



# SRI BHARATHI

ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi and Affiliated to Anna University, Chennai)  
Kaikkurichi, Pudukkottai -622 303

[www.sbec.edu.in](http://www.sbec.edu.in)

## NAAC DOCUMENTS



Quality Indicator Frame Work

Criterion – 1

CURRICULAR ASPECTS

Submitted by

**IQAC**

**Internal Quality Assurance Cell**

Sri Bharathi Engineering College for Women



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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

<b>Criterion 1</b>	<b>Curricular Aspects</b>	<b>100</b>
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## 1.1 Curricular Planning and Implementation(20)

1.1.1 The Institution ensures effective curriculum planning and delivery through a well-planned and documented process including Academic calendar and conduct of continuous internal Assessment

### Table of contents

S.No	Description
1	Preface of the Course File
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8	Tutorial Question Paper
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11	Student Feedback on Faculty
12	Internal Assessment Schedule
13	Cycle Test Question Paper
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16	Cycle Test Co Based Mark Entry
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18	Retest Schedule
19	Retest Sample Question Paper
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21	Retest Co Based Mark Entry
22	Internal Mark Sheet- Anna University Portal
23	Anna University Grade Sheet
24	Co Po Attainment



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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

### PREFACE OF THE COURSE FILE

Batch : 2018-2022

Academic Year : 2021-2022 / EVEN

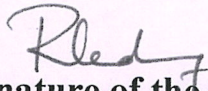
Program : BE CIVIL ENGINEERING

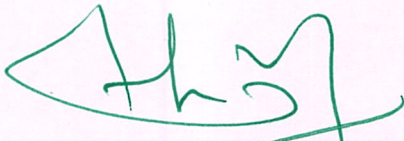
Year & Semester : IV Year / VIII Semester

Course Code : CE8021      NBA COURSE CODE:C409

Name of the Course : Structural Dynamics and Earthquake Engineering

Faculty in-charge : Mrs.R.Padma Rani AP/Civil

  
Signature of the Faculty



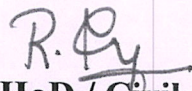
**Dr. S. THILAGAVATHI M.E., Ph.D.,**

PRINCIPAL

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COLLEGE FOR WOMEN

Kaikkurichi - 622 303, Pudukkottai Dt.

  
HoD / Civil

HOD / CIVIL

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DEPARTMENT OF CIVIL ENGINEERING

## REVIEW OF COURSE FILE

(to be pasted on the inner side of the file-backside).(#-State Yes/No.)

S.NO	Details Date:	R-I-*	R-II- *&	R-III- *&	R-IV- *&S	R-V- *&S@
1.	Preface of the course file	Yes				
2.	Vision, Mission, PEOs, POs, PSOs, Blooms taxonomy	Yes				
3.	Subject handlers of yesteryears					
4.	Timetable/Workload of the staff – Distribution of teaching load – Roles and Responsibilities	Yes				
5.	Syllabus signed by staff & HoD	Yes				
6.	Lecture Schedule signed by staff & HoD	Yes				
7.	Course Committee meeting circular and minutes					
8.	Identification of Curricular gap and Content Beyond the syllabus	Yes				
9.	Self-study topics	Yes				
10.	Previous AU Question papers	Yes				
11.	Unit wise Q&A and Objective type questions	Yes				
12.	Unit wise course material	Yes				
13.	Assignment question paper with sample answer sheets and mark entry		Yes			
14.	Tutorial question paper with key and mark entry		Yes			
15.	Class test/IA test Q Paper with Key, sample answer papers and mark entry		Yes			
16.	IA Test- result analysis-CAP-evidence-root cause analysis.		Yes			
17.	Retest –Q paper-Attendance-marks		Yes			
18.	AU Web portal entry sheet		Yes			
19.	Very poor performance in first two tests-action taken.-communication to parents-evidence					
20.	Absence for two tests-action taken-communication to parents-evidence.					
21.	Indiscipline of student reported, if any					
22.	Special class/coaching class/remedial class/attendance-CAP					
23.	Conduct of Seminar, Quizzes - proof					
24.	Content beyond the syllabus - proof				Yes	
25.	Student feedback on faculty				Yes	
26.	Course end survey					
27.	Internal Assessment sheet				Yes	
28.	AU question paper with students feedback					
29.	Discrepancy of the question paper and correspondence, if any					
30.	AU result analysis-Details of arrear students.					
31.	AU grade sheet					Yes
32.	CO – PO & PSO attainment sheet					
	Signature of Course handling faculty					
	Signature of HoD/Civil	 Dr. S. THILAGAVATHI M.E./Ph.D., PRINCIPAL SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN Kaikkurichi - 622 303, Pudukkottai Dt.				

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## DEPARTMENT OF CIVIL ENGINEERING

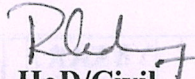
### INDIVIDUAL STAFF WORKLOAD FOR EVEN SEMESTER (2021-2022)

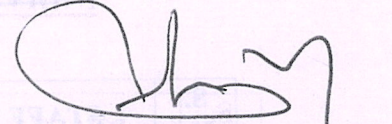
S. No	STAFF NAME	SUB.CODE & SUB.NAME	YEAR / SEM	HRS	TOT. HRS
1.	Dr.S.Guna Selvi	CE8603 - Irrigation Engineering	III/ VI	04	10
		GE3251 - Engineering Graphics (Skilled)	I SEC A	03	
		GE3271 – Engineering Practices Laboratory (Skilled)	I/II (SEC A)	03	
2.	Ms.R.Manju	CE8091 - Hydrology and Water Resource Engineering	IV/ VIII	06	13
		EN8592 - Wastewater Engineering	III/ VI	04	
		CE8612 - Irrigation and Environmental Engineering Drawing	III/ VI	03	
3.	Mrs.R.Priya	CE8601 – Design of Steel Structural Elements	III/ VI	06	12
		CE8612 - Irrigation and Environmental Engineering Drawing	III/ VI	03	
		GE3251 - Engineering Graphics (Skilled)	I SEC A	03	
4.	Ms.G.Gayathri	CE8402 – Strength of Materials II	II/ IV	05	12
		CE8401- Construction Techniques and Practices	II/ IV	04	
		CE8481 – Strength of Materials Laboratory	II/ IV	03	
5.	Mrs.P.Dennis Flora	CE8491 – Soil Mechanics	II/ IV	05	11
		BE8252 – Basic Civil and Mechanical Engineering	I/II	03	
		CE8481 - Strength of Materials Laboratory (Skilled)	II/ IV	03	
6.	Mrs.N.Chithirai Selvi	CE8404 - Concrete Technology	II/ IV	03	12
		GE3251 - Engineering Graphics (Skilled)	I SEC B	06	
		GE3271 – Engineering Practices Laboratory (Skilled)	I/II (SEC B)	03	
7.	Mrs.R.Padma Rani	CE8021 - Structural Dynamics And Earthquake Engineering	IV/ VIII	06	13
		CE8604 - Highway Engineering	III/ VI	04	
		CE8611 - Highway Engineering Laboratory	III/ VI	03	
8.	Mrs.R.Kayalvizhi	CE8602 - Structural Analysis II	III/ VI	05	12
		CE8005 – Air Pollution and Control Engineering	III/ VI	04	
		CE8611 - Highway Engineering Laboratory (Skilled)	III/ VI	03	

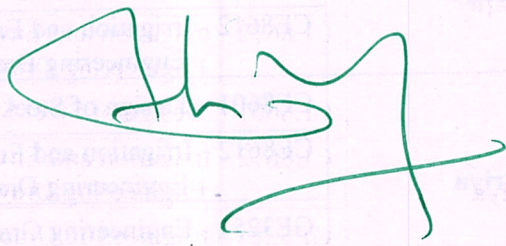
**Dr. S.THILAGAVATHI M.E., Ph.D.,**  
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9.	Mr.A.Sivayogaraj	CE8403 - Applied Hydraulics Engineering	II/ IV	05	14
		CE8461 - Hydraulic Engineering Laboratory	II/ IV	03	
		GE3271 – Engineering Practices Laboratory	I/II (SEC A&B)	06	
10.	Mr.S.Rajapandian	GE3251 - Engineering Graphics	I /II (SEC A&B)	12	14
		BE8252 – Basic Civil and Mechanical Engineering	I/II	02	

  
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**Principal**  
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**KAIKKURICHI - 622 303.**  
**PUDUKKOTTAI DISTRICT**



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## DEPARTMENT OF CIVIL ENGINEERING

### COURSE PLAN

**Subject code & Name: CE 8021 & Structural Dynamics & Earthquake Engineering**

**Branch/Year/Sem: B.E CIVIL / IV / VIII Subject**

**Batch:2018 -2022**

**Staff Name: Mrs. R. Padma Rani**

**Academic year:2021-2022**

#### COURSE OBJECTIVE

- To understand the behaviour of dynamic loading.
- To Study the effect of earthquake loading on the behaviour of structures.
- To Understand the codal provisions to design the structures as earthquake resistant.

