SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4101]

IV B. Tech I Semester (R19) Regular Examinations

HEAT TRANSFER

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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			CO	KL	M
		UNIT-I			
1.	a).	Explain the different modes of heat transfer with neat sketches. Write down the basic laws of heat transfer	1	2	7
	b).	A wire of 6mm diameter with 2mm thick insulation (k=0.11w/m-k). If the convective heat transfer coefficient between the insulating surface and air is 25w/m2k. Analyse the critical thickness of insulation and also find the percentage of change in the heat transfer rate if the critical radius is used.	1	3	8
		OR			
2.	a).	Explain an expression for Conduction of Heat through hollow sphere.	1	2	7
	b).	A composite insulating wall has three layer of material held together by 4cm diameter aluminum (K=200w/m-k) rivet per 0.1 m^2 of surface. The layer of materials consists of 12cm thick brick (k= 0.90 w/m-k) with hot surface at 220°C, 22cm thick timber (k=0.110 w/m-k) with cold surface at 15°C. These two layers are interposed by third layer of insulating material 1.5cm thick of conductivity 0.170w/mk. Analyze the percentage of increase in heat transfer rate due to rivet.	1	3	8
		UNIT-II			
3.	a).	Explain about the Fin efficiency and Fin effectiveness.	1	2	7
	b).	A very long 1cm diameter copper rod k=377W/m-K is exposed to an environment at 22^0C. The base temperature of the rod is maintained at 150^0C.The heat transfer coefficient between the rod and the surrounding air is 11W/m^2K.Estimate the heat transfer rate from the rod to the surrounding air.	1	3	8
		OR			
4.	a).	Explain the Biot and Fourier's numbers and their significance.	1	2	7
	b).	A large steel plate 5cm thick is initially at a uniform temperature of 400^0C. It is suddenly exposed on both sides to a surrounding at 60^0C with convective heat transfer co-efficient of 285W/m^2K. Calculate the center line temperature and the temperature inside the plate 1.25cm from themed plane after 3 minutes.	1	3	8
		UNIT-III			
5.	a).	Classify the advantages and limitations of dimensional analysis.	2	3	7
	b).	Air at 20^0C at atmospheric pressure flows over a flat plate at a velocity	2	3	8

		of 3m/s. If the plate is 1m wide and 80^0C, Solve the following at x = 300mm. 1. Hydrodynamic boundary layer thickness, 2. Thermal boundary layer thickness, 3. Local friction coefficient, 4. Average friction coefficient, 5. Local heat transfer coefficient, 6. Average heat transfer coefficient, 7. Heat transfer.			
		OR			
6.	a).	Explain the temperature and velocity profiles in free convection on a vertical wall.	2	2	7
	b).	Solve the coefficient of heat transfer by free convection between a horizontal wire and air at 25°C. The surface of the wire is at 95°C and if diameter is 2.5mm. Also find the maximum admissible current intensity if the resistance of the wire is 6 ohm/m.	2	3	8
		UNIT-IV			
7.	a).	Categorize brief note on heat transfer during boiling and Condensation.	3	3	7
	b).	A 4 cm OD, 1m long tube is to be used to condense steam at atmospheric pressure. The water flows inside the tube maintaining the wall surface at 60^0C. Inspect the mass of condensate for the tube in (i) Horizontal position and (ii) Vertical position.	3	4	8
		OR			
8.	a).	Compare the advantages of NTU method over the LMTD method of heat exchanger design.	3	3	7
	b).	Hot coil having a specific heat of 2.09kJ/kg-K flows through a counter flow heat exchanger at the rate of 2268kg/h with an inlet temperature of 93^0C and an outlet temperature of 65^0C. Cold oil having a specific heat of 1.67kJ/kg-K flows in at a rate of 3600kg/h and leaves at 149^0C. Examine the area is required to handle this load, if the overall heat transfer coefficient based on the inside area is 0.7 kW/m^{2}K.	3	4	8
		UNIT-V			
9.	a).	Explain the Fick's first law of diffusion.	4	2	7
	b).	Two parallel plates of size 1.0m x 1.0m spaced 0.5m apart are; ocated in very large room , the walls are maintained at a temperature of 27^0C one plate is maintained at a temperature of 900^0C and other at 400^0C their emissivity are 0.2 and 0.5 respectively. If the plate exchange heat themselves and surroundings. Solve the heat transfer to each plate and to them. Consider only the plate surface facing each other.	4	3	8
		OR			
10.	a).	Explain the brief the concept of a black body.	4	2	7
	b).	A 60 mm thick plate with a circular hole of 30 mm diameter along the thickness is maintained at uniform temperature of 300^0C. Solve the loss of energy to the surroundings at 20^0C, assuming that the two ends	4	3	8

		of the hole to be as parallel discs and the metallic surfaces and surroundings have black body characteristics.			

