Hall Ticket Number :										

R-20

Code: 20A332T

II B.Tech. I Semester Regular Examinations March 2022

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

PART-A

(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define centrifugal die casting	1	1
b)	List destructive and non-destructive testing of welds	2	1
c)	List different types of defects in rolled products.	3	1
d)	What is difference between Forward and backward extrusion process	4	1
e)	Explain principle of blow molding	5	1

PART-B

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

		Marks	CO	Blooms Level
	UNIT–I			
2.	Describe different types pattern allowances. Explain the importance of gating and riser system in casting process.	12M	2	1
	OR			
3.	What are the common casting defects? State their causes and remedies.	12M	2	2
	UNIT–II			
4.	Explain TIG welding process with neat diagram. List out advantages and applications of this process.	12M	2	2
	OR			
5.	Classify welding process. Explain different types of welded joints.	12M	2	2
	UNIT–III			
6.	Explain the classification of metal working processes on the basis of forces applied. Describe types of rolling mills with neat block diagram	12M	3	2
	OR			

7.	Compare hot and cold working processes. Explain Blanking, piercing, Bending and drawing processes.	12M	3	2

UNIT–IV

8.	Define Extrusion? What are types of Extrusion processes? Explain each one with neat sketches?	12M	4	2

OR

9.	Explain principles of forging operations. Describe types of forging and their construction	12M	4	2

UNIT–V

10.	What is plastic injection molding? Explain different types of injection molding techniques?	12M	5	2

OR

11.	Explain the steps in manufacturing of powder metallurgy parts. What is role of 3D printers in present scenario?	12M	5	2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A331T

II B.Tech. I Semester Regular Examinations March 2022

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

PART-A

(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define the terms strain energy and resilience.	1	1
b)	Draw Shear force and Bending moment diagram for a simply supported beam with length 'L' and carrying a Uniformly distributed load.	2	1
c)	What do you mean by Pure bending?	3	1
d)	What is the relation between Slope, deflection and radius of curvature of a beam?	4	1
e)	Differentiate between hoop stress and longitudinal stress in a thin cylindrical shell.	5	1

PART-B

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

		Marks	CO	Blooms Level
	UNIT–I			
2. a)	Write a note on Mohr's circle of stresses	4M	1	3
b)	Three bars made of Copper, Zinc and Aluminium are of equal length and have cross section 500,750 and 1000 square mm respectively. They are rigidly connected at their ends. If this compound member is subjected to a longitudinal pull of 250kN, determine the proportion of the load carried on each rod and the induced stresses. Take the value of E for Copper=$1.3X10^5$ N/mm^2, for Zinc=$1X10^5$ N/mm^2 and for Aluminium = $0.8\ X10^5$ N/mm^2.	8M	1	3
	OR			
3.	A bar of 20 mm diameter is tested in tension. It is observed that when a load of 37.7 kN is applied, the extension measured over a gauge length of 200 mm is 0.12 mm and contraction in diameter is 0.0036 mm. Find Poisson's ratio and elastic constants E,G,K.	12M	1	3

UNIT–II

4.	a)	A cantilever 1.5 m long is loaded with a uniformly distributed load of 2 KN/m run over a length of 1.25 m from the free end. It also carries a point load of 3 KN at a distance of 0.25 m from the free end. Draw S.F and B.M. Diagrams of the cantilever beam.	6M	2	6
	b)	A beam 10 m long has supports at its ends A and B. It carries a point load of 2.5 KN at 7 m from A and a uniformly distributed load of 0.5 KN/m between the point load and right end. Draw the SF and BM diagrams.	6M	2	6

OR

5.	a)	Draw the SFD and BMD for a simply supported beam of length 9 m and carrying a uniformly distributed load of 10KN/m for a distance of 6 m from the left end. Also calculate the maximum bending moment on the section.	7M	2	6
	b)	Derive the relation between shear force, bending moment and rate of loading.	5M	2	6

UNIT–III

6.	a)	A square beam 20mm X20mm in section and 2 m long is supported at the ends. The beam fails when a point load of 400 N is applied at the centre of the beam. What uniformly distributed load per meter length will break a cantilever of the same material 40 mm wide,60 mm deep and 3 m long ?	8M	3	3
	b)	What are the assumptions made in theory of simple bending?	4M	3	2

OR

7.		An I section beam 350 mm X150 mm has a web thickness of 10 mm and a flange thickness of 20 mm. If the shear force acting on the section is 40 kN, find (i) the maximum shear stress developed in the I-section (ii) sketch the shear stress distribution across the section and (iii) Calculate the total shear force carried by the web.	12M	3	3

