Ref No:

SRI KRISHNA INSTITUTE OF TECHNOLOGY

LABORATORY PLAN

Academic Year 2019-20

Program:	B E – Mechanical Engineering
Semester :	6
Course Code:	17MEL68
Course Title:	Modeling And analysis
Credit / L-T-P:	2 / 0-0-2
Total Contact Hours:	32
Course Plan Author:	SAGAR H N

Academic Evaluation and Monitoring Cell

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INSTRUCTIONS TO TEACHERS

- Classroom / Lab activity shall be started after taking attendance.
- Attendance shall only be signed in the classroom by students.
- Three hours attendance should be given to each Lab.
- Use only Blue or Black Pen to fill the attendance.
- Attendance shall be updated on-line & status discussed in DUGC.
- No attendance should be added to late comers.
- Modification of any attendance, over writings, etc is strictly prohibited.
- Updated register is to be brought to every academic review meeting as per the COE.

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Note : Remove “Table of Content” before including in CP Book
Each Laboratory Plan shall be printed and made into a book with cover page
Blooms Level in all sections match with A.2, only if you plan to teach / learn at higher levels

A. LABORATORY INFORMATION

1. Laboratory Overview

Degree:	B.E	Program:	ME
Year / Semester :	3/ 6	Academic Year:	2019-20
CourseTitle:	Modeling and Analysis Lab	Course Code:	17MEL68
Credit / L-T-P:	2 / 1-0-2	SEE Duration:	180 Minutes
Total Contact Hours:	36Hrs	SEE Marks:	60Marks
CIA Marks:	40	Assignment	-
Lab. Plan Author:	Mr. S N SUNIL	Sign	Dt :
Checked By:	Mr. K L RAHULr	Sign	Dt :

2. Laboratory Content

Expt.	Title of the Experiments	Lab Hours	Concept	Blooms Level
1	Modeling and stress analysis of: Bars of constant cross section area, tapered cross section area and stepped bar	3		L4 Analyze
2	Modeling and stress analysis of Trusses	3		L4 Analyze
3	Modeling and stress analysis Beams – Simply supported, cantilever, beams with point load , UDL, beams with varying load	3		L4 Analyze
4	Stress analysis of a rectangular plate with a circular hole	3		L4 Analyze
5	Thermal Analysis – 1D & 2D problem with conduction and convection boundary conditions	3		L4 Analyze
6	Dynamic Analysis to find a) Fixed – fixed beam for natural frequency determination b) Bar subjected to forcing function c) Fixed – fixed beam subjected to forcing function	3		L3 Apply

3. Laboratory Material

Books & other material as recommended by university (A, B) and additional resources used by Laboratory teacher (C).

Expt.	Details	Expt. in book	Availability
A	**Text books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
1-5	A first course in the Finite element method, Daryl L Logan, Thomason, Third Edition	3, 4	In Lib / In Dept
1-6	Fundaments of FEM, Hutton – McGraw Hill, 2004	2, 4	In Lib/ In dept
B	**Reference books (Title, Authors, Edition, Publisher, Year.)**	**-**	**-**
		?	In Lib
1-6	Finite Element Analysis, George R. Buchanan, Schaum Series	?	Not Available
C	**Concept Videos or Simulation for Understanding**	**-**	**-**
1	https://www.youtube.com/watch?v=nA_tglygvNo		
D	**Software Tools for Design**	**-**	**-**
	Ansys. Hyper Mesh , Nastran , Abquas		
E	**Recent Developments for Research**	**-**	**-**
		?	In lib
F	**Others (Web, Video, Simulation, Notes etc.)**	**-**	**-**

1	https://www.youtube.com/watch?v=nA_tglygvNo		
?			

4. Laboratory Prerequisites:

Refer to GL01. If prerequisites are not taught earlier, GAP in curriculum needs to be addressed. Include in Remarks and implement in B.5.
Students must have learnt the following Courses / Topics with described Content . . .

Expt.	Lab. Code	Lab. Name	Topic / Description	Sem	Remarks	Blooms Level
1	17MEL56	Energy Conversion lab	Heat Transfer	5		L2

5. Content for Placement, Profession, HE and GATE

The content is not included in this course, but required to meet industry & profession requirements and help students for Placement, GATE, Higher Education, Entrepreneurship, etc. Identifying Area / Content requires experts consultation in the area.
Topics included are like, a. Advanced Topics, b. Recent Developments, c. Certificate Courses, d. Course Projects, e. New Software Tools, f. GATE Topics, g. NPTEL Videos, h. Swayam videos etc.

