

Code No: **R204101C**

R20

SET - 1

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM

IV B. Tech I Semester Advanced Supplementary Examinations March 2025

STRUCTURAL DYNAMICS

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions. **ONE** Question from **Each unit**

All Questions Carry Equal Marks

UNIT-I

1. a) Explain in detail the methods of discretization. [7M]
- b) Discuss the fundamental objectives of dynamic analysis. [7M]

(OR)

2. a) Explain about different types of prescribed loading. [7M]
- b) Discuss about Formulation of the Equations of Motion [7M]

UNIT-II

3. a) Define critical damping and the equation for critical damping. [7M]
- b) Derive the response of a single degree of freedom system for un damped free vibration. [7M]

(OR)

4. A spring mass system with coulomb damping has a mass of 10kg attached to a spring of stiffness 1200N/m. if the coefficient of friction is 0.03. Calculate a) the frequency of free vibration b) No. of cycles corresponding to 50% reduction in amplitude if the initial amplitude is 7cm and c) the time taken to achieve this 5% reduction. [14M]

UNIT-III

5. a) Explain about Hamilton principle. [7M]
- b) Explain about impulsive and general dynamic loadings. [7M]

(OR)

6. Derive the dynamic load factor for rectangular impulse for shown in Figure.1 using Duhamel's integral. [14M]

Loading phase $0 \leq t \leq t_d$
Free vibration phase $t \geq t_d$

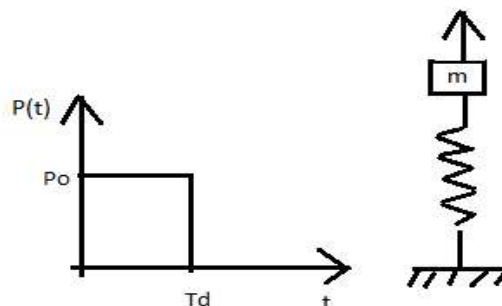


Figure: 1

UNIT-IV

7. Determine the natural frequencies and mode shapes for the figure.2 shown. Take $m_1=1$, $m_2= 2$, [14M]
 $K_1=600$ KN/m, $K_2= 1200$ KN/m.

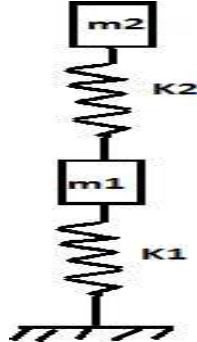


Figure: 2

(OR)

8. What is meant by multi degrees of freedom system and govern the equation of motion for [14M]
MDOF system with neat sketches.

UNIT-V

9. Obtain the differential equation of motion for free flexural vibration of a simply supported [14M]
beam. Sketch the response of first three modes.

(OR)

10. Derive the first mode shape of Cantilever Beam of Continuous system in detail? [14M]