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

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4102]

IV B. Tech I Semester (R19) Regular Examinations

CAD/CAM

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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			CO	KL	M
		UNIT-I			
1.	a).	What is product life cycle? Explain CAD/CAD overlaid product cycle.	1	2	8
	b).	Write short notes on creating manufacturing database.	1	2	7
		OR			
2.	a).	What are the types of system configuration? Write in brief.	1	2	7
	b).	What are benefits of implementing CAD?	1	2	8
		UNIT-II			
3.	a).	A rectangle formed by the four points whose co-ordinates are A (50, 50), B (100, 50), C (100, 80), D (50, 80). Calculate the new co-ordinates (i) when the rectangle is reduced in size using the scaling factor Sx = 0.5, Sy = 0.6. (ii) When the lamina is rotated about origin through 30^0 in the counter clockwise direction. (iii) When the rectangle is translated 3 units in x-direction and 2 units in y-direction.	2	3	7
	b).	Explain about the importance of various graphics standards.	2	2	8
		OR			
4.		Explain about various geometric modeling techniques using examples.	2	2	15
		UNIT-III			
5.	a).	What are the steps to be carried out for solving a physical problem with the help of a FEM software?	3	3	8
	b).	Discuss the CAD applications of FEM in detail.	3	2	7
		OR			
6.	a).	How AI is useful in computer aided design? Explain in detail.	3	2	7
	b).	Discuss the structure of an expert system.	3	2	8
		UNIT-IV			
7.	a).	Comparison between the NC, CNC, and DNC systems.	4	2	8
	b).	Explain about the Opitz coding system.	4	2	7
		OR			
8.	a).	Explain the different types of CAPP systems used in process planning.	4	2	8
	b).	Explain about the Computer Aided process planning-its advantages and applications.	4	2	7
		UNIT-V			

9.	a).	Explain about the robot configurations in detail.	5	2	8
	b).	Discuss about the CMM machine and its types.	CO5	K2	7
		OR			
10.	a).	Discuss about the other optical inspection techniques.	CO5	K2	8
	b).	Discuss about the other non-optical inspection methods.	CO5	K2	7

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

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4103]

IV B. Tech I Semester (R19) Regular Examinations

PROJECT MANAGEMENT

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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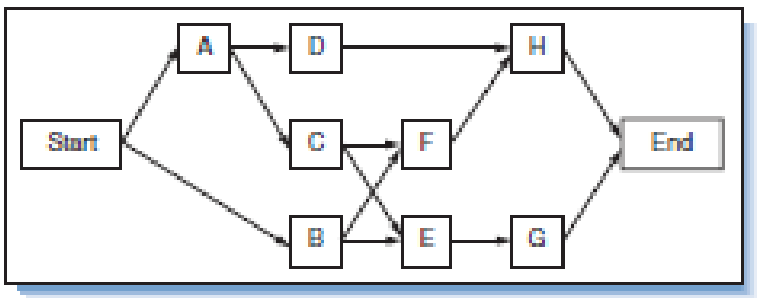
			CO	KL	M
		UNIT-I			
1.	a).	State the characteristics of projects.	01	02	7
	b).	Elucidate different forms of project management.	01	02	8
		OR			
2.	a).	Define and state the objectives of project management.	01	02	7
	b).	Describe in detail the project life cycle.	01	02	8
		UNIT-II			
3.	a).	Describe the role of work break down structure in project planning and control.	02	02	7
	b).	Given the immediate predecessors and *a*, *m*, *b* for each activity in the table below, compute: a. *te* and *V* for each activity b. ES, EF, LS, and LF for each activity. c. Te and *V*p for the project. d. What is P(*T*e < 23)? Activity / Predecessors / a / m / b A / — / 7 / 9 / 11 B / A / 1 / 2 / 3 C / A / 7 / 8 / 9 D / B / 2 / 5 / 11 E / C / 2 / 3 / 4 F / C / 1 / 4 / 8 G / D, E / 6 / 7 / 8 H / F, E / 2 / 6 / 9	02	03	8
		OR			
4.	a).	The project network and associated costs (*T* in days, *C* in $1,000s) are shown below. 	02	03	8

