INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
Course Handout Part II

Date:01/08/2016

In addition to part-I (General Handout for all courses appended to the time table) this portion gives further specific details regarding the course.

Course No. : DE G611
Course Title : DYNAMICS & VIBRATIONS
Instructor-in-charge : Dr. ARUN KUMAR JALAN

1. **Scopes and Objective of the Course:**
The course covers advanced topics in dynamics and vibrations. The emphasis is on application to common engineering situations. The main aim of the course is to prepare students to tackle complex and frontier technological problems in dynamics and vibrations. The analysis of increasingly complex system, has been instrumental in the development of advanced concepts like Lagrange and variation calculus, which forms the core of Part A (dynamics). Advanced topics like Non-linear system analysis is included in Part B.

2. **Text Book:**
"Elements of Vibration analysis", Leonard Meirovitch, McGraw-Hill, Singapore, 1986.

3. **Reference Books:**
a) "Vibration Theory and application", William T. Thomson, CBS Publications, 3rd Ed., 1988.
b) "Mechanical Vibrations - Theory and Application" Francis S. Tse, Ivan E. Morse and Rolland T.Hinkle, Allyn and Bacon Inc. London, 1983.
c) "Classical Dynamics", Donald T. Greenwood, Prentice Hall Inc. Englewood Cliffs, 1977.
d) "An Introduction to advanced Dynamics" S. W. McCuskey, Addision-wesley publishing company,Inc. 1962
e) "Advanced Engineering Dynamics", Harrision and Nettleton, John wiley & sons. New york.1997.

4. **Course Plan:-**

PART (A)

Lect. No	Topics to be covered	Learning Objective	Reference Chap./Sec
1-2	Review Newtonian Mechanics	Newton's law, Principle of virtual work, D Alemberts Principle	Class Notes RB (c): 2,3 RB (D): 1 RB (E): 1
3-4	Lagrange Mechanics Formulation	Lagrange Mechanics, Generalized Coordinates,	Class Notes RB (D): 2 RB (E): 2
5-6	Application of Lagrange Mechanics	Particle and rigid body problems, Engineering Application	Class Notes RB (D): 2

			RB (E): 2
7	Introduction to Hamiltonian Mechanics	Extremism Based concepts examples calculus of variation	Class Notes RB (D): 2 RB (E): 3
8-10	Formulation of Hamiltonian Mechanics	Formulation for Hamiltonian Principle, Euler Equation Examples	Class Notes RB (D):4
11-12	Applications of Euler Equation	Examples Continued	Class notes
PART B			
13-14	Introduction to Vibration	Review of Single dof free & forced Vibrations	TB : 1 RB (b) : 1,2
15-16	Understanding higher dof concept	Two dof, Modal vectors Eigenvalue Problems	TB : 4
17-18	Extension to Multi dof	Lumped Paramter model of continuous system	TB : 4
19	Problems in Multi-DOF	Problem solving	TB : 4
20-21	General Discussion of Continuous Systems	Continous system Exact Solution	TB : 5
22-24	Comparing Discrete and Continuous models	String problem Axial vibration of rod	TB : 5
25-27	Continuous Model: Exact Solutions	Bending vibration of Bars Boundary conditions	TB : 5
28-30	Continuous system: Approximate solutions	Rayleigh's energy method, Rayleigh-Ritz method	TB 7
31	Approximate solutions Continued	Holzer's method	TB 7
32	Finite Element method	General Discussion, Stiffness Matrix by direct approach	TB 8
33-34	Equation of motion using FEM	Assembly process	TB 8
35-36	Solution of equation of motion (FEA)	Eigen value problem, Rayleigh-Ritz method	TB 8
37-38	FEA Continued	Heirarchial finite element method	TB 8
39-40	Introduction to Nonlinear systems	General consideration, Perturbation Technique	TB 10

5. **Evaluation Scheme:**

Component	Duration	Weightage (%)	Date & Time	Remarks
Mid-sem	90 mts	25		CB
Assignment/ Seminar		20		OB
Project		15		OB
Compre. Exam	3 hrs	40		OB+CB

6. **Chamber Consultation Hours:** Wednesday 3.30 pm to 4.30 pm

7. **Notice:** All the notices regarding the course will be displayed on the Department Notice Board.

Instructor-in-charge
DE G611