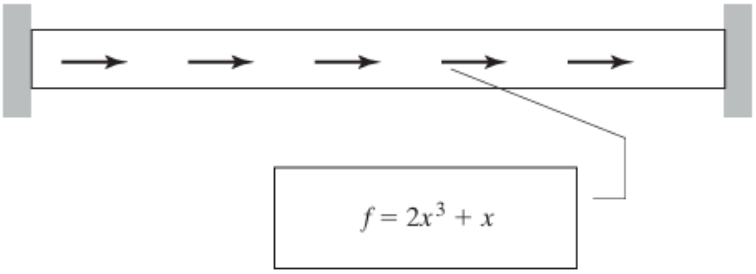
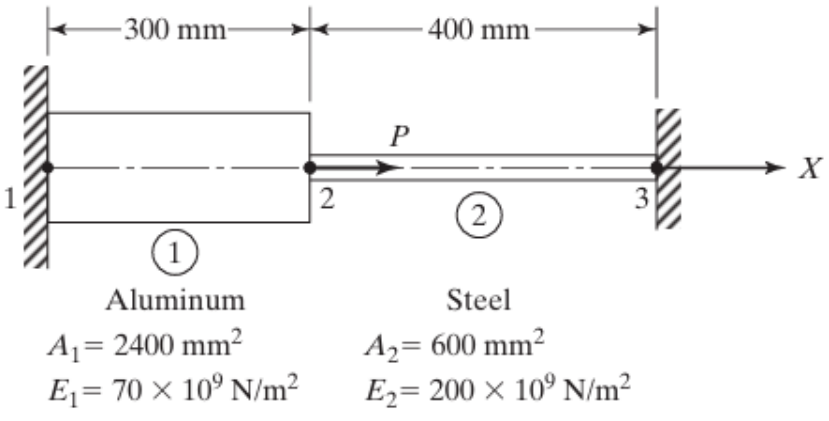
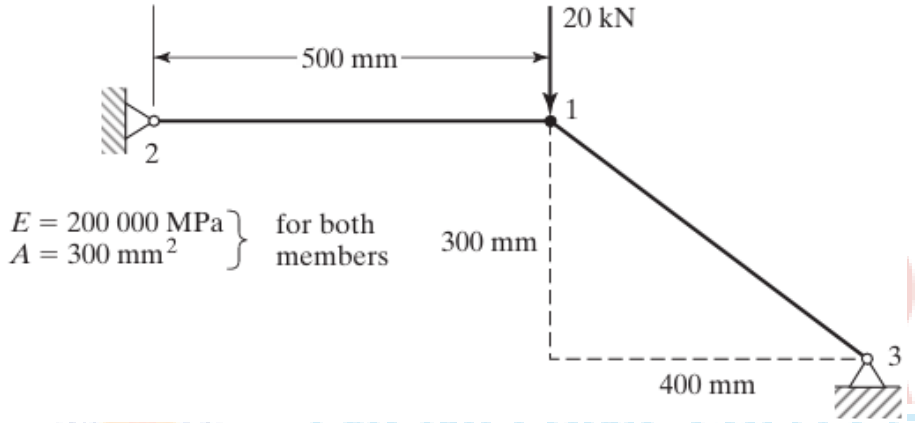
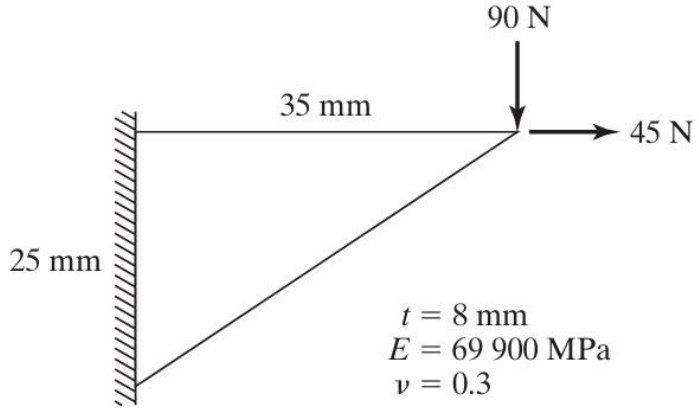
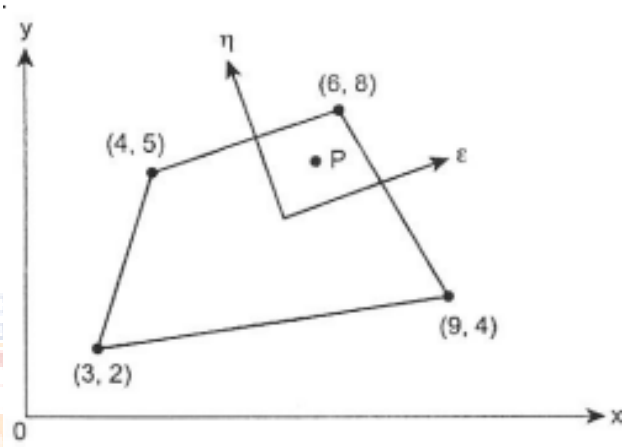
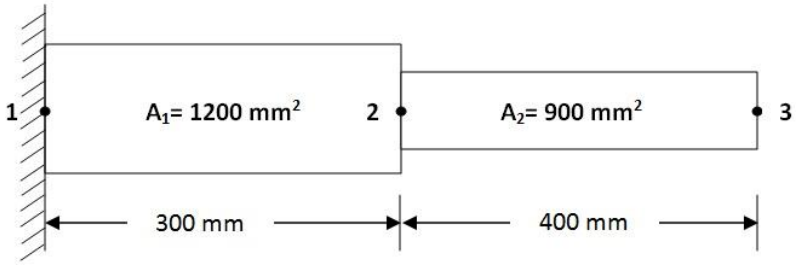
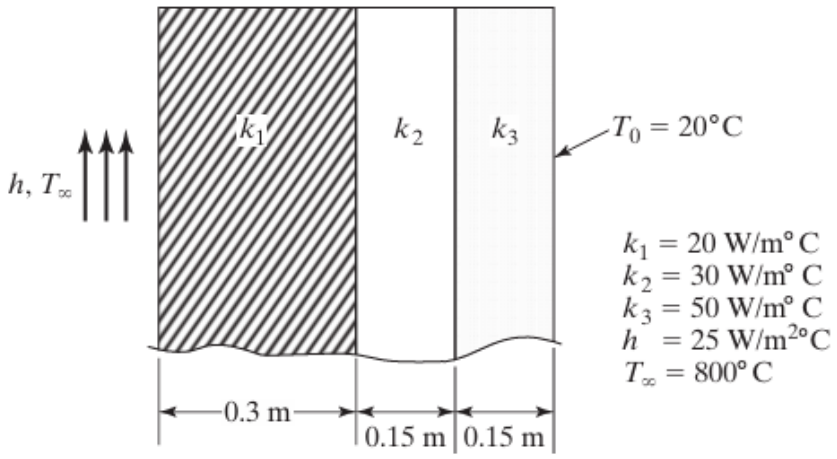
		Course Code: D2510401			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		ADVANCED FINITE ELEMENT METHODS			
		CAD/CAM			
		Time: 3 Hrs.			**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	A rod fixed at its ends is subjected to a varying body force as shown in Figure below. Use the Rayleigh–Ritz method with an assumed displacement field $u = a_0 + a_1x + a_2x^2$ to determine displacement and stress. Take E = 2×10^{11} N/m^2, A = 1 m^2 and L = 1 m. 	**1**	**4**	**12**
		OR			
2.	**a).**	Explain the difference between strong form and weak form of a boundary value problem. Illustrate your explanation with any one example.	**1**	**3**	**6**
	b).	Explain the principle of the Galerkin method. How does it differ from other Weighted Residual Methods such as the collocation and least-squares methods?	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Consider the bar shown in figure below. An axial load P = 200 KN is applied as shown. Determine the nodal displacements and stresses in each material.	**2**	**4**	**12**

