

STRUCTURAL DESIGN LAB

(GR22D5009)

I - M.Tech - I Semester

Mr. C Vivek Kumar

Dr.GVV Satyanarayana



Department of Civil Engineering

Gokaraju Rangaraju Institute of Engineering and Technology

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



Gokaraju Rangaraju Institute of Engineering and Technology

Department of Civil Engineering

STRUCTURAL DESIGN Lab

Course File Check List

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GR 22 Regulations (2022-2023)

GOKARAJU RANGARAJU

INSTITUTE OF ENGINEERING AND TECHNOLOGY

I Year M. Tech. STE – I Semester

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(GR22D5009) STRUCTURAL DESIGN LAB

Cycle I

1. Develop a template for design of one-way slab.
2. Develop a template for design of two-way Slab.
3. Develop a template for design of columns.
4. Develop a template for design of combined footing.
5. Analysis and design of continuous beam

Cycle II

6. Analysis and design of plane frame.
7. Analysis of multi-storeyed space frame.
8. Static analysis of multi-storeyed structure.
9. Dynamic analysis of multi-storeyed structure.
10. Analysis and design of Steel truss.



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(Autonomous)
Bachupally, Hyderabad-500090

DEPARTMENT OF CIVIL ENGINEERING (M.Tech)

I YEAR

ROOM NO: 4207

W.E.F: 15-11-2021

	1	2	3	4	8	9	10
	9:00-10:00	10:00 - 11:00	11:00- 12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00
Monday				LUNCH BREAK	SD Lab		
Tuesday							
Wednesday							
Thursday					SD Lab		
Friday							
Saturday							

CODE	Subject	Faculty
GR22D5009	STRUCTURAL DESIGN Lab	Mr. C Vivek Kumar & Dr.GVV Satyanarayana

CLASS COORDINATOR

PROGRAMME COORDINATOR

HOD



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Program Educational Objectives

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 soft wares 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.

Program 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 bachelors.

PO 4: Possess critical thinking skills and solve core, complex and multidisciplinary structural engineering problems.

PO 5: 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 6: Recognize the need for life-long learning to improve knowledge and competence



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COURSE OBJECTIVES

Academic Year : 2022-2023
Semester : I
Name of the Program: M. Tech **Year:** I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation: Assistant Professor & Professor **Dept.:** Civil Engineering

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

1.	To learn the software applications in structural engineering.
2.	To develop a template for designing of the reinforced concrete members.
3.	To learn the analysis of plane, space truss and frames subjected to different types of loadings.
4.	To study the static and dynamic analysis, design and detailing of RCC framed structural members.
5	To study the analysis and design of Steel truss members.

Signature of HOD

Signature of faculty

Date:

Date:



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COURSE OUTCOMES

Academic Year : 2022-2023

Semester : I

Name of the Program: M.Tech **Year:** I Year

Course/Subject : Structural Design Lab **Course Code** : GR22D5009

Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana

Designation: Assistant Professor & Professor **Dept.:** Civil Engineering

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

Outcomes	
1	Understand the software usages and produce structural drawing for structural members.
2	Analyse and design the plane frame and truss subjected to different type of loading.
3	Design and detailing of RC structural members like beam, column, slab, and Footing
4	Analysis and design of RCC framed structures statically for different loading conditions.
5	Analysis and design of RCC framed structures dynamically for different loading conditions

Signature of HOD

Signature of faculty

Date:

Date:



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Department of Civil Engineering

S.No	ROLL NUMBER	NAME OF THE STUDENT
2	22241D2001	ADDAGATLA MAHESH KUMAR
3	22241D2002	AHMED ABDUL AZEEM
4	22241D2003	BAIRAPAKA BHARATH
5	22241D2004	BARLAPUDI ACHSAH KEERTHANA
6	22241D2005	CHAKALI SOWMYA
7	22241D2006	CHAPPIDI NARESH
8	22241D2007	DANTHALA HARIDEEP KUMAR
9	22241D2008	DEVIREDDY ANISH
10	22241D2009	DHARAVATH NAGENDAR
11	22241D2010	GANGAPURAM SUSHANTH REDDY
12	22241D2011	JEREPOTHULA RAVALIKA
13	22241D2012	KADABOHINA SAI PAVAN
14	22241D2013	KASUMURU BHARATH KUMAR
15	22241D2014	MACHARLA SRINIVAS
16	22241D2015	MALLI SREENIVASULU
17	22241D2016	SHAIK ABDUL MUQEED
18	22241D2017	SHAIK ZABI ULLAH
19	22241D2018	SONWANE SAHIL SHIVAJIRAO

