CE6701 STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

DETAILED SYLLABUS

UNIT I THEORY OF VIBRATIONS

Difference between static loading and dynamic loading – Degree of freedom – idealisation of structure as single degree of freedom system – Formulation of Equations of motion of SDOF system - D'Alemberts principles – effect of damping – free and forced vibration of damped and undamped structures – Response to harmonic and periodic forces.

UNIT II MULTIPLE DEGREE OF FREEDOM SYSTEM

Two degree of freedom system – modes of vibrations – formulation of equations of motion of multi degree of freedom (MDOF) system - Eigen values and Eigen vectors – Response to free and forced vibrations - damped and undamped MDOF system – Modal superposition methods.

UNIT III ELEMENTS OF SEISMOLOGY

Elements of Engineering Seismology - Causes of Earthquake – Plate Tectonic theory – Elastic rebound Theory – Characteristic of earthquake – Estimation of earthquake parameters - Magnitude and intensity of earthquakes – Spectral Acceleration.

UNIT IV RESPONSE OF STRUCTURES TO EARTHQUAKE

Effect of earthquake on different type of structures – Behaviour of Reinforced Cement Concrete, Steel and Prestressed Concrete Structure under earthquake loading – Pinching effect – Bouchinger Effects – Evaluation of earthquake forces as per IS:1893 – 2002 - Response Spectra – Lessons learnt from past earthquakes.

UNIT V DESIGN METHODOLOGY

Causes of damage – Planning considerations / Architectural concepts as per IS:4326 – 1993 – Guidelines for Earthquake resistant design – Earthquake resistant design for masonry and Reinforced Cement Concrete buildings – Later load analysis – Design and detailing as per IS:13920 – 1993.

TEXTBOOKS

1. Chopra, A.K., "Dynamics of Structures – Theory and Applications to Earthquake Engineering", 4th Edition, Pearson Education, 2011.

2. Agarwal. P and Shrikhande. M., "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd. 2007

REFERENCES

1. Biggs, J.M., "Introduction to Structural Dynamics", McGraw Hill Book Co., New York, 1964

2. Dowrick, D.J., "Earthquake Resistant Design", John Wiley & Sons, London, 2009

3. Paz, M. and Leigh.W. "Structural Dynamics – Theory & Computation", 4th Edition, CBS Publishers & Distributors, Shahdara, Delhi, 2006.

OBJECTIVES

The main objective of the course is to introduce dynamic loading and the dynamic performance of the structures to the students. Different types of dynamic loading also to be discussed. The detailed study on the performance of structures under earthquake loading is also one of the focus of the course.