



चौधरी रणबीर सिंह राजकीय अभियांत्रिकी एवं तकनीकी संस्थान, झज्जर
Ch. Ranbir Singh State Institute of Engineering and Technology
Silani Kesho, Jhajjar, Haryana 124103



Department of Civil Engineering
8th Semester (2024-25) (Civil Engineering)

LESSON PLAN

Program	:	B.Tech
Year & Sem.	:	8th
Course No/code	:	PEC-CEEL-414-G
Course Title	:	Structural Dynamics
Max Marks	:	75
No. of Total Lecture	:	36 Lecture/ 12 week Plan
Schedule	:	03 Lecture per week (As per Guidelines of Head of Deptt.)
Name of Faculty	:	Er. Varsha Rani

Recommended Books:

1. Chopra, A.K., "Dynamics of Structures", Prentice Hall, 3rd Edition, NY, 1970.
2. Clough, R.W. & Penzin, J., "Dynamics of Structures", McGraw Hill, 1993.
3. Humar, J.L., "Dynamics of Structures", Prentice Hall, 1990.

Lesson Plan:

LESSON PLAN (As per Guidelines of Head of Deptt.)		
Deptt.: Civil Engg. (2023-24)		Name of Faculty: Er. Varsha Rani
Semester : 8th (2023-24)		Subject: Structural Dynamics (PEC-CEEL-414-G)
Total Duration: 12 week		Workload of subject: 03 Lecture per week (As per Guidelines of Head of Deptt.)
Week	Lecture Day	Name of Topic
1st	1st	Unit-1 Module I: Introduction. Importance of structural dynamics, Difference between static loading and dynamic loading, brief history of vibration.
	2nd	Terminology, Sources of vibration, types of excitations, Principle and working of piezoelectric transducers
	3rd	Spring action and damping; Degrees of freedom;
2nd	4th	Application of Newton's laws, D'Alembert 's principle.
	5th	Module 2: Single degree of freedom systems

	6th	Free vibration of SDOF (Single Degree of Freedom) systems,
3rd	7th	undamped, Damped, viscously damped systems; Coulomb damping material and radiation damping.
	8th	Response of viscously damped SDOF systems to harmonic excitation; Vibration Isolation, Logarithmic decrement.
	9th	Unit-II Module 3: Forced vibration of SDOF system
4th	10th	Forced vibrations of SDOF system, Response of undamped and damped system subjected to harmonic loading
	11th	response to SDOF subject to harmonic base excitation
	12th	Duhamel 's integ>Tal , response to general system of loading
5th	13th	dynamic load factor, response spectrum,
	14th	Module 4: Free vibration of MDOF (Multi Degree Freedom System)
	15th	Free vibration of MDOF (Multi Degree Freedom System),
6th	16th	Natural frequencies, Normal modes, Orthogonality of normal modes
	17th	Eigen Values Shear buildings modeled as MDOF systems.Free vibrations, Natural frequencies
	18th	Unit-III Module 5: Forced vibrations
7th	19th	Forced vibrations, Motion of shear buildings, Model Superposition Method
	20th	Response to shear buildings, Base motion, Harmonic fixed excitation.
	21st	Damped motion of shear buildings, Equations for damped shear buildings, uncoupled damped equations,
8th	22nd	
	23rd	Conditions for damping uncoupled.
	24th	Module 6: Dynamic analysis of base stiffness matrices
9th	25th	Dynamic analysis of base stiffness matrices, Lumped mass
	26th	consistent mass formulation, Equations of motion
	27th	Unit-IV Module 7: Vibration of Continuous Systems: Free vibrations of Continuous systems-axial
10th	28th	transverse vibration of bars I beams. Response of continuous systems to dynamic loads.
	29th	Energy Principle, Rayleigh-Ritz method.
	30th	Module 8: Deterministic Earthquake Response of Systems Rigid Foundation, Types of Earthquake Excitation
11th	31 st	Response to Rigid Soil Excitation, Lumped SDOF elastic systems, Lumped SDOF elastic system

	32 th	Distributed Parameter Elastic Systems - SRSS, CQC combination of modal responses
	33 th	Course Outcomes At the end of the course, the students will be able to
12th	34 th	Convert structure into SDOF system
	35 th	Find response of free and force vibration (harmonic, periodic and transient) of SDOF system
	36 th	Find natural frequency and mode shapes of MDOF system

Approved By:

Er. Varsha Rani
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HOD
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