		<table><tr><th></th><th colspan="2">Normal</th><th colspan="2">Crash</th><th></th></tr><tr><th>Activity</th><th>T_n</th><th>C_n</th><th>T_c</th><th>C_c</th><th>Cost slope</th></tr><tr><td>A</td><td>4</td><td>210</td><td>3</td><td>280</td><td>70</td></tr><tr><td>B</td><td>9</td><td>400</td><td>6</td><td>640</td><td>80</td></tr><tr><td>C</td><td>6</td><td>500</td><td>4</td><td>600</td><td>50</td></tr><tr><td>D</td><td>9</td><td>540</td><td>7</td><td>600</td><td>30</td></tr><tr><td>E</td><td>4</td><td>500</td><td>1</td><td>1100</td><td>200</td></tr><tr><td>F</td><td>5</td><td>150</td><td>4</td><td>240</td><td>90</td></tr><tr><td>G</td><td>3</td><td>150</td><td>3</td><td>150</td><td>—</td></tr><tr><td>H</td><td>7</td><td>600</td><td>6</td><td>750</td><td>150</td></tr></table> a. Verify that the normal duration is 22 days and that the direct cost is $3,050. b. What is the least costly way to reduce the duration to 20 days? What is the project cost?			
	b).	Describe the process of estimating the costs in projects.	02	02	7
		UNIT-III			
5.	a).	Write a note on different sources of risks and risk identification techniques.	03	02	7
	b).	A project has a basic cost estimate of $10 million, risk failure likelihood of 0.6, and risk impact of $5 million. Given the following strategies, which would be best based on decision tree analysis? Strategy 1 will cost $2 million and will reduce the failure likelihood to 0.1. Strategy 2 will cost $1 million and will reduce the failure likelihood to 0.4.	03	03	8
		OR			
6.	a).	Elucidate different risk response planning methods.	03	02	8
	b).	Explain the scope of project control process.	03	02	7
		UNIT-IV			
7.	a).	Present a brief note on different types of meetings for the purpose of project communication	04	02	7
	b).	Delineate different types of project evaluations.	04	02	8
		OR			
8.	a).	Describe project extension.	04	02	7
	b).	State the reasons for terminating the project.	04	02	8
		UNIT-V			
9.	a).	State the role of project manager and his responsibilities.	05	02	7
	b).	Present a note on different types of authorities in project management.	05	02	8
		OR			
10.	a).	Explain the process of team building approach.	05	02	7
	b).	Write about stress in projects and the way to manage it.	05	02	8

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4104]

IV B. Tech I Semester (R19) Regular Examinations

MECHATRONICS

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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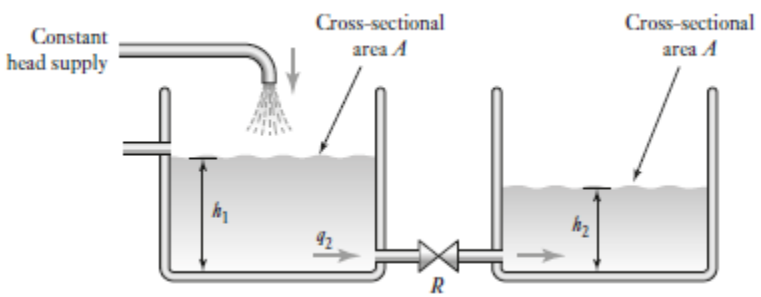
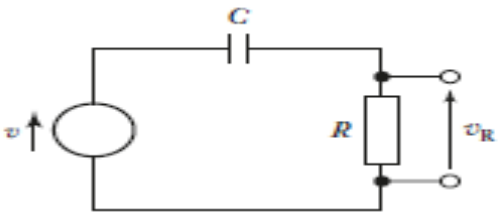
			CO	KL	M
		UNIT-I			
1.	a).	What do you understand by the term Mechatronics? With a neat diagram, show the basic elements of a Mechatronic system. Give examples of Mechatronic systems.	**1**	**2**	**7**
	b).	Write short notes on i) proximity sensor and ii) hall effect sensor	**1**	**2**	**8**
		OR			
2.	a).	Explain optical encoder and strain gauges.	**1**	**2**	**7**
	b).	Discuss integrating and differentiating amplifier.	**1**	**2**	**8**
		UNIT-II			
3.	a).	What is direction control valve? Explain the operation of single solenoid valve.	**2**	**2**	**7**
	b).	What do you understand by the term Actuation system? With a neat schematic diagram, describe the construction and working of a Hydraulic system.	**2**	**2**	**8**
		OR			
4.	a).	Explain digital to analog and analog to digital converters.	**2**	**2**	**7**
	b).	Draw ladder logic diagram of OR, NOR, and XOR logic.	**2**	**2**	**8**
		UNIT-III			
5.	a).	What is the use of a mechanical switch? How does an electrical relay operate? Draw the relay drive circuit and explain its operation.	**3**	**3**	**7**
	b).	Write the working principle of stepper motor.	**3**	**3**	**8**
		OR			
6.	a).	Derive the relationship between the height h_2 and time for the hydraulic system shown in Figure 1. Neglect inertance.  Figure 1	**3**	**3**	**8**
	b).	Derive the relationship between the output, the potential difference across	**3**	**3**	**7**

		the resistor R of vR, and the input v for the circuit shown in Figure 2 which has a resistor in series with a capacitor.  Figure 2			
		UNIT-IV			
7.	a).	A first-order system has a time constant of 4 s and a steady-state transferfunction of 6. What is the form of the differential equation for this system?	**4**	**3**	**7**
	b).	What is the overall transfer function for a closed-loop system having a forward-path transfer function of 5/ (s+3) and a negative feedback-path transfer function of 10?	**4**	**3**	**8**
		OR			
8.	a).	Explain the closed loop control system using a block diagram.	**4**	**3**	**7**
	b).	Explain PD and PID control.	**4**	**3**	**8**
		UNIT-V			
9.	a).	Describe basic elements of microprocessor based control system.	**5**	**3**	**7**
	b).	Lists out differences between microprocessor and microcontroller.	**5**	**3**	**8**
		OR			
10.	a).	Define PLC. Sketch and explain the basic functions of PLC.	**5**	**3**	**7**
	b).	What is an industrial robot? With the help of a block diagram describe different components of a robotic system.	**5**	**3**	**8**

