

DEPARTMENT OF CIVIL ENGINEERING

(STRUCTURAL ENGINEERING)

Earthquake Resistant Design of Buildings

(COURSE CODE: GR20D5019)

I M.TECH - II SEMESTER (YEAR 2021-22)

Dr V.Mallikarjuna Reddy

PROFESSOR



GOKARAJU RANGARAJU INSTITUTE OF

ENGINEERING AND TECHNOLOGY

HYDERABAD



**GokarajuRangaraju Institute of Engineering and Technology
(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Department of Civil Engineering

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (GR20D5019)

COURSE FILE CHECK LIST

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DEPARTMENT OF CIVIL ENGINEERING (STRUCTURAL ENGINEERING)

I M. Tech (GR-20) - II Semester

AY: 2021-22

wef : 11-04-2022

| Day/Hour | 09:00-10:00 | 10:00-11:00 | 11:00-12:00 | 12:00-01:00 | 01:00-02:00 | 02:00-03:00 | 03:00-04:00 | Room No. | |
|-----------|-------------|-------------|-------------|-------------|-------------|-------------|-------------|------------------------------|----------------------|
| MONDAY | | | | Lunch | | | | Theory/ Tutorial | 4203 |
| TUESDAY | ERDB | ERDB | | | | | | Lab | 4207 (MT Lab/NA Lab) |
| WEDNESDAY | | | | | | | | M.Tech Co-ordinator | |
| THURSDAY | | | | | | | | | |
| FRIDAY | | | | | | | | Dr. V Srinivasa Reddy (1117) | |
| SATURDAY | | ERDB | ERDB | | | | | | |

| Sub. Code | Subjects | Faculty Name | Almanac | |
|-----------|--|---|--|--------------------------|
| GR20D5012 | FEM in Structural engineering | Dr. G V V Satyanarayana (842) | 1 st Spell of Instruction | 11-04-2022 to 04-06-2022 |
| GR20D5013 | Structural Dynamics | Dr. V Srinivasa Reddy (1117) | 1 st Mid-term Examinations | 06-06-2022 to 11-06-2022 |
| GR20D5015 | Design of Formwork | Mrs.K.Hemalatha (1177) | 2 nd Spell of Instruction | 13-06-2022 to 06-08-2022 |
| GR20D5019 | Earthquake Resistant Design of Buildings | Dr. V. Mallikarjun Reddy (807) | 2 nd Mid-term Examinations | 08-08-2022 to 13-08-2022 |
| GR20D5020 | Model Testing Lab | Mr.C.Vanadeep(1645)/Mr.C.Vivek Kumar(1500) | Preparation | 15-08-2022 to 20-08-2022 |
| GR20D5021 | Numerical Analysis Lab | Mr.V.Naresh Kumar Varma (1359)/Mr.V.Ramesh (1646) | End Semester Examinations/ (Theory/ Practicals) | 22-08-2022 to 03-09-2022 |
| GR20D5143 | Mini Project | Mr. Y. Kamala Raju (929) | Regular/Supplem entary | |
| GR20D5153 | Disaster Management | Mr.Kusuma Veera Babu (1650) | | |

Dr. V Srinivasa Reddy
Coordinator

Ms. Manisha Gunturi
Time Table Coordinator

Dr.C.Lavanya
HOD-CE

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (Professional Elective IV)

Course Code: GR20D5019

L/T/P/C: 3/0/0/3

I Year II Semester

Prerequisite: Engineering Mechanics, Engineering Geology, Strength of Materials, Structural Analysis, Design of Reinforced Concrete Structures and Design of Steel.

Course Objectives:

1. To impart knowledge on the seismology and behaviour of buildings during earthquakes.
2. Geology of the Earth, Movements of Tectonic Plates, and Effects of Earthquakes
3. Dynamic Behaviour of simple structural systems
4. Structural dynamics of simple systems subject to harmonic and random earthquake loading
5. To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy.

Course Outcome: At the end of the course, the student will be able to

1. To understand the fundamentals of earthquake engineering and seismicity conditions of the country and world.
2. To perform site specific deterministic seismic hazard analysis.
3. To understand the concepts of dynamic equations of motion and perform analysis for dynamic systems in civil engineering applications
4. Capable to correlate information from various engineering and scientific discipline to understand complex behaviour of RC structure subjected to seismic forces.
5. Capable to design RC structures in accordance with the provisions of Indian and International Building Codes considering seismic forces

Unit I

Engineering Seismology: Earthquake phenomenon cause of earthquakes, Faults, Plate tectonics, Seismic waves, Terms associated with earthquakes Magnitude/Intensity of an earthquake scales, Energy released, Earthquake measuring instruments, Seismoscope, Seismograph, accelerograph, Characteristics of strong ground motions, Seismic zones of India. Introduction of Functional planning, Continuous load path, Overall form, simplicity and symmetry, elongated shapes, stiffness and strength. Seismic design requirements, regular and irregular configurations, basic assumptions.

UNIT II Conceptual Design - Horizontal and Vertical Load Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. Twisting of Buildings – Flexible Building and Rigid Building Systems. Strength and Stiffness – Ductility – Definition – Ductility Relationships – Choice of construction Materials – Unconfined Concrete & Confined Concrete – Masonry, Steel Structures. Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method – Equivalent Lateral Force Method. Dynamic Analysis – Response Spectrum Method – Modal Analysis Torsion.

UNIT III Introduction to Earthquake Resistant Design – Seismic Design Requirements and Methods. RC Buildings – IS Code based Method. - Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem - Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear – Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes – Behaviour of Unreinforced and Reinforced Masonry Walls – Behaviour of Walls Box Action and Bands – Behaviour of infill Walls - Non Structural Elements – Failure Mechanism of Non-structural Elements – Effects of Non-structural Elements on Structural System – Analysis – Prevention of Damage to Non-structural Elements – Isolation of Non-Structures.

UNIT IV Design of Shear walls: Classification according to Behaviour, Loads in Shear walls, Design of Rectangular and Flanged Shear walls, Derivation of Formula for Moment of Resistance of Rectangular Shear walls – Coupled Shear Walls. Introduction to non-linear static push Over Analysis.

UNIT V Ductility Considerations in Earthquake Resistant Design of RC Buildings: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility-Factors affecting Ductility Ductile detailing considerations as per IS 13920. Behavior of beams, columns and joints in RC buildings during earthquakes-Vulnerability of open ground storey and short columns during earthquake- Seismic Evaluation and Retrofitting. Capacity Based Design: Introduction to Capacity Design, Capacity Design for Beams and Columns - Case studies.

REFERENCES:

1. Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press
2. Earthquake Resistant Design of structures – Pankaj Agarwal and Manish Shrikhande, Prentice Hall of India Pvt. Ltd.
3. Seismic Design of Reinforced Concrete and Masonry Building – T. Paulay and M.J.N. Priestly, John Wiley & Sons
4. Masonry and Timber structures including earthquake Resistant Design –Anand S.Arya, Nemchand & Bros
5. Earthquake –Resistant Design of Masonry Building –Miha Tomazevic, Imperial college Press.
6. Design of Reinforced Concrete Structures by Subramanian, Oxford University Press.
7. Earthquake Tips – Learning Earthquake Design and Construction C.V.R. Murthy

Reference Codes:

1. IS: 1893 (Part-1) -2002. “Criteria for Earthquake Resistant – Design of structures. ”B.I.S., New Delhi.
2. IS:4326-1993, “Earthquake Resistant Design and Construction of Building”, Code of Practice B.I.S., New Delhi.
3. IS:13920-1993, “Ductile detailing of concrete structures subjected to seismic force” – Guidelines, B.I.S., New Delhi



**GokarajuRangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: EARTHQUAKE RESISTANT DESIGN OF BUILDINGS

Course Code:GR20D5019

Program Educational Objective's

PEO 1:

Graduates of the program will equip with professional expertise on the theories, process, methods and techniques for building high-quality structures in a cost-effective manner.

PEO 2:

Graduates of the program will be able to design structural components using contemporary software and professional tools with quality practices of international standards.

PEO 3:

Graduates of the program will be effective as both an individual contributor and a member of a development team with professional, ethical and social responsibilities.

PEO 4:

Graduates of the program will grow professionally through continuing education, training, research, and adapting to the rapidly changing technological trends globally in structural engineering.



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Name of the Program: M.Tech (Structural Engineering)

Year: I

**Course/Subject: EARTHQUAKE RESISTANT DESIGN OF BUILDINGS Course
Code:GR20D5019**

Programme Outcomes

PO 1: An ability to independently carry out research / investigation and development to solve practical problems

PO 2: An ability to write and present a substantial technical report / document.

PO 3: Students should be able to demonstrate a degree of mastery over the area as per the specialization of the program. The mastery should be at a level higher than the requirements in the appropriate bachelor's.

PO 4: Assess the impact of professional engineering solutions in an environmental context along with societal, health, safety, legal, ethical and cultural issues and the need for sustainable development.

PO 5: Possesses critical thinking skills and solves core, complex and multidisciplinary structural engineering problems.

PO 6: Recognize the need for life-long learning to improve knowledge and competence.



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COURSE OBJECTIVES

Academic Year : 2021-22

Semester: II

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: Earthquake Resistant Design of Buildings Course Code: **GR20D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.:Civil Engineering

Designation: PROFESSOR

On completion of this Subject/Course the student shall be able to:

| S.No | Objectives |
|------|---|
| 1 | To impart knowledge on the seismology and behaviour of buildings during earthquakes. |
| 2. | Geology of the Earth, Movements of Tectonic Plates, and Effects of Earthquakes |
| 3 | Dynamic Behaviour of simple structural systems |
| 4 | Structural dynamics of simple systems subject to harmonic and random earthquake loading |
| 5 | To involve the application of scientific and technological principles of planning, analysis, design of buildings according to earthquake design philosophy. |

Signature of HOD

Signature of faculty

Date:

Date:

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the objectives.



