

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1101]**

**I M. Tech I Semester (R19) Regular Examinations**  
**GEOMETRIC MODELING**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
UNIT-I					
1.	a).	Explain about Non – Parametric representation of curves.	1	2	8
	b).	Derive the geometric form of hermit’s cubic spline.	1	3	7
OR					
2.	a).	Supply the algebraic form of a cubic spline.	1	2	8
	b).	What are the properties of parametric curves?	1	2	7
UNIT-II					
3.	a).	Explain about the properties of Beizer curve.	2	2	8
	b).	Derive the equation of a closed Bezier curve of degree 5.	2	3	7
OR					
4.	a).	Explain about composite beizer curves	2	2	8
	b).	Explain about truncated and subdividing of curves	2	2	7
UNIT-III					
5.	a).	Calculate the five third-order non-uniform B-spline basis functions $N_{i,3}(t)$ $i=1,2,3,4,5$ using the knot vectors $[X]=[0011333]$ which contains an interior repeated knot value.	3	3	8
	b).	Explain about Quadratic and cubic B-Spline basis functions	3	2	7
OR					
6.	a).	Fit a B-spline curve with the following control points $P_1(0,0)$ , $P_2(2,2)$ , $P_3(4,4)$ , $P_4(6,6)$ .	3	3	8
	b).	Sweep the normalized cubic spline curve segment defined by $P [0 3 0 1]$ , $P [3 0 0 1]$ and $P_i [3 0 0 0]$ , $P_i [3 0 0 0]$ 10 units along Z-axis.	3	3	7
UNIT-IV					
7.	a).	Determine the point on bilinear surface defined by $P(0,0)=[0 0 1]$ , $P(0,1)=[1 1 1]$ , $P(1,0)=[1 0 0]$ , $P(1,1)=[0 1 0]$ , i.e., the ends of opposite diagonals on opposite faces of unit cube in object space, corresponding to $u=w=0.5$ in parametric space.	4	3	8
	b).	Show by example that a planar coons bi-cubic surface results when the position, tangent and twist vectors all lie in the same plane.	4	3	7
OR					
8.	a).	Develop the equations of following surfaces: (i)Torus; (ii) Ruled surface; (iii) coons bilinear patch; & (iv) Bezier	4	3	8

		surface of degrees $2 \times 3$ .			
	b).	Explain about coon's surface and sweep surface.	4	2	7
		UNIT-V			
9.	a).	Discuss the properties of composite objects.	5	2	8
	b).	Explain about Tri-cubic solid in detail.	5	2	7
		OR			
10.	a).	Explain Half space modeling in detail and provide two examples.	5	2	8
	b).	Discuss with the help of neat sketches, the most commonly used solid entities	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1102]**

**I M. Tech I Semester (R19) Regular Examinations**  
**COMPUTER AIDED MANUFACTURING**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**  
 All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		<b>UNIT-I</b>			
1.	a).	Discuss briefly about the typical utilization of CAD/CAM systems in an Industrial environment?	1	2	8
	b).	Write the manual part programming for profile milling of figure shown below.	1	3	7
		<b>OR</b>			
2.	a).	Briefly explain any 3 types of geometry commands used in APT.	1	2	8
	b).	Write the APT program for the geometry shown in Figure below.	1	3	7

		UNIT-II			
3.	a).	Discuss about preset and Qualified Tooling systems used in CNC machines. Also describe about Automatic Pallet Changer (APC).	2	2	8
	b).	Explain with the help of neat sketches the working of Automatic Tool Changer (ATC).	2	2	7
		OR			
4.	a).	Describe Adaptive Control with Optimization for a milling machine with a neat sketch.	2	2	8
	b).	Compare CNC with DNC and mention the advantages and disadvantages of DNC.	2	2	7
		UNIT-III			
5.		What is PLC? Draw the basic structure of PLC and discuss the various hardware components of PLC.	3	2	15
		OR			
6.	a).	Discuss the advantages of microcontrollers over microprocessors.	3	2	8
	b).	Write the applications of PLC's in CNC Machines.	3	2	7
		UNIT-IV			
7.	a).	Explain the concept of composite part with an example.	4	2	8
	b).	Briefly explain about OPITZ coding system generally used in group technology.	4	2	7
		OR			
8.	a).	Write the applications of group technology for manufacturing process.	4	2	8
	b).	Explain briefly about product flow analysis with an example.	4	2	7
		UNIT-V			
9.	a).	Explain in detail about MRP-I with the help of a neat sketch.	5	2	8
	b).	Write short notes on production planning and capacity planning.	5	2	7
		OR			
10.	a).	How do you Classify Inspection methods? Explain the principle of operation of Non Contact type Optical Inspection methods.	5	2	8
	b).	With help of a neat sketch explain the functioning of a CMM. Also mention the advantages and limitations of it.	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1103]**

**I M. Tech I Semester (R19) Regular Examinations**  
**COMPUTATIONAL METHODS IN ENGINEERING**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

