

23421

**M.Tech 2nd Semester (Civil Engg.) Specialisation in
Structural Design Examination, May-2017**

**STRUCTURAL DYNAMICS AND EARTHQUAKE
ENGINEERING**

Paper-MTSD-201

Time allowed : 3 hours]

[Maximum marks : 100

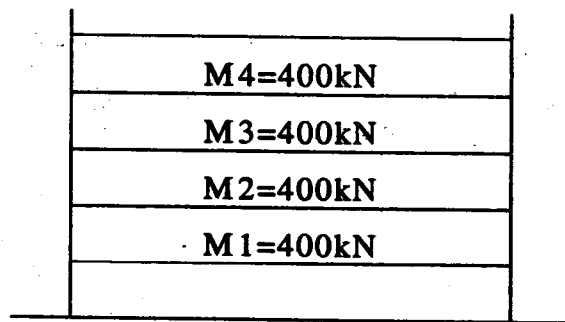
*Note : Attempt any five questions. At least one question
from each unit. Assume any data if missing in the
question paper.*

1. Explain Stodola method and Rayleigh principle with example. 20
2. Derive the expression for numerical evaluation of Duhamel's integral-undamped system. 20
3. Derive the expression for the Damped single degree of freedom with the help of the free body diagrams. 20
4. It is observed that the amplitude of free vibration of a certain structure modeled as a single degree of freedom systems, decreases from 1 to .4 in 10 cycles. What is the percentage of critical damping ? 20
5. Derive the expression for the damped harmonic excitation. 20

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6. A four storey steel frame building as shown in fig. is situated at Delhi. The height of the building is 20m(5m each). The dead and live load is lumped at respective floor. The soil below the foundation is hard rock. Take $I=1.5$, determine the total base shear as per IS1893:2002 and distribute it along the height of the building.



Fixed base

7. A vibrating system consisting of a weight of $w=10 \text{ lb}$ and a spring with stiffness $k=20 \text{ il/in}$ is viscously damped so that the ratio of two consecutive amplitudes is 1 to .85. Determine the natural frequency of undamped system, logarithmic decrement and the damping ratio. 20
8. Define mode shape, eigen values and eigen vectors. Derive the expression for the undamped harmonic excitation. 20