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COURSE OUTCOMES

Academic Year : 2021-22

Semester: II

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: Earthquake Resistant Design of Buildings Course Code: **GR20D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.:Civil Engineering

Designation: PROFESSOR

Expected outcomes of the course/subject are:

| S.No | Objectives |
|------|--|
| 1 | To understand the fundamentals of earthquake engineering and seismicity conditions of the country and world. |
| 2. | To perform site specific deterministic seismic hazard analysis. |
| 3 | To understand the concepts of dynamic equations of motion and perform analysis for dynamic systems in civil engineering applications |
| 4 | Capable to correlate information from various engineering and scientific discipline to understand complex behaviour of RC structure subjected to seismic forces. |
| 5 | Capable to design RC structures in accordance with the provisions of Indian and International Building Codes considering seismic forces. |

Signature of HOD

Signature of faculty

Date:

Date:

Note: Please refer to Bloom's Taxonomy, to know the illustrative verbs that can be used to state the objectives.



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| M.Tech (Structural Engineering) I Year II Semester Academic Year 2021-22 | | |
|--|-----------------------|----------------|
| S.No | Student Name | Roll No |
| 1 | A.Prasanth | 21241D2001 |
| 2 | B.Sriram Gopal | 21241D2002 |
| 3 | C.Madhavi | 21241D2003 |
| 4 | P.Divya | 21241D2004 |
| 5 | D.Umesh Kumar | 21241D2005 |
| 6 | K.Lathasree | 21241D2006 |
| 7 | M.Vaishnavi | 21241D2007 |
| 8 | M.Pranav | 21241D2008 |
| 9 | M.Naga Ashwani | 21241D2009 |
| 10 | R.Venkata Suraj Reddy | 21241D2010 |
| 11 | R.Mohan Bbau | 21241D2011 |
| 12 | C.Sandhya | 21241D2012 |
| 13 | Shaik Feroz | 21241D2013 |
| 14 | S K Sai Chandra | 21241D2014 |
| 15 | T. Harsha Vardhan | 21241D2015 |
| 16 | V.Lalitha | 21241D2016 |
| 17 | Y.Rama Gnaneswari | 21241D2017 |
| 18 | Y.Devesh Goud | 21241D2018 |
| 19 | S.Prasanth Kumar | 21241D2019 |
| 20 | B.Tharun Teja | 21241D2020 |
| 21 | G.Nitish Kumar | 21241D2021 |



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GUIDELINES TO STUDY THE COURSE/SUBJECT

Academic Year : 2021-22

Semester : II

Name of the Program: M.Tech(Structural Engineering)

Year: I

Course/Subject: Earth Quake Resistant Design of Buildings

Course Code: **GR20D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy

Dept.: Civil Engineering

Designation: PROFESSOR

Guidelines to study the Course/ Subject: Structural Analysis

Course Design and Delivery System (CDD):

- The Course syllabus is written into number of learning objectives and outcomes.
- These learning objectives and outcomes will be achieved through lectures, assessments, assignments, experiments in the laboratory, projects, seminars, presentations, etc.
- Every student will be given an assessment plan, criteria for assessment, scheme of evaluation and grading method.
- The Learning Process will be carried out through assessments of Knowledge, Skills and Attitude by various methods and the students will be given guidance to refer to the text books, reference books, journals, etc.

The faculty be able to –

- Understand the principles of Learning
- Understand the psychology of students
- Develop instructional objectives for a given topic
- Prepare course, unit and lesson plans
- Understand different methods of teaching and learning
- Use appropriate teaching and learning aids
- Plan and deliver lectures effectively
- Provide feedback to students using various methods of Assessments and tools of Evaluation
- Act as a guide, advisor, counselor, facilitator, motivator and not just as a teacher alone

Signature of HOD

Signature of faculty

Date:

Date:



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COURSE SCHEDULE

Academic Year : 2021-22

Semester : I

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: Earth Quake Resistant Design of Buildings

Course Code: **GR20D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy

Dept.: Civil Engineering

Designation: PROFESSOR

The Schedule for the whole Course / Subject is:

| S. No. | Description | Duration (Date) | | Total No. Of Periods |
|--------|--|-----------------|----------|----------------------|
| | | From | To | |
| 1. | Unit – I Engineering Seismology | 12-04-22 | 03-05-22 | 14 |
| 2. | Unit- II Conceptual Design | 07-05-22 | 21-05-22 | 09 |
| 3. | Unit-III Introduction to Earth quake Resistant Design | 21-05-22 | 18-06-22 | 11 |
| 4. | Unit-IV Design of Shear Walls | 21-06-22 | 16-07-22 | 14 |
| 5. | Unit-V Ductility Considerations in Earthquake Resistant Design of RC Buildings | 19-07-22 | 06-08-22 | 12 |

Total No. of Instructional periods available for the course: 60Hours / Periods



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**SCHEDULE OF INSTRUCTIONS
UNIT PLAN**

Academic Year : 2021-22
Semester : II UNIT NO.: I
Name of the Program: M.Tech(Structural Engineering) Year: I
Course/Subject: ERDB Course Code: **GR20D5019**
Name of the Faculty: Dr. V.Mallikarjuna Reddy Dept.: Civil Engineering
Designation: PROFESSOR.

| Lesson No. | Date | No. of Periods | Topics / Sub - Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ___ to ___ |
|------------|------------|----------------|---|----------------------------|--|
| 1 | 12-04-2022 | 1 | Introduction about ERDB | 1 & 1 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| 2 | 12-04-2022 | 1 | Earthquake phenomenon, cause of earthquakes | 1 & 1 | |
| 3 | 16-04-2022 | 1 | Faults, Plate tectonics | 1 & 1 | |
| 4 | 16-04-2022 | 1 | Seismic waves | 1 & 1 | |
| 5 | 19-04-2022 | 1 | Terms associated with earthquakes | 1 & 1 | |
| 6 | 19-04-2022 | 1 | Magnitude/Intensity of an earthquake scales | 1 & 1 | |
| 7 | 23-04-2022 | 1 | Energy released, Earthquake measuring instruments | 1 & 1 | |
| 8 | 23-04-2022 | 1 | Seismoscope, Seismograph, accelerograph, | 1 & 1 | |
| 9 | 26-04-2022 | 1 | Characteristics of strong ground motions | 1 & 1 | |
| 10 | 26-04-2022 | 1 | Seismic zones of India. | 1 & 1 | |
| 11 | 30-04-2022 | 1 | Introduction of Functional planning | 1 & 1 | |
| 12 | 30-04-2022 | 1 | Continuous load path, Overall form, simplicity and symmetry | 1 & 1 | |
| 13 | 03-05-2022 | 1 | Elongated shapes, stiffness and strength. | 1 & 1 | |
| 14 | 03-05-2022 | 1 | Seismic design requirements, regular and irregular configurations, basic assumptions. | 1 & 1 | |

Signature of HOD
Date:

Signature of faculty
Date:



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**SCHEDULE OF INSTRUCTIONS
UNIT PLAN**

Academic Year : 2021-22
 Semester : II UNIT NO.: II
 Name of the Program: M.Tech (Structural Engineering) Year: I
 Course/Subject: ERDB Course Code: **GR20D5019**
 Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering
 Designation: PROFESSOR.

| Lesson No. | Date | No. of Periods | Topics / Sub - Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____to ____ |
|------------|------------|----------------|---|----------------------------|--|
| 1 | 07-05-2022 | 1 | Conceptual Design - Horizontal and Vertical Load | 2 & 2 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| 2 | 07-05-2022 | 1 | Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. | 2 & 2 | |
| 3 | 10-05-2022 | 1 | Twisting of Buildings – Flexible Building and Rigid Building Systems. | 2 & 2 | |
| 4 | 10-05-2022 | 1 | Strength and Stiffness – Ductility – Definition – Ductility Relationships | 2 & 2 | |
| 5 | 14-05-2022 | 1 | Choice of construction Materials – Unconfined Concrete & Confined Concrete | 2 & 2 | |
| 6 | 14-05-2022 | 1 | Masonry, Steel Structures | 2 & 2 | |
| 7 | | 1 | Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method | 2 & 2 | |
| 8 | 17-05-2022 | 1 | –Equivalent Lateral Force Method, Dynamic Analysis. | 2 & 2 | |
| 9 | 17-05-2022 | 1 | Response Spectrum Method | 2 & 2 | |
| 10 | 21-05-2022 | 1 | Modal Analysis, Torsion | 2 & 2 | |
| 11 | 07-05-2022 | 1 | Conceptual Design - Horizontal and Vertical Load | 2 & 2 | |

| | | | | | |
|----|------------|---|---|-------|--|
| 12 | 07-05-2022 | 1 | Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. | 2 & 2 | |
| 13 | 10-05-2022 | 1 | Twisting of Buildings – Flexible Building and Rigid Building Systems. | 2 & 2 | |
| 14 | 10-05-2022 | 1 | Strength and Stiffness – Ductility – Definition – Ductility Relationships | 2 & 2 | |
| 15 | 14-05-2022 | 1 | Choice of construction Materials – Unconfined Concrete & Confined Concrete | 2 & 2 | |

Signature of HOD
Date:

Signature of faculty
Date:



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SCHEDULE OF INSTRUCTIONS

UNIT PLAN

Academic Year : 2021-22

Semester : II

UNIT NO.: III

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: ERDB

Course Code: **GR20D5019**

Name of the Faculty: Dr. V.Mallikarjuna Reddy

Dept.: Civil Engineering

Designation: PROFESSOR.

