SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 BS 2101]
II B. Tech I Semester (R19)
MATHEMATICS – III
(MECHANICAL ENGINEERING)
MODEL QUESTION PAPER

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

Answer **ONE Question** from **EACH UNIT**
All questions carry equal marks
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	UNIT-I	**CO**	**KL**	**M**
1.a)	Determine the Fourier series for the function $f(t)=\begin{cases}-1, & -\pi<t<-\pi/2\\ 0, & -\pi/2<t<\pi/2\\ 1, & \pi/2<t<\pi\end{cases}$	CO1	K2	7
b)	Obtain Fourier series of the function f(x) = 2x – x^2 in (0, 3) and hence deduce that $\frac{1}{1^2}-\frac{1}{2^2}+\frac{1}{3^2}-\frac{1}{4^2}+\cdots-\infty=\frac{\pi}{12}$	CO1	K2	8
	(OR)			
2. a)	Obtain a Fourier series for the function f(x) given by $f(x)=\begin{cases}1+\frac{2x}{\pi}, & \text{if } -\pi\le x\le 0\\ 1-\frac{2x}{\pi}, & \text{if } 0\le x\le\pi\end{cases}$ and deduce that $\frac{1}{1^2}+\frac{1}{3^2}+\frac{1}{5^2}+\cdots=\frac{\pi^2}{8}$	CO1	K2	8
b)	Find the Half – Range cosine series for the function f(x) = x^2 in the range $0\le x\le\pi$	CO1	K2	7
	UNIT-II			
3.a)	Using the Fourier Sine Transform of e^{-ax} (a > 0), find $\int_0^\infty \frac{x\sin kx}{a^2+x^2}\,dx$	CO2	K3	7
b)	Using Fourier integral representation, show that $\int_0^\infty \frac{\omega\sin\omega x}{1+\omega^2}d\omega=\frac{\pi}{2}e^{-x},\ x>0$	CO2	K3	8
	(OR)			
4. a)	Find the inverse Fourier transform f(x) of $F_s(p)=\frac{p}{1+p^2}$	CO2	K2	7
b)	Using Parseval's Identity, prove that $\int_0^\infty \frac{x^2}{(1+x^2)^2}dx=\frac{\pi}{4}$	CO2	K3	8
	UNIT-III			
5.a)	Express $\int_0^\infty \sqrt{x}\,e^{-x^3}\,dx$ in terms of gamma function.	CO3	K2	7
b)	Express $\int_0^1 x^m(1-x^n)^p\,dx$ in terms of Gamma functions and hence evaluate $\int_0^1 x^7(1-x^5)^8\,dx$	CO3	K2	8
	(OR)			

6. a)	Apply change of order of integration and evaluate $\int_0^{\infty}\int_x^{\infty}\frac{e^{-y}}{y}dy\,dx$.	CO3	K3	8
b)	Obtain the volume of the ellipsoid $\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$	CO3	K3	7
	UNIT-IV			
7.a)	Obtain the directional derivative of $\phi = xy + yz + zx$ at A in the direction of AB where A= (1,2,-1) , B=(5,6,8) .	CO4	K2	7
b)	Determine curl (culr F) where F = x^2y I – 2 xz J + 2 yz K	CO4	K2	8
	(OR)			
8. a)	Show that the vector $(x^2 - yz)i + (y^2 - xz)j + (z^2 - xy)k$ is irrotational and find its scalar potential.	CO4	K2	8
b)	Determine the values of a and b such that the surface ax^2 –b y z = (a+2)x and 4 x^2y + z^3 =4 cut orthogonally at (1,-1, 2).	CO4	K2	7
	UNIT-V			
9.a)	Obtain the work done in moving a particle once round the circle x^2+y^2=9 in the xy- plane if $\vec{F} = (2x - y - z)i + (x + y - z^2)j + (3x - 2y + 4z)k$.	CO5	K2	7
b)	Evaluate the line integral by Stokes's theorem for the given $\bar{F}$=[y^2,x^2,z+x] and *C* is the triangle with vertices (0,0,0),(1,0,0) and (1,1,0).	CO6	K3	8
	(OR)			
10	Verify Green's theorem in the plane $\int_C [(3x^2 - 8y^2)dx + (4y - 6xy)dy]$, where C is boundary of the region defined by y = $\sqrt{x}$, y = x^2	CO6	K2	15

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

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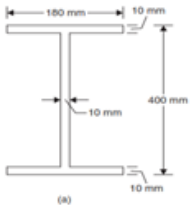
SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2101]
II B. Tech I Semester (R19) Regular Examinations
STRENGTH OF MATERIALS
Department of Mechanical Engineering
MODEL QUESTION PAPER

