Kadi Sarva Vishwavidhyalaya
LDRP INSTITUTE OF TECHNOLOGY & RESEARCH, GANDHINAGAR.

B.E. (Mechanical Engineering) Semester - VI

MID SEMESTER EXAM

Day : Saturday **Subject Name : Dynamics of Machinery**
Date : 28/02/2015 **Subject Code : ME602**
Duration : 90 MINUTES **Max. Marks : 30**

Instructions: 1) All questions are **compulsory**.
2) Figures to the **right** indicate full marks.
3) Use of scientific calculator is permitted.
4) Assume suitable data if necessary stating the same.

Q.1

1) What is main difference between periodic and simple harmonic motion? **01**
2) Show the rotating vector for $x = A \sin(\omega t - \phi)$ **01**
3) Critical damping co-efficient depends upon damper. True or False **01**
4) Explain the BEAT phenomena with sketch and when it occurs. **02**

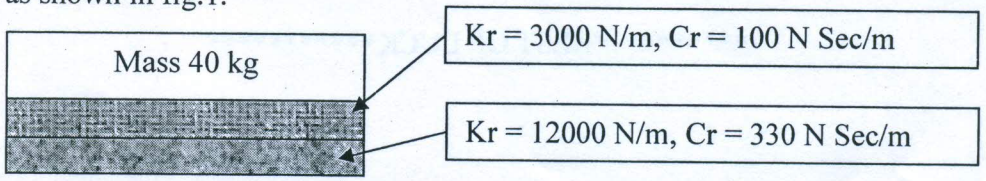
Q-2 A Define logarithmic decrement and device its expression for a SDF system relating damping ratio and relating number of oscillation, initial amplitude and n^{th} oscillation amplitude. **07**

B A railroad bumper of 20000 kg is designed as a spring having stiffness of 200 kN/m in parallel with viscous damper with damping ratio of 1.25. What is the bumper's damping coefficient. **03**

OR

Q-2 A **05**

The machine weighting 40 kg is supported on two slabs of isolators, natural rubber and felt as shown in fig.1.



Determine undamped and damped natural frequencies of the system in vertical direction. Neglect the mass of the isolators.

B A machine weight 18 kg and is supported on spring and dash ports. The total stiffness of the springs is 12 N/mm and damping is 0.2 N sec/mm. The system is initially at rest and velocity of 120 mm/s is imparted to the mass. **05**
Determine: the displacement and velocity of mass as a function of time.

Q-3 Justify the sentence "Reciprocating masses are partially balanced." **05**

Q-4 **A** The following data apply to an outside cylinder uncoupled locomotive : Mass of rotating parts per cylinder = 360 kg ; Mass of reciprocating parts per cylinder = 300 kg ; Angle between cranks = 90° ; Crank radius = 0.3 m ; Cylinder centers = 1.75 m ; Radius of balance masses = 0.75 m ; Wheel centers = 1.45 m. If whole of the rotating and two-thirds of reciprocating parts are to be balanced in planes of the driving wheels, Determine : **07**

1. Magnitude and angular positions of balance masses,
2. Speed in kilometres per hour at which the wheel will lift off the rails when the load on each driving wheel is 30 kN and the diameter of tread of driving wheels is 1.8 m,
3. Swaying couple at speed arrived at in (2) above.

B Define Static and Dynamic balancing with suitable example **03**

OR

Q-4 **A** A five cylinder in-line engine running at 750 r.p.m. has successive cranks 144° apart, the distance between the cylinder centre lines being 375 mm. The piston stroke is 225 mm and the ratio of the connecting rod to the crank is 4. Examine the engine for balance of primary and secondary forces and couples. Find the maximum values of these and the position of the central crank at which these maximum values occur. The reciprocating mass for each cylinder is 15 kg. **05**

B The three cylinders of an air compressor have their axes 120° to one another and their connecting rods are coupled to a single crank. The stroke is 100 mm and the length of each connecting rod is 150 mm. The mass of the reciprocating parts per cylinder is 1.5 kg. Find the maximum primary and secondary forces acting on the frame of the compressor when running at 3000 r.p.m. Describe clearly a method by which such forces may be balanced. **05**

**********BEST OF LUCK**********