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

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4105]

IV B. Tech I Semester (R19) Regular Examinations

RENEWABLE ENERGY SOURCES

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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			CO	KL	M
		UNIT-I			
1.	a).	Discuss the difference between a pyrheliometer and pyranometer	1	2	7
	b).	Explain the sources of non conventional energy in india.	1	2	8
		OR			
2.	a).	Explain the principle of conversion of solar radiation into heat	1	2	7
	b).	Explain the extraterrestrial and terrestrial solar radiation.	1	2	8
		UNIT-II			
3.	a).	Illustrate the solar distillation with neat sketch.	2	2	7
	b).	Explain the different types of concentrating type collectors.	2	2	8
		OR			
4.	a).	Illustrate the central tower receiver power plant with neat sketch	2	2	7
	b).	Explain the non pressurized solar water heating system	2	2	8
		UNIT-III			
5.	a).	Difference between aerobic and anaerobic digestion	3	2	7
	b).	Discuss the Horizontal axis wind mill with neat sketch	3	2	8
		OR			
6.	a).	Compare floating drum and fixed dome type biogas plant	3	2	7
	b).	Demonstrate the working of KVIC digester with neat sketch	3	2	8
		UNIT-IV			
7.	a).	Illustrate how heat is extracted from hot dry rocks with neat sketch	4	2	7
	b).	Explain the three basic kinds of geo thermal resources.	4	2	8
		OR			
8.	a).	Explain the methods of harnessing of geo -thermal energy	4	2	7
	b).	Illustrate advantages and disadvantages of OTEC plants.	4	2	8
		UNIT-V			
9.	a).	Demonstrate the working mini-hydel power plants	5	2	7
	b).	Explain the classification of fuel cells based on the type of electrolyte	5	2	8
		OR			
10.	a).	Explain the working of hydrogen –oxygen fuel cell	5	2	7
	b).	Illustrate the working of Axial flow compressor with neat sketch	5	2	8

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

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4107]

IV B. Tech I Semester (R19) Regular Examinations

POWER PLANT ENGINEERING

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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			CO	KL	M
		UNIT-I			
1.	**(a).**	What are the resources of power development in India?	**1**	**3**	**7M**
	(b).	What are the elements of coal handling system in thermal power plant? Explain.	**1**	**2**	**8M**
		(OR)			
2.	**(a).**	Make a neat sketch and explain the working of multi retort stoker.	**1**	**3**	**7M**
	(b).	Explain different types of dust collectors with neat sketches.	**1**	**2**	**8M**
		UNIT-II			
3.	**(a).**	Describe briefly the layout of a diesel engine power plant.	**2**	**2**	**8M**
	(b).	Write a note on fuel system of diesel engine power plant.	**2**	**3**	**7M**
		(OR)			
4.	**(a).**	What do you understand by an open cycle gas turbine plant? List out its advantages over closed cycle plant.	**2**	**3**	**8M**
	(b).	Why is power generation by gas turbines attractive?	**2**	**2**	**7M**
		UNIT-III			
5.	**(a).**	State the function of a dam. How are dams classified? Briefly describe a few important types of dams?	**3**	**2**	**8M**
	(b).	Define run-off. List the factors which affect the run-off.	**3**	**2**	**7M**
		(OR)			
6.	**(a).**	Illustrate various elements of a hydroelectric power plant?	**3**	**3**	**8M**
	(b).	Explain the terms storage and pondage?	**3**	**2**	**7M**
		UNIT-IV			
7.	**(a).**	Describe the working of a Fast Breeder reactor. What are its advantages?	**4**	**2**	**8M**
	(b).	What are the different radiation hazards? Explain some protection methods.	**4**	**2**	**7M**
		(OR)			
8.	**(a).**	What are the different fuels used in nuclear reactors? Explain the need of breeding.	**4**	**2**	**7M**
	(b).	Explain with help of neat diagram the working of Boiling water reactor.	**4**	**2**	**8M**
		UNIT-V			

9.	**(a).**	What are the pollution and other environmental effects caused by hydroelectric Plants?	**5**	**2**	**7M**
	(b).	What do you understand by power plant economics? Explain the fixed costs and operating costs of a power station.	**5**	**2**	**8M**
		(OR)			
10.	**(a).**	What is meant by load curve? What is its significance in power generation?	**5**	**2**	**7M**
	(b).	A central power station has annual factors as follows: Load factor = 60%, Capacity factor = 40%, Use factor = 50%, Power station has a maximum demand of 20MW. Determine (i). Annual energy production ii). Reserve capacity over and above peak load. (iii). Hours per year not in service	**5**	**3**	**8M**

