Hall Ticket Number :										

R-20

Code: 20A333T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

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 is PMM I?	2	L1
b)	Mention the limitations of first law.	1	L2
c)	Define dryness fraction of steam.	3	L1
d)	Write the characteristic gas equation.	4	L1
e)	Show the Otto cycle on P.v. and T.s. diagram.	5	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)	Explain thermodynamic equilibrium	6M	1	L2
b)	A mass of 1.5 kg of air is compressed in a quasi-static process from 0.1 MPa to 0.7 MPa for which pv =constant. The initial density of air is 1.16 kg/m^3. Find the work done by the piston to compress the air.	6M	1	L3
	OR			
3.	A reciprocating air compressor takes in 2 m^3/min at 0.11MPa, 20°C which it delivers at 1.5 MPa, 111°C to an aftercooler where the air is cooled at constant pressure to 25°C. The power absorbed by the compressor is 4.15 kW. Determine the heat transfer in (a) the compressor, and (b) the cooler. State your assumptions.	12M	1	L3
	UNIT-II			
4.	Two reversible heat engines A and B are arranged in series, A rejecting heat directly to B. Engine A receives 200 kJ at a temperature of 421°C from a hot source, while engine B is in communication with a cold sink at a temperature of 4.4°C. If the work output of A is twice that of B, find (a) the intermediate temperature between A and B, (b) the efficiency of each engine, and (c) the heat rejected to the cold sink.	12M	2	L3

OR

5.	State and prove Carnot theorem.	12M	2	L2

UNIT-III

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

OR

7.	Water at 40°C is continuously sprayed into a pipeline carrying 5 tonnes of steam at 5 bar, 300°C per hour. At a section downstream where the pressure is 3 bar, the quality is to be 95%. Find the rate of water spray in kg/h.	12M	3	L3

UNIT-IV

8.	0.5 kg of air, initially at 25°C, is heated reversibly at constant pressure until the volume is doubled, and is then heated reversibly at constant volume until the pressure is doubled. For the total path, find the work transfer, the heat transfer, and the change of entropy	12M	4	L3

OR

9.	0.5 kg of air at 600 kPa receives an addition of heat at constant volume so that its temperature rises from 110°C to 650°C. It then expands in a cylinder polytropically to its original temperature and the index of expansion is 1.32. Finally, it is compressed isothermally to its original volume. Calculate (a) the change of entropy during each of the three stages, (b) the pressures at the end of constant volume heat addition and at the end of expansion. Sketch the processes on the p-v and T-s diagrams.	12M	4	L3

UNIT-V

10.	Derive the thermal efficiency and m.e.p. of Otto cycle.	12M	5	L3

OR

11.	An air standard limited pressure cycle has a compression ratio of 15 and compression begins at 0.1 MPa, 40°C. The maximum pressure is limited to 6 MPa and the heat added is 1.675 MJ/kg. Compute (a) the heat supplied at constant volume per kg of air, (b) the heat supplied at constant pressure per kg of air, (c) the work done per kg of air, (d) the cycle efficiency, (e) the temperature at the end of the constant volume heating process, (f) the cut-off ratio, and (g) the m.e.p. of the cycle.	12M	5	L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A332T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

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 sprue and raiser	1	L1
b)	What is oxidation and describe its impact in welding	2	L1
c)	Differentiate hot working and cold working process	3	L2
d)	Define Dents and cracks in forging process?	4	L1
e)	Define sintering process in powder metallurgy.	5	L1

PART-B

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

		Marks	CO	BL
	UNIT-I			
2.	Define the pattern? What types of pattern allowances are generally incorporated into a casting pattern? Explain with neat sketches?	12M	1	L1
	OR			
3.	With neat sketches describe the elements of a gating system	12M	1	L2
	UNIT-II			
4.	What is the principle involved in Friction stir welding with a block diagram	12M	2	L1
	OR			
5	Describe with neat sketch the Oxy Acetylene gas welding process.	12M	2	L2
	UNIT-III			
6	Describe press working Process with neat sketch?	12M	3	L2
	OR			
7.	Explain the following metal forming processes a) coining b) Piercing c) Drawing	12M	3	L2
	UNIT-IV			
8.	List the Extrusion processes? Explain any one with neat sketch?	12M	4	L1
	OR			
9.	What are forging defects? Explain rotary forging?	12M	4	L1
	UNIT-V			
10.	Explain extrusion compression and transfer moulding process with neat sketch	12M	5	L2
	OR			
11.	Explain steel making using Bessemer converter?	12M	5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A331T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

