				Course Code: B23ME3101	
SAGI RAMA RISHNAM RAJU ENGINEERING COLLEGE (A)					**R23**
III B.Tech. I Semester MODEL QUESTION PAPER					
MACHINE TOOLS AND METROLOGY					
For ME					
Time: 3 Hrs.					**Max. Mars: 70 M**
Answer Question No.1 compulsorily					
Answer **ONE Question** from **EACH UNIT**					
Assume suitable data if necessary					
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**(a)**	Illustrate the differences between the orthogonal and oblique cutting.	**1**	**2**	**2**
	(b)	List out the properties of cutting fluids.	**1**	**1**	**2**
	(c)	Summarize the operations performed on planar ?	**2**	**2**	**2**
	(d)	Identify the lathe attachments.	**2**	**1**	**2**
	(e)	List out the types of boring machines.	**3**	**1**	**2**
	(f)	Describe up milling and down milling.	**3**	**2**	**2**
	(g)	Compare lapping and honing.	**4**	**2**	**2**
	(h)	What are advantages of interchangeability?	**4**	**1**	**2**
	(i)	What are the primary advantages of using slip gauges over other measuring methods?	**5**	**1**	**2**
	(j)	State the principle of stylus and probe instrument.	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.		List the various types of chips. Use neat sketches to explain the different types of Chips.	**1**	**3**	**10**
		OR			
3.		Determine the expression for cutting forces during metal cutting using Merchant Theory.	**1**	**3**	**10**
		UNIT-2			
4.		Determine any one quick return mechanism used in shaper.	**2**	**3**	**10**
		OR			
5.		Compute the differences between shaper and planar.	**2**	**3**	**10**
		UNIT-3			
6.		Explain the following operations which are done on a drillingmachine.	**3**	**2**	**10**

		i) Drilling ii) Reaming iii) Boring.			
		OR			
7.		Demonstrate any three milling indexing methods.	**3**	**3**	**10**
		UNIT-4			
8.		Explain the types of bonds used in grinding wheel.	**4**	**2**	**10**
		OR			
9.		State and explain static performance characteristics that are to be possessed by a measuring instrument.	**4**	**3**	**10**
		UNIT-5			
10.		With the help of a neat sketch, explain, construction and working of a Tool Makers Microscope.	**5**	**3**	**10**
		OR			
11.		Write a short note on elements of surface texture, also explain the factors effecting surface texture.	**5**	**3**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

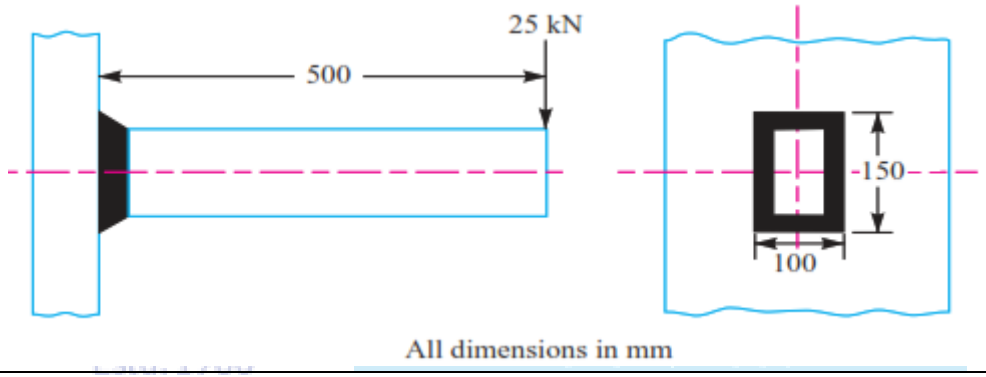
					Course Code: B23ME3102
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. I Semester MODEL QUESTION PAPER			
		FLUID MECHANICS AND HYDRAULIC MACHINES			
		For ME			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	a).	Define Specific volume and Specific gravity	1	1	2
	b).	Classify different types of manometers.	1	1	2
	c).	What do you mean by Stream Line, Path Line and Streak line?	2	1	2
	d).	Write an expression for the rate of fluid flow through Venturimeter?	2	2	2
	e).	List out different types of minor losses.	3	2	2
	f).	What do you mean by boundary layer?	3	1	2
	g).	What is the function of draft tube?	4	1	2
	h).	Write an equation for jet of fluid striking the vertical fixed flat plate?	4	2	2
	i).	What are the types of casings used in centrifugal pumps?	5	1	2
	j).	Define “slip” in reciprocating pump. Can it be negative?	5	1	2
					5 x 10 = 50 Marks
		UNIT-1			
2.		Enunciate Newton’s Law of Viscosity and Derive an expression for it.	1	3	10
		OR			
3.		A U-tube manometer is used to measure the pressure of oil of specific gravity 0.85 flowing in a pipe line. Its left end is connected to the pipe and the right-limb is open to the atmosphere. The center of the pipe is 100 mm below the level of mercury (specific gravity = 13.6) in the right limb. If the difference of mercury level in the two limbs is 160 mm, determine the absolute pressure of the oil in the pipe.	1	3	10
		UNIT-2			
4.		If for a two-dimensional potential flow, the velocity potential is given by $\phi=X(2Y-1)$. Determine the velocity at the point P (4,5). Determine the value of stream function at that point.	2	3	10
		OR			
5.		Derive Bernoulli’s equation from Euler’s equation of motion for a stream tube and discussthe assumptions underlying Bernoulli’s equation.	2	3	10

	UNIT-3			
6.	Demonstrate Hydraulic Gradient Line and Total energy line with a neat diagram.	3	3	10
	OR			
7.	Air is flowing over a flat plate 5 m long and 2.5 m wide with a velocity of 4 m/s at 15°C. If $\rho = 1.208$ kg/m^3 and $\nu = 1.47 \times 10-5$ m^2/s, calculate: (i)Length of plate over which the boundary layer is laminar, and thickness of the boundary layer (laminar), (ii) Shear stress at the location where boundary layer ceases to be laminar	3	3	10
	UNIT-4			
8.	A jet 30 mm diameter with velocity of 10 m/s strikes a vertical plate in the normal direction. Determine the force on the plate if (i) The plate is stationary (ii) If it moves with a velocity of 4 m/s towards the jet and (iii) If the plate moves away from the plate at a velocity of 4 m/s.	4	3	10
	OR			
9.	Demonstrate the constructional features and working of Pelton wheel with neat sketch.	4	3	10
	UNIT-5			
10.	Define specific speed of a centrifugal pump and derive an expression for the same.	5	3	10
	OR			
11.	A single-acting reciprocating pump, running at 50 r.p.m. delivers 0.00736 m^3/s of water. The diameter of the piston is 200 mm and stroke length 300 mm. The suction and delivery heads are 3.5 m and 11.5 m respectively. Determine: (i) Theoretical discharge, (ii) Co-efficient of discharge, (iii) Percentage slip of the pump, and (iv) Power required to run the pump	5	3	10