| Lesson No. | Date | No. of Periods | Topics / Sub - Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____to ____ |
|------------|------------|----------------|---|----------------------------|--|
| 1 | 21-05-2022 | 1 | Introduction to Earthquake Resistant Design | 3 & 3 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| 2 | 24-05-2022 | 1 | Seismic Design Requirements and Methods | 3 & 3 | |
| 3 | 24-05-2022 | 1 | RC Buildings – IS Code based Method. | 3 & 3 | |
| 4 | 28-05-2022 | 1 | Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem | 3 & 3 | |
| 5 | 28-05-2022 | 1 | Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear. | 3 & 3 | |
| 6 | 31-05-2022 | 1 | Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes | 3 & 3 | |
| 7 | 31-05-2022 | 1 | Behaviour of Unreinforced and Reinforced Masonry Walls | 3 & 3 | |
| 8 | 14-06-2022 | 1 | Behaviour of Walls Box Action and Bands – Behaviour of infill Walls | 3 & 3 | |
| 9 | 14-06-2022 | 1 | Non Structural Elements – Failure Mechanism of Non-structural Elements | 3 & 3 | |
| 10 | 18-06-2022 | 1 | Effects of Non-structural Elements on Structural System – Analysis. | 3 & 3 | |
| 11 | 28-05-2022 | 1 | Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem | 3 & 3 | |

Signature of HOD

Signature of faculty

Date:

Date:



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**SCHEDULE OF INSTRUCTIONS
UNIT PLAN**

Academic Year : 2021-22
 Semester : II UNIT NO.: IV
 Name of the Program: M.Tech (Structural Engineering) Year: I
 Course/Subject: ERDB Course Code: **GR20D5019**
 Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering
 Designation: PROFESSOR.

| Lesson No. | Date | No. of Periods | Topics / Sub - Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____ to ____ |
|------------|------------|----------------|---|----------------------------|--|
| 1 | 21-06-2022 | 1 | Introduction about Design of Shear walls . | 4 & 4 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| 2 | 21-06-2022 | 1 | Classification according to Behaviour | 4 & 4 | |
| 3 | 25-06-2022 | 1 | Loads in Shear walls | 4 & 4 | |
| 4 | 25-06-2022 | 1 | Design of Rectangular and Flanged Shear walls. | 4 & 4 | |
| 5 | 28-06-2022 | 1 | Derivation of Formula for Moment of Resistance of Rectangular Shear walls | 4 & 4 | |
| 6 | 28-06-2022 | 1 | Coupled Shear Walls. | 4 & 4 | |
| 7 | 05-07-2022 | 1 | Introduction to non-linear static push Over Analysis | 4 & 4 | |
| 8 | 05-07-2022 | 1 | Solving Problems | 4 & 4 | |
| 9 | 09-07-2022 | 1 | Solving Problems | 4 & 4 | |
| 10 | 09-07-2022 | 1 | Solving Problems | 4 & 4 | |
| 11. | 12-07-2022 | 1 | Solving Problems | 4 & 4 | |
| 12 | 12-07-2022 | 1 | Solving Problems | 4 & 4 | |
| 13 | 16-07-2022 | 1 | Solving Problems | 4 & 4 | |
| 14 | 16-07-2022 | 1 | Solving Problems | 4 & 4 | |

Signature of HOD
Date:

Signature of faculty
Date:



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**SCHEDULE OF INSTRUCTIONS
UNIT PLAN**

Academic Year : 2021-22
Semester : II UNIT NO.: V
Name of the Program: M.Tech (Structural Engineering) Year: I
Course/Subject: ERDB Course Code: **GR20D5019**
Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering

Designation: PROFESSOR.

| Lesson No. | Date | No. of Periods | Topics / Sub - Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____ to ____ |
|------------|------------|----------------|--|----------------------------|--|
| 1 | 19-07-2022 | 1 | Ductility Considerations in Earthquake Resistant Design of RC Buildings | 5 & 5 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| 2 | 19-07-2022 | 1 | Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility. | 5 & 5 | |
| 3 | 23-07-2022 | 1 | Factors affecting Ductility, Ductile detailing considerations as per IS 13920. | 5 & 5 | |
| 4 | 23-07-2022 | 1 | Behavior of beams, columns and joints in RC buildings during earthquakes.. | 5 & 5 | |
| 5 | 26-07-2022 | 1 | Vulnerability of open ground storey and short columns during earthquake. | 5 & 5 | |
| 6 | 26-07-2022 | 1 | Seismic Evaluation and Retrofitting. | 5 & 5 | |
| 7 | 30-07-2022 | 1 | Capacity Based Design: Introduction to Capacity Design | 5 & 5 | |
| 8 | 30-07-2022 | 1 | Capacity Design for Beams and Columns -Case studies | 5 & 5 | |
| 9 | 02-08-2022 | 1 | Solving problems | 5 & 5 | |
| 10. | 02-08-2022 | 1 | Revision | 5 & 5 | |
| 11. | 06-08-2022 | 1 | Revision | 5 & 5 | |
| 12. | 06-08-2022 | 1 | Revision | 5 & 5 | |

Signature of HOD

Signature of faculty

Date:

Date:



**GokarajuRangaraju Institute of Engineering and Technology
(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

**SCHEDULE OF INSTRUCTIONS
COURSEPLAN**

Academic Year : 2021-22

Semester : II UNIT NO.: I TO V

Name of the Program: M.Tech Year: I

Course/Subject: ERDB Course Code: **GR20D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.:Civil Engineering

Designation: PROFESSOR

| Unit No. | Lesson No. | Date | No. of Periods | Topics / Sub-Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____to |
|----------|------------|------------|----------------|---|----------------------------|--|
| 1. | 1. | 12-04-2022 | 1 | Introduction about ERDB | 1 & 1 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| | 2. | 12-04-2022 | 1 | Earthquake phenomenon, cause of earthquakes | 1 & 1 | |
| | 3. | 16-04-2022 | 1 | Faults, Plate tectonics | 1 & 1 | |
| | 4. | 16-04-2022 | 1 | Seismic waves | 1 & 1 | |
| | 5. | 19-04-2022 | 1 | Terms associated with earthquakes | 1 & 1 | |
| | 6. | 19-04-2022 | 1 | Magnitude/Intensity of an earthquake scales | 1 & 1 | |
| | 7. | 23-04-2022 | 1 | Energy released, Earthquake measuring instruments | 1 & 1 | |
| | 8. | 23-04-2022 | 1 | Seismoscope, Seismograph, accelerograph, | 1 & 1 | |
| | 9 | 26-04-2022 | 1 | Characteristics of strong ground motions | 1 & 1 | |
| | 10 | 26-04-2022 | 1 | Seismic zones of India. | 1 & 1 | |
| | 11 | 30-04-2022 | 1 | Introduction of Functional | 1 & 1 | |

| | | | | planning | | |
|----------|------------|------------|----------------|---|----------------------------|--|
| | 12 | 30-04-2022 | 1 | Continuous load path, Overall form, simplicity and symmetry | 1 & 1 | |
| | 13 | 03-05-2022 | 1 | Elongated shapes, stiffness and strength. | 1 & 1 | |
| | 14 | 03-05-2022 | 1 | Seismic design requirements, regular and irregular configurations, basic assumptions. | 1 & 1 | |
| Unit No. | Lesson No. | Date | No. of Periods | Topics / Sub-Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ___to ___ |
| 2. | 1. | 07-05-2022 | 1 | Conceptual Design - Horizontal and Vertical Load | 2 & 2 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| | 2. | 07-05-2022 | 1 | Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures. | 2 & 2 | |
| | 3. | 10-05-2022 | 1 | Twisting of Buildings – Flexible Building and Rigid Building Systems. | 2 & 2 | |
| | 4. | 10-05-2022 | 1 | Strength and Stiffness – Ductility – Definition – Ductility Relationships | 2 & 2 | |
| | 5. | 14-05-2022 | 1 | Choice of construction Materials – Unconfined Concrete & Confined Concrete | 2 & 2 | |
| | 6. | 14-05-2022 | 1 | Masonry, Steel Structures | 2 & 2 | |
| | 7. | | 1 | Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method | 2 & 2 | |
| | 8. | 17-05-2022 | 1 | –Equivalent Lateral Force Method, Dynamic Analysis. | 2 & 2 | |
| | 9. | 17-05-2022 | 1 | Response Spectrum Method | 2 & 2 | |
| | 10. | 21-05-2022 | 1 | Modal Analysis, Torsion | 2 & 2 | |
| | 11. | 07-05-2022 | 1 | Conceptual Design - Horizontal and Vertical Load | 2 & 2 | |
| | 12. | 07-05-2022 | 1 | Resisting Systems - System and Members for Lateral Loads and High Rise / Tall | 2 & 2 | |

| | | | | Structures. | | |
|----------|------------|------------|----------------|---|----------------------------|--|
| | 13. | 10-05-2022 | 1 | Twisting of Buildings – Flexible Building and Rigid Building Systems. | 2 & 2 | |
| | 14. | 10-05-2022 | 1 | Strength and Stiffness – Ductility – Definition – Ductility Relationships | 2 & 2 | |
| | 15 | 14-05-2022 | 1 | Choice of construction Materials – Unconfined Concrete & Confined Concrete | 2 & 2 | |
| Unit No. | Lesson No. | Date | No. of Periods | Topics / Sub-Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____to ____ |
| 3. | 1. | 21-05-2022 | 1 | Introduction to Earthquake Resistant Design | 3 & 3 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| | 2. | 24-05-2022 | 1 | Seismic Design Requirements and Methods | 3 & 3 | |
| | 3. | 24-05-2022 | 1 | RC Buildings – IS Code based Method. | 3 & 3 | |
| | 4. | 28-05-2022 | 1 | Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem | 3 & 3 | |
| | 5. | 28-05-2022 | 1 | Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear. | 3 & 3 | |
| | 6. | 31-05-2022 | 1 | Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes | 3 & 3 | |
| | 7. | 31-05-2022 | 1 | Behaviour of Unreinforced and Reinforced Masonry Walls | 3 & 3 | |
| | 8. | 14-06-2022 | 1 | Behaviour of Walls Box Action and Bands – Behaviour of infill Walls | 3 & 3 | |
| | 9. | 14-06-2022 | 1 | Non Structural Elements – Failure Mechanism of Non-structural Elements | 3 & 3 | |
| | 10. | 18-06-2022 | 1 | Effects of Non-structural Elements on Structural System – Analysis. | 3 & 3 | |