UNIT–IV

8.		A beam of length 20 m is simply supported at its ends and carries two point loads of 4 KN and 10 KN at a distance of 8m and 12 m from left end respectively. Calculate (i) deflection under each load (ii) maximum deflection. Take $E = 2X10^6$ N/mm^2 and $I = 1X10^9$ mm^4.	12M	4	3

OR

9.	a)	Derive the equations for the slope and deflection of a simply supported beam of length L and carrying a uniformly distributed load of w per unit length over the entire length.	6M	4	6
	b)	A cantilever of length 2 m carries a uniformly distributed load of 2 KN/m over a length of 1 m from the free end, and a point load of 1KN at the free end, Find the slope and deflection at the free end If $E = 2.1X10^5$ N/mm^2 and $I = 6.667X\ 10^7$ mm^4.	6M	4	2

UNIT–V

10.	a)	A cylindrical shell is subjected to internal fluid pressure, derive an expression for change in diameter.	5M	5	6
	b)	A cylindrical vessel is 1.5 m diameter and 4 m long is closed at ends by rigid plates. It is subjected to an internal pressure of 3 N/mm^2. If the maximum principal stress is not to exceed 150 N/mm^2, find the thickness of the shell. Assume $E=2X10^5$N/mm^2 and Poisson's ratio is 0.25. Find the changes in diameter, length and volume of the shell.	7M	5	2

OR

11.	a)	Derive the expressions for change in volume of a thin cylindrical shell subjected to an internal pressure 'P'.	5M	5	6
	b)	A cylindrical thin drum 80 cm in diameter and 3 m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of 2.5 N/mm^2, determine (i) change in diameter (ii) change in length and (iii) change in volume.	7M	5	3

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC31T

II B.Tech. I Semester Regular Examinations March 2022

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

PART-A

(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Write merits and demerits of Bisection method.	CO1	L1
b)	Define backward differences.	CO2	L2
c)	Write formulas for first and second derivatives using Newton's forward interpolation formula.	CO3	L3
d)	Explain Taylor's series method for solving IVP $\frac{dy}{dx} = f(x,y) \;\; with \;\; y(x_0) = y_0$.	CO4	L2
e)	Write One dimensional wave equation with boundary and initial conditions.	CO5	L1

PART-B

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

		Marks	CO	Blooms Level
	UNIT–I			
2. a)	Using bisection method, compute the real root of the equation $x^3 - 2x - 5 = 0$.	7M	CO1	L4
b)	Develop an Iterative formula to find the square root of a positive number N .Using Newton-Raphson method.	5M	CO1	L3
	(OR)			
3. a)	Find a real root of the equation $xe^x - 3 = 0$, Using False position method.	6M	CO1	L3
b)	Find a real root of the equation $\log_{10} x = 3$ using iteration method.	6M	CO1	L4
	UNIT–II			
4. a)	Evaluate $\Delta^2 \left(\tan^{-1} x \right)$.	4M	CO2	L3

b) Using Newton's forward formula, find the value of $f(1.2)$ if

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

8M CO2 L4

(OR)

5. a) Compute $f(27)$ Using Lagrange's formula from the following table:

x	14	17	31	35
$f(x)$	68.7	64.0	44.0	39.1

5M CO2 L3

b) Construct Newton's backward interpolation formula for the following data and hence find the value of y for $x =$ 9.

x	4	6	8	10
y	1	3	8	16

5M CO2 L4

UNIT–III

6. a) Determine $\frac{dy}{dx}, \frac{d^2y}{dx^2}$ at $x = 0$ from the following data

x	0	1	2	3	4	5
y	4	8	15	7	6	2

6M CO3 L4

b) Compute the value of $\int_0^1 \frac{dx}{1+x^2}$ using trapezoidal rule.

6M CO3 L3

(OR)

7. a) Evaluate $\int_0^{0.6} e^{-x^2} dx$ by using Simpson's $\frac{1}{3}$ rd rule taking seven ordinates.

6M CO3 L3

b) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's $\frac{3}{8}$ th rule.

