Total No. of Questions : 8] **SEAT No. :**

P4741 **[Total No. of Pages : 3**

[5060]-538
M.E. (Civil - Structures)
STRUCTURAL DYNAMICS
(2013 Pattern) (Semester - I)

Time : 3 Hours] ***[Max. Marks : 50***

Instructions to the candidates:-

1) ***Answer any five questions.***
2) ***Figures to the right side indicate full marks.***
3) ***If necessary, assume suitable data and indicate clearly***
4) ***Use of electronic pocket calculator is allowed.***

Q1) Write a note on hysteretic damping. **[10]**

Q2) For the two cantilever beams whose free ends are connected to springs as shown in Fig.1 write the expressions for the spring constants k_1 and k_2 and determine the equivalent spring constant k_e for the system. **[10]**

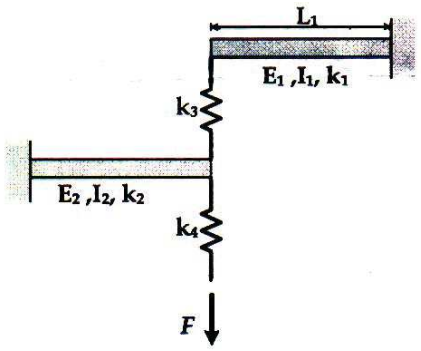

Fig. 1

Q3) Derive the solution for a system subjected to a state of resonance. **[10]**

P.T.O.

Q4) Determine the response for the force F_0 as shown in Fig. 2 for **[10]**

a) $t < t_0$ and

b) $t > t_0$.

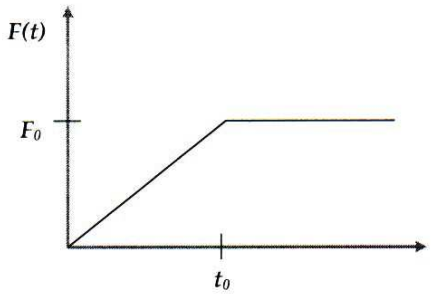

Fig. 2

Q5) A 40 m gantry crane shown in Fig. 3 has a moment of inertia of 0.02 m^4 and modulus of elasticity of 2.06×10^{11} N/m^2. The crane truck has a mass m_1 = 1000 kg, the load being lifted has a mass m_2 = 500 kg, and the cable through which the mass m_2 is lifted has a stiffness of $k = 3 \times 10^5$ N/m. Determine the natural frequencies and mode shapes of the system. **[10]**

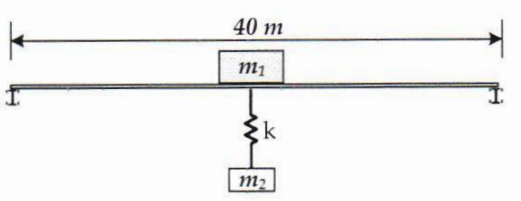

Fig. 3

Q6) Write a note on **[10]**

a) Modal analysis and

b) Explain what are coupled equations?

Q7) What is non-linear analysis? Explain any one method of analysis. **[10]**

Q8) The deflected shape of a non-uniform cantilever beam shown in Fig.4 is defined by $W(x)=\left(1-\frac{x}{l}\right)^2$. Find the fundamental frequency of transverse vibration using the Rayleigh - Ritz method. **[10]**

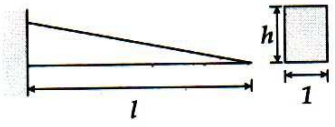

Fig. 4

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