(DCE 416 B)

B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the end of Fourth Year)

CIVIL ENGINEERING

Paper - VI : Structural Dynamics

Time : 3 Hours **Maximum Marks : 75**

Answer question No.1 compulsory ***(15)***

Answer ONE question from each unit ***(4 × 15 = 60)***

1) a) Define analytical model.

b) Define mass moment of inertia.

c) What do you mean by static degree of freedom?

d) State D-Alembert's principle.

e) Define time period.

f) What is critical damping?

g) Define amplitude of motion.

h) Mention the characteristics of Simple Harmonic Motion (SHM).

i) State the principle of virtual work.

j) What is transmissibility and write its equation.

k) What is Rayleigh method.

l) When impulsive loading is applied in response to general dynamic loading.

m) What is meant by coupled stiffness matrix?

n) Explain harmonic forced excitation.

o) Write the relationship between stiffness and flexibility matrices.

UNIT - I

2) A steel beam, simply supported has a span of 0.5 m. The cross-section is 50 mm wide and 5 mm deep. This is connected at mid span by means of a spring having a stiffness of 50 N/mm and a load of 1.5 kN is applied at the other end of the spring. Determine the natural frequency of the system. Take $E = 2.1 \times 10^5$ N/mm^2. **(15)**

OR

3) A vibrating system consists of mass of 200 kg. The spring stiffness is 600 N/cm and damper with a damping coefficient of 6 N.cm^{-1}sec. Determine damping factor and the natural frequency of damped vibration. **(15)**

UNIT - II

4) Explain briefly the following with the help of neat sketches.

a) Undamped Harmonic Excitation. **(7½)**

b) Damped Harmonic Excitation. **(7½)**

OR

5) Define Impulsive loading and Duhamel's Integral. Explain how do you numerically evaluate Duhamel's integral for an undamped system. **(15)**

UNIT - III

6) Determine the natural frequency of vibration of a cantilever beam with a concentrated mass at its end when the distributed mass is taken into account. The beam has a total mass 'm_b' and length 'l'. The flexural rigidity of the beam is EI and the concentrated mass at its end is m. **(15)**

OR

7) a) Explain briefly the generalized single degree of freedom system of a rigid body. **(8)**

b) Describe briefly the Rayleigh's method. **(7)**

UNIT - IV

8) Define shear building. Derive stiffness equations to 3-storey shear building and write the important assumption made in the analysis. **(15)**

OR

9) What are the generalized co-ordinates. Explain how do you obtain them for an Single Degree of Freedom (SDOF) system by considering an example of a rigid body. **(15)**

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