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

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

			CO	KL	M
		UNIT-I			
1.	**a).**	Plot a typical stress-strain curve for mild steel and explain clearly the salient points.	**1**	**K1**	**6**
	b).	A load of *4MN* is applied on a short concrete column *650×650mm*. The column is reinforced with four steel bars of 12mm diameter one in each corner. Find the stresses in the concrete and steel bars. Take $E_s=2.1\times10^5$ N/mm^2, $E_c=1.4\times10^5 N/mm^2$.	**1**	**K3**	**9**
		OR			
2.	**a).**	Define principal planes and principal stresses and also derive the expressions for them.	**1**	**K2**	**7**
	b).	Direct stresses of 40 N/mm^2 (tensile) and compressive stress 25 N/mm^2 are applied to an elastic material at a certain point on planes at right angles to one another. The maximum principal stress in the material is limited to 50 N/mm^2 (tensile). To what shearing stress may be the material is subjected on the given planes and what will be the maximum shear stress at the point?	**1**	**K3**	**8**
		UNIT-II			
3.	**a).**	Name and sketch different types of loads acting on beams	**2**	**K1**	**5**
	b).	Draw the *SF* and *BM* diagrams for a cantilever beam *2m* long, carrying a gradually varying load zero at the free end to *1500N/m* at the fixed end.	**2**	**K3**	**10**
		OR			
4.	**a).**	Derive a relationship between loading, shear force and bending moment	**2**	**K2**	**5**
	b).	A simply supported beam length *8m* rests on supports *6m* apart the right hand end is over hanging by *2m*. the beam carries *UDL* of *1500N/m* over the entire length. Draw *SFD* and *BMD* and find the points of contra flexure, if any.	**2**	**K3**	**10**
		UNIT-III			
5.	**a).**	Derive an expression for bending stress at a layer in a beam stating the assumption made.	**2**	**K2**	**7**
	b).	A circular steel pipe of external diameter 60 mm and thickness 8 mm is used as a, determine the maximum concentrated load that can be carried by it at mid span. Simply supported beam over an effective span of 2 m. If permissible stress for steel is 150 N/mm^2.	**2**	**K3**	**8**
		OR			
6.	**a).**	Prove that the maximum shear stress in a circular section of is 4/3 times the average shear stress.	**2**	**K2**	**7**
	b).	A beam has cross-section as shown in Fig. If the shear force acting on this is 25 KN, draw the shear stress distribution diagram across the depth. 	**2**	**K3**	**8**

		UNIT-IV			
7.	**a).**	Define three Elastic constants and derive relationship between them.	**1**	**K2**	**8**
	b).	A round bar *15 mm* in diameter and *150 mm* in length is tested in tension for the determination of Young's Modulus. It was observed that change in length was *30 times* the change in its diameter. Calculate the modulus of rigidity of the bar if its *E = 70 GPa*.	**1**	**K3**	**7**
		OR			
8.	**a).**	Compare the weights of equal lengths of hollow and solid hollow circular shaft s to transmit a given torque for the same maximum shear stress, if the inside diameter of the hollow circular shaft is 2/3 of the outside diameter.	**3**	**K2**	**7**
	b).	A shaft has to transmit a torque of 15 KN-m. Compare the weights of the shafts per unit length when it has a solid circular section when it is a hollow circular section with an inner diameter that is 80 percent of the outer diameter. Assume that the allowable shear stress is 70MPa.	**3**	**K3**	**8**
		UNIT-V			
9.	**a).**	Derive expressions for the hoop and longitudinal stresses in thin cylinder subjected to internal pressure.	**3**	**K2**	**7**
	b).	A hollow cylindrical drum *600 mm* in diameter has a thickness of *10 mm*. If the drum is subjected to an internal air pressure of *3 N/mm^2*, find the increase in the volume of the drum, if the length of the drum is *2 m*. Take *$E = 2x10^5 N/mm^2$*, and Poisson's ratio is *0.3*	**3**	**K3**	**8**
		OR			
10.	**a).**	State the assumption made in deriving Lame's equations	**3**	**K1**	**4**
	b).	A thick cylinder with internal diameter of *16 cm* and external diameter of *30 cm* is subjected to an internal fluid pressure of *30 MN/m^2*. Plot the variation of radial and hoop stresses in the cylinder wall. Also find the maximum shear stress in the cylinder wall.	**3**	**K3**	**11**

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2102]
II B. Tech I Semester (R19) Regular Examinations
ENGINEERING THERMODYNAMICS
MECHANICAL ENGINEERING DEPARTMENT
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** about the Vanderwall's equation of state and Equality of temperatures	**1**	**2**	**8**
	b).	**Explain** the point function, path function and thermodynamic work.	**1**	**2**	**7**
		OR			
2.	**a).**	**Explain** the Thermodynamic equilibrium and Types of thermodynamic systems	**1**	**2**	**8**
	b).	To a closed system 150 kJ of work is supplied. If the initial volume is 0.6 m3 and pressure of the system changes as p = 8 – 4V, where p is in bar and V is in m^3, **Determine** the final volume and pressure of the system	**1**	**3**	**7**
		UNIT-II			
3.	**a).**	A cylinder contains 0.45 m^3 of a gas at 1×10^5 N/m^2 and 80°C. The gas is compressed to a volume of 0.13 m^3, the final pressure being 5×10^5 N/m^2. **Analyze**: (i) The mass of gas ;(ii) The value of index 'n' for compression; (iii) The increase in internal energy of the gas; (iv) The heat received or rejected by the gas during compression. Take γ = 1.4, R = 294.2 J/kg°C.	**2**	**4**	**8**
	b).	**Infer** the expression for specific heat at constant pressure	**2**	**4**	**7**
		OR			
4.	**a).**	12 kg of air per minute is delivered by a centrifugal air compressor. The inlet and outlet conditions of air are C1 = 12 m/s, p1 = 1 bar, v1 = 0.5 m^3/kg and C2 = 90 m/s, p2 = 8 bar, v2 = 0.14 m^3/kg. The increase in enthalpy of air passing through the compressor is150 kJ/kg and heat loss to the surroundings is 700 kJ/min. **Analyze:** (i) Motor power required to drive the compressor; (ii) Ratio of inlet to outlet pipe diameter. Assume that inlet and discharge lines are at the same level.	**2**	**4**	**8**
	b).	Show the expression of Steady Flow Energy Equation (S.F.E.E.) and explain all the terms in it. **Apply** S.F.E.E for a steam nozzle, boiler and evaporator	**2**	**3**	**7**
		UNIT-III			
5.	**a).**	A reversible heat engine operates between two reservoirs at temperatures 700°C and 50°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 50°C and – 25°C. The heat transfer to the engine is 2500 kJ and the network output of the combined engine refrigerator plant is 400 kJ. (i) **Determine** the heat transfer to the refrigerant and the net heat transfer to the reservoir at 50°C ;(ii) Reconsider (i) given that the efficiency of the heat engine and the C.O.P. of the refrigerator are each 45 per cent of their	**3**	**3**	**8**