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3103
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. I Semester MODEL QUESTION PAPER			
		DESIGN OF MACHINE ELEMENTS			
		For ME			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Describe Machine Design	**1**	**2**	**2**
	b).	Explain Indian standard designation of Cast Irons	**1**	**2**	**2**
	c).	Explain about endurance limit	**2**	**2**	**2**
	d).	Describe notch sensitivity	**2**	**2**	**2**
	e).	List the stresses in screwed fastening due to static loading	**3**	**2**	**2**
	f).	List the disadvantages of welded joints	**3**	**2**	**2**
	g).	Classify sliding contact bearings	**4**	**2**	**2**
	h).	Describe backlash in gears	**4**	**2**	**2**
	i).	Classify shafts	**5**	**2**	**2**
	j).	Describe the purpose of shaft couplings	**5**	**2**	**2**
					5 x 10 = 50 Marks
		UNIT-1			
2.	**a).**	Explain the factors to be considered in selecting a value for factor of safety	**1**	**2**	**4**
	b).	Discuss about manufacturing considerations in Design	**1**	**3**	**6**
		OR			
3.		A mild steel shaft of 50 mm diameter is subjected to a bending moment of 2000 N-m and a torque T. If the yield point of the steel in tension is 200 MPa, find the maximum value of this torque without causing yielding of the shaft according to 1. The maximum principal stress; 2. The maximum shear stress; and 3. The maximum distortion strain energy theory of yielding.	**1**	**4**	**10**
		UNIT-2			
4.		A 50 mm diameter shaft is made from carbon steel having ultimate tensile strength of 630 MPa. It is subjected to a torque which fluctuates between 2000 N-m to – 800 N-m. Using Soderberg method, calculate the factor of safety. Assume suitable values for any other data needed.	**2**	**4**	**10**
		OR			
5.		A transmission shaft carries a pulley midway between the two bearings.	**2**	**4**	**10**

		The bending moment at the pulley varies from 200 N-m to 600 N-m, as the torsional moment in the shaft varies from 70 N-m to 200 N-m. The frequencies of variation of bending and torsional moments are equal to the speed of shaft. The shaft is made of steel FeE400 (Sut = 540 N/mm^2 and Syt =400 N/mm^2). The corrected endurance limit of the shaft is 200 N/mm^2. Determine the diameter of the shaft using a factor of safety of 2			
		UNIT-3			
6.		A steel plate subjected to a force of 5kN and fixed to a channel by means of three identical bolts is shown in Fig. The bolts are made from plain carbon steel 45C8 (Syt = 380 N/mm^2). and the factor of safety is 3. Specify the size of bolts.	**3**	**4**	**10**
		OR			
7.		A rectangular cross-section bar is welded to a support by means of fillet welds as shown in Fig. Determine the size of the welds, if the permissible shear stress in the weld is limited to 75 MPa. 	**3**	**4**	**10**
		UNIT-4			
8.		Design a journal bearing for a centrifugal pump from the following data: Load on the journal = 20 000 N; Speed of the journal = 900r.p.m.; Type of oil is SAE 10, for which the absolute viscosity at 55°C = 0.017 kg / m-s; Ambient temperature of oil = 15.5°C ; Maximum bearing pressure for the pump = 1.5 N / mm^2. Journal bearings are used in helicopters, primarily in the main rotor axis and in the landing gear for fixed wing aircraft. Calculate also the mass of the lubricating oil required for artificial cooling, if rise of temperature of oil be limited to 10°C. Heat dissipation coefficient = 1232 W/m^2/°C.	**4**	**4**	**10**
		OR			
9.		The rolling contact ball bearings are to be selected to support the overhung countershaft. The speed of the shaft is 720r.p.m. The bearings are to have 99% reliability corresponding to a life of 24000 hours. The bearing is subjected to an equivalent radial load of 1kN. Consider life adjustment factors for operating condition and material as 0.9 and 0.85 respectively. Find the basic dynamic load rating of the bearing from manufacturer's	**4**	**4**	**10**

		catalogue, specified at 90% reliability.			
		UNIT-5			
10.		A shaft is supported on bearings A and B, 800 mm between centers. A 20° straight tooth spur gear having 600 mm pitch diameter, is located 200 mm to the right of the left-hand bearing A, and a 700 mm diameter pulley is mounted 250 mm towards the left of bearing B. The gear is driven by a pinion with a downward tangential force while the pulley drives a horizontal belt having 180° angle of wrap. The pulley also serves as a flywheel and weighs 2000 N. The maximum belt tension is 3000N and the tension ratio is 3: 1. Design the shaft if the allowable shear stress of the material is 40 MPa.	**5**	**4**	**10**
		OR			
11.		Design a cast iron protective type flange coupling to transmit 15 kW at 900r.p.m. from an electric motor to a compressor. The service factor may be assumed to be 1.35. The following permissible stresses may be used: Shear stress for shaft, bolt and key material = 40 MPa Crushing stress for bolt and key= 80 MPa Shear stress for cast iron= 8 MPa	**5**	**4**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

Course Code: B23ME3104

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A) | **R23**

III B.Tech. I Semester MODEL QUESTION PAPER

OPERATIONS RESEARCH

For ME

Time: 3 Hrs. **Max. Marks: 70 M**

Answer Question No.1 compulsorily

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

Assume suitable data if necessary

10 x 2 = 20 Marks

			CO	KL	M
1.	**a**	What are the different phases of OR?	**1**	**3**	**2**
	b	Define basic solution and basic feasible solution w.r.to LPP.	**1**	**3**	**2**
	c	What is degeneracy in transportation problem?	**2**	**3**	**2**
	d	What is a travelling salesman problem?	**2**	**3**	**2**
	e	What is meant by no passing rule in job sequencing problems?	**3**	**3**	**2**
	f	Define EOQ and lead time w.r.to inventory problems.	**3**	**3**	**2**
	g	What is meant by a two person – zero sum game?	**4**	**3**	**2**
	h	What are the characteristics of a queueing system?	**4**	**3**	**2**
	i	Differentiate CPM and PERT.	**5**	**3**	**2**
	j	Define the three time estimates of an activity in PERT.	**5**	**3**	**2**
			5 x 10 = 50Marks		
		UNIT-1			
2.		Suppose an industry is manufacturing two types of products P1 and P2. The profitsper Kg of the two products are Rs.30 and Rs.40 respectively. These two productsrequireprocessinginthreetypesofmachines.Thefollowingtableshowstheavailable machine hours per day and the time required on each machine to produceone Kg of P1 and P2. Formulate the problem in the form of linear programmingmodel andsolveit byGraphicalMethod.	**1**	**3**	**10**

Profit/Kg	P1 Rs.30	P2 Rs.40	Total available Machine hours/day
Machine 1	3	2	600
Machine 2	3	5	800
Machine 3	5	6	1100

		OR			
3.		FindthesolutionofthefollowingLPP: Minimize: $Z = 4x_1 - 3x_2$ Subject to: $2x_1 + x_2 \geq 10$ $-3x_1 + 2x_2 \leq 6$ $x_1 + x_2 \geq 6$	**1**	**3**	**10**

	and $x_1, x_2 \geq 0$			
	UNIT-2			
4.	Solve the following transportation problem for minimum total cost.	**2**	**3**	**10**

		To project			Availability (Tons)
		A	B	C	
From plant	X	5	8	8	76
	Y	16	25	15	82
	Z	9	16	25	77
	Requirement (Tons)	72	102	41	--

	OR				
5.	Find the optimal assignment of salesmen to sales areas for the following cost matrix:	**2**	**3**	**10**

		Sales Area			
		A_1	A_2	A_3	A_4
Salesman	S_1	11	17	8	16
	S_2	9	7	12	10
	S_3	13	16	15	12
	S_4	14	10	12	11

	UNIT-3			
6.	Six jobs are to go over two machines M_1 and M_2 in the order M_1M_2. The order of completion of the jobs has no significance. From the data given below, find the sequence that minimizes the total time elapsed and also that minimum time.	**3**	**3**	**10**