Signature of HOD

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BOOKS AND MATERIALS

TEXT BOOKS

- | |
|--|
| 1. Reinforced Concrete Design, Pillai S. U. and Menon D., Tata McGraw-Hill, 3rd Ed, 1999 |
| 2. Illustrate Reinforced Concrete Design, Shah & Karve |
| 3. Advanced Reinforced Concrete Design, Varghese P. C., Prentice Hall of India, New Delhi. |

Suggested / Reference Books

- | | |
|----|--|
| 1. | IS 456-2000; Indian Standard Code of Practice for Plain and Reinforced Concrete. |
| 2. | SP 16: Design Aids for Reinforced Concrete |
| 3. | User's Guide ETABS® 2016 Integrated Building Design Software |

Web Sites

- | | |
|----|---|
| 1. | https://standardsbis.bsbedge.com/ |
| 2. | https://wiki.csiamerica.com/display/doc/ETABS+Training+manuals |
| 3. | https://www.youtube.com/watch?v=mTLmMwKvukw&list=PLELbBNWxxKaCAJL_RKMSwjUlKVRgCway9 |



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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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Department of Civil Engineering

COURSE SCHEDULE

Academic Year : 2022-2023

Semester : I

Name of the Program: M.Tech **Year:** I Year

Course/Subject : Structural Design Lab **Course Code** : GR22D5009

Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana

Designation: Assistant Professor & Professor

The Schedule for the whole Course / Subject is:

S.NO	DESCRIPTION	DATE		NO. OF CLASSES
		FROM	TO	
1	Instructions and Demonstration	15-11-2021	18-11-2021	1 Day
2	Cycle -I	22-11-2021	28-01-2021	7 Weeks
3	Cycle – II	03-02-2022	03-03-2022	7 Weeks
4	Revision	07-03-2022	10-03-2022	1 Week
5	Practical Examination	17-03-2022	17-03-2022	1 Week
6	End Examination	20-03-2022	20-03-2022	1 Week

Total No. of Instructional periods available for the course: **81** Hours / Periods



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STRUCTURAL ENGINEERING LAB

CYCLE -1 EXERCISES RELATED BUILDING STRUCTURAL ELEMENTS

1. Develop a template for design of one-way slab.
2. Develop a template for design of two-way Slab.
3. Develop a template for design of columns.
4. Develop a template for design of combined footing.
5. Analysis and design of continuous beam.

CYCLE -2 EXERCISES RELATED TO ADVANCED STRUCTURES

6. Analysis and design of plane frame.
7. Analysis of multi-storeyed space frame.
8. Static analysis of multi-storeyed structure.
9. Dynamic analysis of multi-storeyed structure.
10. Analysis and design of Steel truss.



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SCHEDULE OF INSTRUCTIONS

Academic Year : 2022-2023

Semester : I

Name of the Program: M.Tech **Year:** I Year

Course/Subject : Structural Design Lab **Course Code** : GR22D5009

Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana

Designation: Assistant Professor & Professor

The Course plan for the whole Course / Subject is:

Lesson No.	Date	No. of Periods	Topics / Sub-Topics	Objectives & Outcomes Nos.
1.	11/15/2021	3	Introduction to Structural Design Lab	CO- 1-5 COB- 1-5
2.	11/18/2021	3	Introduction to STAAD.Pro	CO- 3 COB- 3
3.	11/22/2021	3	Develop a template for design of one-way slab.	CO- 1, 3 COB- 1, 3
4.	11/25/2021	3	Develop a template for design of one-way slab.	CO- 3 COB- 3
5.	11/29/2021	3	Develop a template for design of one-way slab.	CO- 1, 3 COB- 1, 3
6.	12/2/2021	3	Develop a template for design of two-way Slab	CO- 3 COB- 3
7.	12/6/2021	3	Develop a template for design of two-way Slab	CO- 1, 3 COB- 1, 3
8.	12/9/2021	3	Develop a template for design of columns	CO- 3 COB- 3
9.	12/13/2021	3	Develop a template for design of columns	CO- 1, 3 COB- 1, 3
10.	12/20/2021	3	Develop a template for design of combined footing.	CO- 3 COB- 3
11.	12/23/2021	3	Develop a template for design of combined footing.	CO- 1, 3 COB- 1, 3

