ST5102 DYNAMICS OF STRUCTURES

DETAILED SYLLABUS

UNIT I PRINCIPLES OF VIBRATION ANALYSIS

Mathematical models of single degree of freedom systems - Free and forced vibration of SDOF systems, Response of SDOF to special forms of excitation, Effect of damping, Transmissibility, applications-examples related to structural engineering

UNIT II TWO DEGREE OF FREEDOM SYSTEMS

Mathematical models of two degree of freedom systems, free and forced vibrations of two degree of freedom systems, normal modes of vibration, applications.

UNIT III DYNAMIC RESPONSE OF MULTI-DEGREE OF FREEDOM SYSTEMS

Mathematical models of Multi-degree of freedom systems, orthogonality of normal modes, free and forced vibrations of multi degree of freedom systems, Mode superposition technique, response spectrum method, Applications.

UNIT IV DYNAMIC RESPONSE OF CONTINUOUS SYSTEMS

Mathematical models of continuous systems, Free and forced vibration of continuous systems, Rayleigh – Ritz method – Formulation using Conservation of Energy – Formulation using Virtual Work, Applications.

UNIT V DIRECT INTEGRATION METHODS FOR DYNAMIC RESPONSE

Damping in MDOF systems, Nonlinear MDOF systems, step-by-step numerical integration algorithms, substructure technique, Applications.

REFERENCES:

1. Anil K.Chopra, Dynamics of Structures, Pearson Education, 2007.

2. Leonard Meirovitch, Elements of Vibration Analysis, McGraw Hill, 1986, IOS Press, 2006.

3. Mario Paz, Structural Dynamics -Theory and Computation, Kluwer Academic Publishers, 2004.

4. Roy R.Craig, Jr, Andrew J. Kurdila, Fundamentals of Structural Dynamics, John Wiley & Sons, 2011.

OBJECTIVE:

To expose the students the principles and methods of dynamic analysis of structures and to prepare them for designing the structures for wind, earthquake and other dynamic loads.