Job		1	2	3	4	5	6
Time in hours on the machines	M_1	4	8	3	6	7	5
	M_2	6	3	7	2	8	4

	OR			
7.	A manufacturing company purchase 9000 parts of a machine for its annual requirements, ordering one month's usage at a time. Each part costs Rs. 20.	**3**	**3**	**10**

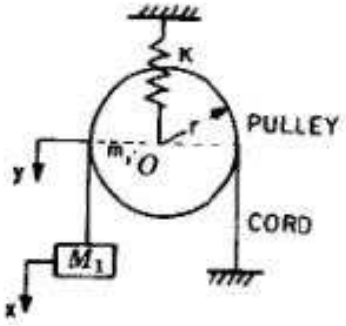
	The ordering cost per order is Rs.15 and the carrying charges are 15% of the average inventory per year. You have been assigned to suggest a more economical purchasing policy for the company. What advice would you offer and how much would it save the company per year?			
	UNIT-4			
8.	Find the best strategy for each player and the value of the game: B: 2, -2, 3 A: 1 → -5, 2; -3 → 5, -1; -5 → 2, -3	**4**	**3**	**10**
	OR			
9.	There is cashier in a store, 15 customers arrive on an average of every 10 minutes.While cashier can serve 18 customers in 10 minutes. Assuming Poisson's distribution for arrival rate and exponential distribution for service rate, Find the following a. Average queue length. b. Average number of customers in the system. c. Average time customer spends in the queue. d. Average time customer spends in the system.	**4**	**3**	**10**
	UNIT-5			
10.	The following are the time estimates and the precedence relationships of the activities in a project network: Activity: A, B, C, D, E, F, G, H, I, J, K Predecessor activity: -, -, -, A, B, B, C, E, D, F,G, H,I Time estimate (weeks): 4, 7, 3, 6, 4, 7, 6, 10, 3, 4, 2 Draw the project network diagram. Determine the critical path and the minimum project completion time.	**5**	**3**	**10**
	OR			
11.	The time estimates (in weeks) and other characteristics of a PERT project are given below.	**5**	**3**	**10**

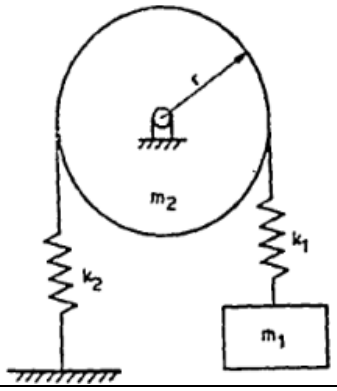
Activity	1-2	1-6	2-3	2-4	3-5	4-5	6-7	5-8	7-8
Optimistic time	3	2	6	4	8	3	3	2	8
Most likely time	6	5	12	5	11	7	9	4	16
Pessimistic time	9	8	18	6	14	11	15	6	18

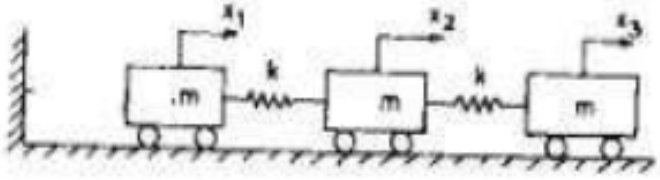
Determine (i) Critical path (ii) Expected completion time of the project

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3105
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. I Semester MODEL QUESTION PAPER			
		MECHANICAL VIBRATIONS (PE-I)			
		For ME			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Define natural frequency and degree of freedom.	**1**	**1**	**2**
	b).	Classify different types of vibrations.	**1**	**2**	**2**
	c).	Define damping ratio and logarithmic decrement.	**2**	**1**	**2**
	d).	List two practical applications of vibration isolation systems.	**2**	**2**	**2**
	e).	What is the purpose of FFT analyzers in vibration measurement?	**3**	**2**	**2**
	f).	List two factors that affect the critical speed of a shaft.	**3**	**2**	**2**
	g).	Differentiate between single and two degrees of freedom systems.	**4**	**2**	**2**
	h).	What are mode shapes in MDOF systems?	**4**	**1**	**2**
	i).	List two applications of Laplace Transforms in engineering.	**5**	**1**	**2**
	j).	What is the Laplace transform of a unit step function?	**5**	**2**	**2**
					5 x 10 =50Marks
		UNIT-1			
2.	**a).**	Derive the equation of motion of spring-mass system by energy method.	**1**	**2**	**5**
	b).	Enlist some advantages and disadvantages of vibrations.	**1**	**2**	**5**
		OR			
3.	**a).**	Find the natural frequency of system shown in figure below. The cord may be assumed inextensible.  	**1**	**3**	**10**
		UNIT-2			

4.	**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**	**10**
		OR			
5.	**a).**	Define transmissibility and derive an expression for the transmissibility ratio.	**2**	**3**	**10**
		UNIT-3			
6.	**a).**	Explain and discuss vibrometer and accelerometer devices with the help of relative amplitude ratio versus frequency ratio plot.	**3**	**3**	**10**
		OR			
7.	**a).**	A disc of mass 4 kg is mounted midway between bearings which may be assumed to be simple supports. The bearing span is 48 cm. The steel shaft which is horizontal is 9 mm in diameter. The CG of the disc is displaced 3 mm form the geometric centre. The equivalent viscous damping at the centre of the disc-shaft may be taken ad 49 N-sec/m. If the shaft rotates at 760 rpm, find the maximum stress in the shaft and compare it with dead load stress in the shaft. Also find the power required to drive the shaft at this speed.	**3**	**3**	**10**
		UNIT-4			
8.	**a).**	Determine the expression for the two natural frequencies of the system shown I figure below. The cord is inextensible and there is no slippage between the cord and the pulley. Take the mass of the pulley as m_2. 	**4**	**3**	**10**
		OR			
9.	**a).**	Three rail bogies are connected by two springs of stiffness 40×10^5 N/m each. The mass of each bogey is 20×10^3 kg. Determine the frequencies of vibration. Neglect friction between the wheels and rails.	**4**	**3**	**10**

					
		UNIT-5			
10.	**a).**	Determine the equation of motion of a mass for a simple mass, spring and damping system using Laplace method. Take m =10 kg, k=1000N/m, C=100 N-sec/m, *x(0)*=0.001m and $\dot{x}(0)$=0.10m/sec.	**5**	**3**	**10**
		OR			
11.	**a).**	Determine the Laplace transform of rectangular and half sinusoidal pulses.	**5**	**3**	**10**

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B2ME3106
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. I Semester MODEL QUESTION PAPER			
		ROBOTICS			
		For ME			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Classify robots based on coordinate systems	**1**	**1**	**2**
	b).	List the main components of an industrial robot.	**1**	**1**	**2**
	c).	Define an actuator	**2**	**1**	**2**
	d).	What are feedback components in robotics?	**2**	**1**	**2**
	e).	What is a homogeneous transformation?	**3**	**1**	**2**
	f).	Differentiate between joint coordinates and world coordinates.	**3**	**1**	**2**
	g).	Define trajectory planning in robotics	**4**	**1**	**2**
	h).	What is robot programming?	**4**	**1**	**2**
	i).	State any two functions of machine vision in robotics.	**5**	**1**	**2**
	j).	What is training in machine vision?	**5**	**1**	**2**
					5 x 10 =50Marks
		UNIT-1	**CO**	**KL**	**M**
2.	**a).**	Explain the role of Automation and Robotics in modern industries with examples.	**1**	**3**	**10**
		OR			
3.	**a).**	Classify robots based on coordinate systems with neat sketches.	**1**	**3**	**10**
		UNIT-2			
4.		Explain pneumatic actuators with neat sketches and applications.	**2**	**3**	**10**
		OR			
5.		Discuss the working principle of electric actuators and stepper motors.	**2**	**3**	**10**
		UNIT-3			
6.		Explain homogeneous transformations as applicable to rotation and translation with examples.	**3**	**3**	**10**
		OR			
7.		Explain forward kinematics of a robotic manipulator with a suitable example.	**3**	**3**	**10**

