

SHIV NADAR UNIVERSITY

I. Course Title: Structural Dynamics

II. Course Code: CED314

III. Course Credits (L:T:P): 3 (3:0:0)

IV. Total Contact Hours/Batch/Week (L:T:P): 3:0:0

V. No. of Batches: 1

VI. Course Type: Major Elective/UWE

VII. Prerequisite: Engineering Mechanics

VIII. Course Coordinator/Instructor: Dr. Jagabandhu Dixit

IX. School/Department: Civil Engineering

X. Disciplines to which the course may be of interest: Civil Engineering and Mechanical Engineering

XI. **Course Objectives:**

- To discuss the theory of structural response to dynamic loads and to understand and appreciate the importance of vibrations
- To appreciate the need and importance of dynamic analysis in structural and mechanical designs
- To determine the response of SDOF and MDOF systems (with and without damping) due to free vibrations, harmonic vibrations, and arbitrary excitations
- Students will learn to compute the dynamic response of structural systems under dynamic loads such as blast and earthquake excitations

XII. **Course Content:**

- Fundamentals of vibration
- Dynamic equilibrium of structures
- Formulation of dynamic models for discrete and continuous structures
- Response of single degree of freedom systems to periodic and non-periodic excitations
- Response spectra
- Response of two degree of freedom systems
- Response of multi-degree of freedom systems
- Response of continuous systems
- Random Vibrations

XIII. **Text Books:**

1. J. L. Humar, Dynamics of Structures, CRC Press, 2012

2. S. S. Rao, Mechanical Vibrations, Prentice Hall, 2010

XIV. Reference Books:

1. R. W. Clough and J. Penzien, Dynamics of Structures, CBS, 2015
2. A. K. Chopra, Dynamics of Structures: Theory and Applications to Earthquake Engineering, Pearson, 2007
3. P. Paultre, Dynamics of Structures, Wiley, 2011
4. S. G. Kelly and S. K. Kudari, Mechanical Vibrations, TMH, 2010
5. W. J. Palm, Mechanical Vibration, Wiley India, 2013
6. W. T. Thomson and M. D. Dahleh, Theory of Vibration with Applications, Prentice Hall, 1997
7. M. Paz and W. Leigh, Structural Dynamics: Theory and Computation, Springer, 2013

XV. Assessment Scheme:

Quizzes – 30% (2 quizzes @ 15% each)

Mid Semester Examination – 30%

Final Examination – 40%

Students must score above 40% to pass the course.