INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

SIMULATION AND ANALYSIS LABORATORY							
II Semester: CAD / CAM							

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BCCD24	**Core**	0	0	4	2	40	60	100
Contact Classes: Nil	**Tutorial Classes: Nil**	**Practical Classes: 45**				**Total Classes: 45**		
Prerequisite: Advanced CAD								

I. COURSE OVERVIEW:

The simulation and analysis laboratory sessions are focusing on creation of geometry, meshing (Discretization) and the physics applied to thermal systems in order to visualize fluid flow and temperature distribution, solving, and reviewing results. This laboratory also covers the usage of finite element methods and necessary coding techniques in the interpretation of results. The Workbench environment is an intuitive up-front numerical methods analysis tool that is used in conjunction with CAD systems and/or Design Modeler. These simulations are used in performing structural, thermal, and electromagnetic systems in the emerging technologies of interdisciplinary applications such as mechanical, aerospace.

II. COURSE OBJECTIVES:

The students will try to learn
I. The importance of software tools needed to Analyze engineering problems.
II. The basics of MATLAB and solve vibration mechanism simulation using multi body dynamic software
III. The fundamentals of ANSYS and perform different stress analysis.
IV. The conductive and convective heat transfer analysis of 2D component using ANSYS.

III. COURSE OUTCOMES:

After successful completion of the course, students should be able to:
CO 1   Solve the vibration Mechanism problems using multi body dynamic software
CO 2   Analyze the Stress developed in plates using ANSYS
CO 3   Identify the Stresses in plate with a circular hole, rectangular L bracket and different types of beams using Ansys
CO 4   Analyze the Stress of an Axi– symmetric components
CO 5   Solve the thermal stress analysis of various 2D components using ANSYS

IV. COURSE CONTENT:

Week-1: MATLAB BASICS: Part -1
MAT LAB basics, dealing with matrices, Graphing-functions of one variable and two variables

Week-2: MATLAB BASICS: Part -2
Use of MATLAB to solve simple problems in vibration Mechanism Simulation using multi body dynamic software.

Week-3: ANSYS BASICS: Part -1
Introduction to Ansys Basics and usage of basic operation

Week-4: ANSYS BASICS: Part -2
Generation Stress analysis of a plate with a circular hole.

Week-5: STRESS ANALYSIS: Part -1
Stress analysis of rectangular L bracket

Week-6: STRESS ANALYSIS: Part -2
Stress analysis of beams (Cantilever, simply supported & Fixed ends)

Week-7: AXI- SYMMETRIC STRESS ANALYSIS: Part -1
Stress analysis of an Axi-symmetric component

Week-8: THERMAL ANALYSIS
Thermal stress analysis of a 2D component

Week-9: HEAT TRANFER ANALYSIS: Part -1
Conductive heat transfer analysis of a 2D component

Week-10: HEAT TRANFER ANALYSIS: Part -2
Convective heat transfer analysis of a 2D component

Week-11: HEAT TRANFER ANALYSIS: Part -3
Radiation heat transfer analysis of a 2D component

Week-12: HEAT TRANFER ANALYSIS: Part -4
Free Convection heat transfer analysis of a 2D component

Week-13: HEAT TRANFER ANALYSIS: Part -5
Forced Convection heat transfer analysis of a 2D component

Week-14: HEAT TRANFER ANALYSIS: Part -6
Radiation heat transfer analysis of a 2D component

V. TEXT BOOKS:

1. W T Thomson, "Theory of Vibrations with Applications", CBS Publishers, Delhi, 3rd edition, 2020.
2. S. S. Rao, "Mechanical Vibrations" Addison-Wesley Publishing Co., 5th edition, 2018.
3. Ashok Kumar Mallik, "Principles of Vibration Control", Affiliated East- West Press, 1st edition, 2019.

VI. WEB REFERENCES:

1. https://trove.nla.gov.au/work/6919983
2. https://2k9meduettaxila.files.wordpress.com/2012/09/rao-mechanical-vibrations-5th-edition-2k9meduettaxila-wordpress-com.pdf