12.	12/27/2021	3	Analysis and design of continuous beam	CO- 1-5	COB- 1-5
13.	1/3/2022	3	Analysis and design of plane frame	CO- 1-3	COB- 1-4
14.	1/21/2022	3	Analysis of multi-storeyed space frame.	CO- 1-3	COB- 1-4
15	1/22/2022	3	Analysis of multi-storeyed space frame.	CO- 1-3	COB- 1-4
16	1/28/2022	3	Static analysis of multi-storeyed structure	CO- 1 & 3	COB- 1 – 4
17	2/3/2022	3	Static analysis of multi-storeyed structure	CO- 1 & 3	COB- 1 – 4
18	2/7/2022	3	Dynamic analysis of multi-storeyed structure. - RSM	CO- 1 & 3	COB- 1 – 4
19	2/10/2022	3	Dynamic analysis of multi-storeyed structure. THM	CO- 1 & 3	COB- 1 – 4
20	2/14/2022	3	Dynamic analysis of multi-storeyed structure. THM	CO- 1 & 3	COB- 1 – 4
21	2/21/2022	3	Analysis and design of Steel truss	CO- 1 – 5	COB- 1-5
22	2/24/2022	3	Analysis and design of Steel truss	CO- 1 – 5	COB- 1-5
23	2/28/2022	3	Revision	CO- 1-3	COB- 4
24	3/3/2022	3	Revision	CO 3 - 5	COB- 1 & 5
25	3/7/2022	3	Internal Lab Exam	CO- 1- 5	COB- 1

Signature of HOD
Date:

Signature of faculty
Date:



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Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation: Assistant Professor & Professor **Department:** Civil Engineering
Lesson No: 2 **Duration of Lesson:** 3 hrs
Lesson Title: Design of all the Structural Components of Frame Buildings

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Design of a structural member: Beam (Manually)
2. Use IS 456 to design and perform checks involved in design
3. Design for shear reinforcements in beam

TEACHING AIDS : Lab Manual, Laptop, Projector, Demonstration.

TEACHING POINTS :

Beam Design: Reinforcements for target moment (for singly and doubly reinforced scenarios)
Shear design in beams
Using IS Codes

Assignment / Questions:

1. Determining moment carrying capacity of a structural member: Beam (CO 1, COB1)

Signature of faculty



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Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation: Assistant Professor & Professor **Department:** Civil Engineering
Lesson No: 4 **Duration of Lesson:** 3 hrs
Lesson Title: Design of all the Structural Components of Frame Buildings (Manually)

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Design of a structural member: One-way Slabs (Manually)
2. Use IS 456 to design and perform checks involved in design

TEACHING AIDS : Lab Manual, Laptop, Projector, Demonstration.

TEACHING POINTS :

Slab Design: Reinforcements for target moment (one way)
Taking loads from IS 875
Using IS Codes in design

Assignment / Questions:

1. Calculate the live loads from IS 875 - Part II for different buildings (CO 1, COB1)
2. Calculate the total ultimate load for those conditions for the given slab (CO 1, COB1)

Signature of faculty



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Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana

Designation: Assistant Professor & Professor **Department:** Civil Engineering

Lesson No: 13 **Duration of Lesson:** 3 hrs

Lesson Title: Modelling of Building using Software

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Model a Beam in STAAD PRO
2. Design of beam using STAAD PRO
3. Check for the reinforcements and compare with already designed beam

TEACHING AIDS : Lab Manual, Laptop, Projector, Demonstration.

TEACHING POINTS :

Modelling of Beam using Coordinate system.