					
		OR			
4.	**a).**	For the two-bar truss shown in Figure below. determine the displacements of node 1 and the stress in elements 1–3. 	**2**	**4**	**12**
		UNIT-3			
5.	**a).**	For the configuration shown in Figure below determine the deflection at the point of load application using a one-element model. 	**3**	**4**	**12**
		OR			
6.	**a).**	Derive the element stiffness matrix for the three nodedaxi-symmetric triangular element.	**3**	**3**	**12**
		UNIT-4			

7.	**a).**	Differentiate between sub-parametric, iso-parametric, and super-parametric elements with suitable diagrams or examples of shape functions.	**4**	**3**	**6**
	b).	Evaluate the following integral using two-point Gaussian quadrature rule and compare the result with exact value. $$\int_{-1}^{1} \left[x^2 + \sin\left(\frac{\pi x}{2}\right)\right] dx$$	**4**	**3**	**6**
		OR			
8.	**a).**	Evaluate the Cartesian coordinate of the point P which has local coordinates ε=0.6 and η=0.8 as shown in figure below. 	**4**	**3**	**6**
	b).	Explain h-refinement and p-refinement techniques in FEM. Discuss their effect on accuracy and computational cost.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Determine the Eigen vectors and Eigen values for the stepped bar shown in figure below. Take E = 200 GPa and specific weight 7850 kg/m^3. Draw also the mode shapes. 	**5**	**4**	**12**
		OR			
10.	**a).**	A composite wall consists of three materials, as shown in Figure below. The outer temperature is T_0 = 20ºC. Convection heat transfer takes place on the inner surface of the wall with T_∞ = 800ºC and h = 25 W/m^2 °C. Determine the temperature distribution in the wall.	**5**	**4**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D2510402			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
ADVANCED CAD					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Explain the functional areas of CAD and discuss the importance of graphics standards in ensuring software interoperability	**1**	**2**	**6**
	b).	Describe the specific requirements of graphics software and illustrate how to ensure the efficient use of CAD tools in a design workflow.	**1**	**3**	**6**
		OR			
2.	**a).**	Discuss the fundamental requirements of geometric 3D modeling and identify why they are critical for modern engineering applications.	**1**	**2**	**6**
	b).	Classify various geometric construction methods and outline the modeling facilities desired in a robust CAD system	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Derive the transformation matrices for 2-D and 3-D operations, specifically for rotation, scaling, and translation using homogeneous coordinates.	**2**	**3**	**6**
	b).	Compare and contrast perspective, orthotropic, and isometric projections, and examine the techniques used for hidden surface removal.	**2**	**3**	**6**
		OR			
4.	**a).**	Analyze the structure and application of data exchange formats like IGES and STEP, and explain their role in product data management.	**2**	**4**	**6**
	b).	Differentiate between Maximum Material Condition (MMC), Least Material Condition (LMC), and Regardless of Feature Size (RFS) in the context of dimensioning standards.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Distinguish between wireframe entities and curve representation methods, specifically comparing parametric analytic curves vs. synthetic curves.	**3**	**3**	**6**
	b).	Explain the parametric representation of a Bezier curve and infer how the position of control points influences the final shape of the curve	**3**	**3**	**6**
		OR			

6.	**a).**	Critique the limitations of Bezier curves and justify the use of B-Splines and NURBS (Non-Uniform Rational B-Splines) for complex shapes.	**3**	**3**	**6**
	b).	Construct the parametric equation for a Hermite cubic curve given specific geometric boundary condition	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Categorize surface entities and explain the fundamental differences between analytic and synthetic surface representation methods.	**4**	**3**	**6**
	b).	Develop the parametric representation for a ruled surface and a surface of revolution, utilizing neat sketches to illustrate the geometry.	**4**	**3**	**6**
		OR			
8.	**a).**	Demonstrate the construction properties of a B-Spline surface and compare it with a Bezier surface regarding local control.	**4**	**3**	**6**
	b).	Illustrate the concept of a blending surface and examine how surface manipulation techniques are applied in complex modeling.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Apply the Euler-Poincare formula to verify the topological validity of a given solid model within a Boundary Representation (B-Rep) scheme.	**5**	**3**	**6**
	b).	Evaluate the effectiveness of Constructive Solid Geometry (CSG) versus Boundary Representation (B-Rep) for different manufacturing applications.	**5**	**4**	**6**
		OR			
10.	**a).**	Analyze the use of Boolean operators (Union, Intersection, Difference) in CSG and schematize the CSG tree for a complex part.	**5**	**4**	**6**
	b).	Explain the concept of Sweeping (linear and non-linear) and assess how Euler operators facilitate the manipulation of topological entities.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

Course Code: D2510403					
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
AI & ML FOR MECHANICAL ENGINEERING					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Illustrate the need for Artificial Intelligence with suitable real-world examples.	**1**	**3**	**6**
	b).	Define Machine Learning and explain its evolution, need, and applications in detail.	**1**	**2**	**6**
		OR			
2.	**a).**	Differentiate between supervised and unsupervised learning with examples.	**1**	**2**	**6**
	b).	Explain the k-Nearest Neighbour (k-NN) algorithm with a neat diagram	**1**	**2**	**6**
		UNIT-2			
3.	**a).**	Illustrate the K-means clustering algorithm with steps and an example.	**2**	**3**	**6**
	b).	What is dimensionality reduction? Explain why it is needed with proper examples.	**2**	**2**	**6**
		OR			
4.	**a).**	Write Bayes' theorem and explain its significance in machine learning with an example.	**2**	**2**	**6**
	b).	Explain the Naïve Bayes classifier with an example.	**2**	**2**	**6**
		UNIT-3			
5.	**a).**	What are multilayer neural networks? Explain their structure and applications.	**3**	**3**	**6**
	b).	Explain the advantages, limitations, and applications of Genetic Algorithms.	**3**	**3**	**6**
		OR			
6.		Explain the architecture of a Convolutional Neural Network with the roles of convolution, pooling, and fully connected layers.	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Compare traditional neural networks, CNNs, RNNs, and autoencoders.	**4**	**3**	**6**
	b).	Describe bagging. Explain how Random Forests use bagging and feature randomness.	**4**	**2**	**6**

		OR			
8.		Illustrate the Recurrent Neural Networks (RNNs) in detail and describe their architecture and applications.	**4**	**3**	**12**
		UNIT-5			
9.		Explain the commonly used machine learning packages (NumPy, Pandas, Scikit-learn, TensorFlow, PyTorch) and their roles in engineering applications.	**5**	**2**	**12**
		OR			
10.	**a).**	Describe how machine learning can be used for creep estimation in materials under high temperature and stress.	**5**	**2**	**6**
	b).	Compare traditional mechanical design approaches with ML-enhanced design processes.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

