Hall Ticket Number :										

R-20

Code: 20A333T

II B.Tech. I Semester Supplementary Examinations July 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)	Distinguish between 'flow process' and 'non-flow process'.	1	L2
b)	Mention few causes of irreversibility.	2	L1
c)	Define dryness fraction.	3	L1
d)	What is compressibility factor?	4	L1
e)	Sketch the Otto cycle on P-V and T-S planes and name all the processes.	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 system contains 0.2 m^3 of a gas at a pressure of 4 bar and 150 ^oC. It is expanded adiabatically till the pressure falls to 1 bar. The gas is then heated at constant pressure till its enthalpy increases by 100 KJ. Determine the network transfer and heat transfer. Take C_P=1 kJ/kgK and C_v=0.714 kJ/kgK.	12M	1	L3
	OR			
3.	10kg of fluid per minute goes through a reversible steady flow process. The properties of fluid at inlet are p_1=1.5 bar, ρ_1=26 kg/m^3,v_1=110 m/s and u_1=910 kJ/kg and at exit are p_2=5.5 bar,ρ_2=5.5 kg/m^3,v_2=190 m/s and u_2=710 kJ/kg. During the passage, the fluid rejects 55kJ/s and rises through 55m. Determine i) Change in enthalpy (ii) Work done during the process.	12M	1	L3
	UNIT–II			
4.	Two reversible heat engines A and B are arranged in series; Engine A rejecting heat directly to engine B. Engine A receives 200 kJ at temperature of 421^{o}C from a hot source, while engine B is in communication with a cold sink at a temperature of 4.4^{o}C. If the work output of A is twice that of B, Find a) the intermediate temperature between A and B, b) the efficiencies of each engine and c) the heat rejected to cold sink.	12M	2	L3
	OR			
5.	A heat pump working on the Carnot cycle takes in heat from a reservoir at 5 ^{o}C and delivers heat to a reservoir at 60 ^{o}C. The heat pump is driven by a reversible heat engine which takes in heat from a reservoir at 840 ^{o}C and rejects heat to a reservoir at 60 ^{o}C. The reversible heat engine also drives a machine that absorbs 30 kW. If the heat pump extracts 17 kJ/s from the 5 ^{o}C reservoir, determine a) the rate of heat supply from the 840 ^{o}C source and b) the rate of heat rejection to the 60 ^{o}C reservoir.	12M	2	L3

UNIT–III

6.	One kg of steam at 10 bar exists at a following conditions (i) Wet and 0.8 dry (ii) Dry and Saturated (iii) At a temperature of 199.9 ^oC Determine the Enthalpy, Specific Volume, Density, Internal Energy and Entropy in each case. Take C_{ps} = 2.25 kJ/kg K	12M	3	L3
	OR			
7.	Derive the Clausuis- clapeyron equation.	12M	3	L2

UNIT–IV

8.	A gaseous mixture contains 21% by volume of nitrogen, 50% by volume of hydrogen, and 29% by volume of carbon-dioxide. Calculate I. The molecular weight of the mixture, II. The characteristic gas constant for the mixture III. The value of the reversible adiabatic index γ (At 10°C, the C_P values of nitrogen, hydrogen, and carbon dioxide are l.039, 14.235, and 0.828 kJ/kg K respectively.)	12M	4	L3
	OR			
9.	Determine the specific volume of water vapour at 110 bar and 841 K by using i. The ideal gas equation of state ii. The principle of corresponding states iii. The super heat steam table iv. Also calculate percentage of error in the volume obtained by ideal gas equation and that by the principle of corresponding states Take P_C= 221.2 bar and T_C=647 K. Use generalized compressibility chart.	12M	4	L3

UNIT–V

10.	For air standard diesel cycle the following data is available: Compression ratio = 16 Heat added/kg = 2500 kJ/kg Lowest temperature in the cycle = 300 K Lowest pressure in the cycle = 1 bar Calculate: i) pressure and temperature at each point in the cycle ii) Thermal efficiency iii) Mean effective pressure if air flow rate of 0.25 kg/sec.	12M	5	L3
	OR			
11.	The minimum pressure and temperature in an Otto cycle are 100 kPa and 27°C. The amount of heat added to the air per cycle is 1500 kJ/kg. (i) Determine the pressures and temperatures at all points of the air standard Otto cycle. (ii) Also calculate the specific work and thermal efficiency of the cycle for a compression ratio of 8 : 1. Take for air : Cv = 0.72 kJ/kg K, and γ=1.4.c	12M	5	L3