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

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4108]

IV B. Tech I Semester (R19) Regular Examinations

ROBOTICS

MECHANICAL ENGINEERING

MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

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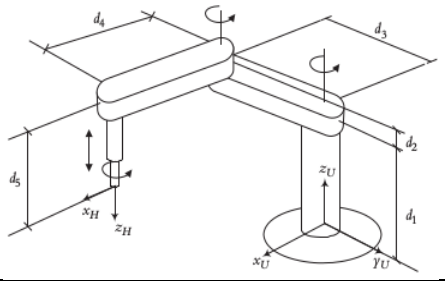
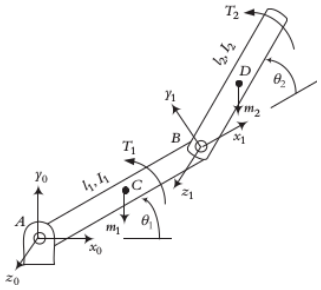
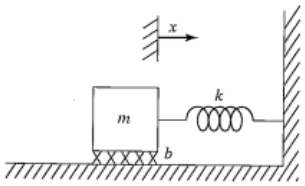
			CO	KL	M
		UNIT – I			
1.	a).	Explain various components of robot.	1	2	7
	b).	Discuss applications of robot in brief.	1	2	8
		OR			
2.	a).	Explain working principle of encoders.	1	2	7
	b).	Compare various types of actuation systems.	1	2	8
		UNIT – II			
3.	a).	Find the new location of point $P(1, 2, 3)^T$ relative to the reference frame after a rotation of 30° about the *z*-axis followed by a rotation of 60° about the *y*-axis.	2	2	7
	b).	A frame *B* is rotated 90° about the *z*-axis, then translated 3 and 5 units relative to the *n*- and *o*-axes respectively, then rotated another 90° about the *n*-axis, and finally, 90° about the *y*-axis. Find the new location and orientation of the frame. $B = \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & -1 & 1 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	2	2	8
		OR			
4.	a).	Suppose that a robot is made of a Cartesian and *RPY* combination of joints. Find the necessary *RPY* angles to achieve the following: $T = \begin{bmatrix} 0.527 & -0.574 & 0.628 & 4 \\ 0.369 & 0.819 & 0.439 & 6 \\ -0.766 & 0 & 0.643 & 9 \\ 0 & 0 & 0 & 1 \end{bmatrix}$	2	3	8
	b).	Also find the Euler angles for the above matrix	2	3	7
		UNIT – III			

5.		For the following SCARA-type robot: a) Assign the coordinate frames based on the D-H representation, b) Fill out the parameters table, c) Write all the *A* matrices, and d) Write the ${}^{U}T_{H}$ matrix in terms of the *A* matrices.  	3	3	15
		OR			
6.	a).	In the 2-DOF robot, the transformation matrix ${}^{0}T_{H}$ is given in symbolic form, as well as in numerical form for a specific location. The length of each link l_1 and l_2 is 1 unit. Calculate the values of θ_1 and θ_2 for the given location. $${}^{0}T_{H} = \begin{bmatrix} C_{12} & -S_{12} & 0 & l_2C_{12} + l_1C_1 \\ S_{12} & C_{12} & 0 & l_2S_{12} + l_1S_1 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} = \begin{bmatrix} -0.2924 & -0.9563 & 0 & 0.6978 \\ 0.9563 & -0.2924 & 0 & 0.8172 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$	3	3	7
	b).	Suppose the location and orientation of a hand frame is expressed by the following matrix. What is the effect of a differential rotation of 0.15 radians about the z-axis, followed by a differential translation of [0.1, 0.1, 0.3]? Find the new location of the hand. $${}^{R}T_{H} = \begin{bmatrix} 0 & 0 & 1 & 2 \\ 1 & 0 & 0 & 7 \\ 0 & 1 & 0 & 5 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$	3	3	8
		UNIT – IV			
7.		Joint 1 of the 6-axis robot is to go from initial angle of θ_i = 30° to the final angle of θ_f = 75° in 5 seconds with a cruising velocity of ω_1 = 10°/sec. Find the necessary time for blending and plot the joint positions, velocities, and accelerations.	4	3	15
		OR			
8.		Using the Lagrangian method, derive the equations of motion for the 2-DOF robot arm, as shown in Figure below. The center of mass for each link is at the center of the link. The moments of inertia are I_1 and I_2.  	4	3	15
		UNIT – V			

9.	a).	Determine the motion of the system shown below if the parameter values are $m = 1$, $b = 5$, and $k = 6$ and the block is released from rest from a position $x = -1$. 	5	3	8
	b).	Explain the concept of control law partitioning with the help of block diagram	5	3	7
		OR			
10	a).	Analyze the stability of a linear spring mass damper system using Lyapunov method	1	2	7
	b).	Develop the block diagram for model based control for nonlinear control of manipulator	1	2	8