		UNIT-4			
8.		Describe methods of path planning and obstacle avoidance in robotics.	**4**	**3**	**10**
		OR			
9.		Explain robot programming and different types of robot programming languages.	**4**	**3**	**10**
		UNIT-5			
10.		Explain the concept of machine vision and its importance in robotics.	**5**	**3**	**10**
		OR			
11.		Discuss various robotic applications of machine vision in industry.	**5**	**3**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

				Course Code: B23ME3107	
SAGI RAMA RISHNAM RAJU ENGINEERING COLLEGE (A)					**R23**
III B.Tech. I Semester MODEL QUESTION PAPER					
ADDITIVE MANUFACTURING					
For ME					
Time: 3 Hrs.				**Max. Mars: 70 M**	
Answer Question No.1 compulsorily					
Answer **ONE Question** from **EACH UNIT**					
Assume suitable data if necessary					
				10 x 2 = 20 Marks	
			CO	**KL**	**M**
1.	**(a)**	Explain the principle of Additive Manufacturing.	**1**	**2**	**2**
	(b)	List the steps to create an STL file.	**1**	**1**	**2**
	(c)	List the advantages of the stereolithography process	**2**	**1**	**2**
	(d)	Explain the principle of ultrasonic additive manufacturing process	**2**	**2**	**2**
	(e)	Write the process parameters involved in the SLS process	**3**	**1**	**2**
	(f)	Explain the need of support material in additive manufacturing	**3**	**2**	**2**
	(g)	Define reverse engineering	**4**	**1**	**2**
	(h)	List the materials available for the Additive manufacturing process	**4**	**1**	**2**
	(i)	Define rapid tooling	**5**	**1**	**2**
	(j)	List the applications of Additive manufacturing in the medical	**5**	**1**	**2**
				5 x 10 = 50 Marks	
		UNIT-I	**CO**	**KL**	**M**
2.		Compare Additive Manufacturing with Conventional Machining processes.	**1**	**2**	**10**
		OR			
3.		Explain the importance of part orientation and support structure while printing	**1**	**2**	**10**
		UNIT-II			
4.		Illustrate the working and modelling process of stereolithography	**2**	**2**	**10**
		OR			
5.		Explain the process of layer bonding technology in Ultrasonic Additive manufacturing process	**2**	**2**	**10**
		UNIT-III			
6.		Explain the applications of Selective Laser Sintering (SLS) process	**3**	**2**	**10**
		OR			
7.		Explain the techniques to improve surface quality of products built	**3**	**2**	**10**

		from Additive manufacturing			
		UNIT-IV			
8.		Describe the steps involved in the reverse engineering process	**4**	**2**	**10**
		OR			
9.		Explain the various materials available for solid-based additive manufacturing process and their properties	**4**	**2**	**10**
		UNIT-V			
10.		Explain the process of RTV epoxy tooling and write its advantages	**5**	**2**	**10**
		OR			
11.		Describe the applications of additive manufacturing in the automotive industry	**5**	**2**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

				Course Code: B23ME3108	
		SAGI RAMA RISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. I Semester MODEL QUESTION PAPER			
		SENSORS AND INSTRUMENTATION			
		For ME			
Time: 3 Hrs.					**Max. Mars: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**(a)**	What are static characteristics of transducers?	**1**	**2**	**2**
	(b)	What is meant by sensor calibration?	**1**	**2**	**2**
	(c)	Compare and contrast LVDT and RVDT.	**2**	**2**	**2**
	(d)	What is the principle of operation of an optical encoder?	**2**	**2**	**2**
	(e)	Define Hall Effect and its use in sensing.	**3**	**2**	**2**
	(f)	Distinguish between magneto resistive and current sensors.	**3**	**2**	**2**
	(g)	Define smart sensors and give examples.	**4**	**2**	**2**
	(h)	What is the significance of MEMS sensors?	**4**	**2**	**2**
	(i)	Define single-channel and multi-channel DAQ.	**5**	**2**	**2**
	(j)	Why is filtering necessary in signal conditioning?	**5**	**2**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.		Discuss the classification of sensors and explain the same on performance measures.	**1**	**3**	**10**
		OR			
3.		Explain various types of calibration techniques used for sensors.	**1**	**3**	**10**
		UNIT-2			
4.		Illustrate the construction and operation of synchro and microsyn.	**2**	**3**	**10**
		OR			
5		Explain the working of various range sensors including LIDAR and ultrasonic sensors.	**2**	**3**	**10**
		UNIT-3			
6.		Explain the principle and construction of load cells.	**3**	**3**	**10**
		OR			
7.		Explain various magnetic sensors and compare their working.	**3**	**3**	**10**

		UNIT-4			
8.		Explain different temperature sensors and compare their characteristics.	**4**	**3**	**10**
		OR			
9.		What are optical sensors? Explain the different types with applications.	**4**	**3**	**10**
		UNIT-5			
10.		Discuss in detail about single and multi-channel data acquisition systems with block diagrams.	**5**	**3**	**10**
		OR			
11.		Describe the real-time applications of DAQ systems in various engineering domains.	**5**	**3**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

				Course Code: B23ME3201	
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R23**
III B.Tech. II Semester MODEL QUESTION PAPER					
HEAT TRANSFER					
For ME					
Time: 3 Hrs.				**Max. Marks: 70 M**	
Answer Question No.1 compulsorily					
Answer **ONE Question** from **EACH UNIT**					
Assume suitable data if necessary					
				10 x 2 = 20 Marks	
			CO	**KL**	**M**
1.	**a).**	What is thermal resistance	**1**	**1**	**2**
	b).	What is Fourier law of conduction	**1**	**1**	**2**
	c).	State the Effectiveness of fin	**2**	**1**	**2**
	d).	What is meant by transient heat conduction	**2**	**1**	**2**
	e).	What is dimensional analysis	**3**	**1**	**2**
	f).	What is turbulent flow	**3**	**1**	**2**
	g).	Define the term boiling	**4**	**1**	**2**
	h).	What is heat exchanger	**4**	**1**	**2**
	i).	Define the radiation heat transfer	**5**	**1**	**2**
	j).	What is radiation shield	**5**	**1**	**2**
				5 x 10 = 50 Marks	
		UNIT-1			
2.		Determine the rate of heat flow through a spherical boiler wall which is 2 m in diameter and 2 cm thick steel (k= 58 W/m K). The outside surface of boiler wall is covered with asbestos (k= 0.116 W/m K)5 mm thick. The temperature of outer surface and that of fluid inside are 50^{o}C and 300^{o}C respectively. Take inner film resistance as 0.0023 K/W.	**1**	**3**	**10**
		OR			
3.		Infer an expression for three-dimensional general heat conduction equation in Spherical Co-ordinate System for a homogeneous material.	**1**	**3**	**10**
		UNIT-2			
4.		Infer an expression for temperature distribution and heat dissipation in a short fin losing heat at the tip of rectangular profile.	**2**	**3**	**10**
		OR			
5.		A 120 mm diameter apple (ρ = 990 Kg/m^3, c = 4170 J/kg^{0}C, k = 0.58 W/m^{0}C) approximately spherical in shape is taken from a 25^{0}C environment and placed in a refrigerator where temperature is 6^{0}C and	**2**	**3**	**5**