					Course Code: D25104A0
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
MECHANICAL BEHAVIOR OF MATERIALS & CHARACTERIZATION					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Sketch and explain grain boundary strengthening mechanism in alloys	**1**	**3**	**6**
	b).	Explain the effects of strain rate and temperature on the tensile property of engineering materials.	**1**	**3**	**6**
		OR			
2.		State and Compare the Tresca and Von Mises yield criteria	**1**	**3**	**12**
		UNIT-2			
3.	**a).**	Discuss about high temperature fracture	**2**	**3**	**6**
	b).	Outline the characters that affect the creep phenomena	**2**	**3**	**6**
		OR			
4.		Draw the deformation mechanism map and explain the various regions of the map.	**2**	**3**	**12**
		UNIT-3			
5.	**a).**	Differentiate Low cycle fatigue and High cycle fatigue	**3**	**3**	**6**
	b).	Discuss the influence of surface condition and metallurgical parameters on fatigue strength.	**3**	**3**	**6**
		OR			
6.		Discuss the factors motivate the selection of engineering materials? Discuss how cost, service requirements, and performance criteria influence material selection decisions	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	With the help neat sketch explain the principle of Transmission Electron Microscopy (TEM)	**4**	**3**	**6**
	b).	List and explain the instrumentation used in an XRD system	**4**	**3**	**6**
		OR			
8.		Discuss the principle and working of a Scanning Electron Microscope (SEM)**.** Explain electron–sample interactions & imaging modes	**4**	**3**	**12**

		UNIT-5			
9.	**a).**	Explain the basic principle of Differential Thermal Analysis (DTA)	**5**	**3**	**6**
	b).	Discuss the instrumentation of Differential Scanning Calorimetry (DSC)	**5**	**3**	**6**
		OR			
10.		List its advantages and disadvantages and also explain in detail the working procedure of EDS.	**5**	**3**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25104A1			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		OPTIMIZATION AND RELIABILITY			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	The profit per acre of a farm is given by: $f(x_1, x_2) = 20\,x_1 + 26\,x_2 + 4\,x_1\,x_2 - 4\,x_1^2 - 3\,x_2^2$ where x_1 and x_2 denote, respectively, the labour cost and the fertilizer cost. Find the values of x_1 and x_2 to maximize the profit.	**1**	**3**	**6**
	b).	Minimize: $3\,x_1^2 + 4\,x_2^2 + 5\,x_3^2$ such that $x_1 + x_2 + x_3 = 10$ using Lagrange's multiplier method.	**1**	**3**	**6**
		OR			
2.	**a).**	Use Kuhn-Tucker conditions to maximize: $f(x_1, x_2) = 2\,x_1^2 + 12\,x_1\,x_2 - 7\,x_2^2$ Subject to: $2\,x_1 + 5\,x_2 \leq 98$	**1**	**3**	**12**
		UNIT-2			
3.	**a).**	Minimize: $f(x_1, x_2) = 2\,x_1^2 + x_2^2$ by using steepest descent method with the starting point (1, 2). Use two iterations.	**2**	**3**	**12**
		OR			
4.	**a).**	Minimize: $f(x_1, x_2) = x_1 - x_2 + 2\,x_1^2 + 2\,x_1\,x_2 + x_2^2$ by using Newton's method with the starting point (0, 0).	**2**	**3**	**6**
	b).	What are the merits and demerits of classical optimization techniques?	**2**	**2**	**6**
		UNIT-3			
5.	**a).**	Explain the working principle of Genetic Algorithm.	**3**	**3**	**6**
	b).	What are the drawbacks of GA?	**3**	**3**	**6**
		OR			
6.	**a).**	Explain the principles of Genetic Programming.	**3**	**3**	**6**
	b).	What are the differences between GA and GP.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Explain Pareto's analysis.	**4**	**3**	**6**

	b).	Write the optimization model for minimizing the weight of a cantilever beam having concentrated load at free end and assuming constraints on maximum stress and maximum deflection. Take the diameter and length of the beam as the decision variables.	**4**	**3**	**6**
		OR			
8.	**a).**	Explain the optimization procedure for path synthesis of a four-bar mechanism	**4**	**3**	**6**
	b).	Describe how optimization techniques can be applied to improve gear tooth strength and minimize dynamic loads during operation.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Define reliability, MTTF and MTBF.	**5**	**2**	**6**
	b).	Explain about the constant, linearly increasing and Weibull models of hazard analysis.	**5**	**3**	**6**
		OR			
10.	**a).**	Explain the key principles of **reliability theory**. Discuss failure distribution functions and their significance.	**5**	**3**	**6**
	b).	What is meant by **design for reliability (DFR)**? Discuss the steps involved in incorporating reliability into the product development cycle.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

				Course Code: D25104A2	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
MECHATRONICS					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Illustrate the working principles of displacement and proximity sensors with examples.	**1**	**3**	**6**
	b).	Illustrate the advantages and disadvantages of mechatronics systems in modern applications.	**1**	**3**	**6**
		OR			
2.		Analyze a full mechatronics system and explain the interaction between sensors, actuators, controllers, and structure.	**1**	**4**	**12**
		UNIT-2			
3.		Explain analog signal conditioning in detail—amplification, filtering, isolation, and linearization.	**2**	**3**	**12**
		OR			
4.	**a).**	Apply the characteristics of a P–N junction diode to design a rectifier for sensor circuits.	**2**	**3**	**6**
	b).	Apply the use of BJTs and FETs in designing amplifiers for sensor signal conditioning.	**2**	**3**	**6**
		UNIT-3			
5.		Explain hydraulic and pneumatic systems with components, diagrams, and applications.	**3**	**3**	**12**
		OR			
6.	**a).**	Illustrate the working of an electro-pneumatic control circuit with a neat diagram.	**3**	**3**	**6**
	b).	Analyze the differences between electrical, mechanical, and fluid actuators.	**3**	**3**	**6**
		UNIT-4			
7.		Analyze the differences between microprocessors and microcontrollers with examples.	**4**	**4**	**12**
		OR			
8.		Explain the architecture and working of PLC.	**4**	**3**	**12**

		UNIT-5			
9.		Explain the architecture of a typical data acquisition system and its interfacing methods.	**5**	**3**	**12**
		OR			
10		Discuss dynamic modelling of mechanical, electrical, and fluid systems with analogies and examples.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25104A3			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		COMPUTATIONAL FLUID DYNAMICS			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	Describe the fundamental conservation equations for fluid flow and heat transfer. Explain the physical significance of each term in these equations.	**1**	**2**	**12**
		OR			
2.	**a).**	Describe various iterative solution methods (Jacobi, Gauss-Seidel, SOR) for solving discretized elliptical equations	**1**	**2**	**12**
		UNIT-2			
3.	**a).**	Apply an explicit finite difference scheme to solve a one-dimensional hyperbolic wave equation.	**2**	**3**	**6**
	b).	Explain the vorticity-stream function formulation and its numerical implementation.	**2**	**3**	**6**
		OR			
4.	**a).**	Explain the artificial compressibility method for solving incompressible viscous flows. Describe its advantages and limitations with suitable examples.	**2**	**3**	**12**
		UNIT-3			
5.	**a).**	Solve a 1D transient heat conduction problem using implicit FVM.	**3**	**3**	**6**
	b).	Discuss the Total Variation Diminishing (TVD) scheme to solve convection-dominated problems by taking a simple example.	**3**	**3**	**6**
		OR			
6.	**a).**	Derive and explain the finite volume formulation for a 2D steady heat conduction problem.	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Explain the role of pressure correction formula in SIMPLE algorithm.	**4**	**3**	**6**
	b).	Solve a lid-driven cavity flow problem using the SIMPLER algorithm	**4**	**3**	**6**
		OR			
8.	**a).**	Compute the solution for transient one-dimensional heat conduction with time-dependent boundary conditions using the finite volume method.	**4**	**3**	**12**
		UNIT-5			