		maximum possible values.			
	b).	**Illustrate** the equivalence of Kelvin-Plank and Clausius statements	**3**	**3**	**7**
		OR			
6.	**a).**	An iron cube at a temperature of 400°C is dropped into an insulated bath containing 10 kg water at 25°C. The water finally reaches a temperature of 50°Cat steady state. Given that the specific heat of water is equal to 4186 J/kg K. **Determine** the entropy changes for the iron cube and the water. Is the process reversible? If so why?	**3**	**3**	**8**
	b).	**Explain** the Entropy–A Property of System	**3**	**2**	**7**
		UNIT-IV			
7.	**a).**	An engine with 200 mm cylinder diameter and 300 mm stroke works on theoretical Diesel cycle. The initial pressure and temperature of air used are 1 bar and 27°C.The cut-off is 8% of the stroke. **Determine:** (i) Pressures and temperatures at all salient points. (ii) Theoretical air standard efficiency. (iii) Mean effective pressure. (iv) Power of the engine if the working cycles per minute are 380. Assume that compression ratio is 15 and working fluid is air. Consider all conditions to be ideal.	**3**	**3**	**8**
	b).	**Explain** the Comparison of Otto, Diesel and Dual Combustion Cycles with help of P-V and T-S diagram based on (I) For the Same Compression Ratio and the Same Heat Input (II) For Constant Maximum Pressure and Heat Supplied	**3**	**2**	**7**
		OR			
8.	**a).**	**Infer** the expression for thermal efficiency of brayton cycle with help of P-V and T-S diagrams	**3**	**4**	**8**
	b).	A perfect gas undergoes a cycle which consists of the following processes taken in order :(a) Heat rejection at constant pressure. (b) Adiabatic compression from 1 bar and 27°C to 4 bars. (c) Heat addition at constant volume to a final pressure of 16 bar. (d) Adiabatic expansion to 1 bar. **Calculate**: (i) Work done/kg of gas. (ii) Efficiency of the cycle. Take: Cp = 0.92, Cv = 0.75.	**3**	**3**	**7**
		UNIT-V			
9.	**a).**	**Infer**the first and second Tds equations	**4**	**4**	**8**
	b).	**Explain** the expression of Helmholtz function and Gibbs function	**4**	**2**	**7**
		OR			
10.	**a).**	**Discuss** about available energy, unavailable energy, availability and irreversibility	**4**	**2**	**8**
	b).	**Infer** an expression for Availability in a Non-Flow Process	**4**	**4**	**7**

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2103]
II B. Tech I Semester (R19) Regular Examinations
MANUFACTURING PROCESSES
Department of 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 about primary and secondary manufacturing processes with examples.	1	K3	7
	b).	Explain about a pattern and discuss about pattern allowances.	1	K3	8
		OR			
2.	a).	Discuss about job and batch production with examples.	1	K3	6
	b).	Explain the properties of green sand.	1	K3	9
		UNIT-II			
3.	a).	Explain the working of Permanent die casting and mention its advantages and disadvantages	1	K3	7.5
	b).	Explain about shell moulding process with a neat sketch	1	K3	7.5
		OR			
4.	a).	Explain about hot chamber pressure die casting with neat sketch and mention its advantages and disadvantages.	1	K3	7
	b).	Elaborate the steps involved in investment casting with neat sketch.	1	K3	8
		UNIT-III			
5.	a).	Distinguish between the hot and cold working process.	2	K3	7.5
	b).	Explain about hot extrusion process with a neat sketch.	2	K3	7.5
		OR			
6.	a).	Explain about the concept of spring back and discuss about any two materials used in sheet metal forming.	3	K3	7
	b).	Discuss about the sheet metal shearing operations with a neat sketch.	3	K3	8
		UNIT-IV			
7.	a).	Distinguish between drop and press forging with a neat sketch.	3	K3	8
	b).	Explain about the high energy rate forming process.	3	K3	7
		OR			
8.	a).	Discuss about machine forging process with a neat sketch.	3	K3	8
	b).	Explain about rotary swaging process.	3	K3	7
		UNIT-V			
9.	a).	Explain the working principle of spot welding process with a neat sketch.	4	K3	7.5
	b).	Explain about the metal inert gas welding process with a neat sketch.	4	K3	7.5
		OR			
10.	a).	Distinguish about the different flames used in arc welding process.	4	K3	7.5
	b).	Explain about Tungsten inert gas welding process with a neat sketch	4	K3	7.5

