AMSV21 STRUCTURAL DYNAMICS AND EARTHQUAKE RESISTANT DESIGN

UNIT-1 INTRODUCTION TO STRUCTURAL DYNAMICS

1.1 Theory of vibrations- Lumped mass and continuous mass systems
1.2 Single Degree of Freedom (SDOF) Systems- Formulation of equations of motion
1.3 Un damped and damped free vibration- Damped- Force vibrations
1.4 Response to harmonic excitation- Concept of response spectrum.

UNIT-2 MULTI-DEGREES OF FREEDOM (MDOF) SYSTEMS (LIMITED TO 2 DOF)

2.1 Formulation of equations of motion- Free vibration
2.2 Determination of natural frequencies of vibration and mode shapes
2.3 Orthogonal properties of normal modes
2.4 Mode superposition method of obtaining response.

UNIT-3 EARTHQUAKE ENGINEERING

3.1 Engineering Seismology- Earthquake phenomenon- Causes and effects of earthquakes
3.2 Faults- Structure of earth- Plate Tectonics- Elastic Rebound Theory
3.3 Earthquake Terminology- Source, Focus, Epicenter etc.
3.4 Earthquake size-Magnitude and intensity of earthquakes, Classification of earthquakes
3.5 Seismic waves- Seismic zones- Seismic Zoning Map of India- Seismograms and Accelerate grams.

UNIT-4 CODAL DESIGN PROVISIONS

4.1 Review of the latest Indian seismic code IS:1893- 2002 (Part-I) provisions for buildings
4.2 Earthquake design philosophy- Assumptions- Analysis by seismic coefficient and response spectrum methods
4.3 Displacements and drift requirements- Provisions for torsion
4.4 Analysis of a multistoried building using Seismic Coefficient method.

UNIT-5 SEISMIC PLANNING

5.1 Plan Configurations- Torsion Irregularities- Re-entrant corners- Non-parallel systems
5.2 Diaphragm Discontinuity- Vertical Discontinuities in load path
5.3 Irregularity in strength and stiffnes Mass Irregularities- Vertical Geometric Irregularity
5.4 Proximity of Adjacent Buildings.

UNT-6 CODAL DETAILING PROVISIONS

6.1 Review of the latest Indian codes IS: 4326 and IS: 13920 Provisions for ductile detailing of R.C buildings – Beam, column and joints.
6.2 SHEAR WALLS: Types- Design of Shear walls as per IS: 13920- Detailing of reinforcements.

Reference Books

1 Earthquake resistance design of structure by Duggal- Oxford University Press.

2 Earthquake Resistant Design by David J. Downik, John Wiley and Sons Publication