#### TEXT BOOK:

**T1.** Mario Paz, Structural Dynamics – Theory and Computations, Fourth Edition, CBS publishers, 1997.

**T2.** Agarwal.P and Shrikhande.M. Earthquake Resistant Design of Structures, Prentice Hall of India Pvt. Ltd. 2007.

#### REFERENCES:

**R1.** Clough.R. W, and Penzien.J, Dynamics of Structures, Second Edition, McGraw Hill International Edition, 1995.

**R2.** Jai Krishna, Chandrasekaran.A.R., and Brijesh Chandra, Elements of Earthquake Engineering, South Asia Publishers, 1994.

**R3.** Minoru Wakabayashi, Design of Earthquake Resistant Buildings, Mc Graw – Hill Book Company, 1986

**R4.** Humar.J.L, Dynamics of Structures, Prentice Hall Inc., 1990.

**R5.**S.R.Damodarasamy and S.Kavitha, Basics of Structural Dynamics and Aseismic Design-PHI learning private ltd. Delhi.

**R6.** Anil K Chopra, Dynamics of structures – Theory and applications to Earthquake Engineering, Prentice Hall Inc., 2007.

**R7.** Moorthy.C.V.R., Earthquake Tips, NICEE, IIT Kanpur,2002.

**R8.** IS13920-1993 Ductile detailing of reinforced concrete structures subjected to seismic forces - Code of practice.

**R9.** IS 1893 part 1 2002 Indian standard criteria for earthquake resistant design of structures.

**R10.** IS 4326-1993 Earthquake Resistant Design and Construction of Buildings--Code of Practice (Second Revision)

#### WEB RESOURCES

**W1:** <https://nptel.ac.in/courses/10510615>

**W2:** <https://drive.google.com/file/d/1S4nnIjtTiMBJtldwS2lzDi5fhlwBgFmx/view>

**W3:** <https://nptel.ac.in/courses/105106151>

#### TEACHING METHODOLOGIES:

- BB - BLACK BOARD
- PPT - POWER POINT PRESENTATION

  
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## DEPARTMENT OF CIVIL ENGINEERING

**CE8021**                      **STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING**                      **LPTC**  
**3003**

### OBJECTIVE:

• To understand the behaviour of dynamic loading. Study the effect of earthquake loading on the behaviour of structures. Understand the codal provisions to design the structures as earthquake resistant.

**UNIT I**                                      **SINGLE DEGREE OF FREEDOM SYSTEM**                                      **9**

Definition of degree of freedom – Idealization of structure as Single Degree of Freedom (SDOF) system – Formulation of equation of motion for various SDOF system – D' Alemberts Principles – Effect of damping – Free and forced vibration of damped and undamped structures – Response to harmonic forces and periodic forces.

**UNITII**                                      **MULTI DEGREE OF FREEDOM SYSTEM**                                      **9**

Formulation of equation of motion for multidegree of freedom (MDOF) system – Evaluation of natural frequencies and modes – Eigen values and Eigen vectors – Response to free and forced vibration of undamped and damped MDOF systems – Modal superposition methods.

**UNITIII**                                      **INTRODUCTION TO EARTHQUAKE ENGINEERING**                                      **9**

Elements of Engineering Seismology – Definitions, Introduction to Seismic hazard, Earthquake phenomenon – Seismotectonics – Seismic Instrumentation – Characteristics of Strong Earthquake motion – Estimation of Earthquake Parameters.

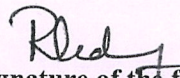
**UNITIV**                                      **EARTHQUAKE EFFECTS ON STRUCTURES**                                      **9**

Effect of earthquake on different types of structures – Behaviour of RCC, Steel and prestressed Concrete Structures under earthquake loading – Pinching Effect – Bouchinger Effects – Evaluation of Earthquake forces – IS Code 1893: 2002 – Response Spectra – Lessons learnt from past earthquakes.

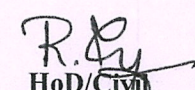
**UNITV**                                      **CONCEPTS OF EARTHQUAKE RESISTANT DESIGN**                                      **9**

Causes of damage – Planning considerations/Architectural concept (IS 4326–1993) – Guidelines for Earthquake resistant design – Earthquake resistant design of masonry buildings – Design consideration – Guidelines – Earthquake resistant design of R.C.C. buildings – Lateral load analysis – Design and detailing (IS 13920:1993).

**TOTAL : 45 PERIODS**

  
Signature of the faculty

  
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## DEPARTMENT OF CIVIL ENGINEERING

Topic No	Topic Name	Books For reference	Page No	Teaching Methodology	No of periods required	Cumulative periods
<b>UNIT I SINGLE DEGREE OF FREEDOM SYSTEM (9)</b>						
1.	Definition of degree of freedom	T1	3-4	BB	1	1
2.	Idealization of structure as Single Degree of Freedom (SDOF) system	T1	5-7	BB	1	2
3.	Formulation of equation of motion for various SDOF system	T1	8-9	BB	1	3
4.	D' Alemberts Principles	T1	10-12	BB	1	4
5	Effect of damping	T1	13-14	BB	1	5
6	Free and forced vibration of undamped structures	T1	15-16	BB	1	6
7	Free and forced vibration of damped structures	T1	31-35	BB	1	7
8	Response to harmonic forces	T1	49-52	PPT	1	8
9	Response to periodic forces.	T1	53-60	BB	1	9
<b>UNIT –II MULTI DEGREE OF FREEDOM SYSTEM (9)</b>						
10	Formulation of equation of motion for multidegree of freedom (MDOF) system	T1	305-310	BB	1	10
11	Evaluation of natural frequencies and modes	T1	311-314	BB	1	11
12	Eigen values and Eigen vectors	T1	315-321	BB	1	12
13	Response to free undamped MDOF systems	T1	322-325	BB	1	13
14	Response to free damped MDOF systems	T1	326-331	BB	1	14
15	Response to forced vibration of undamped MDOF systems	T1	332-336	BB	1	15
16	Response to forced vibration of damped MDOF systems	T1	337-339	BB	1	16

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17	Orthogonality & Normality principles	T1	352-354	PPT	1	17
18	Modal superposition methods	T1	355-358	BB	1	18
<b>UNIT – III INTRODUCTION TO EARTHQUAKE ENGINEERING (9)</b>						
19.	Elements of Engineering Seismology	T1	700-703	BB	1	19
20.	Definitions, Introduction to Seismic hazard	T1	704-708	BB	1	20
21.	Causes of earthquake	T1	709-714	PPT+VH	1	21
22.	Earthquake phenomenon	T1	715-719	BB	1	22
23	Seismotectonics	T1	720-723	BB	1	23
24.	Seismic Instrumentation	T1	724-727	BB	1	24
25.	Characteristics of Strong Earthquake motion	T1	729-734	BB	1	25
26	Estimation of Earthquake Parameters.	T1	186-188	BB	1	26
27	Learning from past earthquake	T1	195-198	BB	1	27
<b>UNIT IV EARTHQUAKE EFFECTS ON STRUCTURES (9)</b>						
28	Effect of earthquake on different types of structures	R5	211-214	BB	1	28
29	Behaviour of RCC Structures under earthquake loading	R5	216-217	BB	1	29
30	Behaviour of Steel Structures under earthquake loading	R5	218-219	BB	1	30
31	Behaviour of prestressed Concrete Structures under earthquake loading	R5	223-227	BB	1	31
32	Pinching Effect	R5	228-230	BB	1	32
33	Bouchinger Effects	R5	232-236	BB	1	33

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## DEPARTMENT OF CIVIL ENGINEERING

34	Evaluation of Earthquake forces – IS Code 1893: 2002	R5	236-240	BB	1	34
35	Response Spectra	R5	199-203	BB	1	35
36	Lessons learnt from past earthquakes.	R5	307-308	PPT	1	36
<b>UNIT V CONCEPTS OF EARTHQUAKE RESISTANT DESIGN</b>						<b>(9)</b>
37	Causes of damage	R5	224-225	BB	1	37
38	Planning considerations / Architectural concept (IS 4326–1993)	R5	224-228	BB	1	38
39	Guidelines for Earthquake resistant design	R5	238-244	BB	1	39
40	Earthquake resistant design of masonry buildings	R5	248-250	BB	1	40
41	Guidelines for Earthquake resistant design of masonry buildings	R5	250-252	BB	1	41
42	Earthquake resistant design of R.C.C. buildings	R5	253-258	BB	1	42
43	Design consideration	R5	271-274	BB	1	43
44	Lateral load analysis	R5	274-280	BB	1	44
45	Design and detailing (IS 13920:1993).	R5	259-265	BB	1	45

### COURSE OUTCOME:

At the end of the course, the student should be able to

C409.1	Explain about the various simulation and mathematical model development.
C409.2	Explain the process of identify, formulate and solve complicated problem.
C409.3	Explain the role of natural calamity in the damage of structures.
C409.4	Develop the skill to analyse data and to apply the same in the practical problems.
C409.5	Apply the developed methodologies for the safe and stable design of structures.
C409.6	Design earthquake resistant structures using IS codes.