		average convective heat transfer coefficient over the apple surface is 12.8 W/m^2 ^{0}C. Determine the temperature at the centre of the apple after a period of 2 hours			
		UNIT-3			
6.		Explain the various parameters used in free convection. Using dimensional analysis obtain an expression for Nusselt number in terms of Grasshoff number and Prandtl numbers?	**3**	**3**	**10**
		OR			
7.		Explain the development of hydrodynamic and thermal boundary layer for flow over a flat plate	**3**	**2**	**10**
		UNIT-4			
8.		Illustrate the regimes of pool boiling with a neat sketch	**4**	**3**	**10**
		OR			
9.		The flow rates of hot and cold-water streams running through a parallel flow heat exchanger are 0.2 kg/s and 0.5 kg/s respectively. The inlet tempratures on the hot and cold sides are 75^{o}C and 20^{o}C respectively. The exit temperature of hot water is 45^{o}C. If the individual heat transfer coefficients on both sides are 650 W/m^{2o}C, calculate the area of the heat exchanger.	**4**	**3**	**10**
		UNIT-5			
10.		Explain the Stefan -Boltzmann law? How is it derived from Plank's law of thermal radiation?	**5**	**2**	**10**
		OR			
11.		Assuming the sun to be a black body emitting radiation with maximum intensity at λ=0.49 μm, calculate the following: (i) The surface temperature of the sun, and (ii) The heat flux at surface of the sun.	**5**	**3**	**10**

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

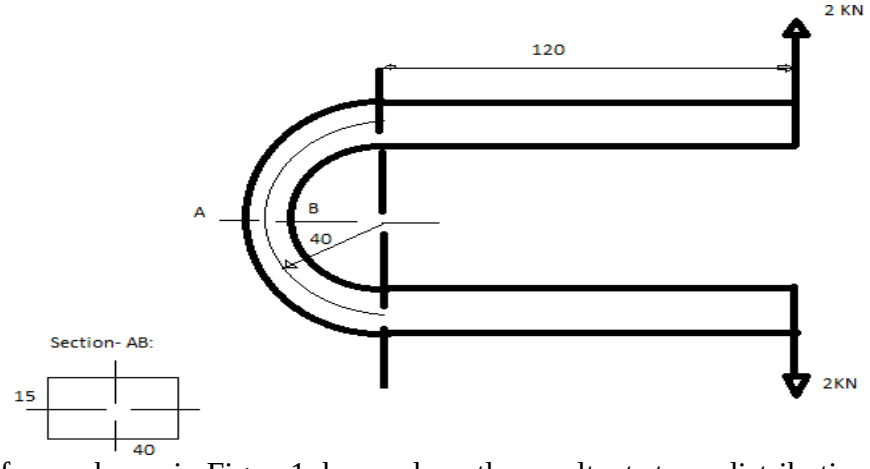
NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3202
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		INDUSTRIAL ENGINEERING AND MANAGEMENT			
		Mechanical Engineering			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	State the importance of planning in management?	**1**	**1**	**2**
	b).	Define process layout and give an example.	**1**	**1**	**2**
	c).	Write about batch production and mass production?	**2**	**1**	**2**
	d).	What is a Gantt chart used for?	**2**	**1**	**2**
	e).	Name two factors that affect productivity.	**3**	**1**	**2**
	f).	Explain the importance of work study?	**3**	**1**	**2**
	g).	Discuss the main objectives of performing the inspection	**4**	**1**	**2**
	h).	Discuss objectives of Six-Sigma.	**4**	**1**	**2**
	i).	Write about Human resource management and types.	**5**	**1**	**2**
	j).	Write about supply chain management	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-I			
2		Articulate Henry Fayol's 14 principles of management with examples.	**1**	**3**	**10**
		OR			
3		Elaborate the types of plant layouts. Compare Process Layout and Product Layout with advantages, disadvantages, and applications.	**1**	**3**	**10**
		UNIT-II			
4.		Define Production Planning and Control. Explain its functions and importance in manufacturing.	**2**	**2**	**10**
		OR			
5		Define and differentiate between Loading, Scheduling, Dispatching, and Routing.	**2**	**2**	**10**
		UNIT-III			
6.		A time study was made of an existing job to develop new time standards. The worker was observed for 30 minutes during which he made 20 units. He was rated at 90% by the analyst. The firm's allowance for rest and	**3**	**3**	**10**

<table>
<tr><td></td><td></td><td>personal time is 12%
(i) What is the normal time for the task?
(ii) What is the standard time for the task?</td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>7.</td><td></td><td>Explain the Micro Motion Study? Explain SIMO Chart and its importance.</td><td>3</td><td>2</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>UNIT-IV</td><td></td><td></td><td></td></tr>
<tr><td>8.</td><td></td><td>Draw p-chart and complete with a conclusion from the chart The below given table is a given result of inspection of 20 samples of 100 items each taken on 20 working days
<table>
<tr><td>Sample no</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td></tr>
<tr><td>No. of defectives</td><td>0</td><td>2</td><td>4</td><td>6</td><td>6</td><td>4</td><td>0</td><td>2</td><td>4</td><td>8</td></tr>
<tr><td>Sample no</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td><td>16</td><td>17</td><td>18</td><td>19</td><td>20</td></tr>
<tr><td>No. of defectives</td><td>8</td><td>0</td><td>4</td><td>6</td><td>14</td><td>0</td><td>2</td><td>6</td><td>6</td><td>2</td></tr>
</table></td><td>4</td><td>4</td><td>10</td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>9.</td><td></td><td>Explain the importance of Quality circles and its applications.What is TQM? List applications of Total Quality Management.</td><td>4</td><td>2</td><td>10</td></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td></td><td></td><td>UNIT-V</td><td></td><td></td><td></td></tr>
<tr><td>10.</td><td></td><td>Discuss the concept and objectives of HRM.How is it different from Personnel Management?</td><td>5</td><td>2</td><td>10</td></tr>
<tr><td></td><td></td><td>OR</td><td></td><td></td><td></td></tr>
<tr><td>11.</td><td></td><td>Discuss the concept of Supply Chain Management.?Explain its components and importance</td><td>5</td><td>2</td><td>10</td></tr>
</table>

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3203
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		ADVANCED SOLID MECHANICS			
		For ME			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Differentiate straight beam from curved beam subjected to uniform BM.	**1**	**1**	**2**
	b).	Derive an expression for position of neutral axis of a curved beam subjected to uniform BM.	**1**	**1**	**2**
	c).	What are the disadvantages of a fixed beam?	**2**	**1**	**2**
	d).	What is the effect of sinking of support on a fixed beam?	**2**	**1**	**2**
	e).	Define a continuous beam. Give some examples.	**3**	**1**	**2**
	f).	What are the advantages of a continuous beam?	**3**	**1**	**2**
	g).	Write the assumptions in deriving the radial and circumferential stresses induced in a thick cylinder.	**4**	**1**	**2**
	h).	What is the purpose of compounding in thick cylinders?	**4**	**1**	**2**
	i).	Find the hoop stress developed in a thin rim of a wheel of radius 400 mm, when it is rotating at a speed of 3000 rpm. Take $\rho = 8000$ kg/m^3.	**5**	**1**	**2**
	j).	What do you mean by a disc of uniform strength?	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-I			
2		Obtain an expression for constant of cross-section, h^2 of a curved bar of trapezoidal Crossection.	**1**	**3**	**10**
		OR			
3		Find maximum and minimum stresses at the most stressed section of the  frame shown in Figure1, hence draw the resultant stress distribution. **Figure 1**	**1**	**3**	**10**