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2104]
II B. Tech I Semester (R19) Regular Examinations
METALLURGY & MATERIALS SCIENCE
Mechanical Department
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 Point defects in crystals with neat sketches?	**CO1**	**K2**	**8M**
	b)	Show that the ratio of c/a ratio for an ideal H.C.P structure is 1.633	**CO1**	**K3**	**7M**
		OR			
2.	**a)**	Illustrate the steps in determining the miller indices of plane?	**CO1**	**K3**	**7M**
	b)	Explain the concept of Slip and Twinning	**CO1**	**K2**	**8M**
		UNIT-II			
3.	**a)**	Draw a neat sketch of iron-carbon diagram and explain it.	**CO2**	**K3**	**9M**
	b)	What is a solid solution? Differentiate substitution and interstitial solid solution with examples.	**CO2**	**K2**	**6M**
		OR			
4.	**a)**	What is a phase diagram? And discuss the methods of construction of phase diagrams	**CO2**	**K2**	**7M**
	b)	Explain the Annealing and Normalizing process.	**CO2**	**K2**	**8M**
		UNIT-III			
5.	**a)**	Draw isothermal transformation curves for a eutectoid steel and explain it.	**CO3**	**K3**	**8M**
	b)	Explain about Carburizing and Nitriding process.	**CO3**	**K2**	**7M**
		OR			
6.	**a)**	Explain CCT diagram for eutectoid steels.	**CO3**	**K2**	**8M**
	b)	Discuss about Flame Hardening and Induction Hardening process.	**CO3**	**K2**	**7M**
		UNIT-IV			
7.	**a)**	Explain in detail about copper and its alloys.	**CO4**	**K2**	**7M**
	b)	Explain different types of cast irons and its applications	**CO4**	**K2**	**8M**
		OR			
8.	**a)**	Discuss the composition and application of high manganese steels.	**CO4**	**K2**	**7M**
	b).	Determine various effects of alloying elements in steels.	**CO4**	**K3**	**8M**
		UNIT-V			
9.	**a).**	What is a composite material? Discuss briefly various reinforcements in composite materials.	**CO4**	**K2**	**9M**
	b).	List out the advantages, limitations and applications of particle-reinforced composites.	**CO4**	**K1**	**6M**
		OR			
10.	**a).**	List out various advantages and limitations of Powder Metallurgy.	**CO4**	**K1**	**7M**
	b).	Discuss the basic steps involved in Powder Metallurgy.	**CO4**	**K2**	**8M**

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2105]
II B. Tech I Semester (R19) Regular Examinations
MECHANICAL ENGINEERING DRAWING
DEPARTMENT OF MECHANICAL ENGINEERING
MODEL QUESTION PAPER

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

Answer all questions
Tolerance Tables are permitted
Assume any missing data wherever it is necessary
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1. Answer the following questions [**20** M]
(a) Profiles of SQUARE and WITHWORTH thread for 40mm pitch. [5 M]
(b) Single riveted butt joint using a 20 mm diameter rivet. [5 M]
(c) Show the conventional representation of the following (i) metals; (ii)bearings; (iii) splined shaft; (iv) Spur gear; (v) straight knurling. [5 M]
(d) Sketch one example with an appropriate tolerance frame showing features for **flatness** and **cylindricity.** [5 M]

2. Indicate the tolerances and allowances for a hole shaft pair shown in bushed bearing assembly designated by Ø 45 H8 d7 and also determine the type of fit. [**10** M]

3. Two rods of 20 mm diameter each are to be coupled together to enable them to transmit power from one shaft to another shaft such that the axis of two shafts lie in the same line. Suggest the type of coupling to be used to transmit power and draw its half sectional front view and its simple side view. [**10** M]

4. Prepare the working (or) productions drawing (with necessary tolerances, roughness symbols and tolerance frames) for the shaft assembly shown in Fig.1. [**15** M]

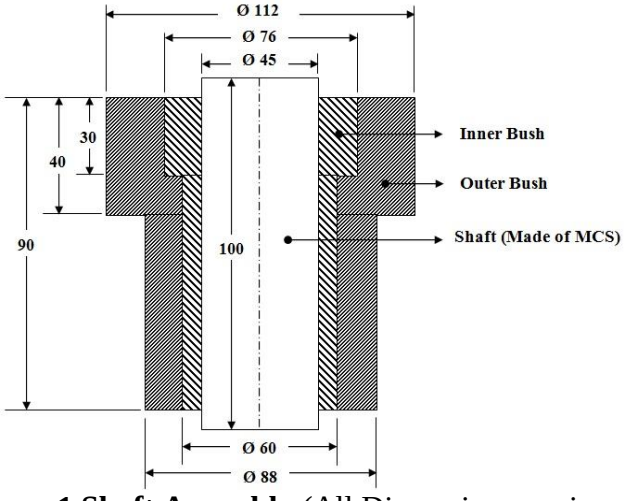
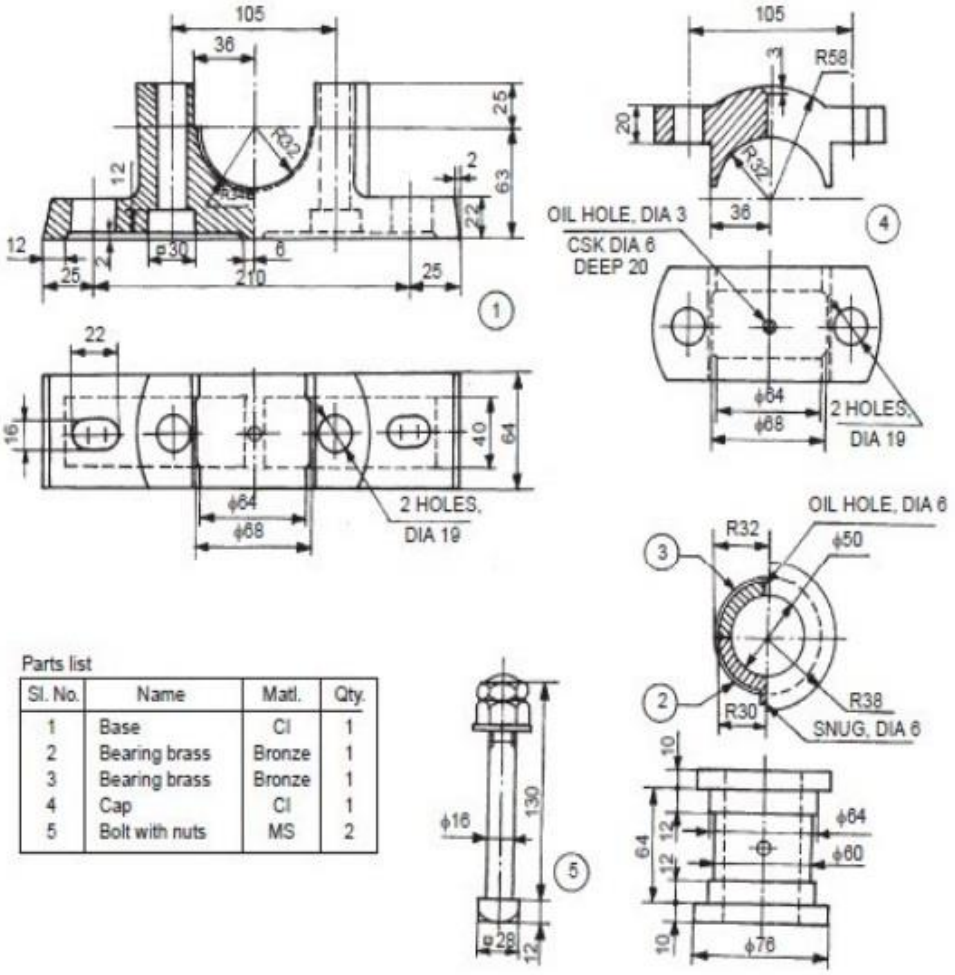