| | 11. | 28-05-2022 | 1 | Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem | 3 & 3 | |
|----------|------------|------------|----------------|---|----------------------------|--|
| Unit No. | Lesson No. | Date | No. of Periods | Topics / Sub-Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____to ____ |
| 4. | 1. | 21-06-2022 | 1 | Introduction about Design of Shear walls . | 4 & 4 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| | 2. | 21-06-2022 | 1 | Classification according to Behaviour | 4 & 4 | |
| | 3. | 25-06-2022 | 1 | Loads in Shear walls | 4 & 4 | |
| | 4. | 25-06-2022 | 1 | Design of Rectangular and Flanged Shear walls. | 4 & 4 | |
| | 5. | 28-06-2022 | 1 | Derivation of Formula for Moment of Resistance of Rectangular Shear walls | 4 & 4 | |
| | 6. | 28-06-2022 | 1 | Coupled Shear Walls. | 4 & 4 | |
| | 7. | 05-07-2022 | 1 | Introduction to non-linear static push Over Analysis | 4 & 4 | |
| | 8. | 05-07-2022 | 1 | Solving Problems | 4 & 4 | |
| | 9. | 09-07-2022 | 1 | Solving Problems | 4 & 4 | |
| | 10. | 09-07-2022 | 1 | Solving Problems | 4 & 4 | |
| | 11. | 12-07-2022 | 1 | Solving Problems | 4 & 4 | |
| | 12. | 12-07-2022 | 1 | Solving Problems | 4 & 4 | |
| | 13. | 16-07-2022 | 1 | Solving Problems | 4 & 4 | |
| | 14. | 16-07-2022 | 1 | Solving Problems | 4 & 4 | |
| Unit No. | Lesson No. | Date | No. of Periods | Topics / Sub-Topics | Objectives & Outcomes Nos. | References (Text Book, Journal...) Page Nos.: ____to ____ |
| 5. | 1. | 19-07-2022 | 1 | Ductility Considerations in Earthquake Resistant Design of RC Buildings | 5 & 5 | Earthquake Resistant Design of structures – S. K. Duggal, Oxford University Press IS Codes |
| | 2. | 19-07-2022 | 1 | Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility. | 5 & 5 | |
| | 3. | 23-07-2022 | 1 | Factors affecting Ductility, Ductile detailing considerations as per IS | 5 & 5 | |

| | | | | | | |
|--|-----|------------|---|--|-------|--|
| | | | | 13920. | | |
| | 4. | 23-07-2022 | 1 | Behavior of beams, columns and joints in RC buildings during earthquakes.. | 5 & 5 | |
| | 5. | 26-07-2022 | 1 | Vulnerability of open ground storey and short columns during earthquake. | 5 & 5 | |
| | 6 | 26-07-2022 | 1 | Seismic Evaluation and Retrofitting. | 5 & 5 | |
| | 7 | 30-07-2022 | 1 | Capacity Based Design: Introduction to Capacity Design | 5 & 5 | |
| | 8 | 30-07-2022 | 1 | Capacity Design for Beams and Columns -Case studies | 5 & 5 | |
| | 9 | 02-08-2022 | 1 | Solving problems | 5 & 5 | |
| | 10. | 02-08-2022 | 1 | Revision | 5 & 5 | |
| | 11. | 06-08-2022 | 1 | Revision | 5 & 5 | |
| | 12. | 06-08-2022 | 1 | Revision | 5 & 5 | |

Signature of HOD

Signature of faculty

Date:

Date:

- Note: 1. ENSURE THAT ALL TOPICS SPECIFIED IN THE COURSE ARE MENTIONED.
2. ADDITIONAL TOPICS COVERED, IF ANY, MAY ALSO BE SPECIFIED IN BOLD
3. MENTION THE CORRESPONDING COURSE OBJECTIVE AND OUT COME NUMBERS AGAINST EACH TOPIC.



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EVALUATION STRATEGY

Academic Year : 2021-22

Semester: II

Name of the Program: M.Tech Structural Engineering Year: I Section: A

Course/Subject: ERDB Course Code: GR20D3067

Name of the Faculty: Dr.V.Mallikarjua Reddy

Dept.: Civil Engineering

Designation: Professors

1. TARGET:

A) Percentage for pass: 90%

b) Percentage of class:

Total Strength: 21

| S.No. | Class / Division | No. of Students |
|-------|------------------------------|-----------------|
| 1 | First Class with distinction | 12 |
| 2 | First Class | 7 |
| 3 | Pass Class | 2 |

2. COURSE PLAN& CONTENT DELIVERY

| S.No | Plan | Brief Description |
|------|------------------|--|
| 1 | Practice classes | 50 Theory classes |
| 2 | Demonstration | Demonstration of Videos |
| 3 | Assignments | Assignments for solving numerical problems |

3. METHOD OF EVALUATION

3.1 Continuous Assessment Examinations

- Assignments: Assignments to assess the knowledge of the student on the basics and concepts in Earthquake Resistant Design of Buildings.
- Quiz: To assess the knowledge of the student in various concepts and basics in ERDB. Internal Examination: Internal Examinations to assess their overall knowledge in ERDB.

3.2. Semester/End Examination

To test their abilities in the course ERDB and to approve their abilities learnt during the same.

Signature of HOD
faculty

Signature of

| GR20D5019 ERDB | Course Outcomes | | | | |
|---------------------------|------------------------|---|---|---|---|
| Course Objectives | 1 | 2 | 3 | 4 | 5 |
| 1 | X | | | | |
| 2 | | X | | | |
| 3 | | | X | | |
| 4 | | | | X | |
| 5 | | | | | X |

| GR20D5019 ERDB | Course Outcomes | | | | |
|---------------------------|------------------------|---|---|---|---|
| Assessment | 1 | 2 | 3 | 4 | 5 |
| 1 | X | | | | |
| 2 | | X | | | |
| 3 | | | X | | |
| 4 | | | | X | |
| 5 | | | | | X |

| GR20D5019 ERDB | Course Objectives | | | | |
|---------------------------|--------------------------|---|---|---|---|
| Assessments | 1 | 2 | 3 | 4 | 5 |
| 1 | X | | | | |
| 2 | | X | | | |
| 3 | | | X | | |
| 4 | | | | X | |
| 5 | | | | | X |



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TUTORIAL SHEET - 1

Academic Year : 2022-23 Date: 03-05-2022
Semester : II
Name of the Program:M.Tech (Structural Engineering) Year: I
Course/Subject: ERDB
Name of the Faculty:Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering

This Tutorial corresponds to Unit No. 1/ Lesson: **Engineering Seismology (GR20D5019)**

1. Draw the sketch of interior of earth showing the parts.
2. Describe zones of Convergence.
3. a) Define earthquake and write the causes of earthquake.
b) Discuss about analysis of earthquake waves.
4. a) Discuss about elastic vibration of simple structures.
b) Explain about non steady state forced vibrations.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 1,1

Outcome Nos.: 1,1

Signature of HOD

Signature of faculty

Date:

Date:



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

TUTORIAL SHEET - 2

Academic Year : 2022-23

Date: 21-05-2022

Semester : II

Name of the Program: M.Tech(Structural Engineering)

Year: I

Course/Subject: ERDB

Name of the Faculty:Dr.V.Mallikarjuna Reddy

Dept.: Civil Engineering

This Tutorial corresponds to Unit No. 2/ Lesson: **Conceptual Design (GR20D5019)**

Designation : PROFESSOR

1. Discuss about seismic design coefficient.
2. Write about Dynamic analysis procedure.
3. Explain about Stiffness and Strength in conceptual design.
4. List the basic factors contributing to the proper seismic behavior of a building.
5. List the factors involved in an adequate earthquake resistant design for a structure.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 2

Outcome Nos.: 2

Signature of HOD

Signature of faculty

Date:

Date:



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TUTORIAL SHEET - 3

Academic Year : 2022-23 Date: 18-06-2022
Semester : II
Name of the Program: M.Tech (Structural Engineering) Year: I
Course/Subject: ERDB
Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering
This Tutorial corresponds to Unit No. 3/ Lesson: Introduction to Earthquake Resistant Design
(GR20D5019)
Designation : PROFESSOR

1. Why cold worked steel is not used in earthquake resistant building structures.
2. List any two damages to RCC buildings.
3. What are the principles of earthquake resistant design of RCC buildings?
4. Describe with the help of neat sketches, restoration and strengthening of RCC beams and columns.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 3

Outcome Nos.: 3

Signature of HOD

Signature of faculty

Date:

Date:



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TUTORIAL SHEET - 4

Academic Year : 2022-23 Date: 16-07-2022
Semester : I
Name of the Program: M.Tech (Structural Engineering) Year: I
Course/Subject: ERDB
Name of the Faculty: Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering

This Tutorial corresponds to Unit No. 4/ Lesson: Design of Shear walls (**GR20D5019**)
Designation : PROFESSOR

1. Describe the various earthquake-resistant features that can be introduced in masonry building to make it earthquake resistant.
2. For a room of 8mx4m internal dimensions, the walls are constructed with 200mm thick modular bricks, having wall thickness 300mm in cement mortar 1:6. The load on the roof is 8kN/m^2 . Check the long wall for vertical bending and design the R.C.C lintel band for the given data.
Design seismic coefficient = 0.10; Height of wall = 4.2m
Lintel height from plinth = 2.4m; Unit weight of masonry = 20kN/m^3
3. List the categories of masonry buildings as per IS4326:1993.
4. With the help of sketch show how the box action is achieved in a masonry building.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 4

Outcome Nos.: 4

Signature of HOD

Signature of faculty



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TUTORIAL SHEET - 5

Academic Year : 2022-23 Date:06-08-2022

Semester : I
Name of the Program: M.Tech (Structural Engineering) Year: I
Course/Subject: ERDB
Name of the Faculty:Dr.V.Mallikarjuna Reddy Dept.: Civil Engineering

This Tutorial corresponds to Unit No. 5/ Lesson: Ductility Considerations in Earthquake Resistant Design of RC Buildings (**GR20D5019**)

Designation : PROFESSOR

- 1.Describe the Non-structural elements.
- 2.List out the architectural components of a building.
- 3.List out the consequences of the failure of the Non- structural elements.
4. Discuss briefly the effect of a structural system on the behavior of a Non-structure.
5. Explain clearly the cantilever walls without openings.
- 6.Explain the concept strong column and weak beams.