		UNIT-II			
4.		Derive the relations between fixing moments of a fixed beam.	**2**	**2**	**10**
		OR			
5		A beam of span 4 m fixed at A and B carries a UDL of 1500 N/m. The support B sinks by 1mm. Find the fixed end moments and draw the BMD for the beam. Take E = 2 X 10^5 N / mm^2, I = 8000cm^4.	**2**	**2**	**10**
		UNIT-III			
6.		Derive Clapeyron's theorem of 3-moments applied to a continuous beam of uniform cross section.	**3**	**3**	**10**
		OR			
7.		A continuous beam ABCD covers three spans, AB=6m, BC=12m, CD=4m. It carries UDLs of 2 KN, 1 KN and 3 KN per meter run on AB, BC and CD respectively. If the beam is of same cross section throughout, find the bending moments at the supports B and C and the pressure on each support. Plot the BMD.	**3**	**2**	**10**
		UNIT-IV			
8.		Derive expressions for radial and hoop stresses induced in a thick cylinder subjected to internal and external pressures.	**4**	**4**	**10**
		OR			
9.		The internal and external diameters of a compound tube are 80 mm and 160 mm respectively. The diameter at the junction after shrinking is 130 mm. If the shrink fit allowance is 0.1 mm and the internal fluid pressure in the compound tube is 50 MPa, determine the shrinkage pressure at the junction.	**4**	**2**	**10**
		UNIT-V			
10.		A steel disc of uniform thickness and having diameter of 900 mm is rotating at 2400 rpm about its axis. Determine the radial and circumferential stresses at the center and at the outer surface. Draw the stress distributions. Take: ρ = 7800 kg /m^3 and μ = 0.3.	**5**	**2**	**10**
		OR			
11.		Derive an expression for thickness of a rotating disc of uniform strength.	**5**	**2**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3205
		SAGI RAMA RISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		COMPUTATIONAL FLUID DYNAMICS			
		For ME			
Time: 3 Hrs.					**Max. Mars: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**(a)**	Define finite difference method.	**1**	**1**	**2**
	(b)	What is the significance of boundary conditions in CFD problems?	**1**	**2**	**2**
	(c)	Write the central difference formula for second derivative.	**1**	**1**	**2**
	(d)	Define stability in the context of numerical schemes.	**2**	**2**	**2**
	(e)	List any two differences between incompressible and compressible flow.	**3**	**1**	**2**
	(f)	What are the advantages of finite volume method?	**4**	**1**	**2**
	(g)	What is a control volume?	**4**	**2**	**2**
	(h)	What is a shape function in FEM?	**4**	**1**	**2**
	(i)	Write two applications of solving fluid flow problems using numerical methods.	**5**	**2**	**2**
	(j)	Mention two uses of CFD in real-world engineering.	**5**	**2**	**2**
					5 x 10 = 50 Marks
		UNIT-1			
1.		Apply the central difference scheme to discretize the 1D steady-state heat conduction equation with Dirichlet boundary conditions.	**1**	**3**	**10**
		OR			
2.		Apply the forward and backward difference methods to approximate the first derivative of a function at a given point using uniform grid spacing	**1**	**3**	**10**
		UNIT-2			
3.		Apply the Crank–Nicolson method to solve a 1D unsteady heat conduction problem.	**2**	**3**	**10**
		OR			
4.		Use MacCormack's method to solve a 1D linear advection equation for one time step.	**2**	**3**	**10**
		UNIT-3			

5.		Apply the SIMPLE algorithm to compute pressure and velocity fields in a 2D incompressible flow.	**3**	**3**	**10**
		OR			
6.		Apply the Lax–Wendroff scheme to solve a 1D linear advection equation for one time step using given initial conditions and grid values.	**3**	**3**	**10**
		UNIT-4			
8.		Apply the finite volume method using the cell-centered approach to discretize and solve the 1D steady-state diffusion equation with constant thermal conductivity.	**4**	**3**	**10**
		OR			
9.		Apply the finite volume method to a 2D steady heat conduction problem in a rectangular domain. Formulate the discretized equations using a uniform grid and specify the boundary conditions.	**4**	**3**	**10**
		UNIT-5			
10.		Use the finite element method to formulate the 1D heat conduction equation using linear shape functions.	**5**	**3**	**10**
		OR			
11.		Apply Galerkin's method to derive the finite element formulation for a 1D steady-state heat conduction problem using linear elements.	**5**	**3**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3206
		SAGI RAMA RISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		ENERGY STORAGE TECHNOLOGIES			
		For ME			
Time: 3 Hrs.					**Max. Mars: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**(a)**	Define energy storage and mention any one of its primary objectives.	**1**	**1**	**2**
	(b)	Mention two reasons why thermal energy storage is important in solar applications.	**1**	**1**	**2**
	(c)	State any two applications of hydrogen-based chemical energy storage systems.	**2**	**1**	**2**
	(d)	What is a double-layer capacitor and how does it store energy?	**2**	**1**	**2**
	(e)	Differentiate between a primary battery and a secondary battery with one example each.	**3**	**2**	**2**
	(f)	Write any two limitations of lead-acid batteries in modern energy storage systems.	**3**	**1**	**2**
	(g)	State any two advantages of supercapacitors over batteries.	**4**	**1**	**2**
	(h)	Differentiate between a hybrid fuel cell-battery system and a fuel cell-supercapacitor system.	**4**	**2**	**2**
	(i)	Define thermal runaway in battery systems.	**5**	**1**	**2**
	(j)	Mention any two methods used in recycling batteries from electric vehicles.	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-1			
2.		Elucidate the energy and power balance in a storage unit in detail with a neat diagram.	**1**	**3**	**10**
		OR			
3.		Evaluate the role of organic and inorganic phase change materials in thermal energy storage systems.	**1**	**3**	**10**
		UNIT-2			
4.		Discuss the applications of chemical energy storage systems in power and transportation sectors.	**2**	**3**	**10**
		OR			
5.		Elaborate the working of superconducting magnetic energy storage system.	**2**	**3**	**10**

		UNIT-3			
6.		Illustrate the typical voltage-discharge profile for a battery cell.	**3**	**3**	**10**
		OR			
7.		Compare the performance characteristics of Li-ion, metal hydride and lead-acid batteries in electric vehicle applications.	**3**	**3**	**10**
		UNIT-4			
8.		Apply the working principle of supercapacitors to develop an energy storage solution for short-term power supply in electric vehicles.	**4**	**3**	**10**
		OR			
9.		Discuss the configuration and working of hybrid fuel cell-battery systems.	**4**	**3**	**10**
		UNIT-5			
10.		Elaborate how an advanced battery-assisted quick charger can be implemented in a public EV charging station to reduce charging time and improve efficiency.	**5**	**3**	**10**
		OR			
11.		Illustrate the methods used for estimating the State of Charge and State of Health of batteries over their lifespan.	**5**	**3**	**10**