Figure 1 Shaft Assembly (All Dimensions are in mm)

5. Draw the following views for the plumber block assembly shown in Figure 2. [20 M]
(i) Half sectional front view; (ii) simple side view



Parts list

Sl. No.	Name	Matl.	Qty.
1	Base	CI	1
2	Bearing brass	Bronze	1
3	Bearing brass	Bronze	1
4	Cap	CI	1
5	Bolt with nuts	MS	2

Figure 2. Parts of Plumber Block

[B19 BS 2201]

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

II B. Tech II Semester (R19)

MATHEMATICS – IV

(MECHANICAL ENGINEERING)

MODEL QUESTION PAPER

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

Answer **ALL Questions.** All questions carry equal marks.

Q. No.		Question	CO	KL	M
1	A	Determine p such that the function $f(z) = \frac{1}{2} log_e(x^2 + y^2) + i\ tan^{-1}(\frac{px}{y})$ will be an analytic function.	CO1	K3	7
	B	In an electro static field, if the potential function is $\emptyset = 3x^2y - y^3$, then determine the flux function and the complex potential function.	CO1	K3	8
OR					
2	A	If $f(z) = u + iv$ is an analytic function of $z = x + iy$, establish that $\{\frac{\partial \lvert f(z)\rvert}{\partial x}\}^2 + \{\frac{\partial \lvert f(z)\rvert}{\partial y}\}^2 = \lvert f'(z)\rvert^2$.	CO1	K3	7
	B	Determine the bilinear transformation which maps the points z = 1, i,-1 into the points w = 0, 1, ∞ respectively. Determine also the fixed points of the transformation.	CO1	K3	8
3	A	Evaluate $\oint_C \frac{z^3-2z+1}{(z-i)^2} dz$ where C is |z| =1, using Cauchy integral formula.	CO2	K3	7
	B	Develop the function f(z) = $\frac{4z+3}{z(z-3)(z-2)}$ as Laurent series (i) (i) in |z| =1 and (ii) in the annular region 1 < |z| < 3.	CO2	K3	8
OR					
4	A	Determine the residues of $f(z) = \frac{z^3}{(z-1)^4(z-2)(z-3)}$ at its poles and hence evaluate $\oint_C f(z)dz$, where C is the circle |z| = 2.5	CO2	K3	7
	B	Apply the calculus of Residues to evaluate $\int_0^{2\pi} \frac{d\theta}{5-3\cos\theta}$.	CO2	K3	8
5	A	Determine the difference equation generated by $y_n = (A + Bn)3^n$.	CO3	K3	7
	B	Solve the difference equation $y_{n+2} + y_{n+1} - 56y_n = 2^n(n^2 - 3)$.	CO3	K3	8
OR					
6	A	Given $Z\{u_n\} = \frac{z}{z-1} + \frac{z}{z^2+1}$ determine the Z-transform of u_{n+2}.	CO4	K3	7
	B	Utilize Z-transforms to solve $u_{n+2} - 2u_{n+1} + u_n = 3n + 5$.	CO4	K3	8
7	A	If X is the random variable of a Poisson distribution such that the probability for X = 2 is two-thirds of the probability for X = 1. Determine the probability for X = 0 and the probability for X = 3. What is the probability for X > 3.	CO5	K3	7
	B	The average and S.D. of the marks obtained by 500 students in a examination are respectively 40% and 10%. Assuming the normality of the distribution, determine approximately (i)how many will pass if 50% is fixed as minimum,	CO5	K3	8

<table>
<tr><td></td><td></td><td>(ii)what should be the minimum mark if 350 students have to pass and (iii)how many have scored marks above 60%?</td><td></td><td></td><td></td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">8</td><td>A</td><td>Derive moment generating function of Poisson distribution.</td><td>CO5</td><td>K3</td><td>7</td></tr>
<tr><td>B</td><td>In a Normal distribution, 31% of the items are under 45 and 8% are over 64. Determine the mean and standard deviation of the distribution.</td><td>CO5</td><td>K3</td><td>8</td></tr>
<tr><td rowspan="2">9</td><td>A</td><td>A sample of 100 electric bulbs produced by manufacturer A showed a mean life time of 1190 hours with a standard deviation of 90 hours. A sample of 75 bulbs produced by manufacturer B showed a mean life of 1230 hours with a standard deviation of 120 hours. Determine whether there is significant difference between the mean life time of the two brands at a level of significance of 0.05</td><td>CO6</td><td>K3</td><td>7</td></tr>
<tr><td>B</td><td>A sample of 1000 days is taken from meteorological records of a certain district and 120 of them are found to be foggy. Determine the probable limits for the percentage of foggy days in the district.</td><td>CO6</td><td>K3</td><td>8</td></tr>
<tr><td colspan="6">OR</td></tr>
<tr><td rowspan="2">10</td><td>A</td><td>A machine is supposed to produce washers of mean thickness 0.12cm. But the mean thickenss of a random sample of 10 washers produced by the machine was found to be 0.128cm with a standard deviation of 0.008cm. Determine whether the machine is working properly at 5% level of significance.</td><td>CO6</td><td>K3</td><td>7</td></tr>
<tr><td>B</td><td>The number of aircraft accidents that occurred during the various days of the week is given below:
<table>
<tr><td>Day:</td><td>Sun</td><td>Mon</td><td>Tue</td><td>Wed</td><td>Thu</td><td>Fri</td><td>Sat</td></tr>
<tr><td>No. of accidents</td><td>14</td><td>16</td><td>8</td><td>12</td><td>11</td><td>9</td><td>14</td></tr>
</table>
Determine whether the accidents are uniformly distributed over the week.</td><td>CO6</td><td>K3</td><td>8</td></tr>
</table>