*** End ***

Hall Ticket Number :										

R-20

Code: 20A332T

II B.Tech. I Semester Supplementary Examinations July 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)	Enumerate types of patterns.		CO1	L1
b)	How do you classify welding processes?		CO2	L2
c)	What are the defects in rolled products?		CO3	L1
d)	Explain drop forging.		CO4	L1
e)	Write methods of steel making.		CO5	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)	Classify special casting processes and explain 'centrifugal casting' process?	6M	CO1	L2
	b)	What are the pattern allowances are generally incorporated into a casting pattern and describe any two?	6M	CO1	L3
		OR			
3.	a)	Explain steps involved in making castings.	6M	CO1	L2
	b)	Examine Gating ratio and design of Gating systems.	6M	CO1	L3
		UNIT–II			
4.		Discuss with neat sketch the various components of Oxy Acetylene gas welding and explain the welding cutting process?	12M	CO2	L3
		OR			
5.	a)	Explain working principle of ARC welding with a neat sketch.	6M	CO2	L2
	b)	Sketch friction stir welding set up and explain its working principle.	6M	CO2	L3

UNIT–III

6.	a)	Compare cold and hot working processes.	6M	CO3	L4
	b)	Recommend which type of press working processes suitable to which application.	6M	CO3	L5

OR

7.	a)	Explain strain hardening.	6M	CO3	L4
	b)	Estimate what defects found in cold and hot working processes.	6M	CO3	L5

UNIT–IV

8.	a)	How do you classify extrusion processes and explain any one extrusion process.	6M	CO4	L2
	b)	Enumerate tools and dies required for forging process.	6M	CO4	L3

OR

9.	a)	Discuss Impact extrusion process with a neat sketch.	6M	CO4	L2
	b)	Explain Drop forging process and mention applications of these products.	6M	CO4	L3

UNIT–V

10.	a)	Describe the injection molding process?	6M	CO5	L1
	b)	Explain Blow molding.	6M	CO5	L2

OR

11.	a)	Elaborate steel making using Bessemer converter?	6M	CO5	L1
	b)	Discuss Injection molding process.	6M	CO5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A331T

II B.Tech. I Semester Supplementary Examinations July 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**

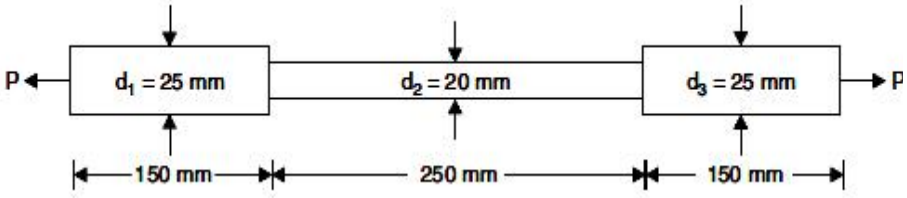
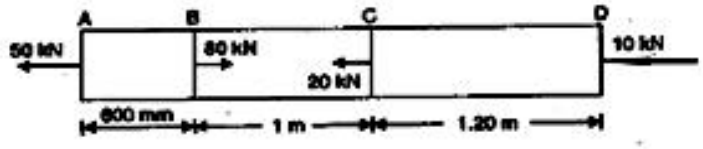
PART-A

(Compulsory question)

1. Answer all the following short answer questions (5 X 2 = 10M)		**CO**	**BL**
a)	Explain the term " complementary shear stress"	1	2
b)	A cantilever beam subjected to a point load of 1.5kN at its free end. If the maximum bending moment in the beam is 6kN-m, determine the length of the beam.	2	3
c)	What is the value of bending stress at neutral axis of a beam	3	1
d)	What are the typical boundary conditions used in finding the constants in the double integration method to find slope and deflection of a simply supported beam.	4	1
e)	Determine the nature of circumferential and longitudinal stresses in a thin cylinder.	5	2