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3208
		SAGI RAMA RISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		NON DESTRUCTIVE EVALUATION			
		For ME			
Time: 3 Hrs.					**Max. Mars: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**(a)**	Differentiate between X rays and Gamma rays.	**1**	**2**	**2**
	(b)	List out the applications of NDE in Aircraft and Aerospace Industries.	**1**	**1**	**2**
	(c)	List the main components of ultrasonic method.	**2**	**1**	**2**
	(d)	State the principle of wave propagation.	**2**	**1**	**2**
	(e)	Define the effectiveness of eddy current.	**3**	**1**	**2**
	(f)	Write the applications of liquid penetration test.	**3**	**1**	**2**
	(g)	What is magnetization of materials.	**4**	**1**	**2**
	(h)	State the principle of magnetic particle test.	**4**	**1**	**2**
	(i)	What is the significance infrared testing method.	**5**	**1**	**2**
	(j)	What is the significance of thermography testing method .	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-1	**CO**	**KL**	**M**
2.		Apply NDT methods to select suitable techniques for inspecting welded constructions in the aerospace industry.	**1**	**3**	**10**
		OR			
3.		Demonstrate about Radiographic test and Radiographic equipment	**1**	**3**	**10**
		UNIT-2			
4.	**(a)**	Determine the characteristics of ultrasonic transducers and applications of ultrasonic testing.	**2**	**3**	**10**
		OR			
5.		Demonstrate the interpretations and apply the acceptance guidelines in ultrasonic testing.	**2**	**3**	**10**
		UNIT-3			
6.		Demonstrate the steps involved in performing a fluorescent penetrant inspection (FPI).	**3**	**3**	**10**
		OR			

7.		Discuss the principle and applications of Eddy Current Testing.	**3**	**2**	**10**
		UNIT-4			
8.		Demonstrate magnetization and demagnetization procedures for materials.	**4**	**3**	**10**
		OR			
9.		Discuss the procedure of magnetic particle test in detail and also the limitation of the magnetic particle test.	**4**	**3**	**10**
		UNIT-5			
10.		Determine the active and passive techniques in detail	**5**	**3**	**10**
		OR			
11.		Compute the differences of contact vs. non-contact infrared inspection methods.	**5**	**3**	**10**

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

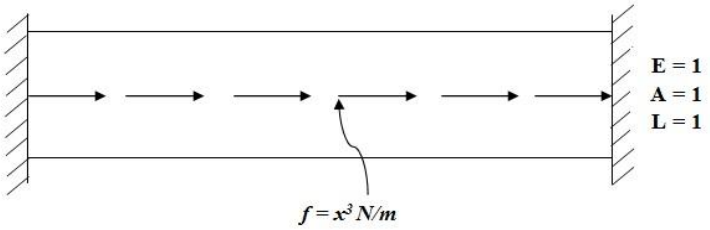
NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

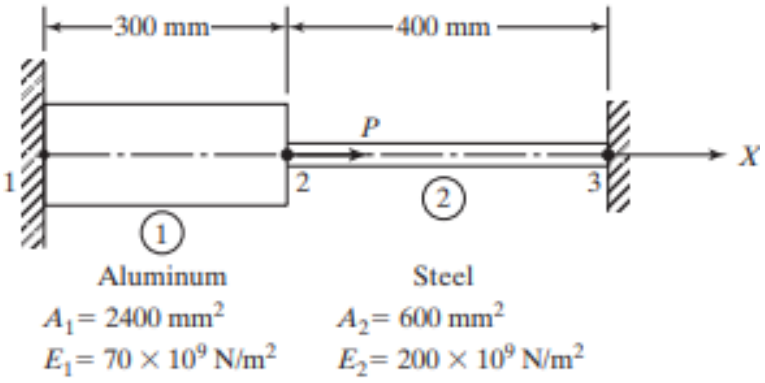
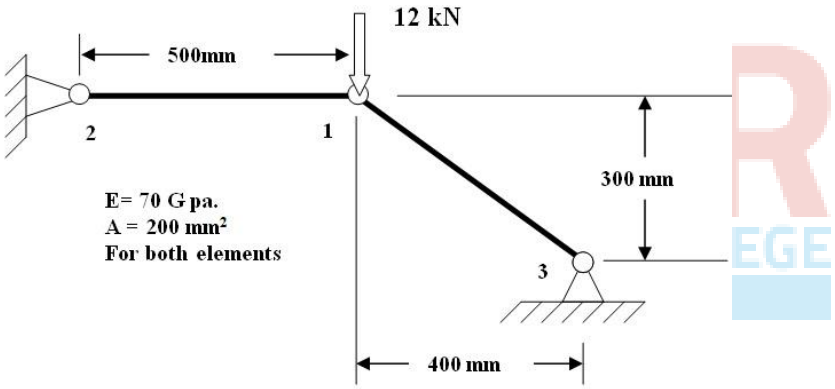
					Course Code: B23ME3209
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)					**R23**
III B.Tech. II Semester MODEL QUESTION PAPER					
RENEWABLE ENERGY TECHNOLOGIES					
For ME					
Time: 3 Hrs.					**Max. Marks: 70 M**
Answer Question No.1 compulsorily					
Answer **ONE Question** from **EACH UNIT**					
Assume suitable data if necessary					
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Why is it important to consider solar radiation on a tilted surface for solar energy applications?	**1**	**1**	**2**
	b).	Distinguish between extraterrestrial and terrestrial solar radiation.	**1**	**2**	**2**
	c).	Define the term "charging" in relation to battery operation.	**2**	**1**	**2**
	d).	Define the term "Depth of Discharge (DoD)" in batteries.	**2**	**1**	**2**
	e).	Name two types of concentrating collectors.	**3**	**1**	**2**
	f).	Define solar drying.	**3**	**1**	**2**
	g).	What is the Betz limit? Mention its theoretical value.	**4**	**1**	**2**
	h).	Define biofuel and give one example.	**4**	**1**	**2**
	i).	What is Ocean Thermal Energy Conversion (OTEC)?	**5**	**1**	**2**
	j).	Expand PEM and state its key application.	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-1			
2.		Explain the environmental impacts of solar power generation. Compare its effects with those of conventional fossil fuel sources.	**1**	**2**	**10**
		OR			
3.		Compare and contrast extraterrestrial and terrestrial solar radiation.	**1**	**2**	**10**
		UNIT-2			
4.		Compare different types of batteries used in solar PV systems, such as lead-acid, lithium-ion, and nickel-cadmium. Discuss their advantages and limitations.	**2**	**2**	**10**
		OR			
5.		Explain the factors influencing the selection of a battery for a solar PV system. Include technical, environmental, and economic considerations.	**2**	**2**	**10**
		UNIT-3			
6.		Compare flat plate collectors and concentrating collectors with respect	**3**	**2**	**10**