Beam Design: using STAAD Pro

Fetch the reinforcement details

Identify the SFD and BMD

Assignment / Questions:

1. Analyzing the capacity of a modeled beam – SFD & BMD (CO2.3, COB3)

Signature of faculty



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LESSON PLAN

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation: Assistant Professor & Professor **Department:** Civil Engineering

Lesson No: 14

Duration of Lesson: 3 hrs

Lesson Title: Modelling of Building using Software

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Modeling of a portal frame using STAAD PRO

TEACHING AIDS : Lab Manual, Laptop, Projector, Demonstration.

TEACHING POINTS :

Portal Frame modelling using STAAD Pro

Identify the SFD and BMD

Assignment / Questions:

1. Creating similar frames to analyse the SFD and BMD values (CO3, COB3)

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LESSON PLAN

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation: Assistant Professor & Professor **Department:** Civil Engineering
Lesson No: 18 **Duration of Lesson:** 3 hrs

Lesson Title: Practice on Structural design software

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Model a 3D building
2. Applying loads on the 3D modeled building
3. Analyze the building

TEACHING AIDS : Lab Manual, Laptop, Projector, Demonstration.

TEACHING POINTS :

3D modeling
Applying the loads involved with dead and live load
Statical ana Analysis on the building

Assignment / Questions:

1. Model for varying plans (CO3, COB3)

Signature of faculty



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Department of Civil Engineering

LESSON PLAN

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr. GVV Satyanarayana
Designation: Assistant Professor & Professor **Department:** Civil Engineering
Lesson No: 22 & 23 **Duration of Lesson:** 3 hrs
Lesson Title: Analysis of Bridge Deck slab

INSTRUCTIONAL/LESSON OBJECTIVES:

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

1. Modelling of roof trusses using STAAD.Pro
2. Analysis of the model

TEACHING AIDS : Lab Manual, Laptop, Projector, Demonstration.

TEACHING POINTS :

Modelling steps involved for roof truss using Staad pro
Materials and support conditions
Loads over roof truss

Assignment / Questions:

1. Make a note of different Types of Trusses (CO5, COB5)
2. Differences between Truss and Roof(CO5,COB5)

Signature of faculty



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Department of Civil Engineering

COURSE COMPLETION STATUS

Academic Year : 2022-2023 **Semester** : I
Name of the Program: M.Tech **Year** : I Year
Course/Subject : Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty : Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation: Assistant Professor & Professor
Actual Date of Completion & Remarks, if any

Cycle	Remarks	Objectives Achieved	Outcomes Achieved
Cycle I	Covered in Time	1,2,3	1,2,3
Cycle II	Covered in Time	1,3,4,5	1,3,4,5

Signature of HOD

Signature of faculty

Date:

Date:



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Assessment in relation to CO's and COB's

Assessment:

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

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					

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					



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Mappings of CO's, COB's Vs PO's, POB's

Course Objectives - Course Outcomes Relationship Matrix

Course Objectives \ Course Outcomes	Course Outcomes				
	1	2	3	4	5
1	X	X	X		
2	X	X			
3	X		X		
4		X			
5				X	X

Course Outcomes - Program Outcomes relations (Contributions: High, Medium and Low)

Structural Design Lab (GR22D5009) CO's	1	2	3	4	5	6
To learn the software applications in structural engineering.	H	H	H		M	M
To develop a template for designing of the reinforced concrete members.	H	H	H			M
To learn the analysis of plane, space truss and frames subjected to different types of loadings.	M	M	M			M
To study the static and dynamic analysis, design and detailing of RCC framed structural members.	M	H	H		M	M
To study the analysis and design of Steel truss members.	H	H	H	M	M	M

Course Objectives - Program Outcomes (PO's) Relationship Matrix

Course Objectives \ Program Outcomes	Program Outcomes					
	1	2	3	4	5	6
1	H	H	H		M	M
2	H	H	H			M
3	M	M	M			M
4	M	M	M			M
5	H	H	H	M	M	M

Course Outcomes - Program Outcomes relations (PO's) Relationship Matrix

Course Outcomes \ Program Outcomes	Program Outcomes					
	1	2	3	4	5	6
1	x	x	x		x	x
2	x	x	x			x
3	x	x	x			x
4	x	x	x			x
5	x	x	x	x	x	x