9.	**a).**	Apply the Galerkin method, with linear elements to the first order equation. $a\frac{\partial u}{\partial x} = q$	**5**	**3**	**12**
		OR			
10.	**a).**	Describe the variational formulation approach in finite element method and apply it to a one-dimensional fluid flow problem. Explain the principle of minimum potential energy.	**5**	**3**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25104B0			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. I Semester MODEL QUESTION PAPER					
MEMS: DESIGN AND MANUFACTURING					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Apply the concept of micro-fabrication to explain the evolution of MEMS technology.	**1**	**3**	**6**
	b).	Illustrate the working principles of micro-sensors to demonstrate their use in industrial applications.	**1**	**3**	**6**
		OR			
2.	**a).**	Apply the principles of micro-actuation and micro-accelerometers to describe their role in modern MEMS systems.	**1**	**3**	**12**
		UNIT-2			
3.		Apply the concept of doping to explain how the conductivity of silicon changes.	**2**	**3**	**12**
		OR			
4.	**a).**	Employ plasma physics concepts to analyze plasma generation.	**2**	**3**	**6**
	b).	Illustrate intermolecular force concepts to show how molecules attract each other.	**2**	**3**	**6**
		UNIT-3			
5.		Use the principles of static bending to evaluate the behavior of thin plates in MEMS design.	**3**	**3**	**12**
		OR			
6.	**a).**	Apply fracture mechanics to describe crack growth.	**3**	**3**	**6**
	b).	Employ FEM principles to determine stress distribution in a micro-beam.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Apply FEM to describe the stress in a micro-pressure sensor.	**4**	**3**	**6**
	b).	Interpret the principles of static bending to evaluate thin-plate behavior in MEMS design.	**4**	**3**	**6**
		OR			
8.		Illustrate piezoelectric material properties to describe their use in MEMS.	**4**	**3**	**12**

		UNIT-5			
9.	**a).**	Apply the steps of photolithography to outline the fabrication of a micro-device.	**5**	**3**	**6**
	b).	Compare etching techniques to distinguish bulk and surface micromachining.	**5**	**3**	**6**
		OR			
10.	**a).**	Describe CVD/PVD concepts to explain thin-film deposition	**5**	**3**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

					Course Code: D25104B1
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		DESIGN FOR MANUFACTURING & ASSEMBLY			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	Apply DFMA principles to explain its role in product development and model the progression of DFMA methodology over time.	**1**	**3**	**6**
	b).	Use DFMA concepts to determine the functional differences between DFA, DFM, and DFMA.	**1**	**3**	**6**
		OR			
2.	**a).**	Analyze a DFMA case study and identify how design changes reduced cost or assembly time.	**1**	**3**	**6**
	b).	Apply the systematic DFA methodology to evaluate the number of operations required in a manual assembly.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Apply product design considerations in machining and model the required sketches.	**2**	**3**	**6**
	b).	Apply dimensional tolerance principles to verify whether a machined part meets functional requirements.	**2**	**3**	**6**
		OR			
4.	**a).**	Use design-for-machining rules to explain recommendations for machined parts with examples.	**2**	**3**	**6**
	b).	Apply machining design rules to predict outcomes and solve machining-related design issues.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Determine how casting discontinuities affect the properties of a cast product and explain their influence.	**3**	**3**	**6**
	b).	Determine the design guidelines for extruded sections and present the required sketches.	**3**	**3**	**6**
		OR			
6.		Use the Keeler–Goodman diagram to determine the forming limit for a steel sheet and predict whether the sheet is safe from tearing or wrinkling.	**3**	**3**	**12**

		UNIT-4			
7.	**a).**	Determine weld design principles to find key factors in weldments and predict the effects of thermal stresses.	**4**	**3**	**6**
	b).	Illustrate the design considerations for a brazed joint with neat sketches.	**4**	**3**	**6**
		OR			
8.		Apply forging design rules to determine the parting line, draft angle, and corner radii for a closed-die forged component.	**4**	**3**	**12**
		UNIT-5			
9.	**a).**	Apply principles of automated assembly to select a suitable parts delivery system for a workstation.	**5**	**3**	**6**
	b).	Use automated assembly concepts to explain various escapement and placement devices.	**5**	**3**	**6**
		OR			
10.		Compare multi-station and single-station assembly systems. For a small electronic device, recommend a suitable configuration using DFMA guidelines.	**5**	**3**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25104B2			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		FRACTURE MECHANICS			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.		Explain the types of fracture in brittle and ductile materials.	**1**	**2**	**12**
		OR			
2.		Explain the characteristics of R curve.	**1**	**2**	**12**
		UNIT-2			
3.		Define the stress concentration factor and stress intensity factor. Explain the significance of the critical stress intensity factor as a material parameter and describe how it is used to predict fracture.	**2**	**2**	**12**
		OR			
4.		Discuss the concepts of plane stress and plane strain conditions in fracture mechanics.	**2**	**2**	**12**
		UNIT-3			
5.		Describe the J-integral method used in Elastic–Plastic Fracture Mechanics.	**3**	**2**	**12**
		OR			
6.		Explain the factors that contribute to improving fracture toughness in materials.	**3**	**2**	**12**
		UNIT-4			
7.		Differentiate between High Cycle Fatigue (HCF) and Low Cycle Fatigue (LCF). Discuss their stress–strain characteristics, deformation mechanisms, and typical applications.	**4**	**2**	**12**
		OR			
8.		Explain the Total Life and Damage Tolerant approaches to fatigue life prediction.	**4**	**2**	**12**
		UNIT-5			
9.		Define creep and explain creep curves.	**5**	**2**	**12**

		OR			
10.		Explain creep-fatigue interaction.	**5**	**2**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25104B3			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. I Semester MODEL QUESTION PAPER			
		SMART MATERIALS			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	Apply the principles of piezoelectricity to explain how a piezoelectric sensor can convert mechanical pressure into electrical output.	**1**	**3**	**7**
	b).	Use the basic principles of smart materials to explain how piezoelectric and magnetostrictive materials can be integrated into smart structural systems.	**1**	**3**	**5**
		OR			
2.	**a).**	Demonstrate the properties of Perovskite piezoceramics to justify their application in ultrasonic transducers.	**1**	**3**	**6**
	b).	Compare single-crystal and polycrystalline piezoelectric materials to determine which is more suitable for high-precision applications.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Explain how IPMCs can be applied in underwater robotic movement or biomimetic devices.	**2**	**3**	**5**
	b).	Use the characteristics of electronic materials to explain their role in smart sensing applications.	**2**	**3**	**7**
		OR			
4.	**a).**	Explain how ER fluids change viscosity under electric fields and apply this principle to a clutch mechanism.	**2**	**3**	**6**
	b).	Compare shape memory alloys and shape memory polymers to choose the better option for a temperature-activated actuator.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Explain how electrode pattern variations affect sensor sensitivity in a piezoelectric device.	**3**	**3**	**6**
	b).	Use accelerometer principles to choose a suitable device for measuring building sway during an earthquake.	**3**	**3**	**6**
		OR			
6.	**a).**	Determine the magnetostrictive sensing principles to detect stress changes in pipelines.	**3**	**3**	**6**
	b).	Explain how magnetic delay-line sensing can be used for long-distance	**3**	**3**	**6**