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

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19ME4109]

IV B. Tech I Semester (R19) Regular Examinations

MECHANICAL VIBRATIONS

MECHANICAL ENGINEERING

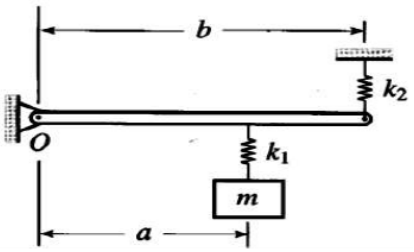
MODEL QUESTION PAPER

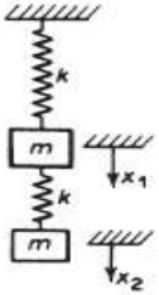
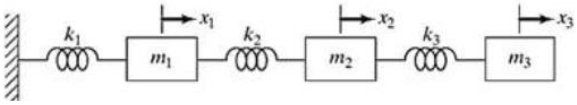
TIME: 3Hrs. **Max. Marks: 75 M**

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

All questions carry equal marks.

*****

			CO	KL	M
		UNIT – I			
1.	a).	Derive the equation of motion of spring-mass system by energy method.	1	3	8
	b).	Explain the classifications of vibration with examples	1	2	7
		OR			
2.	a).	Derive the expression of natural frequency for system given below. 	1	3	8
	b).	Enlist some advantages and disadvantages of vibrations.	1	3	7
		UNIT – II			
3.	a).	A vibrating system consists of a mass of 50 kg, a spring with a stiffness of 30 kN/m and a damper. The damping provided is only 20% of the critical value. Determine the (i) Damping factor; (ii) critical damping coefficient; (iii) natural frequency of damped vibrations (iv) logarithmic decrement	2	3	8
	b).	Explain the transmissibility and transmitted force for a spring mass damper system.	2	3	7
		OR			
4	a)	A heavy machine, weighing 3000N, is supported on a resilient foundation. The static deflection of the foundation due to weight of the machine is found to be 7.5cm. It is observed that the machine vibrates with an amplitude of 1cm when the base of the foundation is subjected to harmonic oscillation at undamped natural frequency of the system with an amplitude of 0.25 cm. Find (i) the damping constant of the foundation; (ii) the dynamic force amplitude on the base, and (iii) the amplitude of the displacement of the machine relative to base	2	3	8
	b)	Derive the expression for logarithmic decrement and give its practical importance.	2	3	7
		UNIT – III			
5.		Write the equations of motion for the system shown in, and determine its natural frequencies and mode shapes.	3	3	15

					
		OR			
6.		Explain forced vibration with harmonic excitation and undamped dynamic vibration absorber.	3	3	15
		UNIT – IV			
7.		Calculate the fundamental natural frequency of vibration of the system using any method. $m_1 = m_3 = m, m_2 = 2m \text{ and } k_1 = k, k_2 = 2k, k_3 = 3k;$ 	4	3	15
		OR			
8.		Explain the procedure adopted for Rayleigh method to determine the natural frequency of multi-degree of freedom system with a suitable example.	4	3	15
		UNIT – V			
9.	a)	The following data relate to a shaft held in long bearing. Length of shaft = 1.2m; Diameter of shaft = 14 mm; Mass of a rotor at midpoint = 16 kg; Eccentricity of center of mass of rotor from center of rotor=0.4mm; Calculate the whirling speed of the shaft.	5	3	8
	b)	What do you mean by whirling of shafts? What is whirling speed? Explain.	5	3	7
		OR			
10.		Briefly explain different types of vibration measuring instruments. Explain the working principle of seismometer in detail.	5	2	15

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 15 marks

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19ME4201]
IV B. Tech II Semester (R19) Regular Examinations
QUALITY CONTROL AND ASSURANCE
MECHANICAL ENGINEERING
MODEL QUESTION PAPER