		CO	KL	M												
UNIT-I																
1.	Solve using gauss – Jordan elimination $x - y + 2z = -8$ $x + y + z = -2$ $2x - 2y + 3z = -20$	1	3	15												
OR																
2.	Fit a curve of the form $y = ax^b$ for the following data: <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>x</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>Y</td> <td>0.5</td> <td>2</td> <td>4.5</td> <td>8</td> <td>12.5</td> </tr> </table>	x	1	2	3	4	5	Y	0.5	2	4.5	8	12.5	1	3	15
x	1	2	3	4	5											
Y	0.5	2	4.5	8	12.5											
UNIT-II																
3.	Using Shooting method, solve the BVP $y'' + y + x = 0$ , $0 < x < 1$ , $y(0) = 0$ and $y(1) = e - 1$ .	2	3	15												
OR																
4.	Solve the heat conduction equation, $u_{xx} - u_t = 0$ , subject to boundary conditions $u(0,t) = u(1,t) = 0$ and $u(x,0) = x - x^2$ . Take $h = 0.25$ and $k = 0.025$ .	2	3	15												
UNIT-III																
5.	Explain FFT by taking a suitable example.	3	2	15												
OR																
6.	Explain DFT by taking a suitable example.	3	2	15												
UNIT-IV																
7.	Solve the Poisson equation $\Delta^2 u = -15(x^2 + y^2 + 15)$ subject to the condition $u = 0$ at $x = 0$ and $x = 3$ $u = 0$ at $y = 0$ and $u = 1$ at $y = 3$ for $0 < x < 3$ . Find the solution taking $h = 1$ with a square.	4	3	15												
OR																
8.	Solve $4u_{xx} = u_{tt}$ $u(0,t) = 0$ $y(4,t) = 0$ $u_t(x,0) = 0$ and $u(x,0) = x(4-x)$ .	4	3	15												
UNIT-V																
9.	Solve $u_{xx} + u_{yy} = 0$ , $0 \leq x, y \leq 1$ , with $u(0,y) = 10 = u(1,y)$ and $u(x,0) = 20 = u(x,1)$ . Take $h = 0.25$ and apply Liebmann method to 3 decimal accuracy.	5	3	15												

		OR			
10.		Explain the procedure for solving wave equation by finite difference method.	5	2	15

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1104]**

**I M. Tech I Semester (R19) Regular Examinations**  
**MATERIAL TECHNOLOGY**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

		UNIT-I	CO	KL	M
1.	a).	Describe mechanism of plastic deformation.	1	2	8
	b).	Write a short not on slip and twinning.	1	2	7
		OR			
2.	a).	Explain the process of precipitation hardening.	1	2	8
	b).	What is the effect of strain and strain rate on super plasticity?	1	2	7
		UNIT-II			
3.	a).	Explain the importance of stress intensity factor in design.	2	2	8
	b).	Explain the work hardening behavior of ductile metals.	2	2	7
		OR			
4.	a).	What is creep rupture and how dose Larson-Miller parameter helps in dealing it?	2	2	8
	b).	Discuss Griffiths theory of brittle fracture.	2	2	7
		UNIT-III			
5.	a).	Differentiate high and low cycle fatigue.	3	2	8
	b).	Discuss various features of fatigue fracture.	3	2	7
		OR			
6.	a).	What are sources of failure and discuss anyone procedure of failure analysis?	3	2	8
	b).	With a neat sketch explain rotating beam type fatigue measurement.	3	2	7
		UNIT-IV			
7.	a).	What are salient features of marging steel?	4	2	8
	b).	List out various applications of dual steel.	4	2	7
		OR			
8.	a).	Write a short note on smart materials.	4	2	8
	b).	Discuss about Ni and Ti Aluminides.	4	2	7
		UNIT-V			
9.	a).	Discuss molecular structures of any two polymeric materials.	5	2	8
	b).	What is the purpose of metallic coatings and mention various procedures to apply coating.	5	2	7
		OR			
10.	a).	Write a short note on processing and application of CBN	5	2	8
	b).	List out various properties of TaC	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1105]**

**I M. Tech I Semester (R19) Regular Examinations**  
**MECHANICAL VIBRATIONS**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

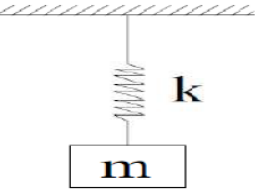
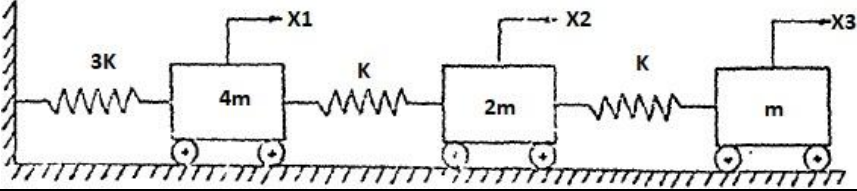
**TIME: 3Hrs.**

**Max. Marks: 75 M**

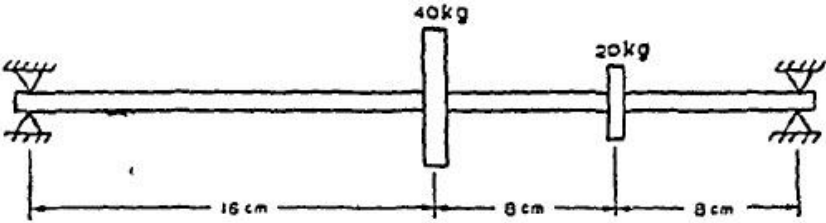
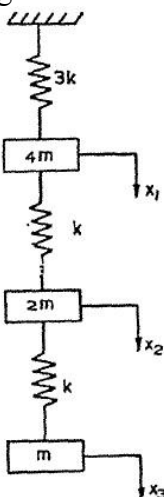
Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
<b>UNIT-I</b>					
1.	a).	Determine the differential equation of a spring mass system (shown in the figure below) and its natural frequency by using (i). D' Alembert's principle and (ii). Rayleigh's method.	1	3	8
					
	b).	Explain the classifications of vibration with examples.	1	2	7
<b>OR</b>					
2.	a).	Write short notes on vibration isolation and transmissibility	1	2	7
	b).	Derive the expression for vibration response of a single degree of freedom system if the damping provided is under damped system.	1	3	8
<b>UNIT-II</b>					
3.		Write short notes on convolution integral and shock spectrum.	2	2	15
<b>OR</b>					
4.		Obtain the response equation for a system subjected to unit step and unit ramp functions.	2	3	15
<b>UNIT-III</b>					
5.		For the three degree of freedom system shown in figure below, obtain the three natural frequencies and the corresponding mode shapes.	3	3	15
					