		structural health monitoring.			
		UNIT-4			
7.	**a).**	Explain how the Joule effect influences the performance of a magnetostrictive actuator.	**4**	**3**	**6**
	b).	Determine the Wiedemann effect to analyze changes in actuator performance under magnetic fields.	**4**	**3**	**6**
		OR			
8.	**a).**	Explain the IPMC actuator properties to design a soft robotic bending element.	**4**	**3**	**6**
	b).	Determine active vibration control concepts to reduce vibrations in a cantilever beam.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Explain the energy-harvesting materials to design a system that converts vibration energy into electrical power.	**5**	**3**	**6**
	b).	Determine self-healing polymer properties to design a system that repairs minor cracks automatically.	**5**	**3**	**6**
		OR			
10.	**a).**	Apply self-healing concepts to improve the durability of coatings or protective layers.	**5**	**3**	**5**
	b).	Determine the intelligent system design concepts to propose a simple smart device with sensing and actuation functions.	**5**	**3**	**7**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D2520401			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		ROBOTICS & UAV SYSTEMS			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	Explain the different robot configurations (Cartesian, Cylindrical, Spherical, and Articulated) and discuss their typical industrial applications.	**1**	**2**	**6**
	b).	Analyze the effect of robot workspace and work volume on the selection of a robot for a given manufacturing task.	**1**	**4**	**6**
		OR			
2.	**a).**	Explain the working principles of different robot drive mechanisms such as electric, hydraulic, and pneumatic drives.	**1**	**2**	**6**
	b).	Compare robot drive mechanisms based on torque capability, speed, energy efficiency, and maintenance requirements.	**1**	**4**	**6**
		UNIT-2			
3.	**a).**	Explain the fundamentals of manipulator kinematics and discuss its importance in robot motion analysis.	**2**	**2**	**6**
	b).	Derive the homogeneous transformation matrix for rotation about the Z-axis followed by translation along the X-axis.	**2**	**3**	**6**
		OR			
4.	**a).**	Explain manipulator path control and differentiate between point-to-point and continuous path control.	**2**	**2**	**5**
	b).	Evaluate how homogeneous transformation matrices aid in trajectory generation and path control.	**2**	**5**	**7**
		UNIT-3			
5.	**a).**	Explain the different types of grippers used in robotic systems and describe their operating principles.	**3**	**2**	**6**
	b).	Analyze the mechanical structure and mechanisms involved in parallel jaw and vacuum grippers with neat sketches.	**3**	**4**	**6**
		OR			
6.	**a).**	Explain how tools function as end effectors and give examples of tool-type end effectors used in industries.	**3**	**2**	**6**
	b).	Compare mechanical, magnetic, and adhesive grippers in terms of structure, operation, advantages, and limitations.	**3**	**4**	**6**
		UNIT-4			

7.	**a).**	Explain lead-through programming and describe how robot paths are created using this method.	**4**	**2**	**6**
	b).	Analyze the capabilities and limitations of lead-through programming for industrial robotic applications.	**4**	**4**	**6**
		OR			
8.	**a).**	Explain the syntax and structure of typical robot programming languages.	**4**	**2**	**6**
	b).	Analyze the essential elements of robot languages, such as data types, control structures, motion commands, and I/O operations.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Explain robot-centered and in-line robot cell layouts with neat sketches.	**5**	**2**	**6**
	b).	Analyze the design considerations involved in planning a robotic work system for a machining cell.	**5**	**4**	**6**
		OR			
10.	**a).**	Explain work handling and control functions in robotic environments with examples.	**5**	**2**	**6**
	b).	Analyze the challenges of integrating multiple robots within an automated manufacturing cell.	**5**	**4**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D2520402			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
ADVANCED MANUFACTURINGPROCESSES					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain the principle, working, process parameters, advantages and limitations of Abrasive Jet Machining (AJM).	**1**	**2**	**6**
	b).	Illustrate the complete working cycle of Wire Electro-Discharge Machining (Wire-EDM) with a neat sketch.	**1**	**3**	**6**
		OR			
2.	**a).**	Describe Ultrasonic Machining (USM) and explain how process parameters affect machining performance.	**1**	**2**	**6**
	b).	Discuss the need for Advanced Machining Processes in modern manufacturing than the conventional machining methods.	**1**	**2**	**6**
		UNIT-2			
3.	**a).**	Describe the functioning of Electron Beam Machining (EBM) with a neat sketch and discuss its capabilities, advantages, limitations, and suitable applications.	**2**	**2**	**6**
	b).	Explain the working principles of Additive Manufacturing (AM) and describe the steps involved in converting a 3D CAD model into a printed component.	**2**	**2**	**6**
		OR			
4.	**a).**	Illustrate Stereo Lithography (SLA), LENS and Laminated Object Manufacturing (LOM) with reference to working mechanisms.	**2**	**3**	**6**
	b).	Discuss the applications and limitations of Additive Manufacturing (AM) in various sectors.	**2**	**2**	**6**
		UNIT-3			
5.	**a).**	Describe the various types of surface coatings and explain the working principles, advantages, and limitations of electroforming.	**3**	**2**	**6**
	b).	Illustrate thermal spraying techniques and ion implantation methods used for surface modification.	**3**	**3**	**6**
		OR			
6.	**a).**	Explain diffusion coating, ceramic coating, organic coating, and cladding methods.	**3**	**2**	**6**
	b).	Explain the applications, characteristics, and classification of ceramics used in engineering	**3**	**2**	**6**
		UNIT-4			

7.	**a).**	Explain the steps involved inlead-through programming in robots.	**4**	**2**	**6**
	b).	Analyze how robot programs represent a path in space.	**4**	**4**	**6**
		OR			
8.	**a).**	Illustrate the structure and properties of composite materials. Explain the differences between particulate composites and fiber-reinforced composites.	**4**	**3**	**6**
	b).	Explain the top-down and bottom-up approaches in nanomaterial processing.	**4**	**2**	**6**
		UNIT-5			
9.	**a).**	Explain the process of crystal growth and wafer preparation in microelectronic device fabrication.	**5**	**2**	**6**
	b).	Explain the oxidation process in microelectronics. Describe dry and wet oxidation techniques	**5**	**2**	**6**
		OR			
10.	**a).**	Illustrate the construction, fabrication steps, and applications of Printed Circuit Boards (PCBs).	**5**	**3**	**6**
	b).	Explain bonding and packaging of integrated circuits. Discuss different bonding techniques and packaging types used in semiconductor devices.	**5**	**2**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D2520403			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
COMPUTER AIDED MANUFACTURING					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Analyze the advantages and disadvantages of NC, CNC, and DNC systems.	**1**	**4**	**6**
	b).	Apply the concepts of CAD/CAM automation in a manufacturing scenario.	**1**	**3**	**6**
		OR			
2.	**a).**	Explain the role of computer-aided process planning (CAPP) in process optimization.	**1**	**3**	**6**
	b).	Analyze the product life cycle and its impact on machine tool automation.	**1**	**4**	**6**
		UNIT-2			
3.	**a).**	Illustrate the constructional features of CNC machine tools through diagrams.	**2**	**3**	**6**
	b).	Analyze the function of feedback devices and drives in CNC positional control.	**2**	**4**	**6**
		OR			
4.	**a).**	Apply the NC coordinate system for part programming of a sample component.	**2**	**3**	**6**
	b).	Differentiate the designation of axes in CNC systems and their practical importance.	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Develop a manual CNC program for drilling or turning operations.	**3**	**3**	**6**
	b).	Analyze the difference between manual programming and advanced programming techniques such as macros.	**3**	**4**	**6**
		OR			
6.	**a).**	Apply fixed cycles in CNC part programming for common machining tasks.	**3**	**3**	**6**
	b).	Demonstrate the use of CAM software in generating and simulating part programs.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Analyze the data flow and subsystems involved in CIM systems.	**4**	**4**	**6**
	b).	Evaluate the benefits and challenges of implementing CIM in	**4**	**4**	**6**