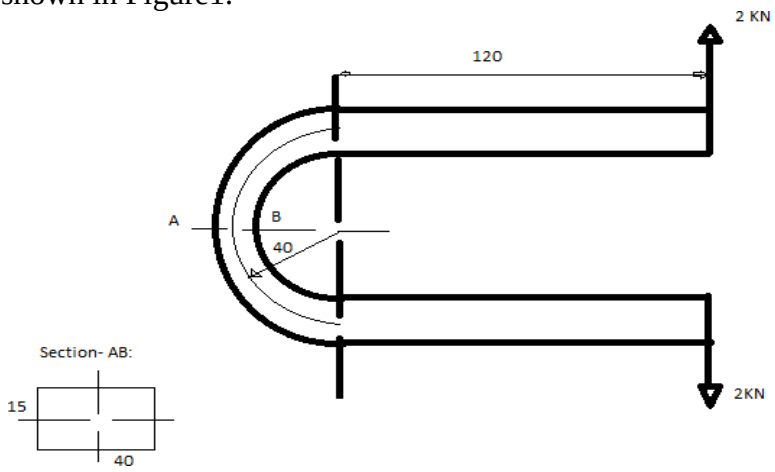
CO-COURSE OUTCOME **KL-KNOWLEDGE LEVEL** **M-MARKS**

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2201]
II B. Tech II Semester (R19) Regular Examinations
ADVANCED STRENGTH OF MATERIALS
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 relation between curvature, slope and deflection of a beam subjected to lateral loading.	CO1	K2	7M
	b).	A simply supported beam of span '*l*' and of uniform flexural rigidity 'EI' carries a UDL of intensity '*w'* covering exactly the left half of the span. Find: i. Equation of elastic curve. ii. Slope at left support. iii. Maximum deflection.	CO1	K3	8M
		OR			
2.		Use moment area method to determine end slopes and central deflection of a simply supported beam of length '*l'* loaded with two equal point loads, each of magnitude 'W' acting at distances of '*l /3'* from each support. Take the flexural rigidity for the beam as EI.	CO1	K3	15M
		UNIT-II			
3.	a).	Derive the relations between fixing moments of a fixed beam.	CO2	K2	7M
	b).	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.	CO2	K3	8M
		OR			
4.		Draw BMD and SFD for a fixed beam of length 4 m and subjected to a UDL of 3 KN /m run throughout its length and a concentrated load of 10 KN at its mid span. Locate the points of contra flexure, if any.	CO2	K3	15M
		UNIT-III			
5.	a).	What are the advantages, disadvantages and applications of continuous beams?	CO2	K1	6M
	b).	Derive Clapeyron's theorem of 3 moments applied to a continuous beam of uniform cross section.	CO2	K2	9M
		OR			
6.		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 and SFD.	CO2	K3	15M
		UNIT-IV			
7.	a).	Derive Euler's buckling load formula for a column having both ends fixed.	CO3	K2	7M
	b).	Determine the crippling loads for a T–section of dimensions 10cm×10cm×2cm and length 5 m, when it is used as a strut with both	CO3	K3	8M

		ends fixed. Take E = 2 X 10^5 N/mm^2.			
		OR			
8.	a).	Derive Secant formula applicable to a column subjected to eccentric load.	CO3	K2	7M
	b).	A hollow cylindrical C.I. column is 4m long with both ends fixed. Determine the internal diameter of the column if it has to carry a safe load of 250 KN with a factor of safety of 5. Take the ID as 0.8 times the E.D, σ_c= 550 N / mm^2 and α = 1/1600 in Rankine's formula.	CO3	K4	8M
		UNIT-V			
9.		Obtain an expression for circumferential stress induced in a curved bar subjected to uniform bending moment.	CO4	K2	15M
		OR			
10.	a).	Obtain an expression for modified area of cross section (h^2) of a curved bar of trapezoidal cross section.	CO4	K2	6M
	b).	Find maximum and minimum stresses at the most stressed section of the frame shown in Figure1.  Figure 1	CO4	K3	9M

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)

[B19 ME 2202]

II B. Tech II Semester (R19) Regular Examinations

APPLIED THERMAL ENGINEERING

(Use of steam tables and Mollier chart is allowed)

