Hall Ticket Number :										

R-20

Code: 20A333T

II B.Tech. I Semester Supplementary Examinations June 2024

Basic Thermodynamics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. In Part-A, each question carries **Two marks.**

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	What are the different types of thermodynamic systems?	1	L1
b)	What is PMM II?	2	L1
c)	When do you go for separating and throttling calorimeter?	3	L2
d)	State the Dalton's law of partial pressures.	4	L1
e)	Define mean effective pressure.	5	L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT-I			
2.	a)	What are the causes of irreversibility?	6M	1	L2
	b)	During one cycle the working fluid in an engine engages in two work interactions: 15 kJ to the fluid and 44 kJ from the fluid, and three heat interactions, two of which are known: 75 kJ to the fluid and 40 kJ from the fluid. Evaluate the magnitude and direction of the third heat transfer.	6M	1	L3
		OR			
3.		A nozzle is a device for increasing the velocity of a steadily flowing stream. At the inlet to a certain nozzle, the enthalpy of the fluid passing is 3000 kJ/kg and the velocity is 60 m/s. At the discharge end, the enthalpy is 2762 kJ/kg. The nozzle is horizontal and there is negligible heat loss from it. (a) Find the velocity at exict from the nozzle. (b) If the inlet area is 0.1 m^2 and the specific volume at inlet is 0.187 m^3/kg, find the mass flow rate. (c) If the specific volume at the nozzle exit is 0.498 m^3/kg, find the exit area of the nozzle.	12M	1	L4
		UNIT-II			
4.		Establish the equivalence of Kelvin-Planck and Clausius statements.	12M	2	L4

OR

5.		Using an engine of 30% thermal efficiency to drive a refrigerator having a COP of 5, what is the heat input into the engine for each MJ removed from the cold body by the refrigerator? If this system is used as a heat pump, how many MJ of heat would be available for heating for each MJ of heat input to the engine?	12M	2	L4

UNIT-III

6.		Draw the phase equilibrium diagram for a pure substance on h-s plot with relevant constant property lines.	12M	3	L3

OR

7.		A rigid closed tank of volume 3 m^3 contains 5 kg of wet steam at a pressure of 200 kPa. The tank is heated until the steam becomes dry saturated. Determine the final pressure and the heat transfer to the tank.	12M	3	L4

UNIT-IV

8.	a)	Derive the expression of work transfer for an ideal gas in a reversible isothermal process.	6M	4	L2
	b)	What are the relations among p, v and T of an ideal gas in a polytropic process?	6M	4	L2

OR

9.		A gas occupies 0.024m^3 at 700 kPa and 95°C. It is expanded in the non-flow process according to the law $pv^{1.2}$ = constant to a pressure of 70 kPa after which it is heated at constant pressure back to its original temperature. Sketch the process on the p-v and T-s diagrams, and calculate for the whole process the work done, the heat transferred and the change of entropy. Take C_p = 1.047 and C_v = 0.775 kJ/kg K for the gas.	12M	4	L4

UNIT-V

10.		Derive the expression for the efficiency of Diesel cycle.	12M	5	L3

OR

11.		In an air standard Diesel cycle, the compression ratio is 15. Compression begins at 0.1 MPa, 40°C. The heat added is 1.675 MJ/kg. Find (a) the maximum temperature of the cycle, (b) the work done per kg of air, (c) the cycle efficiency, (d) the temperature at the end of the isentropic expansion, (e) the cut-off ratio, (f) the maximum pressure of the cycle, and (g) the m.e.p. of the cycle.	12M	5	L4

*** End ***

Hall Ticket Number :										

R-20

Code: 20A332T

II B.Tech. I Semester Supplementary Examinations June 2024

Manufacturing Processes

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. In Part-A, each question carries **Two marks.**

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

			CO	BL
1.	Answer ***all*** the following short answer questions	(5 X 2 = 10M)		
a)	Define Gating Ratio		1	L1
b)	Differentiate arc welding and Gas welding		2	L2
c)	Describe strain hardening		3	L2
d)	List the type of forging process		4	L1
e)	Differentiate injection and blow molding process		5	L2

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT-I			
2.		What is a casting? Describe the various steps involved in obtaining a casting	12M	1	L1
		OR			
3.		List special casting processes and explain 'Investment casting' process?	12M	1	L1
		UNIT-II			
4.		What is the principle involved in Gas Metal Arc Welding (GMAW) with a block diagram	12M	2	L1
		OR			
5.		Explain resistance spot welding process with a neat sketch.	12M	2	L2
		UNIT-III			
6.		Describe Rolling Process? Explain the types or Rolling Mills?	12M	3	L2
		OR			
7.		What is drawing? Explains its types with sketch	12M	3	L1
		UNIT-IV			
8.		Define Extrusion? What are types of Extrusion processes? Explain each one with neat sketches?	12M	3	L1
		OR			
9.		What is hot and cold extrusion process? Explain hydrostatic extrusion	12M	3	L1
		UNIT-V			
10.		Explain injection and blow moulding process with neat sketch	12M	3	L2
		OR			
11.	a)	Explain steel making using crucible process?	6M	3	L2
	b)	What is powder metallurgy and explain its principle	6M	3	L1