		manufacturing.			
		OR			
8.	**a).**	Apply automation principles to optimize production systems using CIM concepts.	**4**	**3**	**6**
	b).	Analyze the CIM wheel to explain process integration strategies.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Explain the working and industrial applications of RFID technology.	**5**	**3**	**6**
	b).	Analyze the differences between optical and non-optical inspection techniques.	**5**	**4**	**6**
		OR			
10.	**a).**	Apply digital manufacturing technologies like IoT and cloud computing in manufacturing contexts.	**5**	**3**	**6**
	b).	Analyze the role of non-contact inspection methods in modern manufacturing quality control.	**5**	**4**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25204A0			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I-M.Tech II Semester MODEL QUESTION PAPER					
PRECISION ENGINEERING					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Explain the need for precision machining in modern manufacturing.	**1**	**3**	**6**
	b).	Discuss how accuracy is evaluated in CNC and NC systems.	**1**	**3**	**6**
		OR			
2.	**a).**	Describe alignment testing of machine tools with examples.	**1**	**3**	**6**
	b).	How does precision influence industrial competitiveness?	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	With neat sketches, describe diamond machining and its major industrial applications in ultra-precision manufacturing.	**2**	**3**	**6**
	b).	Explain micro-machining processes in detail and compare micro-replication, micro-embossing, and micro-engraving.	**2**	**3**	**6**
		OR			
4.	**a).**	Discuss various high-quality surface generation processes such as lapping, honing, super finishing, and burnishing.	**2**	**3**	**6**
	b).	Describe injection moulding in micro-manufacturing. Explain the process flow, challenges, and applications.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Describe in-process, post-process, and online measurement systems, highlighting their advantages and limitations.	**3**	**3**	**6**
	b).	Explain various surface roughness evaluation methods and describe their industrial need with examples.	**3**	**3**	**6**
		OR			
6.	**a).**	Explain X-ray computed tomography and its metrological applications.	**3**	**3**	**6**
	b).	Differentiate between STM and AFM based on measurement principles.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Discuss the industrial applications of nanotechnology in nano-electronics, nano-coatings, MEMS/NEMS, and high-density IC fabrication.	**4**	**3**	**12**

		OR			
8.	**a).**	Describe Focused Ion Beam (FIB) milling and Atomic Layer Deposition (ALD) in detail and compare their capabilities.	**4**	**3**	**12**
		UNIT-5			
9.	**a).**	Explain the concept of datum and datum reference frames. Discuss the rules and steps followed in selecting datums for Geometrical Dimensioning & Tolerancing.	**5**	**4**	**12**
		OR			
10	**a).**	Describe in detail the various form and orientation controls used in Geometrical Dimensioning & Tolerancing with sketches and industrial applications.	**5**	**4**	**12**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25204A1			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
THEORY OF ELASTICITY AND PLASTICITY					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Explain the components of stress and strain with neat representations	**1**	**2**	**6**
	b).	A rectangular plate is subjected to stresses σx = 80 MPa, σy = 40 MPa and τxy = 20 MPa. Determine the principal stresses.	**1**	**3**	**6**
		OR			
2.	**a).**	Derive the differential equations of equilibrium in plane stress condition.	**1**	**3**	**6**
	b).	A stress function $\varphi = ax^3 + by^3$ satisfies the biharmonic equation. Verify whether it can represent a possible stress field.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Explain Saint Venant's principle and its importance in elasticity problems.	**2**	**2**	**6**
	b).	Using Fourier series, determine the temperature–based stress distribution in a thin plate subjected to sinusoidal boundary loading.	**2**	**4**	**6**
		OR			
4.	**a).**	Derive the general stress equations in polar coordinates for axis symmetric loading.	**2**	**3**	**6**
	b).	Compute stresses for a curved bar under pure bending with given data (E=200GPa, R=100mm, M=200N·m).	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Define principal stresses and explain the principal stress ellipsoid.	**3**	**2**	**6**
	b).	For a three-dimensional stress system, calculate maximum shear stress ifσ1=100MPa,σ2=20MPa,σ3=–40MPa.	**3**	**3**	**6**
		OR			
6.	**a).**	State and explain the principle of superposition and uniqueness theorem.	**3**	**2**	**6**
	b).	Determine displacement at a point for a linear elastic body when subjected to known boundary forces	**3**	**4**	**6**
		UNIT-4			

7.	**a).**	Explain Prandtl's stress function approach for torsion problems.	**4**	**2**	**6**
	b).	Determine shear stress at the boundary of a circular shaft of diameter 40 mm subjected to torque T = 500 N·m.	**4**	**4**	**6**
		OR			
8.	**a).**	Discuss torsion of thin-walled multi-cell sections using membrane analogy.	**4**	**3**	**6**
	b).	Compute torsional constant for an elliptical bar with major axis a = 40 mm and minor axis b = 20 mm.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Explain various yield criteria such as Tresca and Von Mises with yield surfaces.	**5**	**2**	**6**
	b).	For a material with σy = 250 MPa, determine whether yielding occurs when σ1 = 200 MPa and σ2 = 150 MPa using Tresca criterion.	**5**	**3**	**6**
		OR			
10.	**a).**	Discuss plastic flow rules and plastic potential theory in detail.	**5**	**3**	**6**
	b).	Calculate plastic work done during simple tension if stress = 300 MPa and plastic strain = 0.02.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25204A2			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
ENTREPRENUERSHIP & DESIGN OF BUSINESS MODELS					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Illustrate how young graduates can pursue entrepreneurship as a career.	**1**	**3**	**6**
	b).	Apply the idea of entrepreneurial personality to describe how personal traits influence business decisions.	**1**	**3**	**6**
		OR			
2.		Identify and describe the knowledge and skills required to become a successful entrepreneur.	**1**	**3**	**12**
		UNIT-2			
3.		Analyze how a supportive family environment can help a young entrepreneur start a business.	**2**	**3**	**12**
		OR			
4.		Evaluate the role of government or non-governmental organizations in promoting entrepreneurship.	**2**	**3**	**12**
		UNIT-3			
5.		Analyze the impact of the Industrial Policy of 1991 on small and medium enterprises.	**3**	**3**	**12**
		OR			
6.		Evaluate how international trade policies impact Indian entrepreneurs.	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Use a simple example to illustrate how a prefeasibility study helps in deciding whether to proceed with a business idea.	**4**	**3**	**6**
	b).	Apply forms of ownership to show how an entrepreneur selects a suitable ownership structure.	**4**	**3**	**6**
		OR			
8.		Demonstrate how budgeting helps in efficient resource allocation in a new business plan.	**4**	**3**	**12**
		UNIT-5			
9.		Analyze effective methods for monitoring and evaluating business	**5**	**3**	**12**

		performance in small firms.			
		OR			
10.	**a).**	Evaluate how venture capital can help IT startups grow rapidly.	**5**	**3**	**6**
	b).	Apply rehabilitation techniques to describe how a failing business unit can be revived.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

