Bibhas Paul

Roll No _____

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- Dec 2017

B.Tech VII / M.Tech I Semester

COURSE CODE: 11M1WCE112 MAX. MARKS: 35

COURSE NAME: STRUCTURAL DYNAMICS

COURSE CREDITS: 3 MAX. TIME: 2 Hrs.

Note: *All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.*

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1. A counterrotating eccentric mass exciter is used to produce forced vibration of a spring supported mass as shown in ***Fig # 1***. When the speed of rotation is varied a resonant amplitude of *0.5 cm* is recorded. When the speed of rotation is increased considerably beyond the resonance frequency, the amplitude tended to be constant at *0.75 cm*. Determine the damping ratio of the system. **[10 Marks]**

2. A simplified SDOF model of a vehicle has mass of 1200 kg and suspension spring stiffness as 400 kN/m. The vehicle runs over a half sine bump at speed of 100 km/hr. The length of the bump is 2 m as shown in ***Fig # 2***. Determine the maximum force exerted on the vehicle by the bump. **[10 Marks]**

3. Determine the natural frequencies and mode shapes of the system shown in ***Fig # 3***. **[8 Marks]**

4. Determine the steady state response of the system shown in ***Fig # 3***. **[7 Marks]**

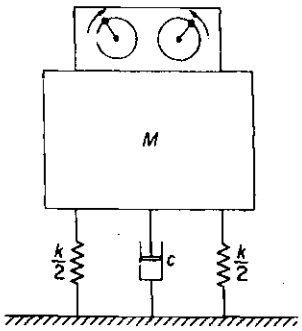

Fig # 1

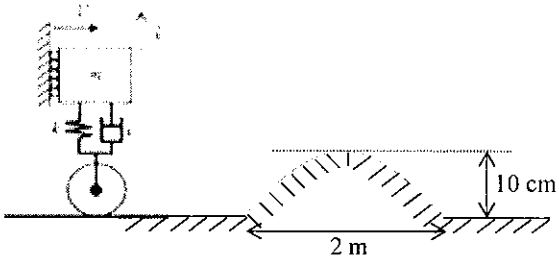

Fig # 2

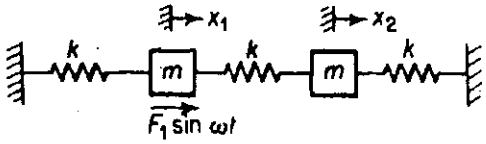

Fig # 3