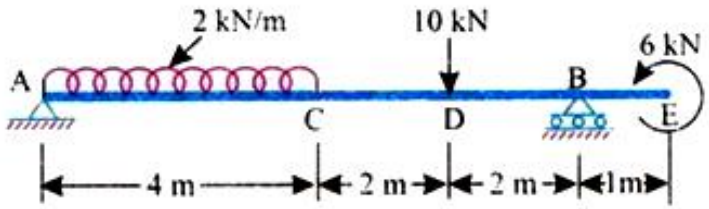
PART-B

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

		Marks	CO	BL
	UNIT–I			
2. a)	The bar shown in Figure. 1 is tested in universal testing machine. It is observed that at a load of 40 KN the total extension of the bar is 0.280 mm. Determine the Young's modulus of the material. 	6M	1	3
b)	A brass bar having Cross sectional area of 1000 mm^2 is subjected to axial forces as shown in figure. Find total elongation of the bar. Take E=1.05x10^5 N/mm^2. 	6M	1	3
	OR			
3. a)	A steel rail is 12 m long and is laid at a temperature of 18°C. The maximum temperature expected is 40°C. Take E = 2 × 10^5 N/mm^2 and α = 12 × 10^{-6} /°C. (i) Estimate the minimum gap between two rails to be left so that the temperature stresses do not develop. (ii) Calculate the temperature stresses developed in the rails, if: No expansion joint is provided.	6M	1	3
b)	Determine the strain energy stored in the wire, when it is stretched by a load of 1000 N, applied at its free end, while other end attached to a rigid support. The wire is of 3m long and cross sectional area of 4 mm^2. Take modulus of elasticity of the wire as 2.0 × 10^5 N/mm^2.	6M	1	3

UNIT–II

4. Draw the shear force and bending moment diagrams for the beam shown in Figure.



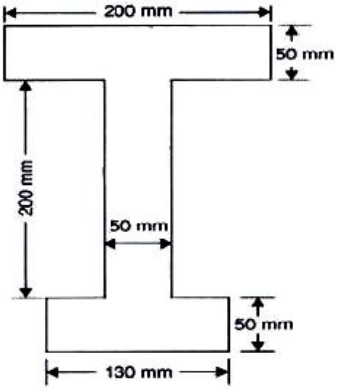
12M 2 3

OR

5. A beam of length is 10m is simply supported and carries point loads of 6kN each at a distance of 2m and 8m from left support and also a uniformly distributed load of 4kN/m between the point loads. Draw the S.F.D and B.M.D. 12M 2 3

UNIT–III

6. The shear force acting on the beam of I- section with unequal flanges is 50 kN. The section is shown in figure. Calculate the shear stress at the N.A. and also draw the shear stress distribution over the depth of the section.



12M 3 3

OR

7. A symmetrical I-section beam of 10mm×350mm web, 150×20 mm flanges is 4m long is simply supported at both ends. If the beam is subjected to a central point load of 100kN, determine the maximum bending stress and bending stress at a point 10mm above the N.A. and 1.5m from right support. 12M 3 3

UNIT–IV

8. A cantilever of length 2.6m carries a uniformly distributed load of 16.5kN/m over the entire length. If moment of inertia of the beam is 7.90×10^7 mm^4, and value of $E = 2 \times 10^5$ N/mm^2, determine the deflection at the free end 12M 4 3

OR

9. Find the maximum deflection of a simply supported beam of 4m length with an eccentric point load of 6kN at 1m from the right support. Take EI = 55000 KN/m^2. 12M 4 3

UNIT–V

10. A cylindrical vessel is 1.2m diameter, thickness 7mm and 4m long is closed at ends. If it is subjected to an internal pressure of 4 N/mm^2, find the change in dimensions of the vessel. Assume $E=2 \times 10^5$ N/mm^2 and Poisson's ratio=0.28. 12M 5 3

OR

11. A cylindrical shell 1m long, 180mm internal diameter, thickness of metal 8mm is filled with a fluid at atmospheric pressure. If an additional $30cm^3$ of the fluid is pumped in to the cylinder. Find the pressure exerted by the fluid on the wall of the cylinder and also find the hoop stress is induced take $E=2\times10^5$ N/mm^2 and Poisson's ratio=0.3 12M 5 3

*****END*****

Hall Ticket Number :										

R-20

Code: 20AC31T

II B.Tech. I Semester Supplementary Examinations July 2023

Partial Differential Equations and Numerical Methods

(Common to CE and 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)	Establish a iterative formula to find $\sqrt{N}$	CO1	L3
b)	State Lagrange's interpolation formula for unequal intervals.	CO2	L1
c)	Write $\frac{dy}{dx}$ and $\frac{d^2y}{dx^2}$ at x_0 using forward differences.	CO3	L2
d)	Write the formula to find K_2 K_4 in R-K method of 4th order.	CO4	L1
e)	State 1-D and 2-D steady state 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)	Using the bisection method, find a real root of the equation $e^x = 4\sin x$ correct to three decimal places	6M	CO1	L3
b)	Find a positive root of the equation $x^4 - x = 10$, Using Newton Raphson method.	6M	CO1	L4
	OR			
3. a)	Find a root of the equation $x^3 - 4x - 9 = 0$ using the regula-falsi method.	6M	CO1	L3
b)	Find a root of the $\cos x - 3x + 1 = 0$ by choosing Iteration method.	6M	CO1	L4
	UNIT–II			
4. a)	Construct Newton's forward interpolation polynomial for the following data.			

x	4	6	8	10
y	1	3	8	16

6M CO2 L3

b) Estimate the valued *f* (42) from the following data.