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### CONTENT BEYOND THE SYLLABUS:

- Earthquake resistant design for shear wall and coupled shear wall

### INTERNAL ASSESSMENT DETAILS:

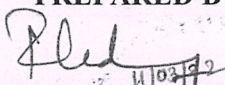
ASSESSMENT NUMBER	I	II	III	MODEL
UNIT	Unit 1 & 2	Unit 3 & half unit in Unit 4)	Half Unit in Unit 4 & Unit 5	All 5 units

### ASSIGNMENT DETAILS:

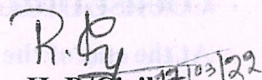
ASSIGNMENT NUMBER	I	II	III
DEADLINE	24.03.2022	28.04.2022	20.05.2022

ASSIGNMENT NUMBER	DESCRIPTIVE QUESTIONS / TOPIC (Minimum of 8 Pages)
I	1. Types of damped systems
II	1. Formulation of equation of motion for MDOF system
III	1. Characteristic of strong earthquake motion

PREPARED BY

  
R. Padma Rani, AP/Civil

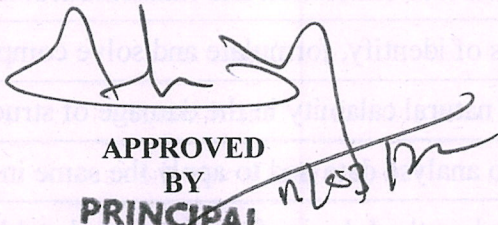
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BY

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## DEPARTMENT OF CIVIL ENGINEERING

### Identification of Curricular Gap & Content Beyond Syllabus(CBS)

Name of the Faculty : Mrs.R.Padma Rani

Course Code & Name : CE8021 & Structural Dynamics and Earthquake Engineering

Academic Year : 2021 -2022 /EVEN

Degree & Program : B.E/CIVIL

Year/ Semester: IV/VIII

#### I.Mapping of Course Outcomes with POs & PSOs.( before CBS)

Table.1 Mapping of COs, PSOs with POs - before CBS.

CE8021	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C409.1	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.2	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.3	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.4	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.5	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.6	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2

#### II. Identification of content beyond syllabus.

Table.2 Identification of content beyond syllabus

Details of Content Beyond Syllabus(CBS) added	POs strengthened/ vacant filled	CO/Unit
Earthquake resistant design for shear wall and coupled shear wall	PO5 (1) Vacant filled	CO5 / V

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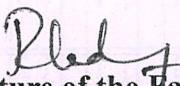
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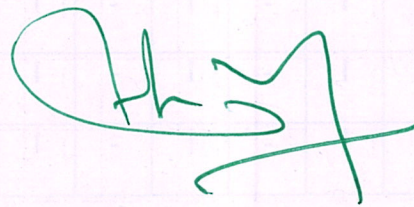
III. Mapping of Course Outcomes with POs & PSOs. (After CBS)

CE8021	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C409.1	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.2	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.3	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.4	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409.5	3	2	2	1	2*	1	-	1	3	1	1	1	3	2	2
C409.6	3	2	2	1	-	1	-	1	3	1	1	1	3	2	2
C409	3	2	2	1	2*	1	-	1	3	1	1	1	3	2	2


Table.3 Mapping of COs, PSOs with POs- after CBS.

  
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(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

### Content Beyond Syllabus(CBS)

Name of the Faculty :Mrs.R.Padma Rani

Course Code & Name : CE8021 & Structural Dynamics and Earthquake Engineering

Academic Year : 2021 -2022 /EVEN

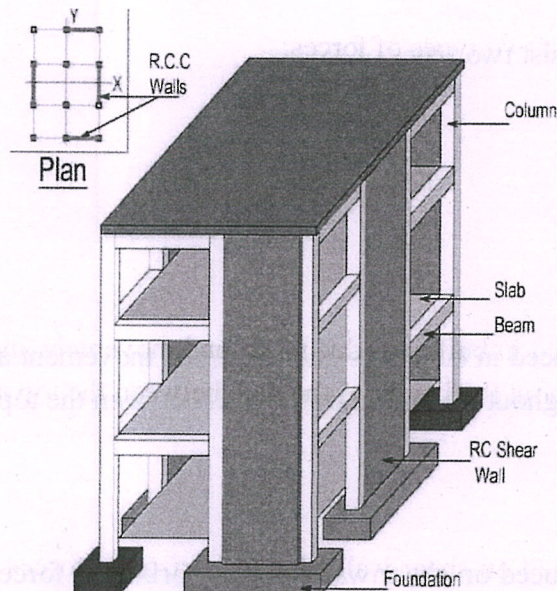
Degree & Program :B.E/CIVIL

Year/ Semester: IV/VIII

#### Shear Wall:

Shear wall is a vertical element used to resist lateral forces such as wind and seismic forces acting on a building structure. It works as a vertical cantilever beam supported at the ground carrying vertical load together with columns. They are mainly used in tall buildings.

In the past two decades, shear walls became an important part of high-rise buildings. As a part of an earthquake building design, these walls are provided in building plans to reduce lateral displacements under earthquake loads.



Reinforced Concrete Shear Wall

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## **Purpose**

These walls are mainly used

1. To resist lateral loads of earthquake and wind.
2. To resist gravity or vertical loads due to its self-weight and other living or moving loads.
3. To resist shear as well as uplift forces on the building.
4. To enhance the strength and stability of a structure.
5. To provide adequate stiffness to the structure.

## **Location Of Shear Wall**

There are mainly two arrangements; one is placed at the edges of the building which could be either plane or flanged shape. The other is placed inside the building in the shape of core walls or channel sections.

In highrise buildings, these walls are generally located at the center of the building, normally in the form of a core wall system to accommodate vertical translation systems such as lifts.

## **Forces On Shear Wall**

These walls mainly resist two types of forces;

1. Shear force.
2. Uplift force.

### **1. Shear Force**

Shear forces are produced in buildings due to ground movement and lateral forces such as wind and waves. These forces act throughout the height of the wall between the top and bottom wall connections.

### **2. Uplift Force**

Uplift forces are produced on shear walls due to horizontal forces act on the top of the wall. These forces try to lift up one end of the wall and push the other end down.

Uplift forces create a greater effect on tall short walls and less effect on low long walls. Sometimes, they require to hold down devices to provide necessary uplift resistance.

  
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## Classification

1. Simple rectangular types and flanged walls.
2. Coupled shear walls.
3. Rigid frame shear walls.
4. Framed walls with in-filled frames.
5. Column supported shear walls.
6. Core type shear walls.

## Types Of Shear Walls

### 1. RC Shear Wall

This is the most common type which consists of reinforced concrete walls and RC slabs. The thickness of the walls varies from 140 mm to 150 mm.

These walls are generally continuous throughout the building's height. However, discontinuous walls might be constructed on the street front or basement level for parking space.

### 2. Steel Plate Shear Wall

Generally, these walls consist of steel plates, boundary columns, and horizontal floor beams. The steel plate wall and boundary columns act as vertical plate girders where the column act as flanges and steel plates act as its web.

These types of walls can be used effectively in highly seismic areas. However, it may be more expensive than other types.

### 3. Plywood Shear Wall

These walls consist of plywood, chords, and base connections. Plywoods transfer shear forces, chords resist tension and compression and base connections transfer shear to the foundation.

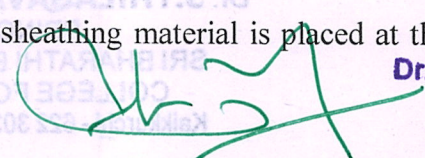
### 4. RC Hollow Concrete Block Masonry Wall

These walls are constructed by providing steel reinforcement both in the vertical and horizontal directions of masonry blocks. RHCBM walls counter lateral seismic loads and safely withstand earthquakes.

This construction system is known as the shear wall diaphragm concept. It gives three-dimensional stability to a building.