Please write the Questions / Problems / Exercises which you would like to give to the students and also mention the Objectives/Outcomes to which these Questions / Problems / Exercises are related.

Objective Nos.: 5

Outcome Nos.: 5

Signature of HOD

Signature of faculty



Gokaraju Rangaraju
Institute of Engineering and Technology (Autonomous)
Department of Civil Engineering
I M.Tech. II Semester ASSIGNMENT-I

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (GR20D5019)

Answer all questions.

1. Explain about nature and occurrence of earthquake, and basic terminology with the help of figure.
2. Discuss about the origin or causes of Tectonic Earthquakes by Elastic Rebound Theory and Plate Tectonic Theory.
3. Explain about Seismoscope and Seismograph.
4. Discuss clearly about Seismic waves with the help of figures.
5. Discuss about seismic design requirements.
6. An earthquake causes an average of 2.2m of strike slip displacement over a 160 km long, 20km deep portion of a transformed fault assuming the average rupture strength along the fault as 1.5kpa, estimate the seismic moment, moment magnitude and seismic energy of earthquake.
7. Discuss about functional planning of buildings.
8. List the basic assumptions.
9. Explain about ductility and list the factors that increase ductility.
10. Explain about Twisting of buildings.



Gokaraju Rangaraju
Institute of Engineering and Technology (Autonomous)
Department of Civil Engineering
I M.Tech. II Semester ASSIGNMENT-II

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (GR20D5019)

Answer all questions.

1. What are non-structures? How do these affect the performance of a structural system?
2. Determine the frequency and design seismic coefficient for an ordinary masonry shear wall in a school building in Mumbai for the given data.
Roof load=22kN/m; Height of wall=3.6m; Width of wall= 0.2m; Unit weight of wall=20kN/m³. Soil is medium.
3. Define shear wall. Explain the difference in the structural behavior of long and short shear walls.
4. The plan of a single storey building having Two shear walls in each direction is shown in the figure given below. All the four walls are of M25 grade concrete and 220mm thick. Height of the building is 3.6m. Design shear force on the building is 186kN in either direction. Determine the lateral force for different structural walls using torsion provisions of IS 1893(Part-1):2016.

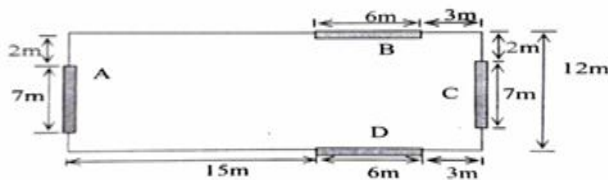


Fig.1 Plan of a Building showing structural walls

5. List the factors that increase the ductility of an R.C Structure.
6. Discuss the web reinforcement to be provide in beams and transverse reinforcement to be provided in columns as per IS 13920:2016.
7. Beam is to be designed for the moments mentioned below.
Moment MA= -95kNm and +39kNm; Moment MB= -97kNm and +9kNm
The characteristic dead and live loads are 12kN/m and 7kN/m respectively. The clear span is 6m and the beams are of 300x600mm with 150mm slab. Assume M25 Concrete and Fe500 grade steel. The structure is to be situated in zone V. Design the beam as per IS 13920:2016.
8. Discuss the behavior of infill walls in a framed structure.
9. Define shear walls. How are these classified?
10. Explain the behavior of masonry walls, box action and bands with neat sketches.

RUBRIC SHEET

Academic Year : 2021-22

Semester : II

Name of the Program: M.Tech Structural Engineering Year: I

Course/Subject: Earthquake Resistant Design of Buildings

Course Code: **GR20D5019**

Name of the Faculty: Dr.V Mallikarjuna Reddy Dept.: Civil Engineering

Designation: Professor

Objective: To learn about Disaster Management.

Student Outcome: Students able to understand the Disaster management.

| | | | Beginning | Developing | Reflecting Development | Accomplished | Exemplary | Score |
|--------------|----------------------------|--|---|---|--|--|--|--------------|
| S. No | Name of the Student | Performance Criteria | 1 | 2 | 3 | 4 | 5 | |
| 1 | 21241D 2009 | The level of knowledge on Engineering seismology | Low level of knowledge on seismic waves | Able to discuss the seismic waves | Ability to explain the types of seismic waves | Full knowledge on types of seismic waves | Able to categorize the seismic waves | 5 |
| 2 | 21241D 2011 | The level of knowledge on conceptual design | Low level of knowledge on conceptual design | Able to discuss about conceptual design | Ability to explain about disaster prone areas in India | Full knowledge on conceptual design | Able to list out the conceptual design | 4 |
| 3 | 21241D 2013 | The level of knowledge on design of shear walls | Low level of knowledge on design of shear walls | Ability to discuss on design of shear walls | Ability to explain on design of shear wall. | Full knowledge on design of shear walls | Ability to design the shear walls | 3 |

Average: 4



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COURSE COMPLETION STATUS

-Academic Year : 2021-22

Semester : II

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **ERDB** Course Code: **GR20D5019**

Name of the Faculty: Dr. V.Mallikarjuna Reddy Dept.: Civil Engineering

Designation: PROFESSOR

Actual Date of Completion & Remarks, if any

| Units | Remarks | No. of Objectives Achieved | No. of Outcomes Achieved |
|--------------|---|-----------------------------------|---------------------------------|
| Unit 1 | Engineering Seismology | 1 | 1 |
| Unit 2 | Conceptual Design | 2 | 2 |
| Unit 3 | Introduction to Earthquake Resistant Design | 3 | 3 |
| Unit 4 | Design of Shear Walls | 4 | 4 |
| Unit 5 | Ductility Considerations in Earthquake Resistant Design of RC Buildings | 5 | 5 |

Signature of HOD

Signature of faculty

Date:

Date:

Note: After the completion of each unit mention the number of Objectives & Outcomes Achieved.



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MAPPING

| GR20D5019/ ERDB | Course Outcomes | | | | |
|--------------------|-----------------|---|---|---|---|
| Course Objectives | 1 | 2 | 3 | 4 | 5 |
| 1 | X | | | | |
| 2 | | X | | | |
| 3 | | | X | | |
| 4 | | | | X | |
| 5 | | | | | X |

1. Assignment ,
2. Internal Examination
3. External Examination
4. Practical Projects
5. Viva

| GR20D5019/ ERDB | Course Outcomes | | | | |
|--------------------|-----------------|---|---|---|---|
| Assessments | 1 | 2 | 3 | 4 | 5 |
| 1 | X | X | X | X | X |
| 2 | X | X | X | X | X |
| 3 | X | X | X | X | X |
| 4 | | | | | |
| 5 | | | | | |

| GR20D5019/ ERDB | Course Objectives | | | | |
|--------------------|-------------------|---|---|---|---|
| Assessments | 1 | 2 | 3 | 4 | 5 |
| 1 | X | X | X | X | X |
| 2 | X | X | X | X | X |
| 3 | X | X | X | X | X |

| | | | | | |
|---|--|--|--|--|--|
| 4 | | | | | |
| 5 | | | | | |

| Course | Program Outcomes | | | | | |
|--------|------------------|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| ERDB | X | X | X | X | X | X |

| Course | Program Outcomes | | | | | |
|--|------------------|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 |
| Earthquake Resistant Design of Buildings (GR20D5019) | X | X | X | X | X | X |

| Earthquake Resistant Design of Buildings (GR20D5019) | Program Outcomes | | | | | |
|--|------------------|---|---|---|---|---|
| Course Outcomes | 1 | 2 | 3 | 4 | 5 | 6 |
| To understand the fundamentals of earthquake engineering and seismicity conditions of the country and world. | M | M | M | M | M | M |
| To perform site specific deterministic seismic hazard analysis. | M | M | | M | M | H |
| To understand the concepts of dynamic equations of motion and perform analysis for dynamic systems in civil engineering applications. | M | M | M | M | M | M |
| Capable to correlate information from various engineering and scientific discipline to understand complex behaviour of RC structure subjected to seismic forces. | M | M | M | M | M | M |
| Capable to design RC structures in accordance with the provisions of Indian and International Building Codes considering seismic forces. | M | M | M | M | M | M |

Gokaraju Rangaraju
Institute of Engineering and Technology
(AUTONOMOUS)
M.Tech I Year II Semester
EARTHQUAKE RESISTANT DESIGN OF BUILDINGS
(Structural Engineering)

Time: 3 Hours

Max Marks: 70

Note: This Question Paper contains two Parts A and B

Part A is compulsory which carries 20 marks. Answer all questions in Part A at one place only.

Part B Consists of 10 questions. Answer any five (one full question from each unit). Each question carries 10 marks and may have a, b, c as sub questions.

PART – A

(10x2 = 20 Marks)

- 1.a) Define earthquake.
- b) Describe zones of Divergence.
- c) Draw the recommended and not recommended layout of H Shaped block.
- d) List out the load combinations for the LSD of reinforced concrete structures.
- e) List the grade of concrete and grade of steel used in earthquake resistant building structures.
- f) List any two forms of failures occur in RCC buildings.
- g) Define masonry buildings.
- h) List out two reasons for the poor performance of masonry buildings in earthquake.
- i) List out the effects due to the failure of Non-structural elements.
- j) List out the various mechanical components which are considered as Non-structural elements.