Courses (with title & code)-Program Outcomes (PO's) Relationship Matrix

Course: Structural Design Lab

Courses	Program Outcomes					
	1	2	3	4	5	6
1	x		x	x	x	x

Program Educational Objectives (PEOs) - Course Outcomes Relationship Matrix

Course Outcomes	Program Educational Objectives			
	1	2	3	4
1	x			x
2	x		x	x
3	x	x	x	
4	x	x		
5	x		x	x



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Rubric Template – Structural Design Lab

Academic Year : 2022-2023 **Semester** : I
Name of the Program:M.Tech **Year** : I Year
Course/Subject :Structural Design Lab **Course Code** : GR22D5009
Name of the Faculty :Mr. C Vivek Kumar & Dr.GVV Satyanarayana
Designation : Assistant Professor & Professor **Department:** Civil Engineering

		Beginning	Developing	Reflecting Development	Accomplished	Exemplary	Score
Name of the Student	Performance Criteria	1	2	3	4	5	
	Level of knowledge on fundamental laboratory tests and collect, analyze or synthesize appropriate data.	Inability to perform fundamental laboratory tests or collect, analyze, or synthesize appropriate data	Able to collect, analyze, and synthesize data related to the properties and behavior of soils in the geotechnical laboratory	Ability to observe collection of samples, perform fundamental laboratory tests, and collect, analyze, and synthesize appropriate data.	Knowledge on collection of Samples & independently perform fundamental laboratory tests, and collect, analyze, and synthesize appropriate data with few procedural errors	Full knowledge on collection of soil samples, independently perform fundamental laboratory tests, and collect, analyze, and synthesize appropriate data with no procedural errors	5
	Level of knowledge on properties of SCC mixes and assessment using appropriate laboratory analysis.	Low level of knowledge on scc properties and the respective laboratory analyses.	Able to understand the importance of SCCmixes and effecting factors.	Ability to apply the knowledge of scc properties in choosing appropriate laboratory analysis	Full Knowledge on properties of scc and assessment of vital parameters using laboratory analyses.	Analyzing all practical aspects of scc properties and their key role in the field of construction.	5
	Level of knowledge on tensile, compressive and flexure strength properties and their real time applications.	Low level of knowledge on strength parameters and their real time applications.	Able to understand the strength parameters under various loading conditions.	Ability to apply the knowledge in the determination of strength parameters	Full knowledge on strength parametersand the respective laboratory analyses.	Analyzing the importance of strength parameters under various existing conditions and their respective applications.	5

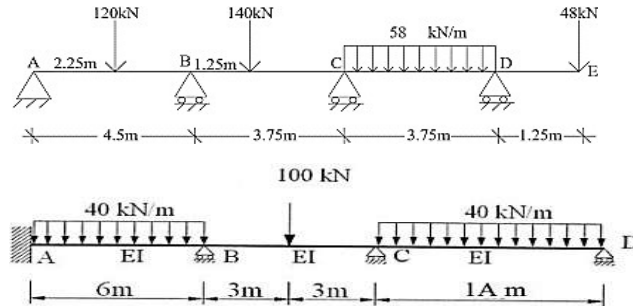
Department of Civil Engineering
Structural Design Lab
External Examination