				Course Code: D25204A3	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
ADDITIVE MANUFACTURING					
CAD/CAM					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Apply the steps of additive manufacturing to make a complex hollow part and explain why this process is suitable	**1**	**3**	**6**
	b).	Compare Micro-stereo lithography with Two-Photon Polymerization for micro-device fabrication.	**1**	**3**	**6**
		OR			
2.	**a).**	Classify AM processes and apply the correct category for manufacturing micro-features.	**1**	**3**	**6**
	b).	Compare different SLA scan patterns and select the one that gives the best accuracy.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Apply material jetting principles to produce a multi-color prototype and justify the process.	**2**	**3**	**6**
	b).	Compare the benefits and drawbacks of material jetting for medical models.	**2**	**3**	**6**
		OR			
4.	**a).**	Evaluate the suitability of bio-extrusion for tissue engineering applications.	**2**	**3**	**6**
	b).	Compare binder jetting with extrusion-based AM for producing ceramic components.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Compare LOM and UC for manufacturing lightweight structural components.	**3**	**3**	**12**
		OR			
6.	**a).**	Apply bonding mechanisms in sheet lamination to fabricate a large laminated model.	**3**	**3**	**12**
		UNIT-4			
7.	**a).**	Use case studies to propose a new industrial application for	**4**	**3**	**6**

		DED/WAAM.			
	b).	Compare DMD and laser-engineered net shaping for repairing turbine blades.	**4**	**3**	**6**
		OR			
8.	**a).**	Compare friction stir AM with WAAM for large component fabrication.	**4**	**3**	**6**
	b).	Evaluate the advantages and disadvantages of WAAM for shipbuilding structures.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Use the concept of solidification rate to predict the microstructure formed in AM metals.	**5**	**3**	**6**
	b).	Apply post-processing techniques to improve dimensional accuracy in AM parts.	**5**	**3**	**6**
		OR			
10.	**a).**	Compare structure–property relationships for AM metals produced at different cooling rates.	**5**	**3**	**6**
	b).	Evaluate different support removal strategies for complex lattice structures.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25204B0			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R25**
		I M.Tech. II Semester MODEL QUESTION PAPER			
		INTRODUCTION TO EMBEDDED SYSTEMS			
		CAD/CAM			
Time: 3 Hrs.					**Max. Marks: 60 M**
		Answer **ONE Question** from **EACH UNIT**			
		All questions carry equal marks			
		Assume suitable data if necessary			
		UNIT-1	CO	KL	M
1.	**a).**	Explain the core components of an embedded system and their roles.	**1**	**3**	**6**
	b).	Describe how different sensors (resistive, optical, thermal) are used in embedded systems.	**1**	**3**	**6**
		OR			
2.	**a).**	Discuss the importance of power supply considerations in embedded product design	**1**	**3**	**6**
	b).	Analyze the safety and reliability requirements when designing embedded systems.	**1**	**4**	**6**
		UNIT-2			
3.	**a).**	Compare the ARM Cortex-M3 and Cortex-R4 architectures in terms of real-time performance.	**2**	**4**	**6**
	b).	Analyse the impact of pipeline design on instruction execution in ARM processors.	**2**	**4**	**6**
		OR			
4.	**a).**	Explain the bus structures used in ARM-based embedded systems and their significance.	**2**	**4**	**6**
	b).	Discuss factors influencing the choice of ARM processor cores in embedded product development.	**2**	**4**	**6**
		UNIT-3			
5.	**a).**	Demonstrate how SPI and I2C protocols are used to communicate with peripheral devices.	**3**	**3**	**6**
	b).	Explain the working and applications of CAN protocol in embedded systems.	**3**	**3**	**6**
		OR			
6.	**a).**	Compare Bluetooth and ZigBee protocols for wireless sensor applications.	**3**	**3**	**6**
	b).	Discuss the challenges of implementing USB 2.0 in embedded devices.	**3**	**3**	**6**
		UNIT-4			

7.	**a).**	Analyze the role of interrupt service routines in real-time embedded applications.	**4**	**4**	**6**
	b).	Discuss methods to optimize embedded C code for speed and memory on ARM processors.	**4**	**4**	**6**
		OR			
8.	**a).**	Explain challenges involved in porting Linux to ARM-v7 using emulation tools.	**4**	**4**	**6**
	b).	Analyze the embedded software requirements of a medical monitoring system case study.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Analyze how different RTOS scheduler policies affect task responsiveness.	**5**	**4**	**6**
	b).	Explain inter-task communication methods in µCOS-II with examples.	**5**	**4**	**6**
		OR			
10.	**a).**	Compare memory management techniques in traditional OS and RTOS environments.	**5**	**4**	**6**
	b).	Discuss the challenges in porting and developing applications on µCOS-II for ARM-v7.	**5**	**4**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

		Course Code: D25204B1			
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
MODELING AND SIMULATION OF MANUFACTURING SYSTEMS					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60 M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	**CO**	**KL**	**M**
1.	**a).**	Explain the terms system, model and simulation.	**1**	**2**	**6**
	b).	Explain in detail on various steps involved in developing a simulation model.	**1**	**2**	**6**
		OR			
2.	**a).**	Explain various advantages and disadvantages of simulation	**1**	**2**	**6**
	b).	Write about applications of simulation in Manufacturing system	**1**	**2**	**6**
		UNIT-2			
3.	**a).**	Explain the characteristics of following distributions (i)Poisson; (ii)Geometric; & (iii) Uniform	**2**	**2**	**6**
	b).	Using mid square method generate 10 random numbers when $X_0 = 3043$.	**2**	**3**	**6**
		OR			
4.	**a).**	Explain about Mid Square method with example.	**2**	**3**	**6**
	b).	Explain the Exponential distribution with example.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Explain inverse Transform method.	**3**	**2**	**6**
	b).	Write about challenges in generating pseudo random numbers	**3**	**2**	**6**
		OR			
6.		Explain Kolmogorov Smirnov test for Random Numbers with an example	**3**	**3**	**12**
		UNIT-4			
7.		Explain in detail how to Design and evaluation of simulation experiments.	**4**	**2**	**12**
		OR			
8.	**a).**	Explain briefly Comparison and selection of simulation languages	**4**	**2**	**6**
	b).	Write about history of simulation languages	**4**	**2**	**6**

		UNIT-5			
9.	**a).**	Explain open and closed queuing networks with example.	**5**	**2**	**6**
	b).	Explain stochastic process in manufacturing.	**5**	**2**	**6**
		OR			
10.	**a).**	Write a short note on simulation of M/M/1 queuing model.	**5**	**2**	**6**
	b).	Explain continus time markov chain model with example.	**5**	**2**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