<b>OR</b>					
6.		Determine the natural frequency of torsional vibrations of a shaft with two circular discs of uniform thickness at the ends. The masses of the discs are $M_1 = 500 \text{ kg}$ and $M_2 = 1000 \text{ kg}$ and their outer diameters are $D_1 = 125 \text{ cm}$ and $D_2 = 190 \text{ cm}$ . The length of the shaft is 300 cm and	3	3	15



	its diameter is 10 cm. Take the Modulus of rigidity for the material of shaft is $G = 0.83 \times 10^{11} \text{ N/m}^2$ .			
UNIT-IV				
7.	Find the lowest natural frequency of transverse vibrations for the system shown in figure below by Rayleigh's method. Take $E=1.96 \times 10^{11} \text{ N/m}^2$ and $I=10^{-6} \text{ m}^4$ .	4	3	15
				
OR				
8.	For the three degree of freedom system shown in figure below find the lowest natural frequency using Stodola's method.	4	3	15
				
UNIT-V				
9.	Calculate the whirling speed of shaft supported by long bearing so as to give zero slope at both ends of the shaft.	5	3	15
OR				
10.	Prove that the critical speed of whirling speed for a rotating shaft is same as the frequency of natural transverse vibration.	5	3	15

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1106]**

**I M. Tech I Semester (R19) Regular Examinations**  
**MECHATRONICS**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
<b>UNIT-I</b>					
1.	a).	What do you mean by Mechatronics? What are the components of Mechatronic system? Explain their role.	1	2	8
	b).	What is a Measurement System? Explain the principle and operation of Optical Encoders.	1	2	7
<b>OR</b>					
2.	a).	Write the advantages and disadvantages of mechatronics system.	1	2	8
	b).	Explain the working of any one temperature measuring sensor that is used in a mechatronic system.	1	2	7
<b>UNIT-II</b>					
3.	a).	What are the various Filters that you come across in Signal conditioning? Explain.	2	2	8
	b).	Explain in detail the Inverting and Non-Inverting type amplifiers.	2	2	7
<b>OR</b>					
4.	a).	With the help of neat sketches Explain BJT, FET and TRIAC.	2	2	15
<b>UNIT-III</b>					
5.		Differentiate among Hydraulic, Pneumatic and Electrical actuation systems.	3	2	15
<b>OR</b>					
6.		Explain the working of an Electro -Hydraulic actuation system with a neat sketch.	3	2	15
<b>UNIT-IV</b>					
7.		What is PLC? Briefly explain the use of timers and counters in PLCs with suitable examples.	4	2	15
<b>OR</b>					
8.	a).	Differentiate between Microprocessor and Microcontroller.	4	2	8
	b).	Draw the generalized block diagram of a Microcontroller and explain function of each component.	4	2	7
<b>UNIT-V</b>					
9.		What do you understand by the terms System and Interfacing and data acquisition? Explain with suitable example.	5	2	15

		OR			
10.	a).	What you mean by ADC? Explain the working of Flash ADC with neat sketch.	5	2	8
	b).	Explain the working of R-2R Ladder DAC.	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1107]**

**I M. Tech I Semester (R19) Regular Examinations**  
**INDUSTRIAL ROBOTICS**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
UNIT-I					
1.	a).	Define the term industrial automation. Explain different types of industrial automation.	1	2	8
	b).	Classify robots based on control systems.	1	2	7
OR					
2.	a).	Explain the different types of electrical drives used in robot actuation.	1	2	8
	b).	Compare pneumatics drive robots with stepper motor drive robots.	1	2	7
UNIT-II					
3.	a).	What are closed form solutions to inverse kinematics problem?	2	2	8
	b).	Explain the concept of redundancy in the context of robots.	2	2	7
OR					
4.	a).	Explain the robot arm dynamics in detail with neat sketches.	2	2	8
	b).	Explain the configuration of robot controller with a neat diagram.	2	2	7
UNIT-III					
5.	a).	What is the function of gripper used in robots? What are the considerations to be made in the selection and design of grippers?	3	2	8
	b).	Discuss about tactile array sensors.	3	2	7
OR					
6.		Describe the machine vision technique used in robotics with a neat block diagram.	3	2	15
UNIT-IV					
7.	a).	Explain the features of second generation robot programming languages.	4	2	8
	b).	Explain the functions of WAIT SIGNAL and DELAY commands in robot programming.	4	2	7
OR					
8.		Explain the various programming methods used in robotics with example and features of each	4	2	14
UNIT-V					
9.		Explain about the functions performed by the work cell controller in detail.	5	2	15

		OR			
10.	a).	What are the desirable features of robot for successful machine tool load/unload applications?	5	2	8
	b).	Write a short note on describing factory future. What will be the role of humans in this factory?	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1108]**