Expt.	Topic / Description	Area	Remarks	Blooms Level
1	Transient Anlysis			L2
-				

B. Laboratory Instructions

1. General Instructions

SNo	Instructions	Remarks
1	Observation book and Lab record are compulsory.	
2	Students should report to the concerned lab as per the time table.	
3	After completion of the program, certification of the concerned staff in-charge in the observation book is necessary.	
4	Student should bring a notebook of 100 pages and should enter the readings /observations into the notebook while performing the experiment.	
5	The record of observations along with the detailed experimental procedure of the experiment in the Immediate last session should be submitted and certified staff member in-charge.	
6	Should attempt all problems / assignments given in the list session wise.	
7	It is responsibility to create a separate directory to store all the programs, so that nobody else can read or copy.	
8	When the experiment is completed, should disconnect the setup made by them, and should return all the components/instruments taken for the purpose.	
9	Any damage of the equipment or burn-out components will be viewed seriously either by putting penalty or by dismissing the total group of students from the lab for the semester/year	
10	Completed lab assignments should be submitted in the form of a Lab Record in which you have to write the algorithm, program code along with comments and output for various inputs given	

2. Laboratory Specific Instructions

SNo	Specific Instructions	Remarks
1	Start computer	
2	Open the text editor	
3	Select new file.	

4	Open the ansys software	
5	Create a model	
6	Apply the boundary condition	
7	Note down the result	

C. OBE PARAMETERS

1. Laboratory Outcomes

Expt.	Lab Code #	COs / Experiment Outcome	Teach. Hours	Concept	Instr Method	Assessment Method	Blooms' Level
-	-	**At the end of the experiment, the student should be able to . . .**	-	-	-	-	-
1	CO1	Analyze the stress and strain generated in bars under different loading condition	9	Bars	Demonstrate	Slip Test	L2
2	CO2	Analyze d the stress and strain generated in trusses under different loading condition	9	Trusses	Demonstrate	Assignment	L2
3	CO3	Analyze the stress and Deflection generated in beams under different loading condition	9	Beams	Demonstrate	Assignment and Slip Test	L2
4	CO4	Analyze stress concentration and strain in plate with hole	9	Plate with hole	Simulation	Assignment	L3
5	CO5	Understand the heat generation in composite wall structure	9	Thermal analysis	Tutorial	Slip test	L2
6	CO6	Analyze the dynamic analysis of beams	9	Dynamic analysis	Tutorial	Assignment	L2
-		**Total**	**36**	**-**	**-**	**-**	**-**

Note: Identify a max of 2 Concepts per unit. Write 1 CO per concept.

2. Laboratory Applications

Expt.	Application Area	CO	Level
1	Stress analysis in complex structure like aircraft structure		
2	Thermal analysis in composite wall structure like furnace , pressure vessels		
3	Structure analysis of bridges and building		

Note: Write 1 or 2 applications per CO.

3. Mapping And Justification

CO – PO Mapping with mapping Level along with justification for each CO-PO pair.
To attain competency required (as defined in POs) in a specified area and the knowledge & ability required to accomplish it.

Expt.	Mapping		Mapping Level	Justification for each CO-PO pair	Level
-	**CO**	**PO**	**-**	**'Area': 'Competency' and 'Knowledge' for specified 'Accomplishment'**	**-**
1	CO1	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of Bars is essential to accomplish solutions to complex engineering problems in Mechanical Engineering.	L2
1	CO1	PO2		'Problem Analysis': Analyzing problems require knowledge / understanding of Structural analysis to accomplish solutions to complex engineering problems in Mechanical engineering.	L3
1	CO1	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of Bars accomplish solutions to complex engineering problems in Mechanical engineering.	L4
2	CO2	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of trusses is essential to accomplish solutions to complex engineering problems in Mechanical Engineering.	L2
2	CO2	PO2		'Problem Analysis': Analyzing problems require knowledge /	L3

				understanding of Structural analysis to accomplish solutions to complex engineering problems in Mechanical engineering.	
2	CO2	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of Trusses accomplish solutions to complex engineering problems in Mechanical engineering.	L4
3	CO3	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of Beams is essential to accomplish solutions to complex engineering problems in Mechanical Engineering.	L2
3	CO3	PO2		'Problem Analysis': Analyzing problems require knowledge / understanding of Structural analysis to accomplish solutions to complex engineering problems in Mechanical engineering.	L3
3	CO3	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of Beams accomplish solutions to complex engineering problems in Mechanical engineering.	L4
4	CO4	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of Plate is essential to accomplish solutions to complex engineering problems in Mechanical Engineering.	L2
4	CO4	PO2		'Problem Analysis': Analyzing problems require knowledge / understanding of Structural analysis to accomplish solutions to complex engineering problems in Mechanical engineering.	L3
4	CO4	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of Plates accomplish solutions to complex engineering problems in Mechanical engineering.	L4
5	CO5	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of Heat transfer in composite wall is essential to accomplish solutions to complex engineering problems in Mechanical Engineering.	L2
5	CO5	PO2		'Problem Analysis': Analyzing problems require knowledge / understanding of Thermal analysis to accomplish solutions to complex engineering problems in Mechanical engineering.	L3
5	CO5	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of Heat transfer in composite wall accomplish solutions to complex engineering problems in Mechanical engineering.	L4
6	CO6	PO1	3	'Engineering Knowledge:' - Acquisition of Engineering Knowledge of bars and Beams is essential to accomplish solutions to complex engineering problems in Mechanical Engineering.	
6	CO6	PO2		'Problem Analysis': Analyzing problems require knowledge / understanding of dynamic analysis to accomplish solutions to complex engineering problems in Mechanical engineering.	
6	CO6	PO3	1	'Design / Development of Solutions': Design & development of solutions require knowledge / understanding & analysis of bars and Beams accomplish solutions to complex engineering problems in Mechanical engineering.	