				Course Code: D25204B2	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
SMART MANUFACTURING					
CAD/CAM					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Explain the key characteristics of Smart Manufacturing.	**1**	**3**	**6**
	b).	Demonstrate how Industry 4.0 technologies help minimize the Six Big Losses in manufacturing.	**1**	**3**	**6**
		OR			
2.	**a).**	Describe the various stages involved in implementing Smart Manufacturing	**1**	**3**	**6**
	b).	Compare key challenges and enabling technologies in Industry 4.0.	**1**	**3**	**6**
		UNIT-2			
3.	**a).**	Define a Smart Machine. Explain its salient features and critical subsystems with neat sketches.	**2**	**3**	**6**
	b).	Discuss the concept of a Smart Sensor ecosystem and its role in IIoT-based manufacturing applications.	**2**	**3**	**6**
		OR			
4.	**a).**	Explain the block diagram of an IIoT sensing device and describe its working principles	**2**	**3**	**6**
	b).	Explain in detail the various sensors used in IIoT applications.	**2**	**3**	**6**
		UNIT-3			
5.	**a).**	Explain the functions of Cyber-Physical Systems (CPS) and elaborate on the 5C architecture with a neat diagram.	**3**	**3**	**6**
	b).	Discuss how CPS-based PHM systems enhance productivity in an Industry 4.0 factory.	**3**	**3**	**6**
		OR			
6.	**a).**	Compare a conventional factory with an Industry 4.0-enabled factory using the 5C CPS architecture.	**3**	**3**	**6**
	b).	Explain the role of the cognition and configuration levels in CPS.	**3**	**3**	**6**
		UNIT-4			
7.	**a).**	Describe the applications and impact zones of Digital Twins in manufacturing industries.	**4**	**3**	**6**
	b).	Explain the tools, benefits, and components of predictive maintenance in IoT-enabled systems.	**4**	**3**	**6**

		OR			
8.	**a).**	Compare preventive maintenance and predictive maintenance with suitable examples.	**4**	**3**	**6**
	b).	Discuss the use of augmented reality (AR) in electrical and mechanical maintenance activities.	**4**	**3**	**6**
		UNIT-5			
9.	**a).**	Explain various IoT protocols used in Industry 4.0 across physical, network, and application layers.	**5**	**3**	**6**
	b).	Discuss criteria for selecting the right IoT connectivity protocol for an industrial environment.	**5**	**3**	**6**
		OR			
10.	**a).**	Describe different network types used in industrial communication for IoT.	**5**	**3**	**6**
	b).	Explain the importance of industrial IoT communication requirements.	**5**	**3**	**6**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

				Course Code: D25204B3	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
I M.Tech. II Semester MODEL QUESTION PAPER					
INTRODUCTION TO QUANTUM TECHNOLOGIES					
CAD/CAM					
Time: 3 Hrs.				**Max. Marks: 60 M**	
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
		UNIT-1	CO	KL	M
1.	**a).**	Determine the de Broglie hypothesis to calculate the wavelength of an electron accelerated through a given potential.	**1**	**3**	**6**
	b).	Use the physical significance of eigen values and eigen functions in quantum measurement.	**1**	**3**	**6**
		OR			
2.	**a).**	Apply the time-independent Schrödinger equation to a particle in an infinite potential well.	**1**	**3**	**7**
	b).	Explain the impact of the Heisenberg Uncertainty Principle and find the measurements of position and momentum.	**1**	**3**	**5**
		UNIT-2			
3.	**a).**	Explain the Bloch sphere representation to determine a general qubit state.	**2**	**3**	**6**
	b).	Explain Bell states to determine whether a given two-qubit state is entangled	**2**	**3**	**6**
		OR			
4.		Classify the concept of quantum state tomography and discuss what measurements are needed.	**2**	**4**	**12**
		UNIT-3			
5.	**a).**	Explain the operation of the Deutsch algorithm using interference principles.	**3**	**3**	**6**
	b).	Explain the working of Grover's search algorithm and amplitude amplification	**3**	**3**	**6**
		OR			
6.		A qubit is in the state . $$\|\psi\rangle = \alpha\|0\rangle + \beta\|1\rangle.$$ It passes through a bit-flip channel defined by: $$\rho \to (1-p)\rho + pX\rho X.$$ Questions 1. Compute the output density matrix. 2. Show that when p = 1, the output state is exactly the bit-flipped version of the input state.	**3**	**3**	**12**

		3. For p = 1/2, show that the channel completely destroys the information in the computational basis.			
		UNIT-4			
7.		Explain the BB84and Ekert protocol steps to generate a secure key and determine the application use for secure key.	**4**	**3**	**12**
		OR			
8.	**a).**	Use properties of single-photon sources in secure communication and Explain it.	**4**	**3**	**6**
	b).	Classify the implementation challenges such as noise, decoherence, and photon loss.	**4**	**4**	**6**
		UNIT-5			
9.	**a).**	Determine the quantum gravimetric improves sensitivity over classical sensors.	**5**	**3**	**6**
	b).	Explain the quantum imaging techniques. Use the application and their resolution limits	**5**	**3**	**6**
		OR			
10.	**a).**	Determine the trapped-ion hardware concepts to implement basic gate operations.	**5**	**3**	**7**
	b).	Explain the superconducting qubits. Use the application, advantages and limitations.	**5**	**3**	**5**

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks

					Course Code: D2530401
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R25**
II M.Tech. I Semester MODEL QUESTION PAPER					
RESEARCH METHODOLOGY AND IPR					
CAD/CAM					
Time: 3 Hrs.					**Max. Marks: 60M**
Answer **ONE Question** from **EACH UNIT**					
All questions carry equal marks					
Assume suitable data if necessary					
			CO	KL	M
UNIT-1					
1.	**a).**	Write briefly about good Research criteria.	1	2	6
	b).	What are the errors in selecting a research problem?	1	2	6
OR					
2.	**a).**	Describe briefly the Research process with a neat sketch.	1	2	6
	b).	Describe the scope and objectives of research problems in academic and industrial contexts.	1	3	6
UNIT-2					
3.	**a).**	Write briefly about Effective Literature studies approaches.	2	2	6
	b).	Explain about Research ethics.	2	2	6
OR					
4.	**a).**	Write briefly about Effective technical writing.	2	3	6
	b).	Explain about the Format of research proposal.	2	3	6
UNIT-3					
5.	**a).**	Write about the various steps in acquisition of trademarks rights.	3	2	6
	b).	Discuss research ethics and its role in maintaining academic integrity.	3	3	6
OR					
6.	**a).**	Write briefly about International cooperation on Intellectual Property.	3	2	6
	b).	Explain the procedure for grants of patents.	3	2	6
UNIT-4					
7.	**a).**	Explain about patent information and databases.	4	2	6
	b).	Define Intellectual Property Rights (IPR) and explain patents, designs, trademarks, and copyrights.	4	2	6
OR					
8.	**a).**	Write briefly about scope of patent rights.	4	2	6
	b).	Write briefly about Licensing and transfer of technology.	4	2	6
UNIT-5					
9.	**a).**	Write briefly about Administration in the patent system.	5	2	6
	b).	Explain the scope of patent rights, licensing, and technology transfer.	5	3	6
OR					

10.	**a).**	Write briefly about New developments in IPR.	5	2	6
	b).	Explain IPR case studies involving IITs and their significance in technology commercialization	5	3	6

CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

NOTE: Questions can be given as **A, B splits** or as a **Single Question** for 12 marks