**I M. Tech I Semester (R19) Regular Examinations**  
**MODELLING AND SIMULATION OF MANUFACTURING SYSTEMS**  
**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
<b>UNIT-I</b>					
1.	a).	Explain the terms system, model and simulation.	1	2	8
	b).	Explain in detail the various steps involved in developing a simulation model.	1	2	7
<b>OR</b>					
2.	a).	Explain various advantages and disadvantages of simulation.	1	2	8
	b).	Write about applications of simulation in Manufacturing system.	1	2	7
<b>UNIT-II</b>					
3.	a).	Explain the characteristics of following distributions: (i)Poisson; (ii)Geometric; & (iii) Uniform	2	2	8
	b).	Explain the terms (i) Null hypothesis; & (ii) Alternative hypothesis	2	2	7
<b>OR</b>					
4.	a).	What is normal probability distribution?	2	2	8
	b).	Explain the exponential distribution with example.	2	2	7
<b>UNIT-III</b>					
5.	a).	Explain inverse Transform method, acceptance-rejection method.	3	2	8
	b).	Write about challenges in generating pseudo random numbers.	3	2	7
<b>OR</b>					
6.	a).	Use LCG method to generate sequence of random numbers when m=63, a=22, c=4 a seed value $z_0 = 19$ .	3	3	8
	b).	Using mid square method generate 10 random numbers when $X_0 = 3043$ .	3	3	7
<b>UNIT-IV</b>					
7.	a).	Explain the terms ( i) verification; (ii) validation; & (iii)credibility	4	2	8
	b).	Explain various principles involved in developing of valid simulation model.	4	2	7
<b>OR</b>					
8.	a).	Explain any four techniques for verification of simulation.	4	2	8
	b).	Write about history of simulation languages.	4	2	7
<b>UNIT-V</b>					
9.	a).	Explain open and closed queuing networks with example.	5	2	8

	b).	Explain stochastic process in manufacturing.	5	2	7
		OR			
10.	a).	Write a short note on simulation of M/M/1 queuing model.	5	2	8
	b).	Explain continuous time markov chain model with example.	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19RD1101]**

**I M. Tech I Semester (R19) Regular Examinations**  
**RESEARCH METHODOLOGY AND IPR**  
**Common to CST,CS,PSA,IT & CAD**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
UNIT-I					
1.	a).	Write briefly about good Research criteria.	CO1	K2	8
	b).	What are the errors in selecting a research problem?	CO1	K2	7
OR					
2.		Describe briefly the Research process with neat sketch.	CO1	K2	15
UNIT-II					
3.	a).	Write briefly about Effective Literature studies approaches.	CO1	K2	8
	b).	Explain about Research ethics.	CO3	K2	7
OR					
4.	a).	Write briefly about Effective technical writing.	CO2	K3	8
	b).	Explain about the Format of research proposal.	CO2	K3	7
UNIT-III					
5.		Write about the various steps in acquisition of trademarks rights.	CO5	K2	15
OR					
6.	a).	Write briefly about International cooperation on Intellectual Property.	CO5	K2	8
	b).	Explain the procedure for grants of patents.	CO5	K2	7
UNIT-IV					
7.		Explain about patent information and databases.	CO5	K2	15
OR					
8.	a).	Write briefly about scope of patent rights.	CO5	K2	8
	b).	Write briefly about Licensing and transfer of technology.	CO4	K2	7
UNIT-V					
9.		Write briefly about Administration in patent system.	CO5	K2	15
OR					
10.		Write briefly about New developments in IPR.	CO6	K2	15

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**



**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1201]**

**I M. Tech II Semester (R19) Regular Examinations**  
**THEORY OF ELASTICITY AND PLASTICITY**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
UNIT-I					
1.		Show that the line elements at the point x, y that have the maximum and minimum rotation are those in the two perpendicular directions $\theta$ determined by $\tan 2\theta = \frac{\partial v / \partial y - \partial u / \partial x}{\partial v / \partial x + \partial u / \partial y}$	1	3	15
OR					
2.	a).	Explain the procedure for determination of stresses on any plane inclined to regular set of axes .The inclination of the plane is defined by direction cosines.	1	3	8
	b).	Discuss Hooks law.	1	3	7
UNIT-II					
3.	a).	Explain how about Fourier series can be applied for two dimensional problem under gravity loading.	2	3	8
	b).	Explain Saint Venant's principle.	2	3	7
OR					
4.		Starting from general solution $\phi = A \log r + B r^2 \log r + C r^2 + D$ . Obtain the expression for radial and hoop stresses in a thick cylinder subjected to internal fluid pressure.	2	3	15
UNIT-III					
5.	a).	Discuss about Homogeneous deformation.	3	3	8
	b).	Discuss about principle axis of strain rotation	3	3	7
OR					
6.	a).	Explain the reciprocal theorem.	3	3	8
	b).	Discuss about principle of superposition.	3	3	7
UNIT-IV					
7.		A hollow circular torsion member has an outside diameter of 22mm and inside diameter of 18mm, with mean diameter ,D=20mm and t/D=0.10.calculate the torque and angle of twist per unit length if shearing stress at mean diameter is 70MPa. Calculate these values if a out is made through the wall thickness along the	4	3	15

		entire length $G=77.5 \text{ GPa}$			
		OR			
8.	a).	Obtain the expression for torque and angle of twist of an elliptical shaft subjected to uniform torsion?	4	3	8
	b).	Explain the analogy of Torsion?	4	3	7
		UNIT-V			
9.	a).	Explain the theories of plastic flow.	5	3	8
	b).	Discuss in detail about the various failure theories of plasticity with its limitations.	5	3	7
		OR			
10.	a).	Derive the expression showing stress strain relationship.	5	3	8
	b).	Explain the strain hardening.	5	3	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1202]**

