

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme		Master of Technology			Branch/Spec.		Mechanical Engineering/ AMS		
Semester		I			Version				
Effective from Academic Year				2021-22		Effective for the batch Admitted in			July 2021
Subject code		3ME1104		Subject Name		Computer Aided Engineering			
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT)		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	2	0	5	Theory	40	60	100
Hours	3	0	4	0	7	Practical	30	20	50
Pre-requisites:									
A student has to understand following subjects before learning these subjects:									
<ul style="list-style-type: none"> • Fundamental knowledge of Machine Design Subjects • Knowledge of programming languages like C, C++ and MATLAB 									
Course Objectives:									
<ul style="list-style-type: none"> • Understand the fundamentals of computer graphics elements and its uses • Implements various algorithms for computer graphics elements and how it is used in software • Implements transformation methods using computer programming method • Interpret various geometric modelling method and different graphics standards 									
Theory syllabus									
Unit	Content								Hrs
1	FUNDAMENTALS OF CAD: Application of computers to design, benefits of CAD, conventional design vs. CAD.								4
2	COMPUTER GRAPHICS AND STANDARDS: Computer graphics: Scan conversions, DDA and Bresenham's algorithm for generation of various figure such as line, circle, and ellipse etc. Graphics standards: Graphics and computing standards, data exchange standards, design database.								8
3	GEOMETRIC TRANSFORMATION: 2D and 3D transformations, its introduction, translation, rotation, scaling, mirroring and shearing operations, general operations i.e. rotation and reflection etc.								12
4	FINITE ELEMENT METHOD: Finite element method and finite volume method, modeling and discretization, interpolation, elements, nodes and degrees-of-freedom, applications of FEA. One-dimensional elements: bar elements, stiffness and force matrices, assembly of elements, properties of global stiffness matrix, boundary conditions, solution of equations, mechanical loads and stresses, thermal loads, and stresses, 2D truss element and related matrices, problems								14
5	CAE SOFTWARE APPLICATIONS: Various software introductions like Solidworks, Ansys, and its applications in structural and thermal systems.								7
Practical content									
The Practical/term work shall be based on the topics mentioned above and will be defended by the candidates.									
Text Books									
1	Zhigang Xiang, Roy A. Plastock, 'Computer Graphics', 2nd Edition, McGraw Hill Education (India) Private Limited								
2	David Rogers and J. Alan Adams, 'Mathematical elements for computer graphics', 2nd Edition, McGraw Hill Education (India) Private Limited								
Reference Books									
1	Donald D Hearn, 'Computer Graphics, C Version', 2nd Edition, Pearson Education (2011).								

2	Tirupathi R. Chandrupatla , ‘Introduction to Finite Elements in Engineering’, 4 edition, Pearson Education (2015)
Mooc Links:	
https://nptel.ac.in/courses/112/102/112102101/	Computer Graphics
https://nptel.ac.in/courses/112/104/112104193/	Finite Element Analysis
Course Outcomes:	
After learning this course, students should be able to:	
<ol style="list-style-type: none">1. Use computer to solve engineering problems using computer graphics algorithms.2. Understand different algorithm concepts and enhance his/her understanding for advance output primitives (element).3. Understand the basics of finite element method and its applications in CAD.4. Use and implement various software to solve engineering problems	