Academic Course Description

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BHARATH UNIVERSITY
Faculty of Engineering and Technology
Department of Civil Engineering

BCE083 - SOIL DYNAMICS & MACHINE FOUNDATION
Eighth   Semester, 2016-17 (Even Semester)

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Course (catalog) description

To understand the soil properties and suitable remedial measures to improve their behavior and to familiarize students with the dynamic properties of soil. To create an understanding about the importance of designing machine foundation for reciprocating and impact machines

Compulsory/Elective course   : Non major Elective for Civil students

Credit/ Contact hours   :   3 credits/45 hr

Course Coordinator   : Dr.S.J.Mohan, Professor

Instructors   :

Name of the instructor	Class handling	Office location	Office phone	Email (domain:@ bharathuniv.ac.in	Consultation
Dr.S.J.Mohan,	Final year Civil	Civil Block		mohansjm@yahoo.com	2.30 – 3.30 PM

Relationship to other courses:

Pre –requisites   :   BCE404 - BASIC STRUCTURAL DESIGN

Assumed knowledge   :   Basic knowledge in STRUCTURAL DESIGNAL

Following courses   :   -Nil-

Syllabus Contents

UNIT I   INTRODUCTION   8
Vibration of elementary systems – vibratory – single degree freedom -system – free and forced vibrations with and without damping – transient response of single degree freedom systems.

UNIT II   WAVES & WAVE PROPAGATION   9
Wave propagation in an elastic homogeneous isotropic medium - Shear and compression waves - wave propagation in elastic, half space (no theoretical treatment or derivation) properties of compression, shear and Raleigh waves – application in soil dynamics.

UNIT III DYNAMIC PROPERTIES OF SOILS   9
Elastic properties of soils – soil treated as spring or elastic half space – Co – efficient – provision of dynamic properties of soil as per latest BIS 5249 -Co efficient of elastic, uniform and non-uniform compression and shear- Determination of dynamic properties of soil- Field & Laboratory methods.

UNIT IV DESIGN OF MACHINE FOUNDATION   10

General requirements of machine foundations – Design criteria – principles of & simple procedures of design of foundations for machineries of reciprocating type, Impact& Rotary type (treated as single degree freedom only) – dynamic loads, simple design procedures for foundations under Reciprocation machines. Impact type machine and Rotary type machines.

UNIT V VIBRATION ISOLATION & SCREENING   **9**

Vibration isolation technique mechanical isolation, foundation isolation, isolation by location isolation by barriers – active and passive isolation tests – problems – types of Isolation – active, passive – principles of vibration neutralizer (no derivation)

TEXT BOOKS:

1. Swamisaran, "Soil Dynamics and Machine Foundations", Galgotia Publications Pvt. Ltd., 2010.

REFERENCES BOOKS:

2. Rtehart F.E, R.D.Woods & J.R. Hall, vibrations of Soils and Foundations, Prentice Hall, 1970.
3. Prakash S. & Pun V.K, Soil Dynamics & Design foundation, McGraw Hill Co. 1998.
4. Srinivasulu P &Vaidanathan C," Handbook on machine Foundations", McGraw Hill Co.1976.
5. Code Practice of Design and Construction of Machine Foundations, I.S.2974, 1987 Part I to IV.
6. Prakash .S and Puri V.K, "Foundation for Machines", McGraw Hill Publishing Company, Newyork, 1988

Computer Usage   Yes

Professional component

General	-	0%
Basic Sciences	-	0%
Engineering sciences & Technical arts	-	0%
Professional subject	-	100%

Broad area: Measuring| Leveling | Set outs| Marking

Test Schedule

S. No.	Test	Tentative Date	Portions	Duration
1	Cycle Test-1	February 1st week	Session 1 to 14	2 Periods
2	Cycle Test-2	March 2nd week	Session 15 to 28	2 Periods
3	Model Test	April 2nd week	Session 1 to 45	3 Hrs
4	University Examination	TBA	All sessions / Units	3 Hrs.

Mapping of Instructional Objectives with Program Outcome

This Course is to introduce the principles of various design methods and applications to Civil Engineering projects.	Correlates to program outcome		
	H	**M**	**L**
1. Single degree freedom -system – free and forced vibrations with and without damping.	a,e,	b,d	
2. Theory of wave propagation in elastic media.	b	e	
3. Determination of dynamic properties of soil- Field & Laboratory methods.	a,e		
4. Design of foundations for machineries of reciprocating type, Impact& Rotary type	a	d	
5. Active and passive isolation problems		e	