TIME: 3Hrs. **Max. Marks: 75 M**

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

<table>
<tr><th></th><th></th><th></th><th>CO</th><th>KL</th><th>M</th></tr>
<tr><td></td><td></td><td>UNIT-I</td><td></td><td></td><td></td></tr>
<tr><td>1.</td><td>a).</td><td>What do you mean by quality, quality of conformance and quality of performance?</td><td>1</td><td>2</td><td>8</td></tr>
<tr><td></td><td>b).</td><td>What is Deming’s philosophy? Explain.</td><td>1</td><td>2</td><td>7</td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>2.</td><td>a).</td><td>Explain Quality Cost and Statistical Quality Control?</td><td>1</td><td>2</td><td>8</td></tr>
<tr><td></td><td>b).</td><td>Explain warning limits with neat diagrams?</td><td>1</td><td>2</td><td>7</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>UNIT-II</td><td></td><td></td><td></td></tr>
<tr><td>3.</td><td>a).</td><td>State the objectives of $\bar{x}$ and R</td><td>2</td><td>2</td><td>7</td></tr>
<tr><td></td><td>b).</td><td>Prepare - R charts using the following measurements of surface roughness taken of 5 rough turned pieces. On each piece 5 measurements are taken along its length. These pieces have been picked up randomly from a lot of 50.
Sample Five measurements per sample (x)
<table>
<tr><td></td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr>
<tr><td>1</td><td>10.5</td><td>10.17</td><td>10.16</td><td>10.18</td><td>10.16</td></tr>
<tr><td>2</td><td>10.17</td><td>10.19</td><td>10.14</td><td>10.11</td><td>10.17</td></tr>
<tr><td>3</td><td>10.16</td><td>10.14</td><td>10.15</td><td>10.17</td><td>10.15</td></tr>
<tr><td>4</td><td>10.19</td><td>10.18</td><td>10.17</td><td>10.15</td><td>10.16</td></tr>
<tr><td>5</td><td>10.14</td><td>10.16</td><td>10.15</td><td>10.14</td><td>10.17</td></tr>
</table>
State whether the process is under control or not</td><td>2</td><td>3</td><td>8</td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>4.</td><td>a).</td><td>What is group control chart? Explain the procedure for plotting control limits on group control chart</td><td>2</td><td>2</td><td>8</td></tr>
<tr><td></td><td>b).</td><td>An automobile part has to conform to the specification of 5.0±0.15, failing which it must be scrapped .The data gathered by the quality control department as follows :n=5 ; number of samples =20 , Σ X=100.2,Σ σ =4.8
set up the X and σ control charts. Assuming that the process is under control, what percentage of the total parts produced actually fell outside the specification limits?</td><td>2</td><td>3</td><td>7</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>UNIT-III</td><td></td><td></td><td></td></tr>
<tr><td>5.</td><td>a).</td><td>Explain defect, defective and fraction defective?</td><td>3</td><td>2</td><td>7</td></tr>
<tr><td></td><td>b).</td><td>Twenty pieces of cloth out of different rolls contained respectively 1,</td><td>3</td><td>3</td><td>8</td></tr>
</table>

		4, 3, 2, 5, 4, 6,7, 2, 3, 2, 5, 7, 6, 4, 5, 2, 1, 3 and 8 defects. Ascertain whether the process is in a state of quality control			
		OR			
6.	a).	Explain demerit control chart?	3	2	7
	b).	In the following table refers to the competition off mean and variance for 30 ideal telephone assemblies with four classes of defectives.	3	3	8

class of defectives	Weight	No of Defects
1	0.64	5
2	0.25	15
3	0.08	75
4	0.02	50

Establish is centerline, UCL,LCL on demerit control chart

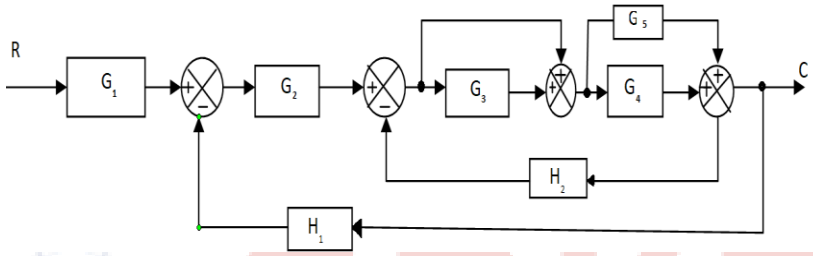
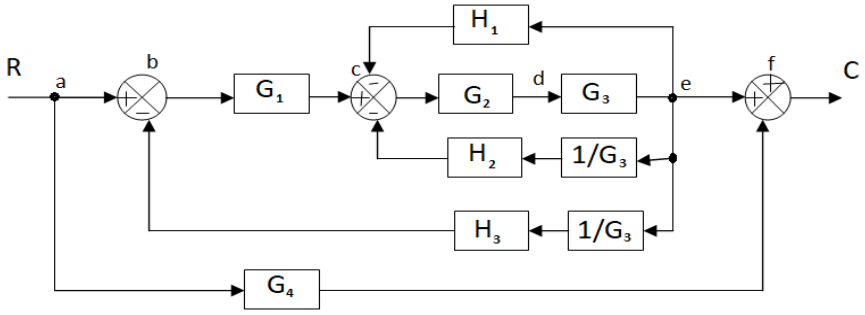
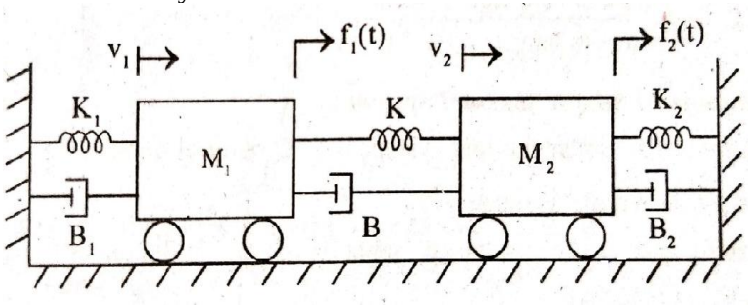
		UNIT-IV			
7.	a).	Explain process capability analysis?	4	2	7
	b).	The design specifications for a component are 100±0.5mm, whereas the process report shows that average price average is 99 .9MM and standard deviation is 0.18. Does this figure call for any action by anyone? What action is necessary and by whom?	4	3	8
		OR			
8.	a).	Explain how do you determine process capability?	4	2	7
	b).	Explain smaller the better type and larger the better type?	4	2	8
		UNIT-V			
9.	a).	Explain Single sampling plan with a neat schematic?	5	2	7
	b).	Derive the OC curve and AOQ curve of single sampling plan N=1000, n=100, C=3	5	3	8
		OR			
10.	a).	Explain Sequential sampling plan.	5	2	7
	b).	Design a single sampling by attributes plan which will meet or nearly meet the following requirements α=0.05,β=0.05,P_1=0.02,P_2=0.08	5	3	8