### 5. Midply Shear Wall

It is a new concept. One-ply of sheathing material is placed at the center of the wall between a series of

  
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pairs of studs and plates oriented in a 90° rotated position relative to these in standard shear walls.

To prevent brittle failure at the end stud due to high tension forces, steel rods are used at each end of the midply wall.

Midply walls have superior survival characteristics under earthquake loading and have a dynamic load-carrying capacity of more than three times compared to standard shear walls.

### Advantages Of Shear Wall:

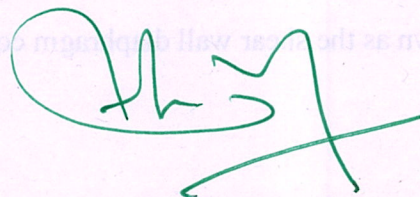
The various advantages are as follows

- These walls provide more strength, stability, and stiffness to a building.
- Reduce lateral sway of a building.
- Easy to construct and easily implemented at the site.
- Thinner walls, hence lightweight.
- Effective in minimizing earthquake damage in structural and non-structural elements.
- Cost-effective.
- Fast construction.
- Best performance.

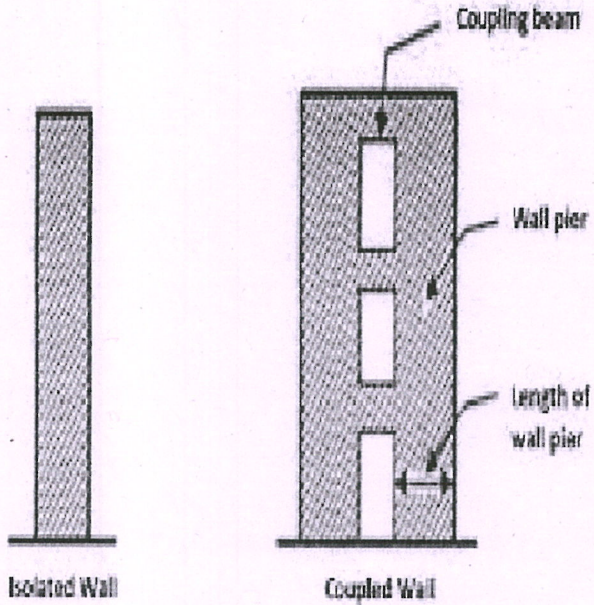
### Coupled shear walls

When two or more shear walls are connected by a system of beams or slabs, total stiffness exceeds the summation of individual stiffness. This is because the connecting beam restrains individual cantilever action. Shear walls resist lateral forces up to 30–40 storeys Walls with openings present a complex problem to the analyst.

Openings normally occur in vertical rows throughout the height of the wall and the connection between wall cross-sections is provided either by connecting beams which form part of the wall or floor slab or a combination of both. The terms 'coupled shear walls', 'pierced shear walls' and 'shear wall with openings' are commonly described for such units. If the openings are very small, their effect on the overall state of stress in the shear wall is minimal. Large openings have a pronounced effect and if large enough result in a system in which frame action predominates. The degree of coupling between two walls separated by a row of openings has been expressed of geometric parameter  $\alpha$  (having a unit of 1/length) which it gives a measure of relative stiffness of beams with respect to that of walls.



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(a) Cantilever shear wall

(b) Coupled shear wall

*Rledy*  
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*R. E.* 11/3/22  
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*[Handwritten signature in green ink]*

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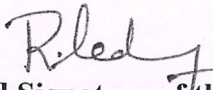
DEPARTMENT OF CIVIL ENGINEERING

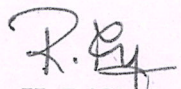
ACADEMIC YEAR 2021-2022(EVEN SEM)

## Assignment Question Paper

Assignment – 01			Date of Issue:	17.3.22	Marks	10
Course code	CE8021	Course Title	Structural Dynamics & Earthquake Engineering			
Year	IV	Semester	VIII	Date of Submission:	24.03.2022	

Q.No	Questions	CO
1.	What is meant by degree of freedom?	C409.1
2.	State D'Alembert's principle.	C409.1
3.	What is meant by logarithmic decrement?	C409.1
4.	What are the consequences of vibration in a system?	C409.1
5.	Define damping.	C409.1
6.	A machine foundation weighs 60KN the spring constant is 11,000KN/m and dash constant $C=200\text{KN-S/m}$ . Find i. Whether the system is overdamped, underdamped or critically damped. ii. Logarithmic decrement iii. Ratio of two successive amplitudes if the initial displacement is 10mm & initial velocity is 0. Displacement at $T=0.1\text{sec}$	C409.1

  
Name and Signature of the Faculty Incharge

  
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DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021-2022(EVEN SEM)

## Assignment Answer Sheet

Name of the Student : S. SRIVIDHYA

AU Register Number: 912618103009

Assignment – 01			Date of Issue:	17.3.22	Marks	10
Course code	CE8021	Course Title	Structural Dynamics & Earthquake Engineering			
Year	IV	Semester	VIII	Date of Submission:	24.03.2022	

Q.No	Questions	CO
1.	What is meant by degree of freedom?	C409.1
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### Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Content Quality	6	05
Presentation Quality	2	02
Timely submission	2	02
Total marks	10	09

Name and Signature of the Faculty Incharge

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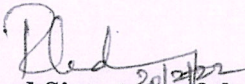
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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

Tutorial – 01			Date of Issue:	20.02.2022	Marks	10
Course code	CE8021	Course Title	Structural Dynamics & Earthquake Engineering			
Year	IV	Semester	VIII	Date of Submission:	22.02.2022	

Q.No	Questions	CO
1.	A one kg mass is suspended by a spring having a stiffness of 1N/mm. Determine the natural frequency and static deflection of the spring.	C409.1
2.	A vertical cable 3m long has a cross sectional area of 4cm <sup>2</sup> supports a weight of 50KN. What will be the natural period and natural frequency of the system? E=2.1*10 <sup>6</sup> kg/cm <sup>2</sup> .	C409.1

  
Name and Signature of the Faculty Incharge

  
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## DEPARTMENT OF CIVIL ENGINEERING

### Tutorial Answer Sheet

Name of the Student : M. Sathya

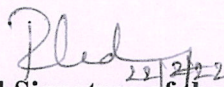
AU Register Number: 912618103008

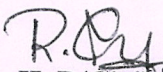
Tutorial – 01			Date of Issue:	20.02.2022	Marks	10
Course code	CE8021	Course Title	Structural Dynamics & Earthquake Engineering			
Year	IV	Semester	VIII	Date of Submission:	22.02.2022	

Q.No	Questions	CO
1.	A one kg mass is suspended by a spring having a stiffness of 1N/mm. Determine the natural frequency and static deflection of the spring.	C409.1
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### Mark Allocation

Rubrics	Marks Allocated	Marks obtained
Problem solving approach	6	06
Correctness of Answer	2	02
Timely submission	2	01
Total marks	10	09

  
Name and Signature of the Faculty Incharge

  
HoD/Civil

  
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## IQAC Academic Audit Form

ACADEMIC YEAR: 2021-2022 EVEN SEMESTER

Name of Department :	CIVIL	Year / Sem :	IV / VIII	No. of Students Registered :	04
Details of Examination :	CT-1 / CT-2 / CT-3 / Model Test				

S.No.	Course Code & Name	List of Reg.No Verified	Course Log Book Verified (Y/N)	Course File Verified (Y/N)	No of students Passed	No of Absentees	No of Failures	Pass %	Remarks
1.	CE 8091 & Hydraulics & Water resource Engineering.	912618103009	Y	Y	4	-	-	100%	-
2.	CE 8021 & Structural Dynamics & Earthquake Engineering.	912618103008	Y	Y	3	-	1	75%	-

Verified by

External Member Name and Signature:

C. Palaniappan 2/6/2022 [C. PALANIAPPAN, AP/ECE]

Internal Member Name and Signature:

P. Dennis Flora 2/6/22 [P. Dennis Flora, AP/CIVIL]

Overall Remarks:

P. Cy  
HoD/ CIVIL

Dr. S. Thilagavathi  
2/6/22  
IQAC Coordinator

Principal

HOD / CIVIL  
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**DEPARTMENT OF CIVIL ENGINEERING**

**ACADEMIC YEAR 2021 - 2022 (EVEN SEMESTER)**

**SUBJECT CODE & TITLE: CE8021 & Structural Dynamics and Earthquake Engineering**

**YEAR/SEM: IV/VIII**

**STUDENT FEEDBACK ON FACULTY**

S.NO.	DESCRIPTION	SCORED OUT OF 4	SCORED OUT OF 100
1.	Syllabus coverage as prescribed by university	4	100
2.	Technical Knowledge of the teacher	4	100
3.	Teacher Communication Skill	3.5	87.5
4.	Regularity in taking classes	4	100
5.	Helping the students in conducting the experiment through set of instructions And Demonstrations	3.25	81.25
6.	Tendency of inviting opinion and questions on subject matter from students	3.75	93.75
7.	Knowledge of the teacher in latest Development of field	3.75	93.75
8.	Perfectness of Valuation	4	100
<b>OVERALL SCORE</b>		<b>3.785</b>	<b>94.53</b>