H: high correlation, M: medium correlation, L: low correlation

Draft Lecture Schedule

Session	Topics	Problem solving (Yes/No)	Text / Chapter
UNIT I	**INTRODUCTION**		
1.	Vibration of elementary systems	Yes	[T1, R2]
2.	Problem	Yes	
3.	Single degree freedom -system – free and forced vibrations	Yes	
4.	Problem	Yes	
5.	Single degree freedom -system with and without damping	Yes	
6.	Problem	Yes	
7.	Problem	Yes	
8.	Transient response of single degree freedom systems	Yes	
9.	Problem	yes	
UNIT II	**WAVES & WAVE PROPAGATION**		
10.	Wave propagation in an elastic homogeneous isotropic medium	Yes	[R2] [T1]
11.	Problem	Yes	
12.			
13.	Properties of compression, shear and Raleigh waves	Yes	
14.	Problem	Yes	
15.	Properties of compression, shear and Raleigh waves	Yes	
16.	Problem	Yes	
17.	Problem	Yes	
18.	Application in soil dynamics.	Yes	
UNIT III	**DYNAMIC PROPERTIES OF SOILS**		
19.	Elastic properties of soils	Yes	[R2] [T1]
20.	Problem	Yes	
21.	Problem	Yes	
22.	Dynamic properties of soil as per latest BIS 5249	Yes	
23.	Problem	Yes	
24.	Problem	Yes	
25.	Problem	Yes	
26.	Determination of dynamic properties of soil- Field & Laboratory methods.	Yes	
27.	Problem	Yes	
UNIT IV	**DESIGN OF MACHINE FOUNDATION**		
28.	Design criteria	Yes	[R2] [T1]
29.	Dynamic loads,	Yes	
30.	Problems	Yes	
31.	Design of foundations for machineries of Impact type	Yes	
32.	Problems	Yes	

33.	Problems	Yes	
34.	Design of foundations under Reciprocation machines.	Yes	
35.	Problem	Yes	
36.	Design of machine for Rotary type machines.	Yes	
UNIT V VIBRATION ISOLATION & SCREENING			
37.	Mechanical isolation	Yes	
38.	Problems	Yes	
39.	Problems	Yes	
40.	Isolation by location isolation by barriers	Yes	[R2] [T1]
41.	Problems	Yes	
42.	Problems	Yes	
43.	Active and passive isolation tests	Yes	
44.	Problems	Yes	
45.	Principles of vibration neutralizer	Yes	

Teaching Strategies

The teaching in this course aims at establishing a good fundamental understanding of the areas covered using:

- Formal face-to-face lectures

- Tutorials, which allow for exercises in problem solving and allow time for students to resolve problems in understanding of lecture material.

- Laboratory sessions, which support the formal lecture material and also provide the student with practical construction, measurement and debugging skills.

- Small periodic quizzes, to enable you to assess your understanding of the concepts.

Evaluation Strategies

Cycle Test – I	-	5%
Cycle Test – II	-	5%
Model Test	-	5%
Assignment	-	5%
Attendance	-	10%
Final exam	-	70%

Prepared by: Dr. S.J.Mohan Professor , Department of Civil   **Dated :**

Addendum

ABET Outcomes expected of graduates of B.Tech / Civil / program by the time that they graduate:

a. An ability to apply knowledge of mathematics, science, and engineering
b. An ability to design and conduct experiments, as well as to analyze and interpret data
c. An ability to design a hardware and software system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
d. An ability to function on multidisciplinary teams
e. An ability to identify, formulate, and solve engineering problems
f. An understanding of professional and ethical responsibility
g. An ability to communicate effectively
h. The broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i. A recognition of the need for, and an ability to engage in life-long learning
j. A knowledge of contemporary issues
k. An ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.

Program Educational Objectives

PEO1: PREPARATION

Civil Engineering graduates will have knowledge to apply the fundamental principles for a successful profession and/or for higher education in Civil Engineering based on mathematical, scientific and engineering principles, to solve realistic and field problems that arise in engineering and non engineering sectors

PEO2: CORE COMPETENCE

Civil Engineering graduates will adapt to the modern engineering tools and construction methods for planning, design, execution and maintenance of works with sustainable development in their profession.

PEO3: PROFESSIONALISM

Civil Engineering Graduates will exhibit professionalism, ethical attitude, communication and managerial skills, successful team work in various private and government organizations both at the national and international level in their profession and adapt to current trends with lifelong learning.

PEO4: SKILL

Civil Engineering graduates will be trained for developing soft skills such as proficiency in many languages, technical communication, verbal, logical, analytical, comprehension, team building, inter personal relationship, group discussion and leadership skill to become a better professional.

PEO5: ETHICS

Civil Engineering graduates will be installed with ethical feeling, encouraged to make decisions that are safe and environmentally-responsible and also innovative for societal improvement.

Course Teacher	Signature
Dr. S.J.Mohan	

Course Coordinator   **HOD/CIVIL**