6M CO3 L3

UNIT–IV

8. a) Using Taylor's method find $y(0.2)$ from $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0.$

6M CO4 L2

b) Using the fourth order Runge – Kutta formula, find $y(0.2)\ and\ y(0.4)$ given that $\frac{dy}{dx}=\frac{y^2-x^2}{y^2+x^2}, y(0)=1.$ — 6M CO4 L3

(OR)

9. a) Apply Euler's method to solve $\frac{dy}{dx}= x+y$ with $y(0)=0$, Choosing the step length $h= 0.2$ to estimate y at $x = 0.2,\ 0.4, 0.6.$ — 6M CO4 L3

b) Find the value of $y\ at\ x=0.1$ by Picard's method, given that $\frac{dy}{dx}=\frac{y-x}{y+x},\ y(0)=1.$ — 6M CO4 L3

UNIT–V

10. A tightly stretched string with fixed end points $x=0$ and $x=L$ is initially in a position given by $y=y_0\sin^3\left(\frac{®x}{L}\right)$ if it is released from rest from this position, find the displacement $y(x,t).$ — 12M CO5 L2

OR

11. Solve the heat equation $\frac{\partial u}{\partial t}=c^2\frac{\partial^2 u}{\partial x^2}$ under the conditions — 12M CO5 L3

$u(0,t)=0$, $u(L,t)=0$ for all t;

$u(x,0)= f(x)\ \ , 0<x<L$.

*** End ***

Hall Ticket Number :										

R-20

Code: 20A235T

II B.Tech. I Semester Regular Examinations March 2022

Basic Electrical and Electronics Engineering

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

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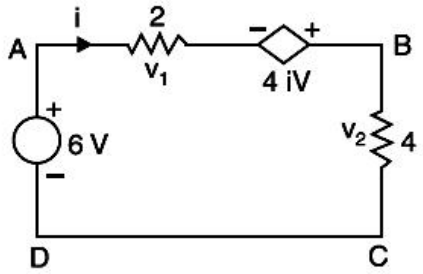
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define current and voltage?	1	L1
b)	Give different methods of speed control of DC motors?	2	L2
c)	Define and write the expression for synchronous speed?	3	L1
d)	What are the applications of P-N junction diode?	4	L2
e)	Write classification of measuring instruments?	5	L2

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

			Marks	CO	Blooms Level
		UNIT–I			
2.	a)	Explain the classification of circuit elements?	6M	1	L2
	b)	State and explain Flemings Right hand rule.	6M	1	L3
		OR			
3.	a)	State and explain Faraday's law of electromagnetic induction?	6M	1	L2
	b)	Find the values of current i and voltage drops v1 and v2 in the circuit which contains a current dependent voltage source. What is the voltage of dependent source? All resistance values are in ohms.	6M	1	L3



		UNIT–II			
4.	a)	With the help of neat sketches explain the working principle and constructional details of DC machine	6M	2	L2
	b)	Calculate the flux in a 4-pole DC generator with 722 armature conductors generating 500V when running at 1000 rpm when the armature is (i) Lap connected (ii) wave connected	6M	2	L3
		OR			

5.	a)	Explain different methods of speed control of DC series motors?	6M	2	L2
	b)	A series generator delivers a current of 100 A at 250V. its armature and series field resistance are 0.1Ω and 0.055Ω, respectively. Find (i) Armature Current (ii) Generated EMF	6M	2	L3

UNIT–III

6.	a)	Explain the operation of single phase induction motor with its constructional features?	6M	3	L2
	b)	Draw the circuit diagram and explain about break test on 3-phase induction motor.	6M	3	L3

OR

7.	a)	Explain the operation of single phase transformer with its constructional features?	6M	3	L2
	b)	A 3300/250 V, 50 Hz single phase transformer is built on a core having an effective cross sectional area of 125cm^2 and 70 turns on LV winding. Calculate (i) B_{max} (ii) No of turns on HV winding.	6M	3	L3

UNIT–IV

8.	a)	Explain in detail the working of PN junction diode and draw VI characteristics.	6M	4	L2
	b)	What is the relation between I_B, I_C and I_E in CB configuration?	6M	4	L4

OR

9.	a)	Draw the circuit diagram of an half wave rectifier and explain its operation. Also derive expressions for rectification efficiency and ripple factor.	6M	4	L4
	b)	Explain the operation of transistor as an amplifier.	6M	4	L2

UNIT–V

10.	a)	What is the principle of CRO? What is the function of time base generator in CRO?	6M	5	L2
	b)	Differentiate Earth wire and Neutral wire. Why is ground wire used in equipment ground?	6M	5	L3

OR

11.	a)	Explain the construction and operation of a miniature circuit breaker (MCB)	6M	5	L2
	b)	State the basic requirements of any measuring instrument. How are the various measuring instruments classified?	6M	5	L1