4. Articulation Matrix

CO – PO Mapping with mapping level for each CO-PO pair, with course average attainment.

-	-	Experiment Outcomes	Program Outcomes														-
Expt.	CO.#	**At the end of the experiment student should be able to . . .**	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3	Level
1	CO1	Analyze the stress and strain generated in bars under different loading condition	√	√	√													L2
1	CO2	Analyze d the stress and strain generated in trusses under different loading condition	√	√	√													L2
2	CO3	Analyze the stress and Deflection generated in beams under different loading condition	√	√	√													L2

2	CO4	Analyze stress concentration and strain in plate with hole	√	√	√													L3
3	CO5	Understand the heat generation in composite wall structure	√	√	√													L2
3	CO6	Analyze the dynamic analysis of beams	√	√	√													L2
-	**CS501PC**	**Average attainment (1, 2, or 3)**																-
-	*PO, PSO*	*1.Engineering Knowledge; 2.Problem Analysis; 3.Design / Development of Solutions; 4.Conduct Investigations of Complex Problems; 5.Modern Tool Usage; 6.The Engineer and Society; 7.Environment and Sustainability; 8.Ethics; 9.Individual and Teamwork; 10.Communication; 11.Project Management and Finance; 12.Life-long Learning; S1.Software Engineering; S2.Data Base Management; S3.Web Design*																

5. Curricular Gap and Experiments

Topics & contents not covered (from A.4), but essential for the course to address POs and PSOs.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					

Note: Write Gap topics from A.4 and add others also.

6. Experiments Beyond Syllabus

Topics & contents required (from A.5) not addressed, but help students for Placement, GATE, Higher Education, Entrepreneurship, etc.

Expt	Gap Topic	Actions Planned	Schedule Planned	Resources Person	PO Mapping
1					

D. COURSE ASSESSMENT

1. Laboratory Coverage

Assessment of learning outcomes for Internal and end semester evaluation. Distinct assignment for each student. 1 Assignment per chapter per student. 1 seminar per test per student.

Unit	Title	Teaching Hours	No. of question in Exam							CO	Levels
			CIA-1	CIA-2	CIA-3	Asg-1	Asg-2	Asg-3	SEE		
1	Modeling and stress analysis of: Bars of constant cross section area, tapered cross section area and stepped bar	9	1	-	-	-	-	-	1	CO1	L4
2	Modeling and stress analysis of Trusses	9	1	-	-	-	-	-	1	CO2	L4
3	Modeling and stress analysis Beams – Simply supported, cantilever, beams with point load , UDL, beams with varying load	9	1	-	-	-	-	-	1	CO3	L4
4	Stress analysis of a rectangular plate with a circular hole	9	1	-	-	-	-	-	1	CO4	L4
5	Thermal Analysis – 1D & 2D problem with conduction and convection boundary conditions	9	1	-	-	-	-	-	1	CO5	L4
6	Dynamic Analysis to find a) Fixed – fixed beam for natural frequency determination b) Bar subjected to forcing function c) Fixed – fixed beam subjected to forcing function	9	1	-	-	-	-	-	1	CO6	L4
-	**Total**	**36**	**7**	**8**	**5**	**5**	**5**	**5**	**20**	-	-

2. Continuous Internal Assessment (CIA)

Assessment of learning outcomes for Internal exams. Blooms Level in last column shall match with A.2.

Evaluation	Weightage in Marks	CO	Levels
CIA Exam – 1	30	CO1 , CO2	L4
CIA Exam – 2	30	CO3, CO4	L4
CIA Exam – 3	30	CO5 , CO6	L4
Assignment - 1	05	CO1 , CO2	L4
Assignment - 2	05	CO3, CO4	L4
Assignment - 3	05	CO5 , CO6	L4
Seminar - 1	05		
Seminar - 2	05		
Seminar - 3	05		
Other Activities – define – Slip test			
Final CIA Marks	**40**	**-**	**-**

-

SNo	Description	Marks
1	Observation and Weekly Laboratory Activities	05 Marks
2	Record Writing	10 Marks for each Expt
3	Internal Exam Assessment	25 Marks
4	Internal Assessment	60 Marks
5	SEE	100 Marks
-	**Total**	**100 Marks**