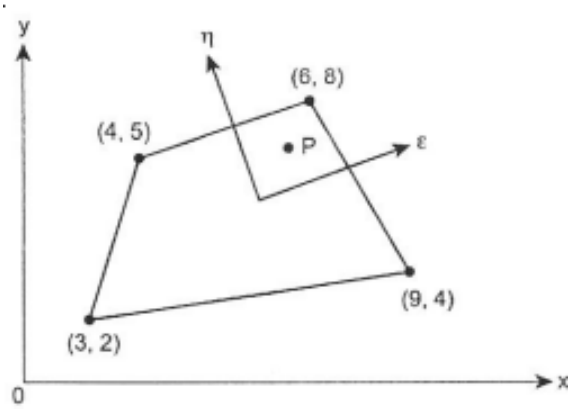
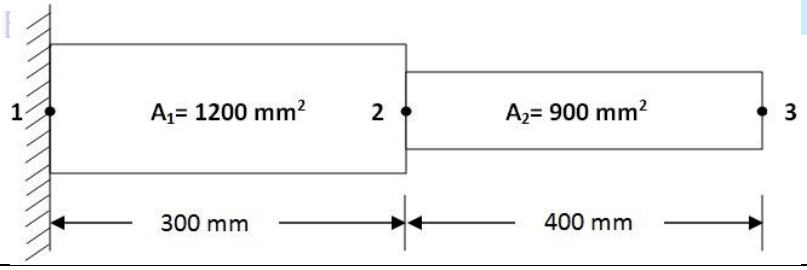
		to design, working, efficiency, and applications			
		OR			
7.		What is a solar pond? Explain its structure, working principle, and applications.	**3**	**2**	**10**
		UNIT-4			
8.		Compare horizontal axis and vertical axis wind turbines with respect to design, working principle, advantages, and limitations.	**4**	**2**	**10**
		OR			
9.		Explain the principles of biomass conversion technologies. Differentiate between anaerobic and aerobic digestion processes.	**4**	**2**	**10**
		UNIT-5			
10.		Compare the merits and demerits of geothermal energy with other renewable energy sources.	**5**	**2**	**10**
		OR			
11.		Explain the construction, working, and characteristics of Phosphoric Acid Fuel Cell (PAFC)	**5**	**2**	**10**

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

					Course Code: B23ME3210
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		FINITE ELEMENT METHODS			
		Mechanical Engineering			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	State the principle of minimum potential energy.	**1**	**2**	**2**
	b).	Differentiate between local and global coordinate systems..	**1**	**1**	**2**
	c).	What is Isoparametric formulation?	**2**	**2**	**2**
	d).	Write the properties of Shape functions.	**2**	**2**	**2**
	e).	Define truss element.	**3**	**1**	**2**
	f).	Define hermite shape functions.	**3**	**1**	**2**
	g).	Define Plane stress condition.	**4**	**1**	**2**
	h).	Write down the shape functions for four noded quadrilateral element.	**4**	**1**	**2**
	i).	List any four applications where axisymmetric elements can be used.	**5**	**2**	**2**
	j).	Define Eigen value problem.	**5**	**1**	**2**
					5 x 10 =50Marks
		UNIT-1			
2.	**a).**	A rod fixed at its ends is subjected to a varying body force ($f = x^3$) 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 u(x) and stress σ(x). Also plot variation of u(x) and σ(x) with respect to x. 	**1**	**3**	**10**
		OR			
3.	**a).**	Discuss in detail about the general procedure of FEM formulation with an example.	**1**	**2**	**5**
	b).	List the applications of Finite Element Analysis.	**1**	**2**	**5**
		UNIT-2			
4.	**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**	**3**	**10**

					
		OR			
5.	**a).**	Derive the element stiffness matrix for one dimensional Quadratic bar element	**2**	**3**	**10**
		UNIT-3			
6.	**a).**	For the two-bar truss shown in figure below, determine the displacements of node 1 and the stress in element 1-3 (Take E = 70 GPa and A = 200 mm^2 for both elements). 	**3**	**3**	**10**
		OR			
7.	**a).**	A beam of 10 m length is fixed at one end and supported by a roller atthe other end has a 20 KN concentrated load applied at the center of thespan. Calculate the deflection under the load. Assume E = 20 × 10^5 N/mm^2 and I = 2500 cm^4.	**3**	**3**	**10**
		UNIT-4			
8.	**a).**	Derive the element stiffness matrix for the three noded triangular element.	**4**	**3**	**10**
		OR			
9.	**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**	**5**

					
	b)	Evaluate the following integral using one point and two-point Gauss quadrature formulae and compare the results with exact solution. $\int_{-1}^{1}[2x^3+5x^2+6]dx$	**4**	**3**	**5**
		UNIT-5			
10.	**a).**	For the axi-symmetric element the element nodal displacements are [2, 1, 1, 1.5, 2.5, 0.5]^T. Determine the element stiffness matrix and element stresses. The coordinate position of node 1 is (30,20), node 2 is (80,20) and node 3 is (50,100). Assume E = 210×10^3 MPa and μ = 0.25. All the coordinates are in mm.	**5**	**3**	**10**
		OR			
11.	**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**	**3**	**10**

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

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks

		Course Code: B23ME3211			
		SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)			**R23**
		III B.Tech. II Semester MODEL QUESTION PAPER			
		REFRIGERATION & AIR-CONDITIONING			
		For ME			
Time: 3 Hrs.					**Max. Marks: 70 M**
		Answer Question No.1 compulsorily			
		Answer **ONE Question** from **EACH UNIT**			
		Assume suitable data if necessary Data book is allowed			
					10 x 2 = 20 Marks
			CO	**KL**	**M**
1.	**a).**	Define Ton of Refrigeration	**1**	**1**	**2**
	b).	Compare a refrigerator and a heat pump.	**1**	**2**	**2**
	c).	Show VCR cycle on T-s and P –H chart.	**2**	**1**	**2**
	d).	List the disadvantages of vapour compression refrigeration system?	**2**	**1**	**2**
	e).	List the properties of refrigerants.	**3**	**1**	**2**
	f).	What are the refrigerant and absorbent in Li-Br and water absorption system ?	**3**	**1**	**2**
	g).	List Psychometric properties of air.	**4**	**1**	**2**
	h).	What is the function of the Rectifier in an absorption system.	**4**	**1**	**2**
	i).	What are the types of Air Conditioning Systems	**5**	**1**	**2**
	j).	What is cryogenic cooling?	**5**	**1**	**2**
					5 x 10 = 50 Marks
		UNIT-1			
2.		Explain working of Bell-Coleman refrigeration system with the help of T-S diagram.	**1**	**2**	**10**
		OR			
3.		A refrigerator working on Bell – Coleman cycle operates between pressure limits of 1.05 bar and 8.5 bar. Air is drawn from the cold chamber at 10°C .Air coming out of compressor is cooled to 30°C before entering the expansion cylinder. Expansion and compression follow the law pv1.35 = constant. Determine theoretical COP.	**1**	**3**	**10**
		UNIT-2			
4.		Compute the theoretical COP of CO2 machine working between temperature range of 25°C & -5°C.The dryness fraction of CO2 gas during the suction stroke is 0.6.	**2**	**3**	**10**
		OR			
5.		Examine the effect of sub cooling and superheating on the performance	**2**	**2**	**10**

		of a vapour compression refrigeration cycle? Explain with the help of p-v and T-S diagrams			
		UNIT-3			
6.		Determine the advantages and disadvantages of Electrolux refrigerator over conventional refrigerators.	**3**	**3**	**10**
		OR			
7.		Explain the Working of Steam jet refrigeration system with a neat sketch.	**3**	**2**	**10**
		UNIT-4			
8.		Make use of Psychometric diagram ,explain i) Sensible Cooling and ii) Heating and humidification.	**4**	**3**	**10**
		OR			
9.		Explain about i) RSHF ii) GSHF	**4**	**2**	**10**
		UNIT-5			
10.		What are the different loads to be considered to estimate the total cooling load in the design of air conditioning systems? Discuss in detail each of these loads.	**5**	**2**	**10**
		OR			
11.		Discuss the advantages of using multistaging in cryogenic refrigeration over single-stage-refrigeration systems.	**5**	**2**	**10**

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

NOTE : Questions can be given as A,B splits or as a single Question for 10 marks