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

6M CO2 L3

OR

5. a) From the following table of half yearly premium for policies maturing at different ages, estimate the premium for policies maturing at the age 46.

Age	45	50	55	60
Premium in Rupees	100	122	153	178

6M CO2 L3

b) Using Lagrange's formula find the value of y when x = 10.

x	5	6	9	11
y	12	13	14	16

6M CO2 L3

UNIT–III

6. Given that

X	1.0	1.2	1.4	1.6	1.8	2.0
Y	0	0.128	0.544	1.296	2.432	4.000

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

OR

7. a) Calculate the value of $\int_0^{\frac{\pi}{2}} \sin x \, dx$ by Simpson's 1/3 rule, using 11 ordinates. 6M CO3 L3

b) Using Trapezoidal rule Estimate $\int_0^2 e^{x^2} dx$ taking 10 intervals. 6M CO3 L3

UNIT–IV

8. Use Runge-Kutta method of fourth order to find *y* when *x* = 1.2 in steps of 0.1, given that $\frac{dy}{dx} = x^2 + y^2$ and $y(1) = 1.5$. 12M CO4 L4

OR

9. a) Solve $y^1 = 1 - y, \quad y(0) = 0$ by modified Euler's method and obtain *y* at *x* = 0.1. 6M CO4 L3

b) Find an approximate value of *y* when *x* = 0.1, if $\frac{dy}{dx} = x - y^2$ and *y* =1 at *x* = 0, using Picard's method. 6M CO4 L3

UNIT–V

10. The points of trisection of a string are pulled a side through the same distance on opposite sides of the position of equilibrium and the string is released from rest. Derive an expression for the displacement of the string at subsequent time and show that the mid-point of the string always remains at rest. 12M CO5 L4

OR

11. An insulated rod of length *l* has its ends A and B maintained at 0^0C and 100^0C respectively until steady state prevail. If B is suddenly reduced to 0^0C and maintained at 0^0C, find the temperature at a distance x from A at time t. 12M CO5 L4

*** End ***

Hall Ticket Number :										

R-20

Code: 20A235T

II B.Tech. I Semester Supplementary Examinations July 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)	Examine the difference between power and energy	1	2
b)	Enumerate the speed control methods of DC motor	2	2
c)	State the principle of operation of 1Ø transformer	3	2
d)	Mention the applications of PN Junction diode	4	2
e)	Justify the need for earthing	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)	Explain in detail about Lenz's law	6M	1	3
	b)	Distinguish between Fleming's right hand and Fleming's left hand rule	6M	1	3
		OR			
3.	a)	Compare and contrast the properties of series and parallel circuits	8M	1	3
	b)	Interpret the need of connecting all the electrical appliances in parallel	4M	1	5
		UNIT–II			
4.	a)	Derive an expression for emf of DC generator	8M	2	4
	b)	Outline in brief the various types of generators and their applications	4M	2	4
		OR			
5.	a)	Explicate the principle of operation of DC motor	7M	2	4
	b)	Discuss in brief about Swinburne's test	5M	2	3
		UNIT–III			
6.		How do you calculate efficiency and regulation using OC and SC tests of 1Ø transformer?	12M	3	5
		OR			
7.		Illustrate with neat sketch brake Test on 3-Φinduction motor	12M	3	4
		UNIT–IV			
8.	a)	Analyze the working of PN Junction diode based on their V-I characteristics	8M	4	4
	b)	Infer the need of using full wave rectifier over half wave rectifier	4M	4	5
		OR			
9.		With relevant input and output characteristic curves explain the operation of CE configuration NPN transistor	12M	4	4
		UNIT–V			
10.		Describe the procedure to measure voltage, current and frequency using CRO?	12M	5	4
		OR			
11.		Evaluate the role of SFU and MCB in electrical installations	12M	5	3

*** End ***