*** End ***

Hall Ticket Number :										

R-20

Code: 20A333T

II B.Tech. I Semester Regular Examinations March 2022

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

PART-A

(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	Define reversible and irreversible processes.	1	L1
b)	Differentiate between refrigerator and heat pump.	2	L2
c)	What is a pure substance? Name two pure substances.	3	L2
d)	Define enthalpy. Is it a property? If it is a property, what kind of property it is?	4	L2
e)	State two assumptions of air standard cycles.	5	L2

PART-B

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

			Marks	CO	Blooms Level
		UNIT–I			
2.	a)	Explain the three types of thermodynamic systems with neat figures. Give examples for each of them.	6M	1	L2
	b)	A vessel of 0.2 m^3 contains nitrogen at 1.013 bar and 15^0 C. If 0.2 kg of nitrogen is pumped into this vessel, calculate the new pressure when the vessel returns to its initial temperature. The nitrogen gas constant is 296 N-m / kg-K.	6M	1	L3
		OR			
3.	a)	State the assumptions and derive Steady Flow Energy Equation.	6M	1	L2
	b)	A gas undergoes two processes that are in series. The first process is an expansion that is carried out according to the law **pV = Constant** and the second process is a constant pressure process that returns the gas to the initial volume of the first process. The start of the first process is at 400 kPa and 0.025 m^3 with the expansion to 200 kPa. Sketch the process on a p-V diagram and determine the work of the combined process.	6M	1	L3
		UNIT–II			
4.	a)	Prove that entropy is a property of a system.	6M	2	L2
	b)	Derive Maxwell's relations.	6M	2	L2
		OR			
5.	a)	State and prove the principle of increase of entropy.	6M	2	L2
	b)	Calculate the entropy change of the universe as a result of the following processes: (i) A copper block of 600 grams mass and with c_p =150 J / kg-K at 100^0 C is placed in a lake at 8^0 C. (ii) Two such blocks at 100^0 C and 0^0 C are joined together.	6M	2	L3

UNIT–III

6.	a)	Show the following processes on T-s and h-s diagrams: (i) Constant volume cooling, (ii) Constant pressure heating (iii) Throttling, and (iv) Isentropic expansion.	6M	3	L2
	b)	A vessel of 0.025 m^3 capacity contains steam at 250^0 C. The mass of liquid present is 4 kg. Determine the pressure, the mass, the specific volume and the enthalpy of the steam.	6M	3	L3
		OR			
7.	a)	Derive Clausius – Clapeyron equation.	6M	3	L2
	b)	Steam at the critical state is contained in a rigid vessel. Heat is transferred from the steam until the pressure falls to 25 bar. Determine the quality of the steam.	6M	3	L3

UNIT–IV

8.	a)	What is adiabatic process? Show that for an adiabatic process: $\mathbf{PV^{\gamma} = constant}$	6M	4	L2
	b)	A mass of gas is compressed in a quasistatic process from 80 kPa, 0.1 m^3 to 0.4 MPa, 0.03 m^3. Assuming that the pressure and volume are related by $\mathbf{pv^n = constant}$, find the work done by the gas system, the heat transferred and the change in internal energy.		4	L3
		OR	6M		
9.	a)	Explain Dalton's law of partial pressures and Avogadro's law of additive volumes.	6M	4	L2
	b)	A mixture of ideal gases consists of 3 kg of nitrogen and 5 kg of carbon dioxide at a pressure of 300 kPa and a temperature of 20^0 C. Find (i) the mole fraction of each constituent, (ii) the equivalent molecular weight of the mixture, (iii) the equivalent gas constant of the mixture, and (iv) the partial pressures and partial volumes.	6M	4	L3

UNIT–V

10.	a)	Differentiate between Otto and Diesel air cycles.	6M	5	L2
	b)	An engine working on Otto cycle is supplied with air at 0.1 MPa, 35^0 C. The compression ratio is 8 and heat supplied is 2100 kJ/kg. Calculate the maximum pressure and temperature of the cycle, the cycle efficiency, and the mean effective pressure.	6M	5	L3
		OR			
11.	a)	Derive an expression for air standard efficiency of dual cycle.	6M	5	L2
	b)	In an engine working on dual cycle, the temperature and pressure at the beginning of the cycle are 90^0 C and 1 bar respectively. The compression ratio is 9. The maximum pressure is limited to 68 bar and total heat supplied per kg of air is 1750 kJ. Compute pressure and temperatures at all salient points and air standard efficiency.	6M	5	L3

*** End ***