**I M. Tech II Semester (R19) Regular Examinations**  
**ADVANCED MANUFACTURING PROCESSES**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		UNIT-I			
1.	a).	Enumerate the various Surface treatment processes and explain the importance of it.	1	2	8
	b).	Explain any two Surface treatment process with a neat sketch.	1	2	7
		OR			
2.	a).	Explain Chemical vapor deposition and Electro forming in detail.	1	2	8
	b).	Explain Thermal Spraying and Diamond coating in detail.	1	2	7
		UNIT-II			
3.	a).	How do you classify Ceramics? What are the applications of ceramics?	2	2	8
	b).	Describe the processing of Particulate ceramics.	2	2	7
		OR			
4.	a).	Classify Ceramic fabrication techniques? Explain any two techniques.	2	2	8
	b).	Describe the composition of Elastomers and Reinforced Plastics.	2	2	7
		UNIT-III			
5.	a).	Explain the basic processing steps involved in Fabrication of MEMS.	3	2	8
	b).	Explain Lithography in detail.	3	2	7
		OR			
6.	a).	Briefly explain Crystal growth and wafer preparation.	3	2	8
	b).	What is the scope of CAD in microelectronics?	3	2	7
		UNIT-IV			
7.	a).	Describe the Wire cut EDM process with neat sketch and list its advantages and limitations.	4	2	8
	b).	Describe the ECM process with neat sketch and list its advantages and limitations.	4	2	7
		OR			
8.	a).	Describe the LBM process with neat sketch and list its advantages and limitations.	4	2	8

	b).	Describe the AJM process with neat sketch and list its advantages and limitations.	4	2	7
		UNIT-V			
9.	a).	Explain the working principle of Stereo Lithography with the help of neat sketch.	5	2	8
	b).	Explain the working principle of Laser sintering with a neat sketch.	5	2	7
		OR			
10.	a).	Explain briefly about Fused Deposition Method with applications and limitations.	5	2	8
	b).	Explain briefly about Rapid tooling and Rapid manufacturing.	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1203]**

**I M. Tech II Semester (R19) Regular Examinations**  
**ADVANCED FINITE ELEMENT METHODS**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

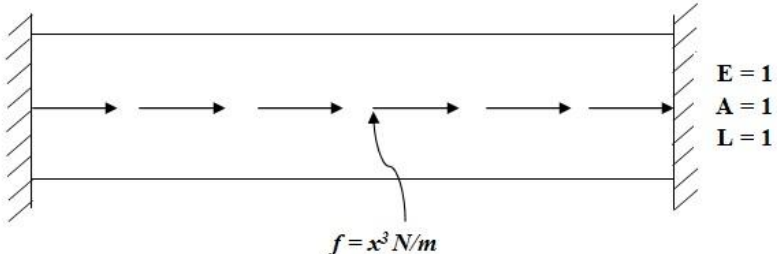
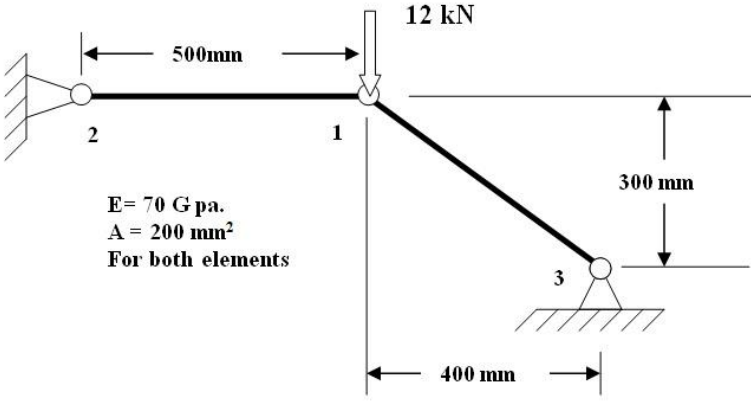
**TIME: 3Hrs.**

