Registration no: | | | | | | | | | | |

Total Number of Pages: 02 **M.TECH**

CEPC102

1st Semester Back Examination – 2016-17

STRUCTURAL DYNAMICS

BRANCH(S): STRUCTURAL ENGINEERING

Time: 3 Hours

Max Marks: 70

Q.CODE:Y981

Answer Question No.1 which is compulsory and any five from the rest.

The figures in the right hand margin indicate marks.

Q1 Answer the following questions: (2 x 10)

a) Define *time period* and *frequency* of vibration.
b) What is the standard percentage of damping value considered in structural vibration?
c) Distinguish between *free vibration* and *forced vibration*.
d) What do you mean by *response spectrum*?
e) If two springs are in series to each other and their resultant is parallel to a 3rd spring, find the equivalent spring factor. K value for each spring is same.
f) Explain the term, *logarithmic decrement*.
g) What do you mean by *resonant frequency* of a system?
h) What does the 'transient response' of a system mean?
i) Explain, with a neat sketch, the relation between external force and mass, stiffness, damping of a linearly elastic system.
j) What do you mean by dynamic response factor ?

Q2 A spring mass system(k_1, m_1) has a natural frequency f_1. Calculate the value of k_2, which when connected to k_1 in parallel increases the frequency by 50%. (10)

Q3 Derive the equation for torsional vibration of rods. (10)

Q4 The mass and stiffness matrices of a dynamic system are given by [m] = $\begin{bmatrix} 3 & 0 \\ 0 & 1 \end{bmatrix}$ and [k] = $\begin{bmatrix} 3 & -1 \\ -1 & 1 \end{bmatrix}$. Calculate the modal matrix and the generalized masses of the system. Ignore damping. (10)

Q5 A vibratory system in a vehicle is to be designated with the following parameters. K = 150 N/m, C= 2 N-sec/m, m= 1 kg. Calculate (a) the decrease of amplitude from its starting value after two complete oscillations and (b)the frequency of oscillation. (10)

Q6 Determine the time response of the undamped spring mass system to the linearly increasing pulse force. (10)

Q7 What do you mean by continuous models in vibrations? Derive Euler equation for transverse vibration of beams. (5x2)

Q8 Write short notes on any two (5 x 2)

a) Harmonic and periodic motion
b) Under damped system
c) Transient vibration
d) Eigen values and Eigen vectors