*** End ***

Hall Ticket Number :										

R-20

Code: 20A331T

II B.Tech. I Semester Supplementary Examinations June 2024

Mechanics of Solids

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. In Part-A, each question carries **Two marks.**

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define i) Modulus of Elasticity and ii)Poisson's ratio	1	1
b)	Define Point of contra-flexure in a beam subjected to bending moment? Explain with examples?	2	1
c)	Define section modulus of a beam? What is the section modulus of a triangular section of base (b) and height (h)?	3	2
d)	What is the deflection under the load of a simply supported beam of span 4m, subjected to a central point load of 20kN? Use flexural rigidity as EI	4	3
e)	A thin spherical shell of diameter 1m and wall thickness 1mm, is subjected to an internal pressure of 20MPa. Calculate the Hoop stress developed in the cylinder?	5	2

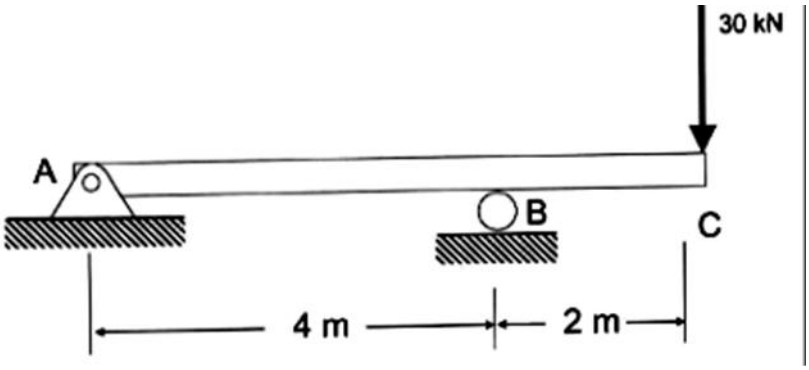
PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

		Marks	CO	BL
	UNIT-I			
2. a)	Derive relation between Modulus of elasticity, Rigidity Modulus and Poisson's ratio	7M	1	1
b)	A circular bar of 200mm diameter and length 500mm is subjected to an axial pull of 100kN. E= 200GPa, determine change in length and diameter of the bar due to loading	5M		3
	OR			
3. a)	A bar of length 2m and uniform cross section of 200 mm^2 is at a room temperature of 30^oC, the bar is heated uniformly to 80^oC. Coefficient of thermal expansion of the bar is 10 x 10^{-6} /^oC. Determine the stress developed in the bar when i) the bar is free to expand ii) the bar is not allowed to expand iii) supports yield by 1mm.	7M	1	3

	b)	A bar of length L, modulus of elasticity E is having varying diameter. The diameter is changing from D to d. Derive the expression for the change in length of the bar due to an axial load of P?	5M	1	2

UNIT-II

4.		Draw Shear Force Diagram and Bending Moment Diagram of the over-hanging beam shown in figure. Mark salient points 	12M	2	4

OR

5.	a)	Derive the relation between Bending Moment, Shear Force and rate of load on a beam	5M	2	4
	b)	A cantilever beam of length L and loaded with uvl of intensity w at the free end and zero at the fixed end. Draw SFD and BMD of the beam? Show important points in the beam	7M	2	3

UNIT-III

6.	a)	State assumptions in Pure bending?	4M	3	1
	b)	Derive the flexural equation?	8M	3	2

OR

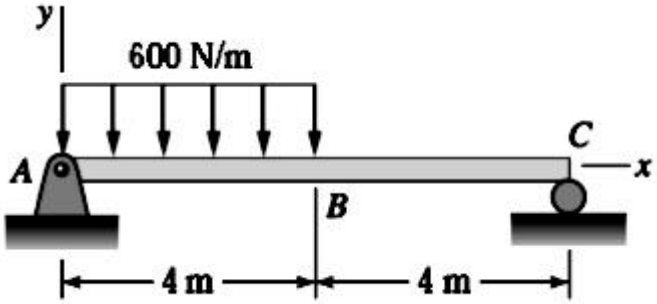
7.	a)	What is flexural rigidity?	2M	3	1
	b)	A simply supported beam of 4m length having a rectangular cross section of 100 mm width and 200 mm depth. It is subjected to a point load of 100 kN 1.5 m from left end. E=200GN/m^2.Calculate maximum bending stress developed in the beam?	10M	3	4

UNIT-IV

8.		A cantilever beam of length 4m is fixed at left end and free at the right end. A point load of 10 kN is applied at the free end. EI is the flexural rigidity of the beam. Determine slope and deflection at the mid span of cantilever beam?	12M	4	4

OR

9. A simply supported beam of uniform cross section is subjected to loading as shown in the figure below. E=100GPa, the beam is having circlar cross section of diamter 100mm. Determine deflection at mid span (at B)?



