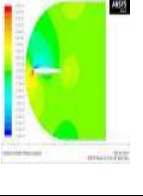


**Government of Karnataka**  
**Department of Technical Education**  
**Board of Technical Examinations, Bangalore**

	<b>Course Title: Computer Aided Analysis and Simulation lab</b>		
	Scheme (L:T:P) : <b>0:2:4</b>	Total Contact Hours: <b>78</b>	Course Code: <b>15ME65P</b>
	Type of Course: <b>Tutorial and practice</b>	Credit : <b>03</b>	Core/ Elective: <b>Core(practice)</b>
CIE:25 Marks		SEE:50 Marks	

**Prerequisites:** Learning concepts of strength of materials, machine design and Computer aided engineering.

**Course Objectives:**

To make students understand and learn about the analysis and simulation of simple mechanical parts through software and the solving techniques of various engineering problems.

**Course Out comes**

Students *On successful completion of the course, the students will be able to attain CO:*

Course Outcome		CL	Linked experiments	Linked PO	Teaching Hrs
CO1	Learn ANSYS- Analysis Software/Any analysis soft ware	<i>U/A</i>	1-8	2,3,4	<b>09</b>
CO2	Use the ANSYS software/Any open source analysis soft ware for solving various problems	<i>U/A</i>	1-8	2,3,4	<b>50</b>
CO3	Have a good grip on simulations of the models any of the analysis software	<i>U/A</i>	1-8	2,3,4	<b>19</b>
<b>Total sessions</b>					<b>78</b>

Legend: U: Understand A: application

**COURSE-PO ATTAINMENT MATRIX**

Course	Programme Outcomes									
	1	2	3	4	5	6	7	8	9	10
<b>CAS LAB</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>3</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<p><i>Level 3- Highly Addressed, Level 2-Moderately Addressed, Level 1-Low Addressed.</i>  Method is to relate the level of PO with the number of hours devoted to the Cos which address the given PO.  If <math>\geq 40\%</math> of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 3  If 25 to 40% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 2  If 5 to 25% of classroom sessions addressing a particular PO, it is considered that PO is addressed at Level 1  If <math>&lt; 5\%</math> of classroom sessions addressing a particular PO, it is considered that PO is considered not-addressed.</p>										

**LIST OF GRADED PRACTICAL EXERCISES**



The practical/Graded exercises should be properly designed and implemented with an attempt to develop different types of learning outcomes in affective domain and psychomotor domain, so that students are able to acquire the necessary skills.

Exercise No.	Practical/Exercise	Apprx. Hrs. Required
<b>ANALYSIS and SIMULATION USING ANSYS</b>		
1	Introduction to computer aided analysis and simulation	06
2	Awareness about using ANSYS	02
3.	Familiarisations of using ANSYS	02
4.	Tutorial on Finite element analysis - Introduction-Element properties-one dimensional problems-beams and frames-three dimensional problems in stress analysis	10
5	<b>Stress Analysis of Bars of Constant Cross Section Area</b> 1. Determine the nodal displacement, stress in each element and reaction forces of bar subjected to a Tensile force. 2. Determine the nodal displacement, stress in each element and reaction forces of bar subjected to a Compression force.	06
6	<b>Stress Analysis of Bars of Tapered Cross Section Area</b> 1. Determine the nodal displacement, stress in each element and reaction forces of Taper bar subjected to a external loads.	06
7	<b>Stress Analysis of Bars Varying In Cross Section or Stepped Bars</b> 1. Determine the nodal displacement, stress in each element and reaction forces of Stepped bar subjected to a external loads.	10
8	<b>Stress analysis of Beams</b> 1. Draw the shear force and bending moment diagrams for the given Cantilever beam due to applied load. 2. Draw the shear force and bending moment diagrams for the given Simply supported beam due to central point load 3. Draw the shear force and bending moment diagrams for the given Simply supported beam due to UDL 4. Draw the shear force and bending moment diagrams for the given Simply supported beam due to applied load(one point loads, and UDL) 5. Draw the shear force and bending moment diagrams for the given Simply supported beam due to Uniformly varying load(UVL) 6. Draw the shear force and bending moment diagrams for the given Simply supported beam due to applied load(Several point loads,UVL)	30
9	<b>Stress Analysis of a Rectangular Plate with a circular Hole</b> 1. Determine the stress acting on a rectangular plate with a	06