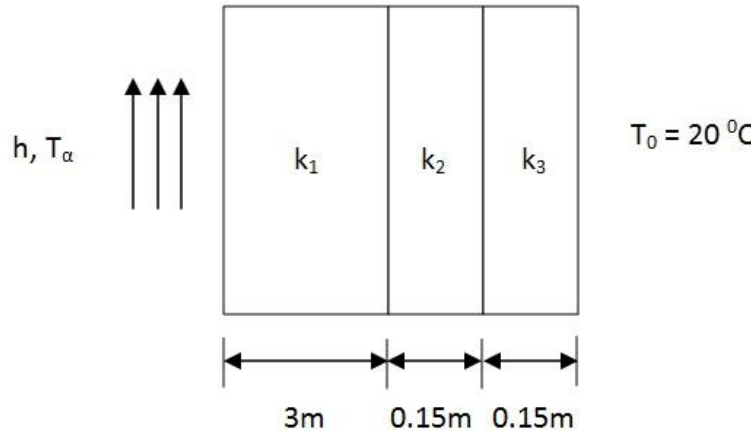
**Max. Marks: 75 M**

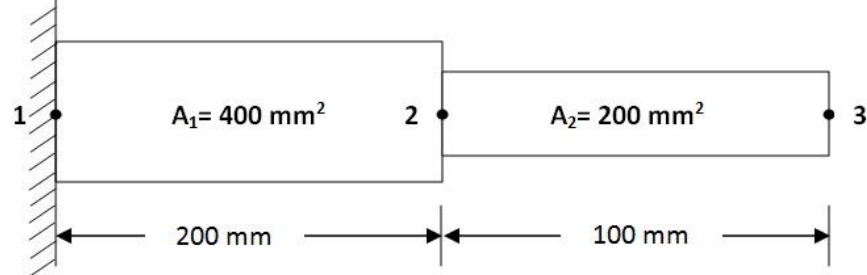
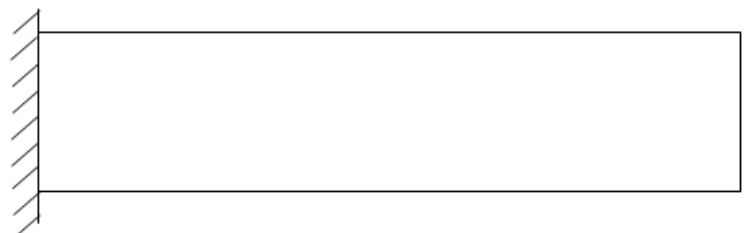
Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		<b>UNIT-I</b>			
1.	<p>A rod fixed at its ends is subjected to a varying body force as shown in Fig. 1. Use the Rayleigh-Ritz method with an assumed displacement field <math>u = a_0 + a_1x + a_2x^2</math> to determine displacement <math>u(x)</math> and stress <math>\sigma(x)</math>. Also plot variation of <math>u(x)</math> and <math>\sigma(x)</math> with respect to <math>x</math>.</p>  <p align="center">Fig. 1</p>	1	3	15	
		OR			
2.	<p>Explain in detail about Raleigh Ritz method and Galerkin method with an example.</p>		1	2	15
		<b>UNIT-II</b>			
3.	<p>For the two-bar truss shown in Fig. 2, determine the displacements of node 1 and the stress in element 1-3.</p>  <p align="center">Fig. 2</p>	2	3	15	
		OR			

4.		A beam of 10 m length is fixed at one end and supported by a roller at the other end has a 20 kN concentrated load applied at the centre of the span. Calculate the deflection under the load for the beam. Assume $E = 20 \times 10^5$ N/mm <sup>2</sup> and $I = 2500$ cm <sup>4</sup> .	2	3	15
UNIT-III					
5.		A composite wall consists of three materials shown in Fig. 3. The outer temperature is 20 <sup>0</sup> C. Convection heat transfer takes place on the inner surface of the wall with $h = 20$ W/m <sup>2</sup> <sup>0</sup> C and $T_\alpha = 1000$ <sup>0</sup> C. Determine the temperature in the wall. Assume $k_1 = 20$ W/m <sup>0</sup> C, $k_2 = 30$ W/m <sup>0</sup> C and $k_3 = 40$ W/m <sup>0</sup> C.	3	3	15
 <p style="text-align: center;">Fig. 3</p>					
OR					
6.		Derive the element stiffness matrix for three noded triangular element	3	3	15
UNIT-IV					
7.	a	Differentiate between iso, sub and super parametric elements.	4	3	8
	b	Explain in detail about h-refinement and p-refinement.	4	2	7
OR					
8.		Evaluate the following integral using one point and two-point gaussian quadrature formulae and compare the results with exact solution.	4	3	15
$\int_{-1}^1 [3e^x + x^2 + \frac{1}{(x+2)}] dx$					
UNIT-V					
9.		Determine the natural frequencies and mode shapes for the stepped bar shown in Fig. 4. Take $E = 70$ GPa and specific weight 2700 kg/m <sup>3</sup> .	5	3	15

	 <p style="text-align: center;">Fig. 4</p>			
	OR			
10.	<p>Evaluate the lowest eigen value and the corresponding eigen mode for the beam shown in Fig. 5 by discretising the beam in to two elements.</p>  <p style="text-align: right;"> <b>E = 200 GPa</b>  <b>A = 240 mm<sup>2</sup></b>  <b>I = 2000 mm<sup>4</sup></b>  <b>ρ = 7840 kg/m<sup>3</sup></b>  <b>L = 600 mm</b> </p> <p style="text-align: center;">Fig. 5</p>	5	3	15

CO-COURSE OUTCOME

KL-KNOWLEDGE LEVEL

M-MARKS

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1204]**

**I M. Tech II Semester (R19) Regular Examinations**  
**FRACTURE MECHANICS**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

	UNIT-I	CO	KL	M
1.	Explain the types of fracture in brittle and ductile materials.	1	2	15
	OR			
2.	Explain the ductile /brittle transition temperature for notched and un notched components.	1	2	15
	UNIT-II			
3.	Explain the characteristics of R curve.	1	2	15
	OR			
4.	Derive the stress intensity factor for Mode I crack using Westergaurd approach.	1	3	15
	UNIT-III			
5.	Determine J integral for double cantilever beam.	1	3	15
	OR			
6.	Explain in detail how a crack tip opening displacement is measured.	1	2	15
	UNIT-IV			
7.	Suppose the fatigue behavior of a steel is characterized by a two line response when plotted on an S- logN plot, namely (i). $S(\text{MPa}) = 1000 - 100 \log N$ ; between $N = 0$ to $N = 10^6$ stress cycles, (ii). $S(\text{MPa}) = 400$ ; for $N > 10^6$ stress cycles. (a). Sketch the S - logN plot. (b). What is the value of the endurance limit? (c). How many stress cycles will the steel probably sustain prior to failure at a stress of 460 MPa?	2	3	15
	OR			
8.	Explain about total life and damage tolerant approaches to life prediction.	2	2	15
	UNIT-V			
9.	Define creep and explain creep curves.	3	2	15
	OR			
10.	Explain creep-fatigue interaction.	3	2	15

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**



**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1205]**

**I M. Tech II Semester (R19) Regular Examinations**  
**PRODUCT DESIGN AND DEVELOPMENT**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