12M 4 4

UNIT-V

10. A thin cylinder of length 1000mm, internal diameter 100mm is subjected to an internal pressure of 2MPa. E=200N/mm^2. Poisson's ratio 0.25, calculate the change in length, diameter and volume of the cylinder due to internal pressure? 12M 5 3

OR

11. a) Derive the expression to determine hoop and circumferential stress in a thin sphere 6M 5 3

b) A thin cylinder is subjected to an internal fluid pressure due to water flowing in the cylinder. The allowable strength of material of the cylinder is 150MPa. Diameter of the cylinder is 500mm, length 2m. Determine the thickness of the metal of the cylinder. 6M 5 4

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC31T

II B.Tech. I Semester Supplementary Examinations June 2024

Partial Differential Equations and Numerical Methods

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**

2. In Part-A, each question carries **Two marks.**

3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1. Answer ***all*** the following short answer questions **(** 5 X 2 = 10M) CO BL

a) Write the formula for iteration method and specify its order of convergence. CO1 L1

b) Explain Interpolation. CO2 L2

c) Evaluate $\int_{0.6}^{2.0} y\,dx$ by using trapezoidal rule to the following table

x	0.6	8	1.0	1.2	1.4	1.6	1.8	20
y	1.23	1.58	2.03	4.32	6.25	8.38	10.23	12.45

CO3 L5

d) Write the formula for Runge-Kutta method of second order. CO4 L1

e) Write One-dimensional Heat flow equation, Two-dimensional Heat flow equation. CO5 L1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

Marks CO BL

UNIT-I

2. a) By using the bisection method, find an approximate root of the equation $\sin x = 1/x$, that lies between x=1 and x=1.5 (measured in radians). Carry out computations up to the 7th stage 6M CO1 L3

b) Find the root of the equation $\cos x = 3x - 1$ by using Iteration method 6M CO1 L4

OR

3. a) Find a real root of the equation $x \log_{10} x = 1.2$ by using regula – falsi method correct to four decimal places. 6M CO1 L4

b) Using Newton-Raphson method, find a root of the equation $x^4 - x = 10$ correct to three decimal places. 6M CO1 L3

UNIT-II

4. a) Find the value of $f(42)$ to the following data

X	20	25	30	35	40	45
$f(x)$	354	332	291	260	231	204

6M CO2 L4

b) Using Lagrange's formula, express the function $\frac{3x^2+x+1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions. 6M CO2 L3

OR

5. a) Using Newton's backward formula, find the value of f (2.0), if

x	1	1.4	1.8	2.2
f(x)	3.49	4.82	5.96	6.5

6M CO2 L3

b) Find the relation between E and D. 6M CO2 L4

UNIT-III

6. Given that

x	1	1.2	1.4	1.6	1.8	2
y	2.72	3.32	4.06	4.95	6.05	7.39

Find $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at $x=1.1$ and $x=1.2$ 12M CO3 L4

OR

7. a) Use the Trapezoidal rule to estimate $\int_0^6 x\sec x\,dx$ taking 8 intervals. 6M CO3 L3

b) A river is 80 feet wide; the depth is d in feet at a distance x foot from one bank is given by the following table, find approximately the area of cross-section

x	0	0.8	1.0	30	40	50	60	70	80
y	0	4	7	9	12	15	14	8	3

6M CO3 L4

UNIT-IV

8. Employ the Taylor's series method to find an approximate value of y at x=1.1, x=1.2 for the differential equation $\frac{dy}{dx}=\log xy, y(1)=2$ 12M CO4 L4

OR

9. a) Using Picard's process of successive approximation, obtain a solution when $x = 2$ up to 5th approximation of $\frac{dy}{dx}=2x-y$ such that y (0) =3 6M CO4 L3

b) Apply Runge-kutta fourth order method, find an appro ma e value of y when $x = 0.1$ Given that $\frac{dy}{dx}=x+y^2$, such that $y = 1$ when x = xi at o 6M CO4 L4

UNIT-V

10. solve the Laplace equation $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ =0 subjected to the conditions

$u(0,y)=u(l,y)=u(x,0)=0$ and $u(x,a)=\sin\left(\frac{n\pi x}{l}\right)$ 12M CO5 L3

OR

11. A tightly stretched string with fixed end points x=0 and x=l is initially in a position given by $y=y_0\sin^3\left(\frac{\pi x}{l}\right)$. If it is released from fest from this position, find the displacement $y(x,t)$ 12M CO5 L4