	circular hole due to the applied external load	
		<b>TOTAL</b>
		<b>78</b>



### TEXT BOOKS & REFERENCE

S. No	Title of Book	Author	Publication
1	ANSYS free software tutorial	Free soft ware (Student version)	<a href="https://www.google.co.in/search?biw=1024&amp;bih=667&amp;q=ansys+software+tutorial&amp;sa=X&amp;ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXCgB">https://www.google.co.in/search?biw=1024&amp;bih=667&amp;q=ansys+software+tutorial&amp;sa=X&amp;ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXCgB</a> <a href="https://www.google.co.in/search?biw=1024&amp;bih=667&amp;q=ansys+software+free+download+for+windows+7+64+bit&amp;sa=X&amp;ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXSgC">https://www.google.co.in/search?biw=1024&amp;bih=667&amp;q=ansys+software+free+download+for+windows+7+64+bit&amp;sa=X&amp;ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXSgC</a> <a href="https://www.google.co.in/search?biw=1024&amp;bih=667&amp;q=ansys+software+tutorial&amp;sa=X&amp;ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXygE">https://www.google.co.in/search?biw=1024&amp;bih=667&amp;q=ansys+software+tutorial&amp;sa=X&amp;ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXygE</a>

### SUGGESTED LEARNING RESOURCES

- <http://www.nptel.ac.in>
- [www.ansys.com/Student](http://www.ansys.com/Student)
- [https://www.google.co.in/search?biw=1024&bih=667&q=ansys+software+free+download+for+windows+7+64+bit&sa=X&ved=0ahUKewjm5o\\_MndHNAhUBsI8KHbRWDhUQ1QIIXCgB](https://www.google.co.in/search?biw=1024&bih=667&q=ansys+software+free+download+for+windows+7+64+bit&sa=X&ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXCgB)
- [https://www.google.co.in/search?biw=1024&bih=667&q=ansys+software+free+download+for+windows+7+32+bit&sa=X&ved=0ahUKewjm5o\\_MndHNAhUBsI8KHbRWDhUQ1QIIXSgC](https://www.google.co.in/search?biw=1024&bih=667&q=ansys+software+free+download+for+windows+7+32+bit&sa=X&ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXSgC)
- [https://www.google.co.in/search?biw=1024&bih=667&q=ansys+software+tutorial&sa=X&ved=0ahUKewjm5o\\_MndHNAhUBsI8KHbRWDhUQ1QIIXygE](https://www.google.co.in/search?biw=1024&bih=667&q=ansys+software+tutorial&sa=X&ved=0ahUKewjm5o_MndHNAhUBsI8KHbRWDhUQ1QIIXygE)
- [http://www.colorado.edu/MCEN/MCEN4173/Ansys\\_introduction.pdf](http://www.colorado.edu/MCEN/MCEN4173/Ansys_introduction.pdf)
- [http://www2.warwick.ac.uk/fac/sci/eng/study/pg/students/esrhaw/introduction\\_to\\_ansys.pdf](http://www2.warwick.ac.uk/fac/sci/eng/study/pg/students/esrhaw/introduction_to_ansys.pdf)
- <http://www.mece.ualberta.ca/tutorials/ansys>

### SUGGESTED LIST OF STUDENT ACTIVITES

1. Each student should submit any one of the following type activity or any other similar activity related to the course and before take up get it approved from concerned Teacher and HOD.
2. Each student should conduct different activity and no repeating should occur

1	Ask the students to take the simple problems in Strength of Materials, analyze the stresses by using software.
2	Ask the students to take the simple problems in Design of machine elements, analyze the stresses by using software.
3	At least take two simple mechanical components likes step turned shaft, measure the dimensions, Apply loads and analyze for stresses.
4	Study and understand the concept of theories of failure –Maximum shear stress theory, Maximum distortion energy theory ( Von-Mises Theory of failure)
5	Identify the theory of failure for the brittle material and ductile materials