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## DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021 - 2022 (EVEN SEMESTER)

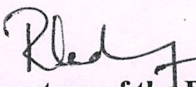
SUBJECT CODE & TITLE: CE8021 & Structural Dynamics and Earthquake Engineering

YEAR/SEM: IV/VIII

### REPORT SHEET

S .NO	REG.NO	NAME	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
1.	912618103005	MEENACHI K	4	4	3	4	3	4	4	4
2.	912618103008	SATHYA M	4	4	3	4	3	4	4	4
3.	912618103009	SRIVIDHYA S	4	4	4	4	3	3	4	4
4.	912618103010	UMAMAHESWARIK	4	4	4	4	4	4	3	4
AVERAGE			4	4	3.5	4	3.25	3.75	3.75	4
PERCENTAGE			100	100	87.5	100	81.25	93.75	93.75	100

EXCELLENT	VERY GOOD	GOOD	AVERAGE	POOR
4	3	2	1	0

  
Signature of the Faculty

  
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**KAIKKURICHI, PUDUKKOTTAI – 622 303.**

**Circular**

Date: 05.05.2022

The Second cycle test will be conducted from **16.05.2022** to **21.05.2022** for the IV, VI & VIII semester (II, III & IV year) students.

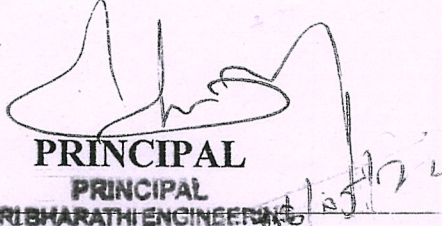
The following instructions are to be followed by the faculty members.

- Total marks for which the question paper to be set will be for 60 marks.  
**(PART A 10X2=20 PART B 2X13=26 & PART C 1X14=14)**
- It is the responsibility of the **question paper** setter to take the Xerox copies of the required number of question papers and it should be handed over to the Exam cell Coordinators Mr. J. Sathyaraj AP/ EEE / Mrs. G. Bhuvaneshwari AP/CSE along with **answer key** on or before **12.05.2022**.
- The Exam Coordinators (exam cell) are requested to make necessary arrangements (hall arrangements, invigilation duty etc.,) for conducting the test.
- Faculty members are requested to handover the valued answer scripts to the students on or before **23.05.2022** and the class in-charges are requested to send the consolidated mark sheet along with the attendance percentage (from 16<sup>th</sup> March 2022 to 14<sup>th</sup> May 2022) to the parents on or before **24.05.2022**.

Ce:

- All faculty
- Exam cell
- Office file

  
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**KAIKKURICHI - 622 303**  
**PUDUKKOTTAI DISTRICT**



**SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN  
KAIKKURICHI, PUDUKKOTTAI – 622 303.**

**Circular**

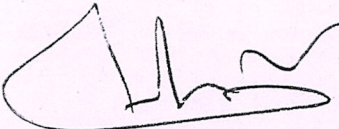
Date: 05.05.2022

The Second cycle test will be conducted from 16.05.2022 to 17.05.2022 for the VIII semester (IV Year) B.E students for 60 marks as per the time table given below. Students are directed to prepare well and score good marks. Regular classes will be conducted at **11.50 am** onwards.

Date	09.45 am -11.45 am
16-05-2022	CE8021-Structural Dynamics and Earthquake Engineering (CIVIL) CS8080-Information retrieval Techniques (CSE) EE8018-Microcontroller Based System Design (EEE) EC8094- Satellite Communication (ECE)
17-05-2022	CE8091-Hydrology and Water Resource Engineering (CIVIL) GE8076-Profession Ethics in Engineering (CSE/ECE) EE8015-Electrical Energy Generation, Utilization and Conservation (EEE)

Cc:

- All IV year B.E Classes
- All faculty
- Exam cell
- Notice Board
- Office file

  
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Dr. **S.THILAGAVATHI** M.E., Ph.D.,  
PRINCIPAL  
SRI BHARATHI ENGINEERING  
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Kaikkurichi - 622 303, Pudukkottai Dt.



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**KAIKKURICHI, PUDUKKOTTAI – 622 303.**

**CIRCULAR**

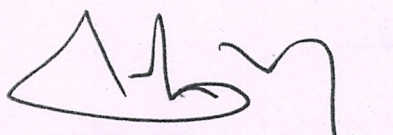
**Date: 13.05.2022**

It is informed that cycle test II scheduled on 16<sup>th</sup> May 2022 for IV year BE Students are rescheduled as given below.

Year/ Department	Subject Code and Name	Date of Examinations	
		Originally Scheduled	Reschedule Date
IV (CIVIL, CSE,EEE & ECE)	CE8021-Structural Dynamics and Earthquake Engineering (CIVIL) CS8080-Information retrieval Techniques (CSE) EE8018-Microcontroller Based System Design (EEE) EC8094- Satellite Communication (ECE)	16-05-2022 FN (09.45 am to 11.45 am)	18-05-2022 FN (09.45 am to 11.45 am)

Cc:

- All HoD's ( CIVIL/ CSE/ EEE/ ECE)
- All faculty members
- IQAC Coordinator
- Exam cell
- Office file

  
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13a	Discuss about the features of seismograph with neat sketch?	C409.3	K2
OR			
13b	Explain about the four recent earthquake and explain how the properties are destroyed?	C409.3	K2

*R. Padma Rani*  
Course Faculty

(Name / Sign / Date)

[R. PADMA RANI]

*R. Manju*  
HoD/Civil

(Name / Sign / Date)

[R. MANJU]

*[Signature]*

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Part - A (10x2 = 20 marks)

1) Focus is the location within the earth where fault rupture actually occurs whereas the epicentre is the location on the surface above the focus. (2)

2)	June 16, 1819	8.3	Kutch	
	June 12, 1897	8.7	Assam	
	April 4, 1905	8.6	Kargra	(2)
	Dec. 26, 2004	9.0	Sumatra	

3) Seismograms are the records produced by seismographs used to calculate the location & magnitude of an earthquake. (2)

4) Lowest frequency of vibration called fundamental frequency. (2)

Corresponding displacement shape of vibration called fundamental mode of vibration.

5) Stiffness due to columns & inertia due to slabs are considered.

No Joint rotations in structure (2)



6) Process of uncoupling the coupled differential equation is called decoupling of equations. (2)

7) It is defined as the time required to complete one cycle of free vibration.

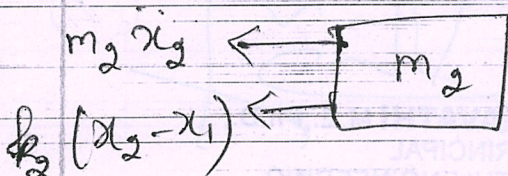
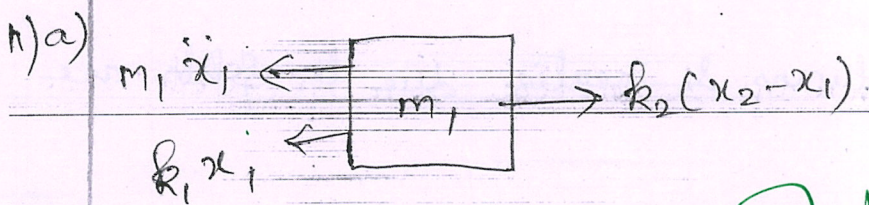
Frequency is the no. of cycles per unit time. (2)

8) It is a graphical representation of the relative amplitudes of the two coordinates & their phase angle relationship. (2)

9) The system which requires two independent coordinates to describe the motion completely called two degree of freedom system. (2)

10) It is a starting pt for understanding the forces within the earth that cause earthquakes. (2)

Part - B (2x13 = 26)