		CO	KL	M
	<b>UNIT-I</b>			
1.	Explain different stages of Product Life Cycle with suitable examples.	1	2	15
	OR			
2.	Explain in detail about modern product development process and innovative thinking.	1	2	15
	<b>UNIT-II</b>			
3.	Explain in detail about the process of concept generation along with techniques involved in it.	2	2	15
	OR			
4.	Discuss in detail about Robust design and design optimization	2	2	15
	<b>UNIT-III</b>			
5.	Discuss the concept of design for safety and environmental considerations in product design.	2	2	15
	OR			
6.	What are various value engineering techniques? Discuss the procedure to value a product with example.	2	2	15
	<b>UNIT-IV</b>			
7.	Discuss the methodology of product development economics and give its importance.	3	2	15
	OR			
8.	Explain the ergonomic design of product with the help of suitable example.	3	2	15
	<b>UNIT-V</b>			
9.	Explain in detail about various creative techniques used in product design.	4	2	15
	OR			
10.	Discuss about the procedures involved in patent ownership and transfer.	4	2	15

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1206]**

**I M. Tech II Semester (R19) Regular Examinations**  
**MATERIALS CHARACTERIZATION TECHNIQUES**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		UNIT-I			
1.	a).	What are the main crystal structures? Explain with neat diagram	1	2	8
	b).	Explain about single crystal diffraction.	1	2	7
		OR			
2.		Explain in detail about X-ray spectrometry	1	2	15
		UNIT-II			
3.		Explain about microscopic techniques in detail.	2	2	15
		OR			
4.		Explain about operating conditions of SEM and preparation of SEM specimen.	2	2	15
		UNIT-III			
5.		Explain about Differential Scanning calorimetry (DSC) in detail.	3	2	15
		OR			
6.		Explain about various electrical characterization techniques.	3	2	15
		UNIT-IV			
7.		Discuss about magneto-optical kerr effect, magnetic resonance and electron spin resonance.	4	2	15
		OR			
8.		Explain about Magnetic characterization techniques in detail.	4	2	15
		UNIT-V			
9.		Explain in detail about Raman spectroscopy.	5	2	15
		OR			
10.		Write about Optical metallography in detail.	5	2	15

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1207]**

**I M. Tech II Semester (R19) Regular Examinations**  
**OPTIMIZATION AND RELIABILITY**  
**CAD/CAM**

**Department of Mechanical Engineering**  
**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT**.

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
<b>UNIT-I</b>					
1.	a).	The profit per acre of a farm is given by: $f(x_1, x_2) = 20x_1 + 26x_2 + 4x_1x_2 - 4x_1^2 - 3x_2^2$ 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	7
	b).	Minimize: $3x_1^2 + 4x_2^2 + 5x_3^2$ such that $x_1 + x_2 + x_3 = 10$ using Lagrange's multiplier method.	1	3	8
<b>OR</b>					
2.		Use Kuhn-Tucker conditions to maximize: $f(x_1, x_2) = 2x_1^2 + 12x_1x_2 - 7x_2^2$ Subject to: $2x_1 + 5x_2 \leq 98$	1	3	15
<b>UNIT-II</b>					
3.	a).	Minimize: $f(x_1, x_2) = 2x_1^2 + x_2^2$ by using steepest descent method with the starting point (1, 2). Use two iterations.	2	3	8
	b).	What are the merits and demerits of classical optimization techniques?	2	2	7
<b>OR</b>					
4.	a).	What are the salient features and limitations of Newton's method ?	2	2	8
	b).	Minimize: $f(x_1, x_2) = x_1 - x_2 + 2x_1^2 + 2x_1x_2 + x_2^2$ by using Newton's method with the starting point (0, 0).	2	3	7
<b>UNIT-III</b>					
5.	a).	Explain the working principle of Genetic Algorithm.	3	2	8
	b).	What are the drawbacks of GA?	3	2	7
<b>OR</b>					
6.	a).	Explain the principles of Genetic Programming.	3	2	8
	b).	Explain Pareto's analysis.	3	2	7
<b>UNIT-IV</b>					
7.	a).	Develop an optimization model for optimizing the arc welding parameters.	4	3	8

	b).	Write the optimization model for path synthesis of a four bar mechanism. Use the structural error as the objective function.	4	3	7
		OR			
8.	a).	Develop an 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	8
	b).	Write a constrained minimization model for volume of a helical compression spring.	4	3	7
		UNIT-V			
9.	a).	Define : Risk, Reliability, MTTF, MTBF.	5	2	8
	b).	Explain about the constant, linearly increasing and Weibull models of hazard analysis.	5	2	7
		OR			
10.	a).	The time to wear for a cutting tool is distributed normally with a mean of 2.8 hours and standard deviation of 0.6 hour. Find (i) The probability that the tool will wear out in 1.5 hours (ii) Find out the reliability for 1.5 hours (iii) How often the cutting edge of the tool must be replaced in order to keep the failure less than 10 percentage?	5	3	8
	b).	What are the various ways to improve Reliability by design? Explain	5	2	7

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)**  
**[M19CAD1208]**

**I M. Tech II Semester (R19) Regular Examinations**

**ADDITIVE MANUFACTURING**

**CAD/CAM**

**Department of Mechanical Engineering**

**MODEL QUESTION PAPER**

**TIME: 3Hrs.**

**Max. Marks: 75 M**

Answer **ONE Question** from **EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