### Course Delivery:

The course will be delivered through specific instructional strategies detailed as below

S.N.	Unit Name	Strategies
1	Introduction to Analysis software	Demonstration
2	Tutorial	Demonstration by any free software/ /Open source software
3	Problems for analysis.	Open source software

### Course Assessment and Evaluation Scheme:

Method	What		To whom	When/Where (Frequency in the course)	Max Marks	Evidence collected	Course outcomes
<b>DIRECT ASSESSMENT</b>	<b>CIE</b> (Continuous Internal Evaluation)	<b>IA</b> Tests	Students	Two Tests (Average of two tests to be computed)	10	Blue books	1,2,3
				Record Writing (Average marks of each exercise to be computed)	10	Record Book	1,2,3
				Activity	05	Report	1,2,3
				<b>TOTAL</b>	25		
	<b>SEE</b> (Semester End Examination)	End Exam		End of the course	50	Answer scripts at BTE	1,2,3
<b>INDIRECT ASSESSMENT</b>	Student Feedback on course		Students	Middle of the course		Feedback forms	1,2,3, Delivery of course
	End of Course Survey			End of the course		Questionnaires	1,2,3 Effectiveness



						of Delivery of instructions & Assessment Methods
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• **MODEL OF RUBRICS /CRITERIA FOR ASSESSING STUDENT ACTIVITY**

**RUBRICS MODEL**

<b>RUBRICS FOR ACTIVITY( 5 Marks)</b>						
<b>Dimension</b>	<b>Unsatisfactory</b>	<b>Developing</b>	<b>Satisfactory</b>	<b>Good</b>	<b>Exemplary</b>	<b>Student Score</b>
	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>	<b>5</b>	
<b>Collection of data</b>	Does not collect any information relating to the topic	Collects very limited information; some relate to the topic	Collect much information; but very limited relate to the topic	Collects some basic information; most refer to the topic	Collects a great deal of information; all refer to the topic	Ex: 4
<b>Fulfill team's roles &amp; duties</b>	Does not perform any duties assigned to the team role	Performs very little duties but unreliable.	Performs very little duties	Performs nearly all duties	Performs all duties of assigned team roles	5
<b>Shares work equally</b>	Always relies on others to do the work	Rarely does the assigned work; often needs reminding	Usually does the assigned work; rarely needs reminding	Normally does the assigned work	Always does the assigned work without having to be reminded.	3
<b>Listen to other Team mates</b>	Is always talking; never allows anyone else to speak	Usually does most of the talking; rarely allows others to speak	Talks good; but never show interest in listening others	Listens, but sometimes talk too much	Listens and speaks a fair amount	2
<b>Average / Total marks=(4+5+3+2)/4=14/4=3.5=4</b>						

**Note: This is only an example. Appropriate rubrics/criteria may be devised by the concerned faculty (Course Coordinator) for assessing the performed activity.**

**Note to IA verifier: The following documents to be verified by CIE verifier at the end of semester**

1. Blue books ( 20 marks)
2. Student suggested activities report for 5 marks
3. Student feedback on course regarding Effectiveness of Delivery of instructions & Assessment Method



Serial no	Description	Marks	
1	<b>ANSYS Basic</b>	10	20
	<b>Pre-processing</b>	10	
2	<b>Solution, Post-processing</b>	10	25
3	<b>Result , Conclusion with analytical comparisons</b>	15	
4	<b>Viva</b>		5
<b>TOTAL</b>			<b>50</b>

### Scheme of Valuation for End Examination

### EQUIPMENT LIST:

**Quantity: 01 Each**

Sr. No.	Resource with brief specification
1	Computer processor 500 GB HDD 1GB Graphics accelerator 2 GB RAM System-30 Nos 17" TEF Color Monitor Intel Core i3 /i5/i7
2	Color Desk Jet Printer-1 No
3	Operating system – Windows XP, Windows 7, Windows 8
3	Software ANSYS student Version ( freely available)/Any open source software <a href="http://www.ansys.com/Products/Academic/ANSYS-Student">http://www.ansys.com/Products/Academic/ANSYS-Student</a>