Time: 9.30 AM to 12.00 PM

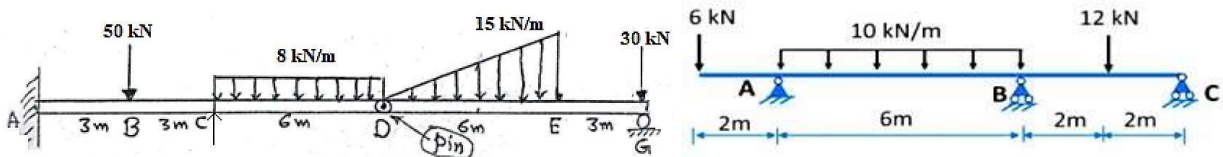
Date: 21/03/2022

1. Design a reinforced concrete slab for a hall measuring 3 m x 8 m. The slab is supported over the RCC beams 250 mm wide and spaced at 4 m c/c. The superimposed load is 4 kN/m². Use M20 concrete and Fe415 steel. Assume necessary data required.
2. Design a reinforced concrete slab for a hall measuring 2.5 m x 7.5 m. The slab is supported over the RCC beams 250 mm wide and spaced at 3.5 m c/c. The superimposed load is 4.5 kN/m². Use M25 concrete and Fe415 steel. Assume necessary data required.
3. Design a slab over a room 4 m x 6 m as per IS code. The edge of the slab is simply supported, and the corner are not held down. The live load on the slab is 3 kN/m². The slab has a bearing of 150 mm on supporting walls. Use M20 concrete and Fe415 steel.
4. Design a slab over a room 4 m x 5 m as per IS code. The edge of the slab is simply supported, and the corner are not held down. The live load on the slab is 4 kN/m². The slab has a bearing of 150 mm on supporting walls. Use M25 concrete and Fe415 steel.
5. Design a short column of size 400 mm x 500 mm subjected an axial load $P_u = 250$ kN and biaxial bending moment as follows: $M_{ux} = 150$ kN-m, $M_{uy} = 120$ kN-m, Use M25 concrete and Fe 415 steel.
6. Design a short column of size 500 mm x 600 mm subjected an axial load $P_u = 200$ kN and biaxial bending moment as follows: $M_{ux} = 150$ kN-m, $M_{uy} = 120$ kN-m, Use M20 concrete and Fe 415 steel.
7. Design a combined rectangular footing for RC columns A and B separated by 4m c/c. Column A is 500x500 sq.mm and column B 600x600 sq.mm CSA and carries 1200 kN and 1600 kN respectively. SBC of soil is 200 kN/m². Use M25 and Fe415 grades.
8. Design a continuous beam of three equal spans of 3m to carry a DL of 15 kN/m² and LL of 10 kN/m². Use M20 concrete and Fe415 steel. [Mid Span]
9. Design a continuous beam of three equal spans of 3m to carry a DL of 15 kN/m² and LL of 10 kN/m². Use M20 concrete and Fe415 steel. [End Span]

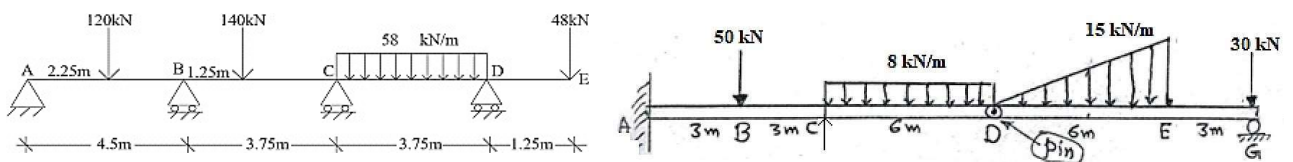
10. Analyse and design the RCC beam for the following support and load conditions. Show SFD and BMD.



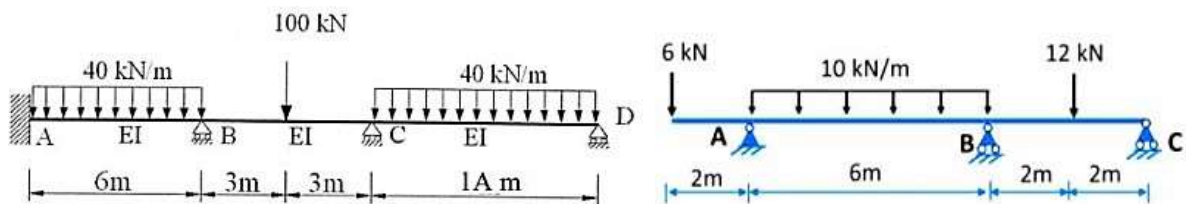
11. Analyse and design the RCC beam for the following support and load conditions. Show SFD and BMD.