*** End ***

Hall Ticket Number :										

R-20

Code: 20A235T

II B.Tech. I Semester Supplementary Examinations June 2024

Basic Electrical and Electronics Engineering

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two marks.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A

(Compulsory question)

1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		CO	BL
	a) State Lenz's Law?		CO1	2
	b) Define back EMF of a DC motor?		CO2	1
	c) Describe the losses present in a transformer.		CO3	2
	d) Sketch the V-I characteristics of diode.		CO4	4
	e) Define term controlling torque in PMMC?		CO5	1

PART-B

Answer *five* questions by choosing one question from each unit (5 x 12 = 60 Marks)

			Marks	CO	BL
		UNIT-I			
2.	a)	Explain inductive and capacitive networks?	6M	CO1	2
	b)	Illustrate a series circuit.	6M	CO1	4
		OR			
3.	a)	State Kirchhoff's laws with examples.	6M	CO1	1
	b)	Illustrate a series-parallel circuit.	6M	CO1	4
		UNIT-II			
4.		Describe constructional details of a DC motor with neat sketch.	12M	CO2	2
		OR			
5.		Describe the efficiency and losses of a DC shunt motor by brake test.	12M	CO2	2
		UNIT-III			
6.	a)	Explain mutual induction process in a single phase transformer?	6M	CO3	2
	b)	How does the SC and OC test help to find the regulation?	6M	CO3	2
		OR			
7.		Explain synchronous impedance method in calculating the regulation of an alternator.	12M	CO3	2
		UNIT-IV			
8.	a)	Explain full wave rectifier.	6M	CO4	2
	b)	Explain in detail about PNP and NPN Transistor.	6M	CO4	2
		OR			
9.		Sketch input and output characteristics of CE configuration.	12M	CO4	3
		UNIT-V			
10.	a)	Describe the parts and functioning of a moving iron instrument?	6M	CO5	2
	b)	Draw the block diagram of CRO and represent the parts.	6M	CO5	2
		OR			
11.	a)	Explain types of earthing.	6M	CO5	2
	b)	Write the differences between MCB and fuse.	6M	CO5	2

*** End ***

Hall Ticket Number :										

R-19

Code: 19A333T

II B.Tech. I Semester Supplementary Examinations June 2024

Basic Thermodynamics

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks
		UNIT–I	
1.	a)	What is meant by displacement work? Explain the same with reference to the Quasi-static process.	7M
	b)	Classify the types of thermodynamic systems with the help of suitable example.	7M
		OR	
2.	a)	To a closed system 150 KJ of work is supplied. If the initial volume is 0.6 m^3 and the 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.	7M
	b)	Derive the general steady flow energy equation and deduce SFEE for Turbine.	7M
		UNIT–II	
3.	a)	Discuss about the limitations of First law of Thermodynamics	7M
	b)	A reversible heat engine operates between a source at 800˚C and sink at 30˚C. What is the least rate of heat rejection per KW network output of the engine?	7M
		OR	
4.	a)	Write a short notes on Third law of Thermodynamics	5M
	b)	Three Carnot Heat Engines HE1, HE2, HE3 are connected in series. They are working with same thermal efficiency. The heat supplied to the entire system is2400 kW and heat rejected from entire system is 300 kW Calculate work done for each engine.	9M
		UNIT–III	
5.		A vessel having a capacity of 0.05 m^3 contains a mixture of saturated water and saturated steam at a temperature of 245°C. the mass of the liquid present is 10 kg. Calculate the pressure, mass, specific volume, specific enthalpy, specific entropy, and specific internal energy.	14M
		OR	
6.	a)	What is a pure substance?	5M
	b)	Steam enters in an engine at a pressure of 10 bar absolute and 250^{0}C. It is exhausted at 0.2 bar. The steam exhaust is 0.9dry. Find i) drop in enthalpy, ii) Change in entropy	9M
		UNIT–IV	
7.		One kg of CO_2 has a volume of 1 m^3 at 100˚C. Compute the pressure by a) Vander Waal's equation b) Perfect gas equation The Vander Waal's constants a = 362850 Nm^4 /(kg-mol)^2 and b=0.0423 m^3 /(kg-mol).	14M
		OR	
8.	a)	Derive the expressions for heat transfer and work done during a reversible isothermal process.	5M
	b)	Explain Throttling process and Free expansion process.	9M
		UNIT–V	
9.	a)	State Avogadro's law of Additive volumes.	4M
	b)	A gas mixture consists of 0.4kg of carbon monoxide and 1.1 kg of carbon dioxide Calculate the mass fraction, mole fraction, molar mass and gas constant.	10M
		OR	
10.	a)	Explain Mass fraction .Mole fraction, Internal energy and specific heat of gas mixtures	9M
	b)	Briefly discuss about the Volumetric Analysis.	5M

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