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

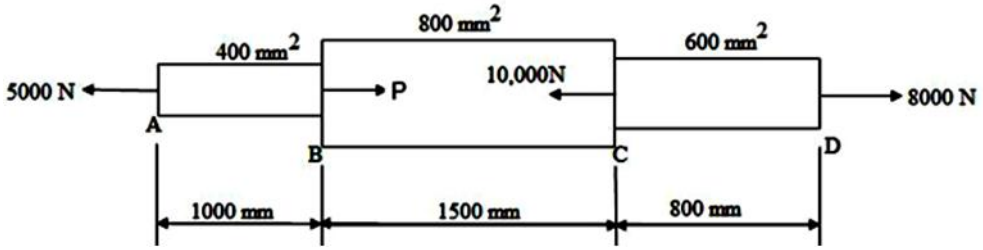
(Compulsory question)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	What are various elastic constants? What are independent elastic constants?	1	1
b)	What are the differential relations between Bending Moment, Shear Force and Rate of Loading?	2	1
c)	State simple bending equation?	3	2
d)	What are the different methods used to find out the slope and deflection at a section in a loaded Beam?	4	1
e)	A thin sphere of diameter 1m and thickness of wall 1mm is subjected to internal fluid pressure of 10MPa. Determine maximum circumferential stress?	5	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 stepped bar as shown in figure is subjected to different axial forces at different locations. E=200N/mm^2. Determine i) unknown value of axial force P, ii) total axial deformation of the bar			



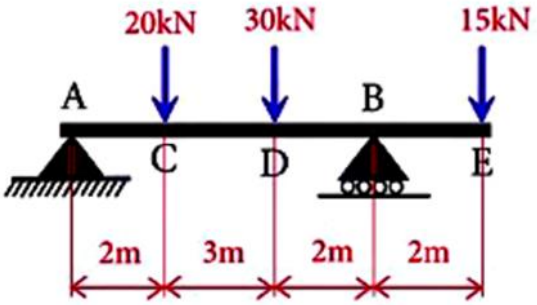
12M 1 3

OR

3.	A prismatic bar of uniform diameter 100mm is made of mild steel with coefficient of thermal expansion of the bar as 12 x 10^{-6}/^{o}C. The bar is heated to 100 ^{o}C from initial temperature of 10 ^{o}C. E= 100GPa. Determine thermal stress developed in the bar, when the bar is i) free to expand ii) expansion at the ends is completely prevented iii) when supports at the end yields by 0.5mm.	12M	1	3

UNIT-II

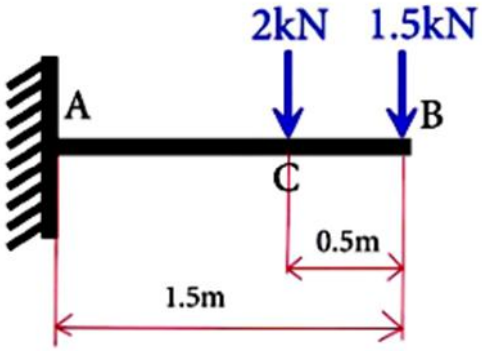
4. Draw BMD and SFD of the beam shown in the figure and indicate point of contra-flexures, if any?



12M 2 4

OR

5. Draw SFD and BMD of the beam shown in the figure and indicate maximum Bending Moment and maximum Shear Force in the beam.



