Find the lower natural frequency of vibration for the system shown in fig.6 by Rayleigh's method. $E= 2x10^{11}$ N/m^2 $I= 4x10^{-7}$ m^4

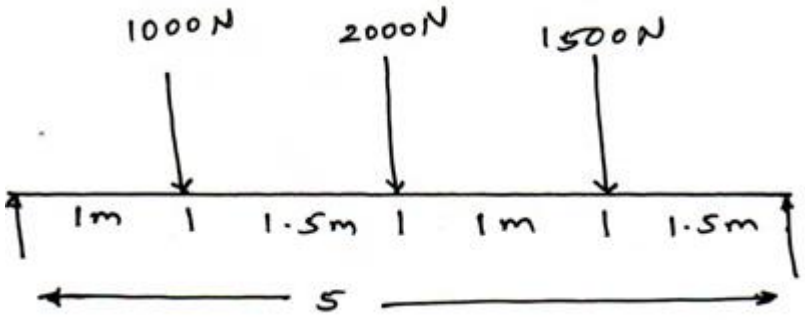


Figure.6

ID NO:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20% Max Marks: 40 Max Time: 1 hr. 26 March Monday 2018

TEST – 2 **SET A**

Even Semester 2017-18 Course: **MEC 212 Mechanical Vibration** VI Sem. Mechanical

---

Instruction:

(i) Read the question properly and answer accordingly.

(ii) Question paper consists of 3 parts.

(iii) Scientific and Non-programmable calculators are permitted

---

Part A

(4Q x 4 M = 16 Marks)

1. A seismic instrument with a natural frequency of 6 Hz is used to measure the vibration of a machine operating at 120 rpm. The relative displacement of the seismic mass as read from the instrument is 0.05 mm. Determine the amplitude of vibration of the machine. Neglecting the damping.
2. A machine having a mass of 100 kg and supported on springs of total stiffness 7.84×10^5 N/m has an unbalanced rotating element which results in a disturbing force 392 N at a speed of 3000 rpm. Assuming a damping factor of $\zeta=0.20$. Determine the amplitude of motion due to unbalance.
3. What is vibration Isolation? Derive the equation for transmissibility. Discuss is with respect to the frequency ratio and damping factor.
4. Explain the working principle of seismic Instrument. Discuss it with respect of Accelerometer and vibrometer.

Part B

(2 Q x 8 M = 16 Marks)

5. A vibratory body of mass 150 kg supported on springs of total stiffness 1050 kN/m has a rotating unbalance force 525 N at a speed of 6000 rpm. If the damping factor is 0.3, determine a) the amplitude caused by the unbalance and its phase angle. b) the transmissibility and c) the actual force transmitted.

6. A rotor of mass 12 kg is mounted on 10 mm diameter shaft supported between two bearings placed at 900 mm from each other. The rotor is having 0.02 mm eccentricity. If the system rotates at 3000 rpm, determine the amplitude of steady state vibrations and the dynamic force on the bearings. Take E= 2×10^{11} N/m^2.

Part C

(1Q x 8 M = 8 Marks)

7. Find the frequencies of the system shown in fig.1 and show the normal modes.

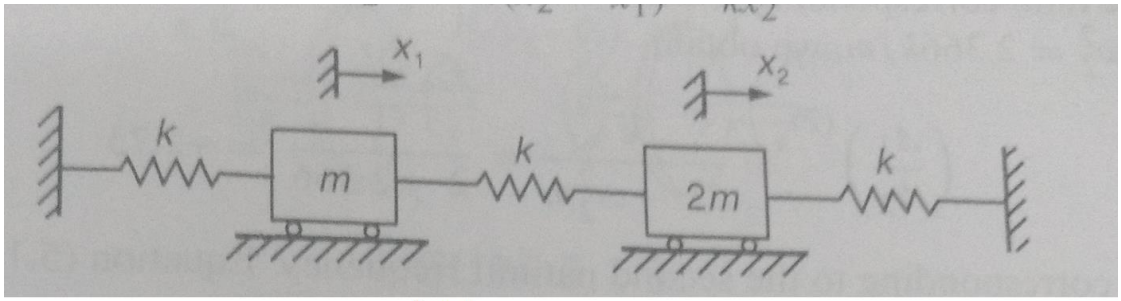


figure.1

GAIN MORE KNOWLEDGE
REACH GREATER HEIGHTS

ID NO:	

PRESIDENCY UNIVERSITY, BENGALURU

SCHOOL OF ENGINEERING

Weightage: 20 % Max Marks: 40 Max Time: 1 hr. 21 Feb Wednesday 2018

TEST – 1

Even Semester 2017-18 Course: **MEC 212 Mechanical Vibration** IV Sem. Mechanical