MECHANICAL ENGINEERING DEPARTMENT

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).**	Two boilers one with super heater and other without super heater are delivering equal quantities of steam into a common main. The pressure in the boilers and main is20 bar. The temperature of steam from a boiler with a super heater is 350°C and temperature of the steam in the main is 250°C.**Determine** the quality of steam supplied by the other boiler. Take Cps = 2.25 kJ/kg.	**1**	**3**	**8**
	b).	**Explain** the Formation of Steam with help of neat sketch	**1**	**2**	**7**
		OR			
2.	**a).**	Steam at a pressure 15 bar and 0.95 dry is generated in a boiler and is made to pass through its super heater where additional quantity of heat is supplied to heat at constant pressure consequently the temperature of steam increases to 350°C and **Determine** (i) heat supplied in the super heater (ii) change in internal energy .Use mollier Diagram	**1**	**3**	**8**
	b).	**Illustrate** the separating throttling calorimeter with help of neat sketch and derive formula for dryness fraction	**1**	**3**	**7**
		UNIT-II			
3.	**a).**	In a steam turbine Steam at 20 bar & 350^0C is expanded to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into the boiler. Assume ideal processes, **calculate** per kg of steam the network and the cycle efficiency	**2**	**3**	**8**
	b).	**Illustrate** the working of steam power plant with Binary vapour power cycle. Infer the expression for its thermal efficiency and work ratio.	**2**	**4**	**7**
		OR			
4.	**a).**	In a single-heater regenerative cycle the steam enters the turbine at 30 bar, 400°C and the exhaust pressure is 0.10 bar. The feed water heater is a direct contact type which operates at 5 bar. **Determine**:(i) The efficiency and the steam rate of the cycle	**2**	**3**	**8**
	b).	**Illustrate** the working of steam power plant with reheat cycle. Derive the expression for its thermal efficiency and work ratio.	**2**	**4**	**7**
		UNIT-III			
5.	**a).**	**Infer** an expression for critical pressure ratio and maximum mass flow rate	**3**	**4**	**8**
	b).	**Calculate** the required cross section area at the out let of nozzle to pass 0.545 kg/sec of the steam expanding without losses from 14bar dry saturated to 9 bar according to the law pv1.3=constant if i). the speed at the inlet is negligible ii) the velocity of approach is 152.5m/s	**3**	**3**	**7**
		OR			
6.	**a).**	Steam expands isentropic ally from the state of 8 bar & 250^0C to 1.5	**3**	**3**	**8**

		bar in a C-D nozzle .The steam flow rate is 0.75 kg/sec **Calculate** the exit velocity of steam & exit area of nozzle if (i) no frictional losses prevails (ii) frictional losses account 8% of the total enthalpy drop in divergent portion only			
	b).	**Illustrate** the Super saturated flow of steam in nozzles with help of h-s diagram	**3**	**4**	**7**
		UNIT-IV			
7.	**a).**	The rotor of an impulse turbine of 60cm diameter runs at 9600 rpm. The nozzle is set at $20^0$and the steam leaves them at 600m/s the blade outlet angle is $30^0$and the friction factor for the blade is 0.8. **Calculate** the power developed per kg of steam per second and the diagram efficiency	**3**	**3**	**8**
	b).	What is compounding of steam turbine? **Discuss** various methods of compounding steam turbines	**3**	**2**	**7**
		OR			
8.	**a).**	Steam with absolute velocity of 300 m/sec is supplied through a single stage impulse turbine the nozzle angle is 25^0 the mean diameter of blade rotor is 1 m and it has a speed of 2000 rpm find suitable blade angles, for zero axial thrust with velocity coefficient 0.9 and steam flow rate is 10 kg/sec **Calculate** power developed	**3**	**3**	**8**
	b).	**Infer** the conditions for maximum efficiency of a reaction turbine	**3**	**4**	**7**
		UNIT-V			
9.	**a).**	**Explain** the working of high-level jet condenser and Ejector condenser with help a neat sketch	**4**	**2**	**8**
	b).	A Condenser of a steam power plant has a vacuum of 65cm of Hg, when barometer reads 75cm. The condensing steam has a temperature of 45^0C and dryness fraction is 0.9. **Calculate** the amount of air to be handled by air pump per min. if the rate of condensation is 2000kg/hr.	**4**	**3**	**7**
		OR			
10.	**a).**	**Illustrate** the working of Lancashire Boiler with help of a neat sketch	**4**	**3**	**8**
	b).	A boiler evaporates 3.6 kg of water per kg of coal into dry saturated steam at10bar.The temperature of feed water is 32^0C.**Determine** the equivalent evaporation "from and at 100^0C"as well as the factor of evaporation	**4**	**3**	**7**

CO-COURSE OUTCOME KL-KNOWLEDGE LEVEL M-MARKS

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2203]
II B. Tech II Semester (R19) Regular Examinations
METAL CUTTING AND MACHINE TOOLS
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).	Distinguish between the orthogonal and oblique cutting with a neat sketch.	1	K3	5
	b).	Derive expression for cutting forces during metal cutting by using Merchant Theory.	1	K3	10
		OR			
2.	a).	Sketch out the single point cutting tool nomenclature.	1	K3	5
	b).	Discuss about the factors affecting the tool life and mention the tool wear mechanisms.	1	K3	10
		UNIT-II			
3.	a).	Discuss about the specifications of a lathe machine with neat sketch.	2	K3	5
	b).	Explain about the swiveling the compound rest method and tail stock set over method in taper turning on lathe machine.	2	K3	10
		OR			
4.	a).	Elaborate about the crank and slotted link mechanism in shaper machine.	2	K3	8
	b).	Explain about the jig boring with a neat sketch.	2	K3	7
		UNIT-III			
5.	a).	Discuss about the parts and functioning of radial arm drilling machine with a neat sketch.	3	K3	7
	b).	Distinguish between plain, universal and omniversal milling machine.	3	K3	8
		OR			
6.	a).	Explain about the up milling and down milling process with a neat sketch.	3	K3	8
	b).	Explain about the broach tool nomenclature with a neat sketch.	3	K3	7
		UNIT-IV			
7.	a).	Elaborate about the grit grade and structure of the grinding wheel.	3	K3	7
	b).	Explain about the lapping and honing operations.	3	K3	8
		OR			
8.	a).	Explain about the working of vertical grinding machine.	3	K3	7
	b).	Explain the glazing and loading of grinding wheel.	3	K3	8
		UNIT-V			
9.	a).	Elaborate the process of AJM with a neat sketch and mention its advantages and disadvantages.	4	K3	8
	b).	Explain the process of USM with a neat sketch and mention its advantages and disadvantages.	4	K3	7
		OR			
10.	a).	Discuss the process of EBM with a neat sketch and mention its advantages and disadvantages.	4	K3	7
	b).	Explain the wire cut EDM process with a neat sketch and mention its	4	K3	8

		advantages and disadvantages.			