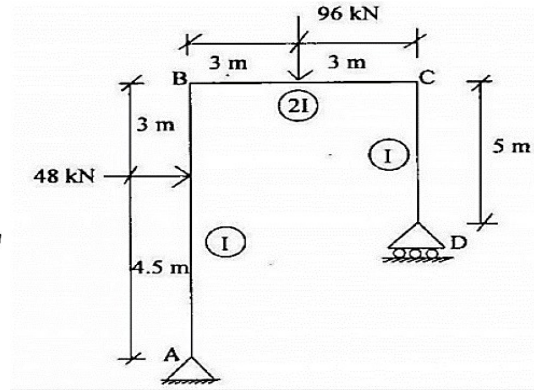
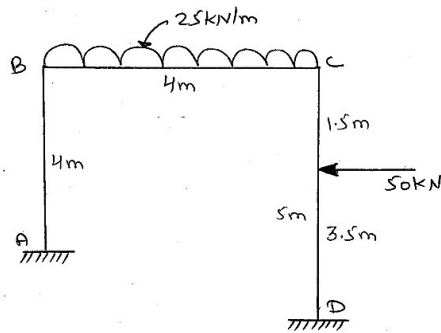
12. Analyse and design the RCC beam for the following support and load conditions. Show SFD and BMD.



13. Analyse and design the RCC beam for the following support and load conditions. Show SFD and BMD.



14. Analyse and design the RCC Frame for the following support and load conditions. Show SFD and BMD.



15. Analyse and Design the 3D frame (G+5) with a size of 15 m x 20 m consists of 3 m x 4 m Bay size with DL, LL with their load combinations. Assume whichever data necessary.
16. Analyse and Design the 3D frame (G+6) with a size of 20 m x 25 m consists of 4 m x 5 m Bay size with DL, LL with their load combinations. Assume whichever data necessary.
17. Analyse and Design the 3D frame (G+7) with a size of 25 m x 20 m consists of 5 m x 4 m Bay size with DL, LL with their load combinations. Assume whichever data necessary.
18. Analyse and Design the 3D steel truss with a size of 12 m x 20 m consists of 5 m Bay size with DL, LL with their load combinations. Assume whichever data necessary.



**GokarajuRangaraju Institute of Engineering and Technology
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M. Tech STRUCTURAL ENGINEERING

STRUCTURAL DESIGN LAB INTERNAL EXAM MARK SHEET

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GR22 2022-23 D 20 110 A A GR22D5009

S.No	Branchcode	Roll No	Subject Code	Subject Name	Lab Internals	Assessment Marks	Record Marks	Lab Attendance Marks	Sessional Marks
1	20	22241D2001	GR22D5009	Structural Design Lab	7	8	9	7	31
2	20	22241D2002	GR22D5009	Structural Design Lab	8	9	9	10	36
3	20	22241D2003	GR22D5009	Structural Design Lab	6	10	9	2	27
4	20	22241D2004	GR22D5009	Structural Design Lab	8	8	9	6	31
5	20	22241D2005	GR22D5009	Structural Design Lab	8	8	9	5	30
6	20	22241D2006	GR22D5009	Structural Design Lab	7	10	9	3	29
7	20	22241D2007	GR22D5009	Structural Design Lab	6	10	9	6	31
8	20	22241D2008	GR22D5009	Structural Design Lab	7	10	9	7	33
9	20	22241D2009	GR22D5009	Structural Design Lab	7	8	9	1	25
10	20	22241D2010	GR22D5009	Structural Design Lab	8	10	9	3	30
11	20	22241D2011	GR22D5009	Structural Design Lab	8	10	9	4	31
12	20	22241D2012	GR22D5009	Structural Design Lab	8	8	9	8	33
13	20	22241D2013	GR22D5009	Structural Design Lab	9	10	10	2	31
14	20	22241D2014	GR22D5009	Structural Design Lab	7	10	9	3	29
15	20	22241D2015	GR22D5009	Structural Design Lab	10	10	10	7	37
16	20	22241D2016	GR22D5009	Structural Design Lab	7	10	10	4	31
17	20	22241D2017	GR22D5009	Structural Design Lab	8	8	9	4	29
18	20	22241D2018	GR22D5009	Structural Design Lab	9	10	9	9	37
19	20	22241D2019	GR22D5009	Structural Design Lab	5	5	5	1	16