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(4)

$$2)a) \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1.5 & 0 \\ 0 & 0 & 2 \end{bmatrix} \begin{bmatrix} \ddot{x}_1 \\ \ddot{x}_2 \\ \ddot{x}_3 \end{bmatrix} + \begin{bmatrix} 600 & -600 & 0 \\ -600 & 1800 & -1200 \\ 0 & -1200 & 3000 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = 0 \quad (4)$$

$$\omega_1 = 14.5 \text{ rad/s}$$

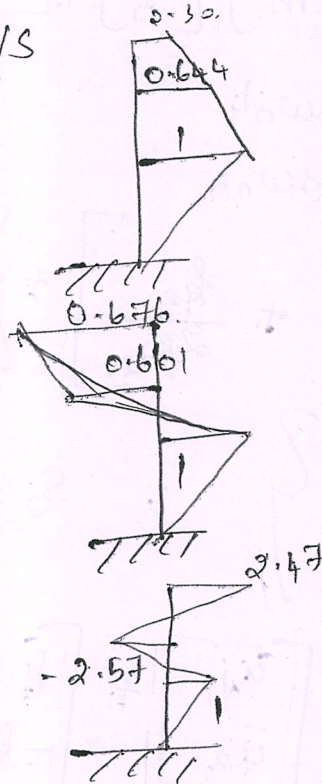
$$\omega_2 = 31.1 \text{ rad/s}$$

$$\omega_3 = 46.1 \text{ rad/s}$$

$$\Phi_1 = \begin{Bmatrix} 1 \\ 0.644 \\ 0.30 \end{Bmatrix}$$

$$\Phi_2 = \begin{Bmatrix} 1 \\ -0.601 \\ -0.676 \end{Bmatrix}$$

$$\Phi_3 = \begin{Bmatrix} 1 \\ -2.57 \\ 2.47 \end{Bmatrix}$$



12)b) Logarithmic Decrement Method -

$$S = \ln \frac{x_1}{x_2} \quad (4)$$

Amplitude  $x_0 = x e^{-\beta \omega n t}$

$$S = \frac{2\pi\beta}{\sqrt{1-\beta^2}}$$

$$S = 2\pi\beta$$

$$x_n = x_0 e^{-nS} \quad (2)$$

Half power Bandwidth method:

To determine the damping rate from

frequency domain.

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(3)

$$\begin{bmatrix} m_1 & 0 \\ 0 & m_2 \end{bmatrix} \begin{bmatrix} \ddot{x}_1 \\ \ddot{x}_2 \end{bmatrix} + \begin{bmatrix} k_1+k_2 & -k_2 \\ -k_2 & k_2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = 0$$

Mass matrix

Stiffness matrix

(3)

characteristic equation is

$$[m] [\ddot{x}] + [k] [x] = 0$$

$$x_1 = X_1 \cos \omega_n t$$

$$x_2 = X_2 \cos \omega_n t$$

(4)

$$R_{1,2} = \left[ \frac{k_1+k_2}{2m_1} + \frac{k_2}{2m_2} \right] + \left\{ \frac{1}{4} \left[ \frac{k_1+k_2}{m_1} + \frac{k_2}{m_2} \right] - \frac{k_1 k_2}{m_1 m_2} \right\} = 0$$

$$S_1 = \left\{ \begin{matrix} X_2^{(1)} \\ X_1^{(1)} \end{matrix} \right\} ; S_2 = \left\{ \begin{matrix} X_2^{(2)} \\ X_1^{(2)} \end{matrix} \right\} \quad (2)$$

11) b)

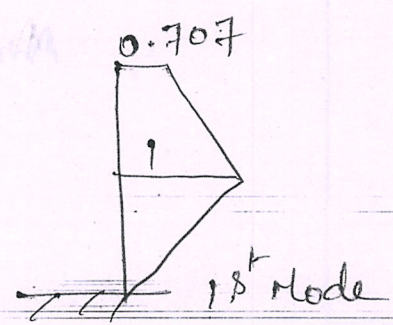
$$\begin{bmatrix} m/4 & 0 \\ 0 & m/2 \end{bmatrix} \begin{bmatrix} \ddot{u}_1 \\ \ddot{u}_2 \end{bmatrix} + \begin{bmatrix} k & -k \\ -k & 2k \end{bmatrix} \begin{bmatrix} u_1 \\ u_2 \end{bmatrix} = 0 \quad (4)$$

$$\omega_1 = \frac{1.53}{L} \sqrt{\frac{E}{\rho}}$$

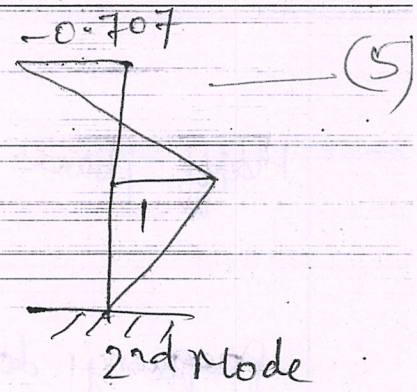
(4)

$$\omega_2 = \frac{3.695}{L} \sqrt{\frac{E}{\rho}}$$

Mode Shape  $\phi_1 = \left\{ \begin{matrix} 1 \\ 0.707 \end{matrix} \right\}$



Mode Shape  $\phi_2 = \left\{ \begin{matrix} 1 \\ -0.707 \end{matrix} \right\}$



13) a) Seismograph :

Instrument used to measure record the motions of a earth's surface caused by seismic waves as a function of time. \_\_\_\_\_ (4)

Parts : -

- 1) clock
- 2) sensor
- 3) recorder
- 4) chart
- 5) Electronic amplifier.

\_\_\_\_\_ (5)

Seismographs often employ three sensors, recording in each of the north-south, east-west & vertical (up & down directions). \_\_\_\_\_ (4)

13) b) Koyna earthquake of 1967 :

Magnitude - 6.5

\_\_\_\_\_ (4)

Bihar - Nepal earthquake of 1988 :-

Magnitude - 6.6

\_\_\_\_\_ (2)

RC structure more damaged.

Jabalpur earthquake 1997 :-

RC frame buildings with open 1<sup>st</sup> storey

were damaged due to failure of ground storey columns.

\_\_\_\_\_ (4)

Sikkim earthquake 2006 :-

Cause Damage to both masonry as well as reinforced concrete buildings.

Course Faculty

12/5/22

\_\_\_\_\_ (4)



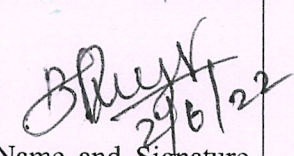

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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## Cycle Test Answer Book

Name	M. Sathya			Year/ Semester	IV/VIII
Reg No.	212618103008	Date/Session	18.5.22/AN	Department	CIVIL
Course code	CE 8021	Course Title	Structural Dynamics & Earthquake Engine		
Cycle Test (Put a tick mark)	CT 1 <input type="checkbox"/>	CT 2 <input checked="" type="checkbox"/>	CT 3 <input type="checkbox"/>	Model	<input type="checkbox"/>
Name and Signature of the Invigilator with date		V. NITHYA POORANI 18/5/22 [V. NITHYA POORANI APICE]			

Instruction to the Student: Put tick mark to the question attended in the column against question.							
Part A			Part B / Part C				Total Marks
Q. No.	✓	Marks	Q. NO.	✓	a	b	
					Marks	Marks	
1	✓	1	11	✓	13		13
2	✓	2	12	✓	10		10
3	✓	2	13	✓	9		9
4	✓	2	14				
5	✓	2	15				
6		—	16				
7		—	<b>Total</b>				
8	✓	2	47/60		R. Padma Rani 18/5/22 [R. PADMA RANI Name and Signature of the Examiner with date]		
9	✓	2					
10	✓	2					
<b>Total</b>		15					

To be filled by the examiner							
Course Outcomes	1	2	3	4	5	6	Total
Marks allotted		36	24				60
Marks Obtained		29	18				47
IQAC Audit - Remarks							 Name and Signature of the IQAC member
							

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(MRS. B. PRIYA)



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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021 – 2022 (EVEN SEMESTER)

### STUDENTS MARK STATEMENT- CO BASED

#### CYCLE TEST-II

SUBJECT CODE & TITLE: CE8021 & Structural Dynamics and Earthquake Engineering

YEAR/SEM: IV/VIII

MONTH & YEAR: MAY & 2022

S.NO	REG NO	STUDENT NAME	CO2 (36)	CO3 (24)	TOTAL (60)	TOTAL (100)
1.	912618103005	MEENACHI K	16	10	26	<u>43</u>
2.	912618103008	SATHYA M	29	18	47	78
3.	912618103009	SRIVIDHYA S	31	23	54	90
4.	912618103010	UMAMAHESWARI K	24	14	38	63

#### MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	-	-	1	-	1	1	1	-

Total No.of Candidates Present	04
Total No.of Candidates Absent	-
Total No.of Students Pass	03
Total No. of Students Fail	01
Percentage of Pass	75%

*R. S. Thilagavathi*  
Faculty Incharge

*R. S. Thilagavathi*  
**Dr. S. THILAGAVATHI M.E., Ph.D.,**  
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*R. S. Thilagavathi*  
HoD/Civil

HOD / CIVIL  
SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN  
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PUDUKKOTTAI - 622 303

*R. S. Thilagavathi*  
Principal

PRINCIPAL

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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

### ROOT CAUSE ANALYSIS

Name of the Faculty : Mrs.R.Padma Rani

Degree & Program : B.E./CIVIL

Year/ Semester: IV/VIII

Academic Year : 2021 -2022 /EVEN

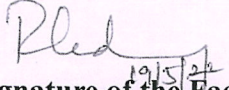
Cycle Test : I/II/III

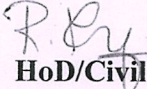
Course Code & Name : CE8021 & Structural Dynamics and Earthquake Engineering

Result Target : 100%

Result Achieved: 75%

S.NO	REG NO	NAME OF THE STUDENT	CAUSES FOR FAILURE	CORRECTIVE ACTION TAKEN
1.	912618103005	K. Meenachi	Confused in problem.	Give more tutorial problems.