PART – B

(5x10 = 50 Marks)

- 2.a) Discuss the characteristics of seismic waves.
- b) Explain about measurement of earthquakes.

OR

- 3.a) Discuss about modelling of structures.
- b) Explain about steady state forced vibrations.

- 4.a) Discuss about equivalent lateral force procedure.
- b) List out the assumptions made in the analysis of earthquake resistant design of buildings.

OR

5. A building should exhibit ductile behavior in earthquake prone regions. Do you agree with this statement? If yes, then give the measures and provisions you would make at the conceptual stage to make a building stiff.

6. State the advantages of using concrete over brick masonry for buildings in seismic areas. What are the limitations of using concrete and how are these overcome in buildings.

OR

7. Design a rectangular RCC beam of 6m span supported on a RCC column to carry a point load 100 kN in addition to its own weight. The moment due to seismic force is 5.01 kN-m and shear force is 32kN. Use M20 concrete and Fe415 steel.

8. Discuss the behavior of the following masonry walls in seismic regions.
- Unreinforced masonry walls
 - Reinforced masonry walls

OR

9. Design an unreinforced masonry wall from the following data.
- Unit weight of wall = 20kN/m^3 . Prism strength of masonry = 7.5N/m^2
Seismic force at roof level = 20kN at a height of 4.0m from the base
Length of wall = 4.5m . Height of wall = 4.6m .

10. What are the common earthquake damages in Non-structures? What measures do you suggest to prevent them.

OR

- 11.a) Discuss the strategies in the location of structural walls in the buildings.
b) Explain procedure for design of shear wall and ductile detailing.



Gokaraju Rangaraju
Institute of Engineering and Technology (Autonomous)
Department of Civil Engineering
I M.Tech. II Semester MID I EXAMINATION June--2022

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (GR20D5019)

Time: 75 Minutes

Date of examination 09-06--2022

Max.Marks: 15 Marks

3x5=15 Marks

Name and Roll No.: _____

| | | | | | | | | | |
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| | | | | | D | | | | |
|--|--|--|--|--|---|--|--|--|--|

Answer all questions.

Part-B

1. a. Explain about nature and occurrence of earthquake, and basic terminology with the help of figure. BL-4 (CO-1) (5M)

OR

- b. Discuss about the origin or causes of Tectonic Earthquakes by Elastic Rebound Theory and Plate Tectonic Theory. BL-4 (CO-1) (5M)

2. a. Discuss clearly about Seismic waves with the help of figures. BL-4 (CO-1) (5M)

OR

- b. An earthquake causes an average of 2.2m of strike slip displacement over a 160 km long, 20km deep portion of a transformed fault assuming the average rupture strength along the fault as 1.5kpa, estimate the seismic moment, moment magnitude and seismic energy of earthquake. BL-2 (CO-1) (5M)

- 3.a. i. Explain about functional planning of buildings. BL-2 (CO-2) (3M)

- ii. Illustrate the basic assumptions. BL-2 (CO-2) (2M)

OR

- b. Explain about ductility and list the factors that increase ductility. BL- 2 (CO-5) (5M)



Gokaraju Rangaraju
Institute of Engineering and Technology(Autonomous)
Department of Civil Engineering
I M.Tech. II Semester MID I EXAMINATION June--2022

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (GR20D5019)

Time: 15 Minutes

Date of examination 09-06--2022

Max.Marks: 5 Marks

$10 \times \frac{1}{2} = 5$ Marks

Name and Roll No.: _____

| | | | | | | | | | |
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-
1. Magnitude of energy released by an earthquake is measured by using []
a) Temblor scale b) Richter scale c) Tectonic scale d) Seismic scale
 2. Earthquakes occur most frequently at []
a) Plate surface b) Plate boundaries c) Plate vacuum d) Ocean beds
 3. Instrument used to measure the earthquake is known as []
a) Quake meter b) Quake graph c) Seismograph d) Typanicgraph
 4. At the intensity level of "1" []
a) people don't feel earthquake b) weak buildings collapse
c) Buildings and Bridges collapse d) people feel the tremor and windows rattle
 5. The point at which earthquake takes place is known as []
a) Origin b) Epicenter c) Earth d) Focus
 6. Earthquakes occur when there is a sudden release of stored up energy in the Earth's
a) Inner core b) Outer core c) Upper mantle d) Lower crust []
 7. The vibrations radiate from the focus in all directions as []
a) Longitudinal waves b) Transverse waves c) Seismic waves d) Typanic waves
 8. Which of the following earthquake waves is first recorded on the seismograph []
a) P waves b) Rayleigh waves c) S waves d) Love waves
 9. Which theory is acclaimed as a satisfactory explanation about the cause of earthquake.
a) Elastic Rebound theory b) Clastic theory
c) Tremors theory d) Seismology theory []
 10. For more than 40 floors _____ is used. []
a) Bearing wall system b) Moment resisting frame
c) Dual system d) Tube system



Gokaraju Rangaraju
Institute of Engineering and Technology (Autonomous)
Department of Civil Engineering
I M.Tech. II Semester MID II EXAMINATION August--2022

EARTHQUAKE RESISTANT DESIGN OF BUILDINGS (GR20D5019)

Time: 75 Minutes

Date of examination 17-08--2022

Max.Marks: 15 Marks

3x5=15 Marks

Name and Roll No.:

| | | | | | | | | | |
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| | | | | | D | | | | |
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Answer all questions.

Part-B

| | | M | CO's | BL's | PI's |
|--|--|---|------|------|-------|
| 1 | a. What are non-structures? How do these affect the performance of a structural system? | 5 | 3 | 4 | 2.1.1 |
| OR | | | | | |
| | b.Determine the frequency and design seismic coefficient for an ordinary masonry shear wall in a school building in Mumbai for the given data. Roof load=22kN/m; Height of wall=3.6m;Width of wall= 0.2m; Unit weight of wall=20kN/m ³ . Soil is medium. | 5 | 3 | 5 | 3.2.1 |
| 2 | a. Define shear wall. Explain the difference in the structural behavior of long and short shear walls. | 5 | 4 | 4 | 5.2.2 |
| OR | | | | | |
| | b.The plan of a single storey building having Two shear walls in each direction is shown in the figure given below. All the four walls are of M25grade concrete and 220mm thick. Height of the building is 3.6m. Design shear force on the building is 186kN in either direction. Determine the lateral force for different structural walls using torsion provisions of IS 1893(Part-1):2016. | 5 | 4 | 5 | 3.2.1 |
| <p style="text-align: center;">Fig.1 Plan of a Building showing structural walls</p> | | | | | |
| 3 | a. i. List the factors that increase the ductility of an R.C Structure. ii. Discuss the transverse reinforcement to be | 2 | 5 | 2 | 5.2.2 |

| | | | | | |
|-----------|---|---|---|---|-------|
| | provided in columns as per IS 13920:2016. | 3 | 5 | 4 | |
| OR | | | | | |
| | <p>b. Beam is to be designed for the moments mentioned below.</p> <p>Moment $M_A = -95\text{kNm}$ and $+39\text{kNm}$; Moment $M_B = -97\text{kNm}$ and $+9\text{kNm}$</p> <p>The characteristic dead and live loads are 12kN/m and 7kN/m respectively. The clear span is 6m and the beams are of $300 \times 600\text{mm}$ with 150mm slab. Assume M25 Concrete and Fe500 grade steel. The structure is to be situated in zone V. Design the beam as per IS 13920:2016</p> | 5 | 5 | 5 | 3.2.1 |





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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

| M.Tech StructuralEngg. I yr-II Sem- GR20 2021-22 | | | |
|---|----------------|------------------------|-----------------------------|
| ERDB GR20D5019 (MID-I) | | | |
| S.No | Roll No | Name of Student | Maximum Marks (30 M) |
| 1 | 21241D2001 | A.Prasanth | 11 |
| 2 | 21241D2002 | B.Sriram Gopal | 17 |
| 3 | 21241D2003 | C.Madhavi | 17 |
| 4 | 21241D2004 | P.Divya | 16 |
| 5 | 21241D2005 | D.Umesh Kumar | 19 |
| 6 | 21241D2006 | K.Lathasree | 16 |
| 7 | 21241D2007 | M.Vaishnavi | 18 |
| 8 | 21241D2008 | M.Pranav | 17 |
| 9 | 21241D2009 | M.Naga Ashwani | 19 |
| 10 | 21241D2010 | R.Venkata Suraj Reddy | 13 |
| 11 | 21241D2011 | R.Mohan Bbau | 13 |
| 12 | 21241D2012 | C.Sandhya | 19 |
| 13 | 21241D2013 | Shaik Feroz | 12 |
| 14 | 21241D2014 | S K Sai Chandra | 17 |
| 15 | 21241D2015 | T. Harsha Vardhan | 16 |
| 16 | 21241D2016 | V.Lalitha | 19 |
| 17 | 21241D2017 | Y.Rama Gnaneswari | 11 |
| 18 | 21241D2018 | Y.Devesh Goud | 18 |
| 19 | 21241D2019 | S.Prasanth Kumar | A |
| 20 | 21241D2020 | B.Tharun Teja | A |
| 21 | 21241D2021 | G.Nitish Kumar | A |