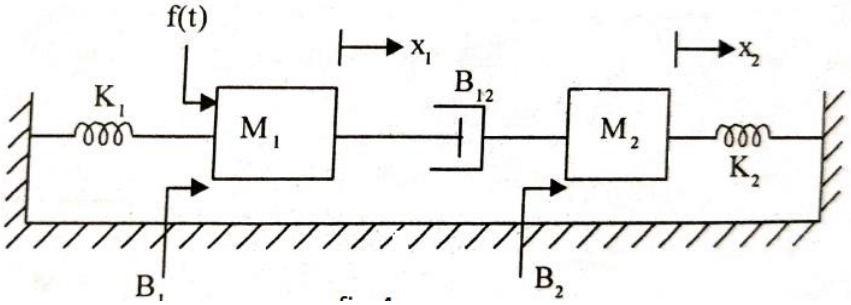
CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19ME4202]
IV B. Tech II Semester (R19) Regular Examinations
CONTROL 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
		UNIT-I			
1.	**a).**	Define control system and distinguish between open loop and closed loop systems?	**1**	**K2**	**7**
	b).	Using block diagram reduction technique determine the overall transfer function C(s)/R(s) for the system shown in Fig. 1.  Fig. 1	**1**	**K3**	**8**
		OR			
2.		Convert the block diagram shown in Fig. 2 to signal flow graph and find the transfer function of the system?  Fig. 2	**1**	**K3**	**15**
		UNIT-II			
3.		Write the differential equations governing the mechanical system shown in the Fig. 3. and draw force–voltage and force-current analogous circuit for the same mechanical system.  Fig. 3	**2**	**K3**	**15**

	OR			
4.	Determine the transfer function $X_1(s) / F(s)$ and $X_2(s) / F(s)$ for the system shown in Fig 4.  Fig. 4	**2**	**K3**	**15**
	UNIT-III			
5.	Construct three different state models for a feedback system whose closed loop transfer function is given as, $\frac{Y(s)}{U(s)} = \frac{10(s+4)}{s(s+1)(s+3)}$	**3**	**K3**	**15**
	OR			
6.	For a system represented by state equation $\dot{X}(t) = A\,X(t)$ the response is $X(t)=\begin{bmatrix} e^{-2t} \\ -2e^{-2t} \end{bmatrix}$ when $X(0) = \begin{bmatrix} 1 \\ -2 \end{bmatrix}$ and $X(t) = \begin{bmatrix} e^{-t} \\ -e^{-t} \end{bmatrix}$ when $X(0) = \begin{bmatrix} 1 \\ -1 \end{bmatrix}$ determine the system matrix A and the sate transition matrix.	**3**	**K3**	**15**
	UNIT-IV			
7.	For a unity feedback control system whose open loop transfer function is given by G(s), find (a)The position, velocity and acceleration error constants, (b)The steady state error when the input is R(s) Where $G(S) = \frac{10(s+2)}{s^2(s+1)}$ and $R(s) = \frac{3}{s} - \frac{2}{s^2} + \frac{1}{3s^3}$	**4**	**K3**	**15**
	OR			
8.	A unity feedback control system has an open loop transfer function, G(s)=10/s(s+2). Find the rise time, percentage overshoot, peak time, and settling time for a step input of 12 units.	**4**	**K3**	**15**
	UNIT-V			
9.	Determine the location of roots on the s-plane and stability of the system whose characteristic polynomial is given by, $s^7+5s^6+9s^5+9s^4+4s^3+20s^2+36s+36=0$	**5**	**K3**	**15**
	OR			
10.	Draw Nyquist plot for a system whose open loop transfer function is given below and also determine the range of K for which closed loop system is stable. $G(s)H(s) = \frac{K}{s(s+2)(s+10)}$	**5**	**K3**	**15**

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