B.E DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2018)

Third Semester

MECHANICAL ENGINEERING

U18MET3004: Computer Aided Design

COURSE OUTCOMES

CO1: Apply the concepts of computer graphics and graphics systems.

CO2: Apply transformations and graphics pipeline procedure.

CO3: Apply the concepts of various types of curves and surfaces.

CO4: Practice the solid modeling features.

CO5: Apply various Graphic file standards with their importance.

CO6: Apply Interactive Computer Programming techniques.

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1.	Explain the product cycle in computer-aided design.	CO1	[K$_2$]
2.	Define homogeneous coordinates.	CO1	[K$_2$]
3.	Differentiate between 2D and 3D transformations.	CO2	[K$_2$]
4.	What is the significance of the graphics pipeline?	CO2	[K$_2$]
5.	Explain Bezier curves and their application in graphics.	CO3	[K$_2$]
6.	What is B-rep in solid modeling?	CO4	[K$_2$]
7.	Define Coons patch and its importance in surface modeling.	CO4	[K$_2$]
8.	What are the benefits of using OpenGL in CAD?	CO5	[K$_2$]
9.	Write the importance of the IGES standard.	CO5	[K$_2$]
10.	What are the key features of interactive computer programming?	CO6	[K$_2$]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11.   Scenario: A company is designing a complex machine part for an automotive
             engine. The design requires both 2D and 3D transformations to visualize the

part from different perspectives before manufacturing.

	a)	Demonstrate how 2D transformations (translation, scaling, and rotation) will be applied to prepare the initial sketches of the part.	7	CO1	[K₄]
	b)	Show how 3D transformations will be used to view the machine part from multiple angles, using homogeneous coordinates.	7	CO2	[K₃]
	c)	Write the importance of using clipping algorithms in this process.	2	CO3	[K₂]

12.		Scenario: A team is tasked with developing an ergonomic chair design for a client. The final design needs to be modeled in 3D, and the client requests mass-property calculations to ensure the chair's balance and stability.			
	a)	Apply the concepts of line drawing algorithm to design the chair.	7	CO2	[K₄]
	b)	Explain how mass-property calculations will be used to ensure the chair's balance, referencing assembly modeling techniques.	7	CO3	[K₃]
	c)	Describe how tolerance analysis will play a role in the final design.	2	CO1	[K₂]

13.	a)	Describe the key differences between Hermite curves and B-spline curves and their use in modeling.	7	CO3	[K₃]
	b)	Explain the process of modeling a surface using bicubic patches.	7	CO1	[K₃]
	c)	Discuss the significance of surface modeling techniques in visual realism.	2	CO2	[K₂]

14.	a)	Explain how solid modeling using Constructive Solid Geometry (CSG) is applied in CAD.	7	CO4	[K₃]
	b)	Compare the advantages of using B-rep over CSG in complex design projects.	7	CO5	[K₃]
	c)	Describe how mechanism simulation assists in CAD design verification.	2	CO6	[K₂]

15.	a)	Discuss the importance of Graphical Kernel System (GKS) in CAD.	7	CO5	[K₃]
	b)	Describe the use of STEP and IGES standards for data exchange in CAD systems.	7	CO6	[K₃]
	c)	Explain the role of OpenGL in enhancing visual realism in 3D modeling.	2	CO4	[K₂]

16.	a)	Describe the process of hidden surface removal in computer graphics.	7	CO6	[K₃]
	b)	Explain the application of color shading techniques in visual realism.	7	CO4	[K₃]
	c)	Discuss how computer animation enhances CAD designs.	2	CO5	[K₂]

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