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 ME 2204]
II B. Tech II Semester (R19) Regular Examinations
FLUID MECHANICS
MODEL QUESTION PAPER

Time: 3Hrs. **Max. Marks: 75**

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

			CO	KL	M
		UNIT-I			
1.	a)	Define Hydrostatic law and Derive expression for pressure variation in a static fluid.	1	1	7
	b)	The dynamic viscosity of an oil which is used for lubrication between shaft and sleeve is 6poise. If the shaft is of diameter 0.4m and rotates at 190 rpm, calculate the power lost in the bearing for a sleeve length of 90mm. The thickness of the oil film is 1.5mm.	1	1	8
		OR			
2.	a)	Derive an equation for total pressure and centre of pressure on vertical plane surface.	1	1	7
	b)	A uniform body of size 4 m long, 2 m wide, 1 m deep floats in water. What is the weight of the body if depth of immersion is 0.6 m? Determine the meta centric height also.	1	1	8
		UNIT-II			
3.	a)	Derive 3D- continuity equation in Cartesian co-ordinate system.	2	2	7
	b)	If for two-dimensional potential flow the velocity potential is given by $\phi = x(2y-1)$. Determine the magnitude of the resultant velocity, direction of the resultant velocity also determine the value of stream function Ψ at (4,5).	2	3	8
		OR			
4.	a)	Derive Bernoulli's Equation from Euler's Equation for incompressible flow.	2	3	7
	b)	An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30cm diameter. The pressure difference measured by a mercury oil differential manometer on the two sides of the orifice meter gives a reading of 50cm of mercury. Find the rate of flow of oil of sp.gr. 0.9 when the co-efficient of discharge of the orifice meter = 0.64.	2	3	8
		UNIT-III			
5.	a)	Derive Darcy Weis-bach equation for head loss due to friction in pipes.	3	4	7
	b)	Two pipes of lengths 2500 m each and diameters 80 cm and 60 cm respectively, are connected in parallel. The co-efficient of friction for each pipe is 0.006. The total flow is equal to 250 litres/sec. Find the rate of flow in each pipe.	3	4	8
		OR			
6.	a)	Write short notes on model laws.	3	4	7
	b)	The efficiency η of a fan depends on density ρ, dynamic viscosity μ of the	3	4	8

		fluid, angular velocity ω, diameter D of the rotor and the discharge Q. Express η in terms of dimensionless parameters.			
UNIT-IV					
7.	a)	Derive an expression for displacement thickness and momentum thickness.	4	4	7
	b)	Determine the displacement thickness, momentum thickness and energy thickness for velocity distribution in the boundary layer is given by $\frac{u}{U} = \frac{y}{\delta}$	4	4	8
OR					
8.	a)	Derive an Equation for drag force along the flat plate due to boundary layer formation.	4	4	7
	b)	A plate 450mm×150mm has been placed longitudinally in a stream of crude oil of specific gravity 0.925 and kinematic viscosity 0.9 stokes which flows with a velocity of 6 m/s. Calculate (i) The frictional drag on the plate and (ii) The thickness of the boundary layer at the trailing edge.	4	4	8
UNIT-V					
9.	a)	Derive an expression for velocity of sound for an adiabatic Process.	5	4	7
	b)	An aeroplane is flying at a height of 14 km where temperature is -45^{o}c the speed of the plane is corresponding to M=2 find the speed of the plane if R=287J/kg K and γ=1.4.	5	4	8
OR					
10.	a)	Derive an expression for area velocity relationship for compressible flow.	5	4	7
	b)	Find the Mach number when an aeroplane is flying at 900 km/hour through still air having a pressure of 8 N/cm^2 and temperature -15^{0}C. Take k=1.4 and R=287 J/kg K. Calculate the pressure, temperature and density of air at the stagnation point on the nose of the plane.	5	4	8

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

SAGI RAMA KRISHNAM RAJU ENGINEERING COLLEGE (A)
[B19 HS 2202]
II B. Tech II Semester (R19) Regular Examinations
MANAGERIAL ECONOMICS AND FINANCIAL ACCOUNTANCY
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.	Define Economics. Explain in detail about Micro and Macro Economics	**CO1**	**K2**	**15**
	OR			
2.	What do you understand by Elasticity of demand? How do you measure Elasticity of Demand?	**CO1**	**K4**	**15**
	UNIT-II			
3.	Define &classify Cost. Elaborate the Elements of Cost?	**CO2**	**K2**	**15**
	OR			
4.	How do you determine BEP? What are its Assumptions and Applications?	**CO2**	**K3**	**15**
	UNIT-III			
5.	What are the features of Perfect Competition? How the price will be determined under Perfect Competition?	**CO3**	**K2**	**15**
	OR			
6.	Why is pricing significant in the context of business? Evaluate any four pricing strategies?	**CO3**	**K1**	**15**
	UNIT-IV			
7.	What are features of Mixed Economy? Critically evaluate its Merits &Demerits.	**CO4**	**K1**	**15**
	OR			
8.	What do you mean by Business Cycles? Explain about various theories of Business cycles?	**CO4**	**K2**	**15**
	UNIT-V			
9.	Explain about the concept and causes of depreciation. Evaluate the straight line method and diminishing balance methods.	**CO5**	**K2**	**15**
	OR			
10.	Explain about Trading Account, Profit & Loss account and Balance Sheet.	**CO5**	**K3**	**15**

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