  
Signature of the Faculty

  
HoD/Civil

  
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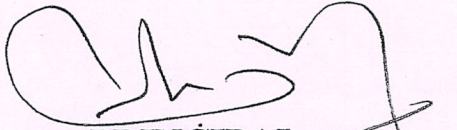
Circular

Date: 23.05.2022

Retest for Second cycle test will be conducted from **25.05.2022** to **31.05.2022** for the IV, VI & VIII semester (II, III & IV year) students.


The following instructions are to be followed by the faculty members.

- Total marks for which the question paper to be set will be for 50 marks.  
**(PART A 5X2=10, PART B 2X13=26 & PART C 1X14=14)**
- It is the responsibility of the **question paper** setter to take the Xerox copies of the required number of question papers.
- Concerned Faculty members are requested to conduct the examination as per the scheduled and handover the valued answer scripts to the students on or before **01.06.2022**.

  
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23/5/22

Cc:

- All faculty
- Exam cell
- Office file

  
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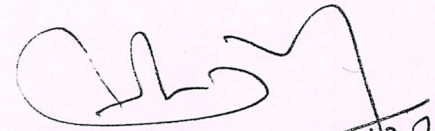
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KAIKKURICHI, PUDUKKOTTAI – 622 303.**

**Circular**

Date: 23.05.2022


Retest for Second cycle test will be conducted from 25.05.2022 to 26.05.2022 for the VIII semester (IV Year) B.E students for 50 marks as per the time table given below. Students are directed to prepare well and score good marks.

Date	04.00 pm -05.30 pm
25-05-2022	CE8021-Structural Dynamics and Earthquake Engineering (CIVIL) CS8080-Information retrieval Techniques (CSE) EE8018-Microcontroller Based System Design (EEE) EC8094- Satellite Communication (ECE)
26-05-2022	CE8091-Hydrology and Water Resource Engineering (CIVIL) GE8076-Profession Ethics in Engineering (CSE/ECE) EE8015-Electrical Energy Generation, Utilization and Conservation (EEE)

  
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23/5/22


Cc:

- All IV year B.E Classes
- All faculty
- Exam cell
- Notice Board
- Office file

  
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Register Number: 

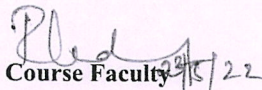
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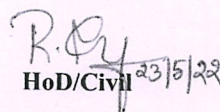
Cycle Test – II - Retest			Date/Session	25.05.2022/AN	Marks	50
Course code	CE8021	Course Title	Structural Dynamics & Earthquake Engineering			
Regulation	2017	Duration	90 minutes	Academic Year	2021-2022(Even Sem)	
Year	IV	Semester	VIII	Department	Civil	

<b>COURSE OUTCOMES : Students will be able to</b>	
<b>C409.1</b>	Explain about the various simulation and mathematical model development.
<b>C409.2</b>	Explain the process of identify, formulate and solve complicated problem.
<b>C409.3</b>	Explain the role of natural calamity in the damage of structures.
<b>C409.4</b>	Develop the skill to analyse data and to apply the same in the practical problems.
<b>C409.5</b>	Apply the developed methodologies for the safe and stable design of structures.
<b>C409.6</b>	Design earthquake resistant structures using IS codes.

Q.No.	Question	CO	BTL
<b>PART A</b>			
(Answer all the Questions 5 x 2 = 10 Marks)			
1	What is meant by fundamental frequency?	C409.2	K2
2	What is meant by multi degrees of freedom system?	C409.2	K2
3	What are the causes of earthquake?	C409.3	K2
4	Classify the types of fault.	C409.3	K1
5	Classify the types of earthquake.	C409.3	K1
<b>PART B</b>			
(Answer all the Questions 2 x 13 = 26 Marks)			
6a	Explain the orthogonality and normality principles.	C409.2	K2
OR			
6b	Explain the concept of modal superposition method.	C409.2	K2
7a	A cantilever bar is to be modelled by a massless uniform bar to which are attached with two lumped masses representing the mass of original system as $k=2AE/L$ & $m=\mu AE$ . Determine the natural frequencies of the system and mode shape of the system.	C409.2	K3
OR			
7b	Evaluate the natural frequency and mode shape for the two degrees of undamped system	C409.2	K3
<b>PART C</b>			
(Answer all the Questions 1 x 14 = 14 Marks)			
8a	Explain about the types of seismic waves with neat sketches.	C409.3	K2
OR			
8b	Explain about the characteristics of strong ground motion.	C409.3	K2

  
 Course Faculty 23/5/22  
 (Name /Sign / Date)  
 [R.PADMA RANI]

  
**Dr. S. THILAGAVATHI M.E., Ph.D.**  
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 HoD/Civil 23/5/22  
 (Name /Sign / Date)  
 {R. MANJU}



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Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021 – 2022 (EVEN SEMESTER)

### ATTENDANCE SHEET –RETEST FOR CYCLE TEST-II

Name of the Faculty :Mrs.R.Padma Rani

Course Code & Name : CE8021 & Structural Dynamics and Earthquake Engineering

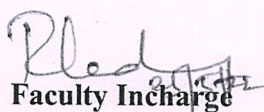
Academic Year : 2021 -2022 /EVEN

Degree & Program :B.E/CIVIL

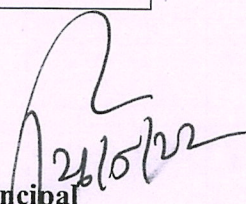
Year/ Semester: IV/VIII

Date:25.05.2022

S.NO	REG NO	STUDENT NAME	SIGNATURE
1.	912618103005	MEENACHI K	K.Meenachi

  
Faculty Incharge

  
HoD/Civil 25/5/22  
HOD / CIVIL  
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Principal  
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Kaikkurichi - 622 303, Pudukkottai Dt.



# SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN

(Approved by AICTE, New Delhi, Affiliated to Anna University, Chennai-25)

Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

## DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021 – 2022 (EVEN SEMESTER)

### STUDENTS MARK STATEMENT- CO BASED

#### RETEST FOR CYCLE TEST-II

SUBJECT CODE & TITLE: CE8021 & Structural Dynamics and Earthquake Engineering

YEAR/SEM: IV/VIII

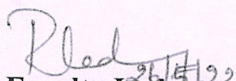
MONTH & YEAR: MAY & 2022

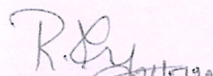
S.NO	REG NO	STUDENT NAME	CO2 (36)	CO3 (24)	TOTAL (60)	TOTAL (100)
1.	912618103005	MEENACHI K	25	12	37	62

#### MARKS RANGE:

<20	20-30	31-40	41-50	51-60	61-70	71-80	81-90	91-100
-	-	-	-	-	1	-	-	-

Total No.of Candidates Present	01
Total No.of Candidates Absent	-
Total No.of Students Pass	01
Total No. of Students Fail	-
Percentage of Pass	100%

  
Faculty Incharge

  
HoD/Civil  
HOD / CIVIL

SRI BHARATHI ENGINEERING  
COLLEGE FOR WOMEN  
KAIKKURICHI,  
PUDUKKOTTAI - 622 303

  
Principal

PRINCIPAL  
SRI BHARATHI ENGINEERING  
COLLEGE FOR WOMEN  
KAIKKURICHI - 622 303  
PUDUKKOTTAI DISTRICT

  
Dr. S.THILAGAVATHI M.E., Ph.D.,  
PRINCIPAL  
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## DEPARTMENT OF CIVIL ENGINEERING

ACADEMIC YEAR 2021 - 2022 (EVEN SEMESTER)

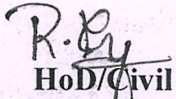
### FINAL INTERNAL STUDENTS MARK STATEMENT(Out of 20)