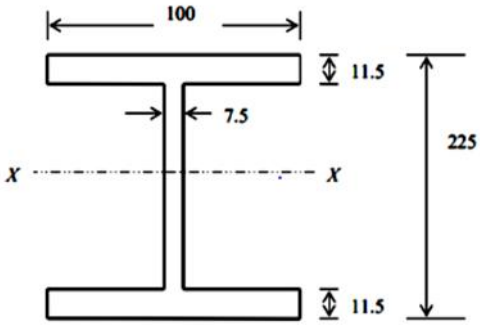
12M 2 4

UNIT-III

6. A simply supported beam of length 4m, is subjected to a point load of 10 kN acting at a distance of 1m from one of the supports. E = 200GPa. The beam is triangular in cross section with base 100mm and height 150mm. calculate maximum bending stress developed in the beam? 12M 3 5

OR

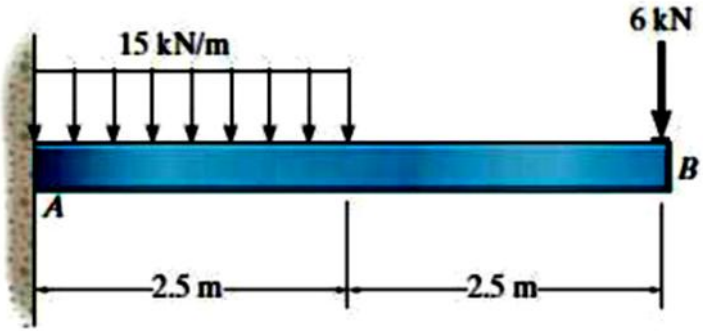
7. A symmetrical I section as shown in figure (all dimensions are in mm) is subjected to a vertical sheer force of 100kN. Draw shear stress distribution by showing the salient values of shear stress at critical locations.



12M 3 5

UNIT-IV

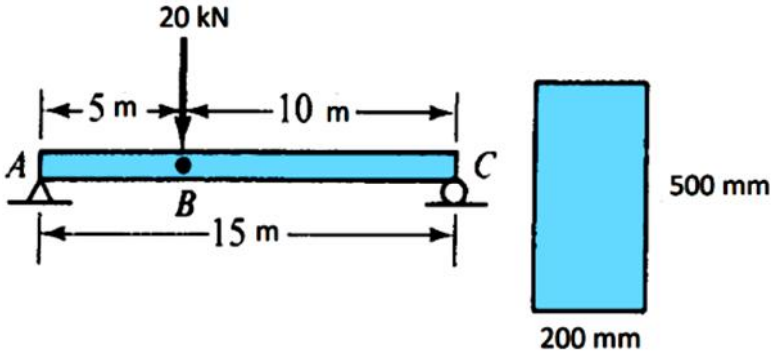
8. A cantilever beam shown in figure is made of uniform circular section of diameter 100mm. E = 200MN/m^2. Determine slope and deflection at the free end?



12M 4 4

OR

9. A prismatic beam of wood with E= 80GPa is subjected to eccentric point load as shown in figure. Determine deflection just below the load. Also calculate slopes at supports.



12M 4 5

UNIT-V

10. A thin cylinder with closed ends of 600mm diameter and 2m long has a shell thickness of 12mm. If it carries a fluid pressure of 2MPa, calculate change in diameter, length and volume of the cylinder use E=100GPa and Poisson's ratio 0.4 12M 5 3

OR

11. A thin cylinder with closed ends is subjected to fluid pressure, with usual notations derive the expression for hoop and longitudinal stress. 12M 5 2

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC31T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

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)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Write the formula of Newton –Raphson method.	CO1	L1
b)	Show that $(1+\Delta)(1-\nabla)=1$	CO2	L1
c)	Write Simpsons 1/3 rule.	CO3	L1
d)	Using Euler's method, find an approximate value of y corresponding to $x = 0.25$, given that $\frac{dy}{dx} = 1+xy$ and $y = 1$ when $x = 0$.	CO4	L3
e)	Write One-dimensional Heat flow equation, Two-dimensional Laplace 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)	Find a root of the equation $x^3 - 4x - 9 = 0$ using bisection method correct to three decimal places.	6M	CO1	L4
b)	Find the root of the equation $x^3 + x^2 - 1 = 0$ by using Iteration method.	6M	CO1	L4
	OR			
3. a)	Find a real root of the equation $\cos x = xe^x$ by using regula – falsi method correct to four decimal places.	6M	CO1	L4
b)	Using Newton-Raphson method, find a root of the equation $3x = \cos x + 1$.	6M	CO1	L3
	UNIT-II			
4. a)	Given $\sin 45^0 = 0.7071$, $\sin 50^0 = 0.7660$, $\sin 55^0 = 0.8192$, $\sin 60^0 = 0.8660$, find $\sin 52^0$, using Newton's forward formula.	6M	CO2	L4
b)	Find the cubic polynomial which takes the following values			