---

Instruction:

(i) Read the question properly and answer accordingly.
(ii) Question paper consists of 3 parts.
(iii) Scientific and Non-programmable calculators are permitted

---

Part A

(4 Q x 4 M = 16 Marks)

1. A spring-mass system has a natural frequency of 10 Hz. When the spring constant is reduced by 800 N/m, the frequency is altered by 45 percent. Find the mass and spring constant of the original System

2. Write the equation motion and find the natural frequency of the system shown in figure.1

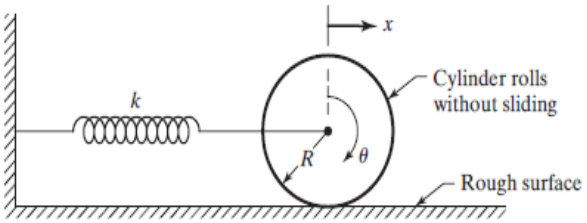


Figure. 1

3. Define logarithmic decrement and derive its equation for successive cycles

4. A body of 5 kg is supported on a spring of stiffness 200 N/m and has dashpot connected to it which produces a resistance of 0.1023 N at a velocity of 0.01m/s. In what ratio will the amplitude of Vibration be reduced after 5 cycles?

Part B

(2 Q x 8 M = 16 Marks)

5. The cylinder of mass m and radius r rolls without slipping on circular surface of radius R as shown in figure.2. Determine the natural frequency for small oscillations about the lowest point.

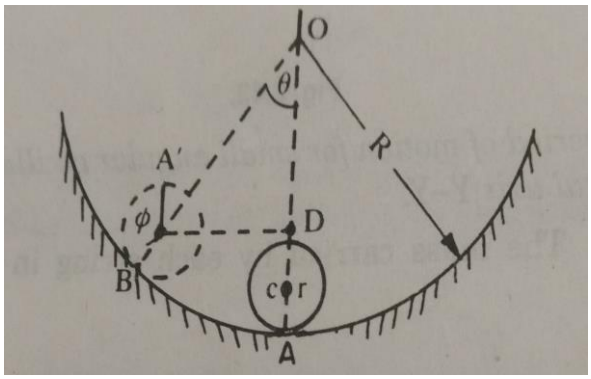


Figure:2

6. A door 2.0 m height, 0.75 m wide and 0.04 m thick and weighing 35 kg is fitted with an automatic door closer. The door opens against a spring with a modulus of 0.1N.m/radian. If the door is opened 90^0 and released, how long will it take the door to be within 1^0 of closing? Assume the return spring of the door to be critically damped.

Part C

(1Q x 8 M = 8 Marks)

7. The torsional pendulum with a disc of moment inertia J=0.05 kg.m^2 immersed in a viscous fluid as shown in figure.3. During vibration of pendulum, the observed amplitudes on the same side of the neutral axis for Successive cycles are found to decay 50% of the initial value. The diameter of the shaft is 10mm and length of shaft is 0.5 m and rigidity modulus of the shaft is 84 G.Pa. Determine (a) logarithmic decrement (b) The periodic time of vibration (c) the frequency when the disc is removed from the fluid.

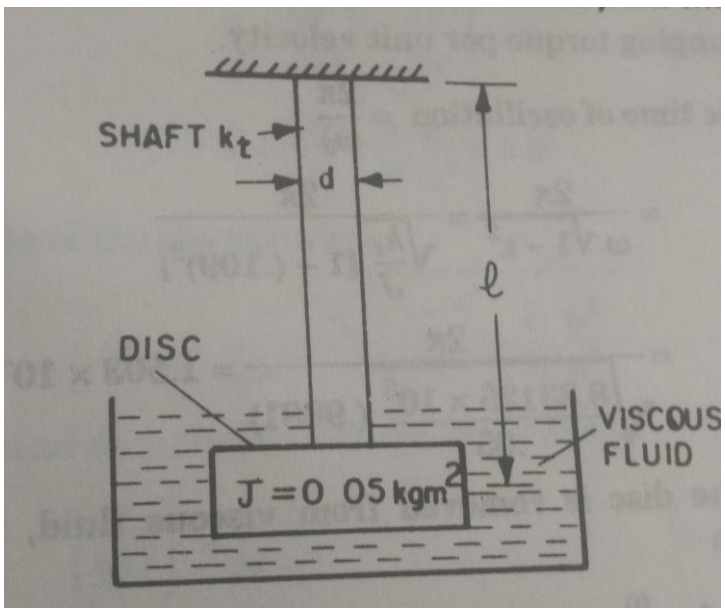


Figure: 3