



(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 147853

Roll No.

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B. Tech.

(SEM. VIII) THEORY EXAMINATION, 2014-15

VEHICLE DYNAMIC

Time : 3 Hours]

[Total Marks : 100

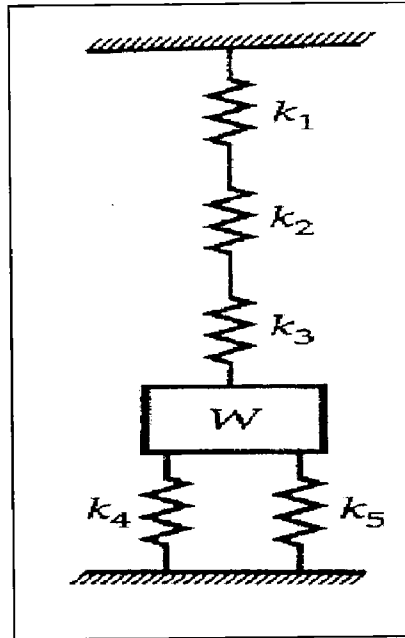
Note: - Attempt all sections.

1. Attempt four questions: (5*4=20)
 - A. What is viscous damping? Explain with suitable sketch.
 - B. A car having a mass of 1000kg deflects its spring 4 cm under its load. Determine natural frequency of the car in vertical direction.
 - C. What is forced vibration? Draw total response curve for forced vibration.
 - D. What is Vibrometer? Write short note on Vibrometer.
 - E. Write short note on equivalent stiffness of spring combination.

2. Attempt any two questions:

(10*2=20)

- A. Derive the expression for equation of motion with harmonic force with suitable diagram.
- B. For the system shown in fig.



$K_1=1500\text{N/m}$, $K_2= 3000 \text{ N/m}$, $K_3,K_4,K_5= 500\text{N/m}$

Find 'mass' such that the system has a Natural Frequency of 10 Hz.

C. What is vibration? What are the types of vibration?

3. Attempt any two questions:

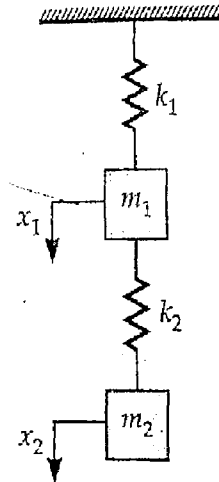
(10*2=20)

- A. What are characteristics curves? Explain it with suitable diagram for forced vibration
- B. Explain various types of forces and moments generally act on the tyres.

- C. Fig. shows a vibrating system having two degree of freedom. Determine the two natural frequencies of vibrations and the ratio of amplitudes of the motion of m_1 and m_2 for the two modes of vibration.

Given $m_1=2.5\text{Kg}$, $m_2= 1.8 \text{ kg}$

$K_1=k_2=80\text{N/m}$



4. Attempt any two questions: (10*2=20)

- A. What is the use of tyres? Explain types of tyres are generally used in automobiles explain them with suitable sketch?
- B. What is Semi Definite system? Derive the expression with suitable sketch.
- C. An automobile weighs 2000 N and has a wheel base of 3.0 meters. Its centre of gravity is located 1.4 meter behind the front wheel axis and has a radius of gyration about its C.G as 1.1 meter. The front springs have a combined stiffness of $6 \cdot 10^6 \text{N/m}$ and rear springs $6.5 \cdot 10^6 \text{N/m}$. Find the principle mode of vibration of the automobile, and locate the nodal points for each mode

5. Attempt any two questions:

(10*2=20)

- A. Derive the expression for critical speed of shaft. what is its importance?
 - B. Derive the expression for response of a Rotating unbalance system.
 - C. A vibrating system is defined by the following parameters $m= 3\text{kg}$, $K=1000\text{N/m}$, $C=3\text{N-s/m}$. Determine The damping factor, The natural frequency of damped vibration, Logarithmic decrement, The ratio of two consecutive amplitude, The number of cycles after which the original amplitude is reduced to 20%.
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