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| M.Tech StructuralEngg. I yr-II Sem- GR20 2021-22 | | | |
|---|----------------|------------------------|-----------------------------|
| ERDB GR20D5019 (MID-II) | | | |
| S.No | Roll No | Name of Student | Maximum Marks (30 M) |
| 1 | 21241D2001 | A.Prasanth | 12 |
| 2 | 21241D2002 | B.Sriram Gopal | 15 |
| 3 | 21241D2003 | C.Madhavi | 15 |
| 4 | 21241D2004 | P.Divya | 17 |
| 5 | 21241D2005 | D.Umesh Kumar | 19 |
| 6 | 21241D2006 | K.Lathasree | 13 |
| 7 | 21241D2007 | M.Vaishnavi | 17 |
| 8 | 21241D2008 | M.Pranav | 13 |
| 9 | 21241D2009 | M.Naga Ashwani | 19 |
| 10 | 21241D2010 | R.Venkata Suraj Reddy | 15 |
| 11 | 21241D2011 | R.Mohan Bbau | 15 |
| 12 | 21241D2012 | C.Sandhya | 13 |
| 13 | 21241D2013 | Shaik Feroz | 14 |
| 14 | 21241D2014 | S K Sai Chandra | 14 |
| 15 | 21241D2015 | T. Harsha Vardhan | 15 |
| 16 | 21241D2016 | V.Lalitha | 17 |
| 17 | 21241D2017 | Y.Rama Gnaneswari | 13 |
| 18 | 21241D2018 | Y.Devesh Goud | A |
| 19 | 21241D2019 | S.Prasanth Kumar | A |
| 20 | 21241D2020 | B.Tharun Teja | 13 |
| 21 | 21241D2021 | G.Nitish Kumar | 10 |



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 12-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 1

Duration of Lesson: 1hr

Lesson Title: Introduction about ERDB

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Get awareness about Earthquake Resistant Design of Buildings.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Introduction about ERDB

Assignment / Questions: (1 & 1) 1. Explain about ERDB briefly.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 12-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 2

Duration of Lesson: 1hr

Lesson Title: Earthquake phenomenon, cause of earthquakes

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Earthquake phenomenon and cause of earthquakes

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Earthquake phenomenon, cause of earthquakes

Assignment / Questions: (1 & 1) 1. Discuss about causes of earthquakes.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 16-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 3

Duration of Lesson: 1hr

Lesson Title: Faults, Plate tectonics

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Faults, Plate tectonics.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Faults, Plate tectonics

Assignment / Questions: (1 & 1) 1. Discuss about faults and plate tectonics.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 16-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 4

Duration of Lesson: 1hr

Lesson Title: Seismic waves

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Seismic waves.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Seismic waves

Assignment / Questions: (1 & 1) 1.Explain about Seismic waves.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 19-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 5

Duration of Lesson: 1hr

Lesson Title: Terms associated with earthquakes.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Terms associated with earthquakes.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Terms associated with earthquakes.

Assignment / Questions: (1 & 1) 1. Discuss about terms associated with earthquakes.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 19-04-2022

Semester : II **Unit – I Engineering Seismology**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 6

Duration of Lesson: 1hr

Lesson Title: Magnitude/Intensity of an earthquake scales

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Magnitude/Intensity of an earthquake scales.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Magnitude/Intensity of an earthquake scales

Assignment / Questions: (1 & 1) 1. Explain about Magnitude/Intensity of an earthquake scales.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 23-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 7

Duration of Lesson: 1hr

Lesson Title: Energy released, Earthquake measuring instruments.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Energy released, Earthquake measuring instruments.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Energy released, Earthquake measuring instruments.

Assignment / Questions: (1 & 1) 1. Discuss about the Energy released, Earthquake measuring instruments.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 23-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 8

Duration of Lesson: 1hr

Lesson Title: Seismoscope, Seismograph, accelerograph,

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand about Seismoscope, Seismograph, accelerograph.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Seismoscope, Seismograph, accelerograph

Assignment / Questions: (1 & 1) 1. Explain about Seismoscope, Seismograph, accelerograph.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 26-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 9

Duration of Lesson: 1hr

Lesson Title: Characteristics of strong ground motions

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand about Characteristics of strong ground motions.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Characteristics of strong ground motions

Assignment / Questions: (1 & 1) 1. Discuss about Characteristics of strong ground motions.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 26-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 10

Duration of Lesson: 1hr

Lesson Title: Seismic zones of India.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand about Seismic zones of India.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Seismic zones of India.

Assignment / Questions: (1 & 1) 1. Explain about Seismic zones of India.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 30-04-2022

Semester : II Unit – I Engineering Seismology

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 11

Duration of Lesson: 1hr

Lesson Title: Introduction of Functional planning

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Functional planning.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Functional planning

Assignment / Questions: (1 & 1) 1. Explain about Functional planning.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 30-04-2022

Semester : II **Unit – I Engineering Seismology**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 12

Duration of Lesson: 1hr

Lesson Title: Continuous load path, Overall form, simplicity and symmetry

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Continuous load path, Overall form, simplicity and symmetry.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

Continuous load path, Overall form, simplicity and symmetry

Assignment / Questions: (1 & 1) 1. Discuss about Continuous load path, Overall form, simplicity and symmetry.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 03-05-2022

Semester : II **Unit – I Engineering Seismology**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 13

Duration of Lesson: 1hr

Lesson Title: Elongated shapes, stiffness and strength.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand Elongated shapes, stiffness and strength.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Elongated shapes, stiffness and strength.

Assignment / Questions: (1 & 1) 1. Discuss about Elongated shapes, stiffness and strength

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 03-05-2022

Semester : II **Unit – I Engineering Seismology**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 14

Duration of Lesson: 1hr

Lesson Title: Seismic design requirements, regular and irregular configurations, basic assumptions.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Seismic design requirements, regular and irregular configurations, basic assumptions.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Seismic design requirements, regular and irregular configurations, basic assumptions.

Assignment / Questions: (1 & 1) 1. Explain about Seismic design requirements, regular and irregular configurations, basic assumptions.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 07-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 15

Duration of Lesson: 1hr

Lesson Title: Horizontal and Vertical Load

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the impact of Horizontal and Vertical Load.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Horizontal and Vertical Load

Assignment / Questions: (2 & 2) 1. Explain about the impact of Horizontal and Vertical Load

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 07-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 16

Duration of Lesson: 1hr

Lesson Title: Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Resisting Systems - System and Members for Lateral Loads and High Rise / Tall Structures

Assignment / Questions: (2 & 2) 1. Discuss about Resisting Systems, Members for Lateral Loads and High Rise / Tall Structures

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 10-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 17

Duration of Lesson: 1hr

Lesson Title: Twisting of Buildings – Flexible Building and Rigid Building Systems.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand about Twisting of Buildings – Flexible Building and Rigid Building Systems.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Twisting of Buildings – Flexible Building and Rigid Building Systems

Assignment / Questions: (2 & 2) 1. Discuss about Twisting of Buildings – Flexible Building and Rigid Building Systems.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 10-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 18

Duration of Lesson: 1hr

Lesson Title: Strength and Stiffness – Ductility – Definition – Ductility Relationships

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Strength and Stiffness – Ductility – Definition – Ductility Relationships

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Strength and Stiffness – Ductility – Definition – Ductility Relationships

Assignment / Questions: (2 & 2) 1. Discuss about Strength and Stiffness – Ductility – Definition – Ductility Relationships.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 14-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 19

Duration of Lesson: 1hr

Lesson Title: Choice of construction Materials – Unconfined Concrete & Confined Concrete

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of construction Materials – Unconfined Concrete & Confined Concrete

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Choice of construction Materials – Unconfined Concrete & Confined Concrete

Assignment / Questions: (2 & 2) 1. Discuss about Choice of construction Materials – Unconfined Concrete & Confined Concrete

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 14-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 20

Duration of Lesson: 1hr

Lesson Title: Masonry, Steel Structures

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Masonry and Steel Structures.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Masonry, Steel Structures

Assignment / Questions: (2 & 2) 1. Explain about Masonry and Steel Structures behaviour during earthquakes.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 17-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 21

Duration of Lesson: 1hr

Lesson Title: Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand about Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Types of cements
- Cement making process
- Ingredients of cement

Assignment / Questions: (2 & 2) 1. Write about Design Earthquake Loads – Basic Load Combinations – Permissible Stresses. Seismic Methods of Analysis – Static Method

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 17-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 22

Duration of Lesson: 1hr

Lesson Title: Equivalent Lateral Force Method, Dynamic Analysis.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand about Equivalent Lateral Force Method, Dynamic Analysis..

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Equivalent Lateral Force Method, Dynamic Analysis.

Assignment / Questions: (2 & 2) 1. Discuss about Equivalent Lateral Force Method, Dynamic Analysis.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 21-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 23

Duration of Lesson: 1hr

Lesson Title: Response Spectrum Method

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand Response Spectrum Method.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Response Spectrum Method

Assignment / Questions: (2 & 2) 1. Explain about Response Spectrum Method.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 21-05-2022

Semester : II **Unit – II Conceptual Design**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 24

Duration of Lesson: 1hr

Lesson Title: Modal Analysis, Torsion

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand Modal Analysis, Torsion.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Modal Analysis, Torsion

Assignment / Questions: (2 & 2) 1. Discuss about Modal Analysis and Torsion

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 24-05-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 25 Duration of Lesson: 1hr

Lesson Title: Introduction to Earthquake Resistant Design

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Earthquake Resistant Design.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Introduction to Earthquake Resistant Design

Assignment / Questions: (3 & 3) 1. Explain briefly about Earthquake Resistant Design.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 24-05-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 26 Duration of Lesson: 1hr

Lesson Title: Seismic Design Requirements and Methods

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Seismic Design Requirements and Methods.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Seismic Design Requirements and Methods

Assignment / Questions: (3 & 3) 1. Discuss about Seismic Design Requirements and Methods

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 28-05-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 27 Duration of Lesson: 1hr

Lesson Title: RC Buildings – IS Code based Method.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of IS Code based Method in the design of RC Buildings.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- RC Buildings – IS Code based Method.

Assignment / Questions: (3 & 3) 1. Discuss about RC Buildings – IS Code based Method.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 28-05-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 28

Duration of Lesson: 1hr

Lesson Title: Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem

Assignment / Questions: (3 & 3) 1. Explain about Vertical Irregularities – Mass Irregularity Torsional Irregularity - Plan Configuration Problem

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 31-05-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**
Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 29

Duration of Lesson: 1hr

Lesson Title: Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear.