		CO	KL	M
	<b>UNIT-I</b>			
1.	Classify and explain the AM process.	1	2	15
	<b>OR</b>			
2.	Explain in detail about physical principles for layer generation.	1	2	15
	<b>UNIT-II</b>			
3.	Explain the applications of SLS and its processing techniques.	2	2	15
	<b>OR</b>			
4.	Explain the working principle of 3DP.	2	2	15
	<b>UNIT-III</b>			
5.	Write the applications of rapid prototyping in industrial product development.	2	2	15
	<b>OR</b>			
6.	Discuss in detail about various properties of additive manufactured tools.	2	2	15
	<b>UNIT-IV</b>			
7.	Explain how plastic components are manufactured using indirect methods.	3	2	15
	<b>OR</b>			
8.	Explain in detail about various indirect methods for the manufacture of metal components.	3	2	15
	<b>UNIT-V</b>			
9.	Explain in detail about metal tools based on multilevel additive manufacturing processes.	3	2	15
	<b>OR</b>			
10.	Write the difference between direct and indirect tooling techniques.	3	2	15

**CO-COURSE OUTCOME**

**KL-KNOWLEDGE LEVEL**

**M-MARKS**

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)****[M19CAD2101]****II M. Tech I Semester (R19) Regular Examinations****NON DESTRUCTIVE EVALUATION****(Program Elective-V)****Department of Mechanical Engineering****MODEL QUESTION PAPER****TIME: 3Hrs.****Max. Marks: 75 M****Answer ONE Question from EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		UNIT-I			
1.		Explain about principle of Eddy Current testing and eddy-current path?	1	3	15
		OR			
2.	a).	Explain the high sensitivity eddy current testing techniques with necessary sketches	1	3	8
	b).	What are the limitations of eddy current tests?	1	3	7
		UNIT-II			
3.	a).	Explain about Radiographic test and Radiographic equipment?	2	2	10
	b).	Discuss the safety aspects of industrial radiography.	2	2	5
		OR			
4.		Describe the arrangement of real time radiographic system with neat sketch.	2	2	15
		UNIT-III			
5.	a).	What is the principle of ultrasonic testing? Discuss different methods of ultrasonic testing.	3	3	8
	b).	Discuss the elements in pulse echo flaw detector system.	3	3	7
		OR			
6.	a).	Explain the terms attenuation, beam spread and acoustic impedance and their importance in ultrasonic testing.	3	3	8
	b).	List applications, advantages and limitations of ultrasonic testing.	3	3	7
		UNIT-IV			
7.		What is the Principle of Optical holography technique and explain?	4	3	15
		OR			
8.		What is the Principle of Electron beam holography technique and explain?	4	3	15
		UNIT-V			
9.		What is the importance of NDE in nuclear and non nuclear applications?	5	3	15
		OR			
10.		Explain the method for NDE for pressure vessels. Discuss the test methods.	5	3	15

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

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)****[M19CAD2102]****II M. Tech I Semester (R19) Regular Examinations****QUALITY ENGINEERING****(Program Elective-V)****Department of Mechanical Engineering****MODEL QUESTION PAPER****TIME: 3Hrs.****Max. Marks: 75 M****Answer ONE Question from EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		UNIT-I			
1.		Discuss various economic consequences of tightening tolerances in detail.	1	2	15
		OR			
2.		Explain the importance of quality engineering in design production process.	1	2	15
		UNIT-II			
3.		For an example multiple component, explain tolerance allocation.	2	2	15
		OR			
4.		What is loss function? How is tolerance design done using it?	2	2	15
		UNIT-III			
5.		Explain in detail about observation method and ranking method with suitable example.	3	2	15
		OR			
6.		Discuss various types of ANOVA used in quality engineering.	3	2	15
		UNIT-IV			
7.		Differentiate between test strategies and efficient test strategies used for an experimental set up.	4	2	15
		OR			
8.		Explain various interpretation methods used for analyzing experimental results.	4	2	15
		UNIT-V			
9.		“Six sigma is a statistical measure used to ensure quality of products and services” Discuss.	5	2	15
		OR			
10.		What is six sigma methodology? Describe the DMAIC problem solving methodology.	5	2	15

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

**SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)****[M19CAD2103]****II M. Tech I Semester (R19) Regular Examinations****GREEN MANUFACTURING****(Program Elective-V)****Department of Mechanical Engineering****MODEL QUESTION PAPER****TIME: 3Hrs.****Max. Marks: 75 M****Answer ONE Question from EACH UNIT.**

All questions carry equal marks.

\*\*\*\*\*

			CO	KL	M
		UNIT-I			
1.	a).	Explain the impact of manufacturing in environmental ecology	1	2	8
	b).	Discuss the role of manufacturing sector in national growth.	1	2	7
		OR			
2.	a).	Explain about various casting defects in detail with neat sketches.	1	2	8
	b).	List the advantages and limitations of green manufacturing	1	2	7
		UNIT-II			
3.	a).	List the principles of green manufacturing	2	2	8
	b).	Discuss in detail about green manufacturing and sustainability.	2	2	7
		OR			
4.		Discuss the Product Life Cycle of manufactured goods in detail.	2	2	15
		UNIT-III			
5.		What do you mean by Multi attributes decision making and explain the structure for Multi attributes decision making in detail	3	2	15
		OR			
6.		Explain in detail about Weighted Product Method and Grey Relation Analysis with an example.	3	2	15
		UNIT-IV			
7.		Explain the creation of sustainable growth enabling techniques for assuring green manufacturing.	4	2	15
		OR			
8.		Discuss in detail about carbon footprint analysis and Green Process Economics.	4	2	15
		UNIT-V			
9.		Explain about closed loop & open Loop production system and Green manufacturing through clean energy supply.	5	2	15
		OR			
10.	a)	Discuss in detail about Environmental implication of Nanomanufacturing.	5	2	7
	b)	Write a short note on Green packaging and supply chain.	5	2	8

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