x	0	1	2	3
f(x)	1	2	1	10

6M CO2 L4

OR

5. a) Evaluate $f(9)$ by using Lagrange's formula with the following data

x	5	7	11	13	17
$f(x)$	150	392	1492	2366	5202

6M CO2 L5

b) Find the missing term in the table

X	2	3	4	5	6
Y	45.0	49.2	54.1	-	67.4

6M CO2 L4

UNIT-III

6. Given that

x	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

Find $\frac{dy}{dx}$ *and* $\frac{d^2y}{dx^2}$ *at* $x=1.5$ *and* $x=4.0$ 12M CO3 L4

OR

7. Evaluate $\int_0^1 \frac{1}{1+x}dx$ using

i) Trapezoid rule ii) Simpson's 1/3rd rule and iii) Simpson's 3/8th rule. 12M CO3 L5

UNIT-IV

8. Emplo[illegible]e Taylor's series method to find an approximate value of y at x=0.1, 0.2, 0.3, .4 for the Differential equation $\frac{dy}{dx}=x^2-y,\ y(0)=1.$ 12M CO4 L4

OR

9. a) Using modified Euler's method, find an approximate value of y when x = 0.2 given that $y^1=y+e^x, y(0)=0$ 6M CO4 L4

b) Using Runge-kutta fourth order method, Solve $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}$ with $y(0)=1$ at $x=0.2$ 6M CO4 L3

UNIT-V

10. A string is stretched and fastened to two points l apart. Motion is started by displacing the string in the form $y=a\sin\left(\frac{®x}{l}\right)$ from which it is released at time t=0. Show that the displacement of any point at a distance x from one end at time t is given by $y(x,t)=a\sin\left(\frac{®x}{l}\right)\cos\left(\frac{®ct}{l}\right)$ 12M CO5 L3

OR

11. Solve the one-dimensional heat flow equation $\frac{\partial u}{\partial t}=c^2\frac{\partial^2 u}{\partial x^2}$ given that $u(0,t)=0$, $u(l,t)=0$ *and* $u(x,0)=3\sin\left(\frac{®x}{l}\right), 0<x<l$ 12M CO5 L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A235T

II B.Tech. I Semester Regular & Supplementary Examinations December 2023

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)

		CO	BL
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	State right hand thumb rule.	CO1	1
b)	Classify DC generators?	CO2	4
c)	Define transformation ratio?	CO3	1
d)	What is meant by breakdown voltage of Diode?	CO4	1
e)	State the principle of CRT.	CO5	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)	Explain in detail about static and Dynamic Emf?	6M	CO1	2
	b)	Three resistors of 30Ω connected in parallel are fed by a 100Volts DC source. Find current through each resistor?	6M	CO1	2
		OR			
3.	a)	State Fleming's right hand, left hand rules and Faraday's laws of electromagnetic induction.	6M	CO1	2
	b)	List the types of passive elements.	6M	CO1	1
		UNIT-II			
4.	a)	Classify DC generators and state the applications.	6M	CO2	4
	b)	State and discuss the speed control methods of a dc motor.	6M	CO2	2
		OR			
5.		How the efficiency and losses of a DC machine are calculated with Swinburne's test. Explain.	12M	CO2	2
		UNIT-III			
6.		Describe the brake test on three phase induction motor.	12M	CO3	2
		OR			
7.		Describe the synchronous impedance method for evaluating the voltage regulaiton of the alternator.	12M	CO3	4
		UNIT-IV			
8.	a)	Explain PNP and NPN transistors.	6M	CO4	2
	b)	Describe the V-I characteristics of diode.	6M	CO4	2
		OR			
9.	a)	How the CE configuration is helpful in various applications.	6M	CO4	3
	b)	Explain the operation of half wave rectifier using PN junction diode.	6M	CO4	2
		UNIT-V			
10.	a)	How a function generator works? Describe.	6M	CO5	2
	b)	List various wires and cables.	6M	CO5	2
		OR			
11.		Considering any six domestic electrical appliances, calculate the energy consumption for 30 days.	12M	CO5	2

*** End ***