Assignment / Questions: (3 & 3) 1. Discuss about Design Lateral Force, Base Shear Evaluation – Lateral Distribution of Base Shear.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 31-05-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 30

Duration of Lesson: 1hr

Lesson Title: Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes

Assignment / Questions: (3 & 3) 1. Explain about Structural Walls Strategies and the Location of Structural Walls – Sectional Shapes

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 14-06-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 31

Duration of Lesson: 1hr

Lesson Title: Behaviour of Unreinforced and Reinforced Masonry Walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Behaviour of Unreinforced and Reinforced Masonry Walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Behaviour of Unreinforced and Reinforced Masonry Walls

Assignment / Questions: (3 & 3) 1. Discuss about Behaviour of Unreinforced and Reinforced Masonry Walls

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 14-06-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 32

Duration of Lesson: 1hr

Lesson Title: Behaviour of Walls Box Action and Bands – Behaviour of infill Walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Behaviour of Walls Box Action and Bands – Behaviour of infill Walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Behaviour of Walls Box Action and Bands – Behaviour of infill Walls

Assignment / Questions: (3 & 3) 1. Discuss about Behaviour of Walls Box Action and Bands – Behaviour of infill Walls

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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(Autonomous)**

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LESSON PLAN

Academic Year : 2021-22

Date: 18-06-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 33

Duration of Lesson: 1hr

Lesson Title: Non Structural Elements – Failure Mechanism of Non-structural Elements

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Non Structural Elements – Failure Mechanism of Non-structural Elements.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Non Structural Elements – Failure Mechanism of Non-structural Elements

Assignment / Questions: (3 & 3) 1. Discuss about Non Structural Elements – Failure Mechanism of Non-structural Elements

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 18-06-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 34

Duration of Lesson: 1hr

Lesson Title: Effects of Non-structural Elements on Structural System – Analysis.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Effects of Non-structural Elements on Structural System – Analysis.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Effects of Non-structural Elements on Structural System – Analysis

Assignment / Questions: (3 & 3) 1. Discuss about Effects of Non-structural Elements on Structural System – Analysis

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 21-06-2022

Semester : II **Unit – III Introduction to Earthquake Resistant Design**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 35

Duration of Lesson: 1hr

Lesson Title: Prevention of Damage to Non-structural Elements – Isolation of Non-Structures.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Prevention of Damage to Non-structural Elements – Isolation of Non-Structures.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Prevention of Damage to Non-structural Elements – Isolation of Non-Structures.

Assignment / Questions: (3 & 3) 1. Discuss about Prevention of Damage to Non-structural Elements – Isolation of Non-Structures.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 21-06-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 36

Duration of Lesson: 1hr

Lesson Title: Introduction about Design of Shear walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Design of Shear walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Design of Shear walls

Assignment / Questions: (4 & 4) 1. Explain about Design of Shear walls.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 25-06-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 37

Duration of Lesson: 1hr

Lesson Title: Classification according to Behaviour

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Classification of shear walls according to Behaviour.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Classification according to Behaviour

Assignment / Questions: (4 & 4) 1. Discuss about classification of shear walls according to Behaviour

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 25-06-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 38

Duration of Lesson: 1hr

Lesson Title: Loads in Shear walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Loads in Shear walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Loads in Shear walls

Assignment / Questions: (4 & 4) 1. Discuss about Loads in Shear walls.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 28-06-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 39

Duration of Lesson: 1hr

Lesson Title: Design of Rectangular and Flanged Shear walls.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Design of Rectangular and Flanged Shear walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Design of Rectangular and Flanged Shear walls.

Assignment / Questions: (4 & 4) 1. Discuss about Design of Rectangular and Flanged Shear walls.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 28-06-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 40

Duration of Lesson: 1hr

Lesson Title: Derivation of Formula for Moment of Resistance of Rectangular Shear walls

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Derivation of Formula for Moment of Resistance of Rectangular Shear walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Derivation of Formula for Moment of Resistance of Rectangular Shear walls

Assignment / Questions: (4 & 4) 1. Derive the Formula for Moment of Resistance of Rectangular Shear walls.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 05-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 41

Duration of Lesson: 1hr

Lesson Title: Coupled Shear Walls.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Coupled Shear Walls.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Coupled Shear Walls.

Assignment / Questions: (4 & 4) 1. Discuss about Coupled Shear Walls.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 05-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 42

Duration of Lesson: 1hr

Lesson Title: Introduction to non-linear static push over Analysis

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the non-linear static push Over Analysis.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Introduction to non-linear static push Over Analysis

Assignment / Questions: (4 & 4) 1. Discuss about non-linear static push Over Analysis.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 09-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 43

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the design problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problems.

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 09-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 44

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the shear wall problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problems

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



LESSON PLAN

Academic Year : 2021-22

Date: 12-07-2022

Semester : II **Unit – IV Design of shear walls**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 45

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the shear wall problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problems

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 12-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 46

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problem

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 16-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 47

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problem

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 16-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 48

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the problems.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving the problems

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 19-07-2022

Semester : II Unit – IV Design of shear walls

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 49

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the problems.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problems

Assignment / Questions: (4 & 4) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 19-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 50

Duration of Lesson: 1hr

Lesson Title: Ductility Considerations in Earthquake Resistant Design of RC Buildings

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Ductility Considerations in Earthquake Resistant Design of RC Buildings.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

Ductility Considerations in Earthquake Resistant Design of RC Buildings

Assignment / Questions: (5 & 5) 1. Discuss about Ductility Considerations in Earthquake Resistant Design of RC Buildings

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440**

LESSON PLAN

Academic Year : 2021-22

Date: 23-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 51 Duration of Lesson: 1hr

Lesson Title: Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Impact of Ductility- Requirements for Ductility- Assessment of Ductility.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Introduction-Impact of Ductility- Requirements for Ductility- Assessment of Ductility.

Assignment / Questions: (5 & 5) 1. Explain about Impact of Ductility, Requirements for Ductility and Assessment of Ductility.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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LESSON PLAN

Academic Year : 2021-22

Date: 23-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering) Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy. Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 52 Duration of Lesson: 1hr

Lesson Title: Factors affecting Ductility, Ductile detailing considerations as per IS 13920.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Factors affecting Ductility, Ductile detailing considerations as per IS 13920.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Factors affecting Ductility, Ductile detailing considerations as per IS 13920.

Assignment / Questions: (5 & 5) 1. Discuss Factors affecting Ductility, Ductile detailing considerations as per IS 13920.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 26-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 53

Duration of Lesson: 1hr

Lesson Title: Behavior of beams, columns and joints in RC buildings during earthquakes.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Behavior of beams, columns and joints in RC buildings during earthquakes.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Behavior of beams, columns and joints in RC buildings during earthquakes

Assignment / Questions: (5 & 5) 1. Discuss about Behavior of beams, columns and joints in RC buildings during earthquakes.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 26-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 54

Duration of Lesson: 1hr

Lesson Title: Vulnerability of open ground storey and short columns during earthquake.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Vulnerability of open ground storey and short columns during earthquake.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Vulnerability of open ground storey and short columns during earthquake.

Assignment / Questions: (5 & 5) 1. Discuss about Vulnerability of open ground storey and short columns during earthquake.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 30-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 55

Duration of Lesson: 1hr

Lesson Title: Seismic Evaluation and Retrofitting.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the importance of Seismic Evaluation and Retrofitting.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Seismic Evaluation and Retrofitting.

Assignment / Questions: (5 & 5) 1. Discuss about Seismic Evaluation and Retrofitting.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
(Autonomous)**

Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 30-07-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 56

Duration of Lesson: 1hr

Lesson Title: Capacity Based Design: Introduction to Capacity Design

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Capacity Based Design.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Capacity Based Design

Assignment / Questions: (5 & 5) 1. Discuss about Capacity Based Design.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 02-08-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 57

Duration of Lesson: 1hr

Lesson Title: Capacity Design for Beams and Columns -Case studies

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Capacity Design for Beams and Columns -Case studies.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Capacity Design for Beams and Columns -Case studies

Assignment / Questions: (5 & 5) 1. Discuss about Capacity Design for Beams and Columns.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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LESSON PLAN

Academic Year : 2021-22

Date: 02-08-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 58

Duration of Lesson: 1hr

Lesson Title: Solving problems

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Solve the problem.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Solving problems

Assignment / Questions: (5&5) 1. Solve the problem for the given data.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



**Gokaraju Rangaraju Institute of Engineering and Technology
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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 06-08-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 59

Duration of Lesson: 1hr

Lesson Title: Revision- Behaviour of joints in RC buildings during earthquake.

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Behaviour of joints in RC buildings during earthquake.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Behaviour of joints in RC buildings during earthquake

Assignment / Questions: (5 & 5) 1. Explain about Behaviour of joints in RC buildings during earthquake.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.



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Bachupally, Kukatpally, Hyderabad – 500 090. (040) 6686 4440

LESSON PLAN

Academic Year : 2021-22

Date: 06-08-2022

Semester : II **Unit – V Ductility Considerations in Earthquake Resistant Design of RC Buildings**

Name of the Program: M.Tech (Structural Engineering)

Year: I

Course/Subject: **Earthquake Resistant Design of Buildings(ERDB)** Course Code: **GR22D5019**

Name of the Faculty: Dr.V.Mallikarjuna Reddy.

Dept.: Civil Engineering

Designation: PROFESSOR

Lesson No: 60

Duration of Lesson: 1hr

Lesson Title: Revision- Behaviour of joints in RC buildings during earthquake

INSTRUCTIONAL/LESSON OBJECTIVES:

On completion of this lesson the student shall be able to:

1. Understand the Behaviour of joints in RC buildings during earthquake.

TEACHING AIDS : white board, Different colour markers

TEACHING POINTS :

- Behaviour of joints in RC buildings during earthquake

Assignment / Questions: (5 &5) 1. Discuss about behaviour of joints in RC buildings during earthquake by considering a case study.

Signature of faculty

Note: Mention for each question the relevant Objectives and Outcomes Nos.