

B. MECH. ENGG. (EVENING) SUPPLE EXAMINATION, 2017  
(3<sup>rd</sup> Year 1<sup>st</sup> Semester)  
DYNAMICS OF MACHINES

Time : 3 hours

Full Marks: 100

[Answer any five]

1. Explain rotating unbalance with equation of motion and suitable plots.  
Find the expression for suitable cross sectional area of a flywheel used for an IC engine.  
Mention requisite assumption. 10+10
  
2. Explain what is 'Damping Ratio'.  
From the equation of motion of free vibration, derive expressions of overdamped, underdamped and critically damped motions and explain those with suitable curve plottings. 5+15
  
3. What do you mean by 'Logarithmic Decrement'.  
From the equation of motion of viscously damped forced vibration, show the vector relationship and with the help of the same, solve the equation and show the curves of 'amplitude' and 'phase angle' with 'frequency ratio' for different 'damping ratios'. 6+14
  
4. Explain the balancing procedure of masses  $m_1, m_2, m_3, m_4$  and at radius of  $r_1, r_2, r_3, r_4$  with the use of additional masses.  
Given:  $m_1 = m_2 = 10$  kg,  $m_3 = m_4 = 50$  kg.  
All radius  $r_1, r_2, r_3, r_4$  are equal to 5 mm.  
Initial configuration:  $m_1$  is horizontal towards right,  $m_2$  is  $75^\circ$  apart from the same,  $m_3$  is towards left,  $m_4$  is further  $30^\circ$  apart from  $m_3$ .  
Distance between  $m_1$  &  $m_2$  is 1 m, that between  $m_2$  &  $m_3$  is 2 m and that between  $m_3$  &  $m_4$  is 1.5 m. 20
  
5. What is 'Support Motion'. From the derivation of the same explain how to isolate vibration from an object oscillating support. 8+12
  
6. Write short notes on: 10 x 2
  - i) Static and Dynamic Unbalance
  - ii) Seismometer & Accelerometer