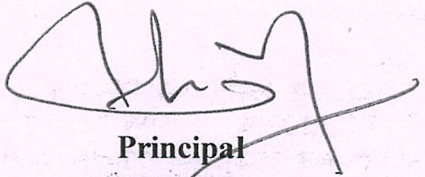
SUBJECT CODE & TITLE : CE8021 & Structural Dynamics and Earthquake Engineering

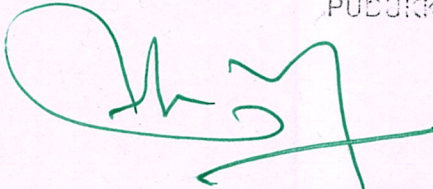
YEAR/SEM : IV/VIII

S.NO	REG NO	STUDENT NAME	TOTAL (20)
1.	912618103005	MEENACHI K	17
2.	912618103008	SATHYA M	18
3.	912618103009	SRIVIDHYA S	19
4.	912618103010	UMAMAHESWARI K	17

  
Faculty Incharge

  
HOD / CIVIL  
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## DEPARTMENT OF CIVIL ENGINEERING

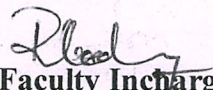
ACADEMIC YEAR 2021-2022 (EVEN SEMESTER)

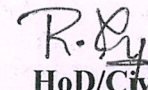
### ANNA UNIVERSITY RESULT STATEMENT APRIL/MAY-2022

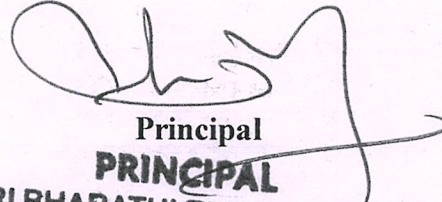
SUBJECT CODE & TITLE : CE8021 & Structural Dynamics and Earthquake Engineering

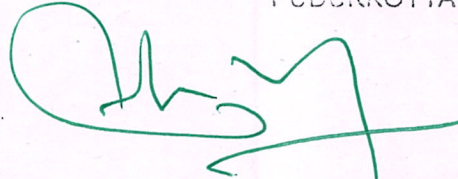
YEAR/SEM : IV/VIII

S.NO	REG NO	STUDENT NAME	GRADE
1.	912618103005	MEENACHI K	B+
2.	912618103008	SATHYA M	A
3.	912618103009	SRIVIDHYA S	A
4.	912618103010	UMAMAHESWARI K	B

  
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**SRI BHARATHI ENGINEERING COLLEGE FOR WOMEN**

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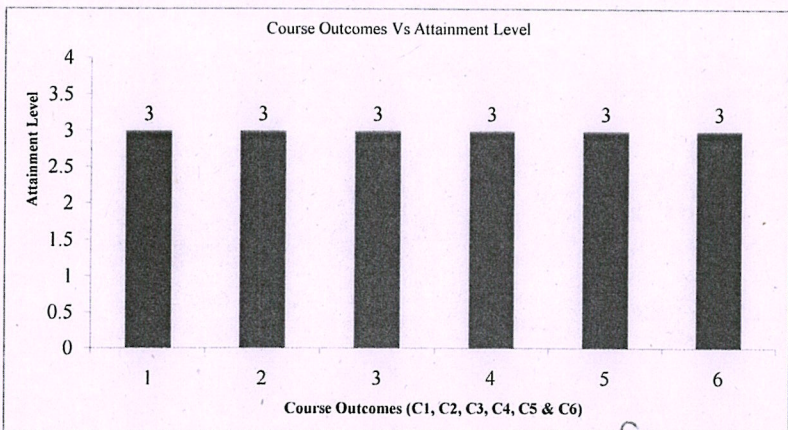
Kaikkurichi, Pudukkottai, Tamil Nadu – 622 303, India

DEPARTMENT OF CIVIL ENGINEERING

Department of Civil Engineering

**Internal Assessment - Attainment of Course Outcomes (Through Direct Assessment)**

ACADEMIC YEAR - 2021 - 22													BATCH		2018-2022																						
COURSE CODE/TITLE		CE8021(C409) / Structural Dynamics and Earthquake Engineering											COURSE OUTCOME																								
YEAR / SEM		IV / VIII											TARGET(%)																								
COURSE COORDINATOR		Mrs.R Padma Rani											TOTAL STRENGTH																								
ATTAINMENT LEVEL		Level		Range																																	
		1		UP TO 60% of the students scored more than target																																	
		2		61 - 79% of the students scored more than target																																	
		3		80% & ABOVE of the students scored more than target																																	
S.NO	REG NO	NAME OF THE STUDENT	IAT 1 - MARKS ALLOTTED						IAT 2 - MARKS ALLOTTED						IAT 3 - MARKS ALLOTTED						Assignment / Mini Project / Tutorial / Seminar						TOTAL COURSE OUTCOME										
			C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6	C1	C2	C3	C4	C5	C6					
			60	40								40	60										60	40		10	10				10	60	50	50	60	60	50
1	912618103005	MEENACHI K	49	32								33	49										53	35		9	8			7	49	41	41	49	53	42	
2	912618103008	SATHYAM	53	36								35	53										57	38		9	7		8	53	45	42	53	57	46		
3	912618103009	SRIVIDHYA S	58	38								39	58										59	40		8	8		9	58	46	47	58	59	49		
4	912618103010	UMAMAHESWARI K	50	34								34	51										53	35		9	8		8	50	43	42	51	53	43		
CO's Target Value																											39.0	32.5	32.5	39.0	39.0	32.5					
No. of Students scored above CO's Target Value																											4	4	4	4	4	4					
Percentage of Students scored above Target																											100.0	100.0	100.0	100.0	100.0	100.0					
CO Attainment																											3	3	3	3	3	3					
CO attainment Values to plot the Graph																											3	3	3	3	3	3					



*[Signature]*  
Faculty Incharge

*[Signature]*  
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*[Signature]*  
HOD/CIVIL  
SRI BHARATHI ENGINEERING  
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KAIKKURICHI,



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**DEPARTMENT OF CIVIL ENGINEERING**

**COURSE OUTCOME ATTAINMENT - UNIVERSITY EXAMINATION**

**ACADEMIC YEAR : 2021 - 2022 (EVEN SEM)**

**CLASS : IV CIVIL**

**Batch:2018-2022**

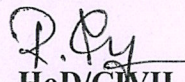
**SUBJECT :CE8021(C409) / Structural Dynamics and Earthquake Engineering**


**CO Attainment Level: 1 - (UPTO 60%) 2- (61%-79%) 3-(80% and Above)**

**TOTAL STRENGTH : 4**

S.NO	Register No	NAME	Univ. Grade	
1	912618103005	MEENACHI K	B+	
2	912618103008	SATHYA M	A	
3	912618103009	SRIVIDHYA S	A	
4	912618103010	UMAMAHESWARI K	B	
No. of O Grade			0	0
No. of A+ Grade			0	0
No. of A Grade			2	2
No. of B+ Grade			1	1
No. of B Grade			1	1
No. of U Grade			0	0
No. of UA Grade			0	0
Target for course outcome Attainment			60	4
No of students above the target			4	
CO-Attainment University (%)			100.00	

  
Faculty Incharge

  
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Overall Attainment Sheet – COs - POs &amp; PSOs attainment calculation

CO	CO-Attainment Internal (CO-INT) (Avg. Attainment of All section) (%)	CO-Attainment University (CO-UNI) (Avg. Attainment of All section) (%)	Direct CO Attainment (0.20xCO-INT + 0.80xCO-UNI) (%)	CO Attainment Level
C409.1	100.0	100.00	100.0	3
C409.2	100.0	100.00	100.0	3
C409.3	100.0	100.00	100.0	3
C409.4	100.0	100.00	100.0	3
C409.5	100.0	100.00	100.0	3
C409.6	100.0	100.00	100.0	3

Expected CO-PO Level

Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C409.1	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.2	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.3	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.4	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.5	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.6	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2

PO Attainment Level

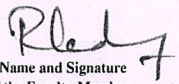
Course	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C409.1	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.2	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.3	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.4	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.5	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409.6	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
C409	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2

Attainment of POs and PSOs:

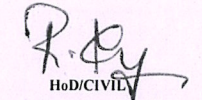
Course Code	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
C409	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2
Attainment	3	2	2	1	-	1	-	1	3	-	1	1	3	2	2

Comments by  
Program  
Coordinator

Remarks by  
HoD

  
Name and Signature  
of the Faculty Member  
**R. PADMA RANI**

  
**Dr. S. THILAGAVATHI M.E., Ph.D.,**  
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