JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -2 EXAMINATION- 2024

M.Tech. (SE) -I Semester (CE)

COURSE CODE (CREDITS): 11M1WCE112 MAX. MARKS: 25

COURSE NAME: Structural Dynamics

COURSE INSTRUCTORS: Mr. Chandra Pal Gautam MAX. TIME: 1 Hour 30 Minutes

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Note: *(a) All questions are compulsory.*

(b) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

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Q.1. (i) Derive the general solution of un-damped free vibration.

(ii) A 25 kg mass is attached to a spring with a stiffness of 200 N/m. The system is displaced by 0.1 m and released with an initial velocity of 10m/s. Find the natural frequency and the displacement equation. **[4+3 = 7]**

Q.2 The roof of one story building is circular having diameter 5m. It is supported by 3 circular columns of diameter 300mm and height 4m. Thickness of roof slab is 130 mm, Grade of concrete is M30. Assume that all the columns are massless. Find the natural frequency of the system. **[7]**

Q.3. (i) Derive the general solution of damped free vibration.

(ii) The roof of one story building has mass 5000 kg. All the columns supporting the roof together offer a lateral stiffness of 25000 N/m. Assume percentage of critical damping to be 2.3%, find the un-damped and damped natural period of the building. **[4+3 = 7]**

Q.4 Discuss the types of damping depending upon the critical damping ratio with real life examples. Also draw the diagram in amplitude versus time for different damping. **[4]**