Hall Ticket Number :										

R-20

Code: 20A332T

II B.Tech. I Semester Supplmentary Examinations August 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)	What is importance of riser in casting technology?	1	1
b)	What is thermit welding and list its applications?	2	1
c)	Explain principle of hot working process.	3	1
d)	What is rotary swaging in forging process?	4	1
e)	Explain principle of transfer 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.	Explain Investment casting process with neat sketch. Describe any two applications of Investment casting process.	12M	2	1
	OR			
3.	What is pattern? Describe various types of patterns with neat sketch.	12M	2	2
	UNIT–II			
4.	Explain MIG welding process with neat diagram. List out advantages and applications of this process.	12M	2	2
	OR			
5.	What are heat affected zones in welding? Give remedies to minimize the heat affected zones.	12M	2	2
	UNIT–III			
6.	Differentiate hot working and cold working. Compare blanking die and drawing die.	12M	3	2
	OR			

7.	Describe mechanism of rolling process. Explain defects in Rolled products.	12M	3	2

UNIT–IV

8.	Differentiate forward and backward extrusion process. Compare soldering, brazing and welding process.	12M	4	3

OR

9.	Explain forging process and its advantages. What are various defects in forging?	12M	4	2

UNIT–V

10.	Describe Methods of processing plastics. What are desirable properties of plastic molding materials?	12M	5	2

OR

11.	What are methods used to produce metal powder? Explain any three methods of producing powder.	12M	5	2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A331T

II B.Tech. I Semester Supplmentary Examinations August 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)	Draw a typical stress-strain curve for mild steel and indicate the salient points.	1	1
b)	Define the terms Shear force and Bending moment and write its sign conventions.	2	1
c)	What do you understand by neutral axis and moment of resistance?	3	1
d)	Write the slope and deflection equations for cantilever beam carrying UDL.	4	1
e)	How does a thin cylinder fail due to internal fluid pressure?	5	1

PART-B

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

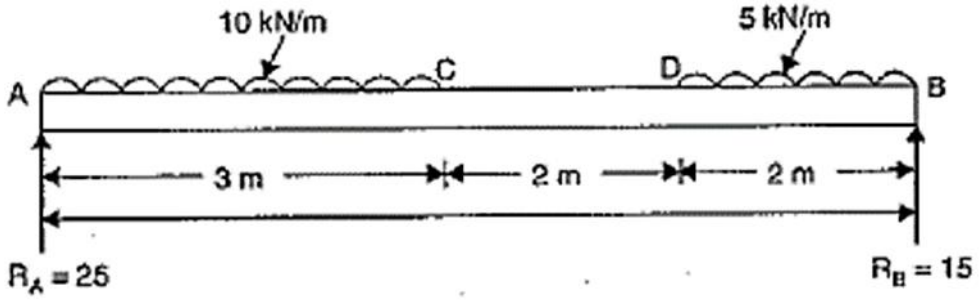
		Marks	CO	Blooms Level
	UNIT-I			
2. a)	Derive an expression between Modulus of elasticity, Modulus of rigidity and the Poisson's ratio.	4M	1	6
b)	A steel tube of 30 mm external diameter and 25 mm internal diameter encloses a gun metal rod of 20 mm diameter to which it is rigidly joined at each end. The temperature of the whole assembly is raised to 140^0 C and the nuts on the rod are then screwed lightly home on the ends of the tube. Find the intensity of stress in the rod when the common temperature has fallen to 30^0 C. The value of E for steel and gun metal is 2.1 $X10^5$ N/mm^2 and $1X10^5$ N/mm^2 respectively. The linear coefficient of expansion for steel and gun metal is $12X10^{-6}/^0$ C and $20X10^{-6}/^0$ C.	8M	1	3
	OR			
3. a)	Explain the terms Principal stresses and Principal planes.	4M	1	2

	b)	The principal tensile stresses at a point on two perpendicular planes are 60 MPa and 30 MPa. Find the normal, tangential and resultant stress and its obliquity on a plane at 20^0 with the major principal plane.Also find the intensity of stress which acting alone can produce the same maximum strain. Assume Poisson's ratio as 0.3.	8M	1	3

UNIT-II

4.		A Simply supported beam of length 5 m carries a uniformly increasing load of 800 N/m run at one end to 1600 N/m run at the other end. Draw the S.F and B.M diagrams for the beam. Also calculate the position and magnitude of maximum bending moment.	12M	2	6

OR

5.		Draw the S.F and B.M diagrams of a simply supported beam of length 7 m carrying uniformly distributed loads as shown in figure. 	12M	2	6

UNIT-III

6.	a)	Derive the bending equation from the first principles	5M	3	6
	b)	A timber beam of rectangular beam of length 8 m is simply supported. The beam carries a U.D.L of 12 KN/m run over the entire length and a point load of 10 KN at 3 m from the left support.If the depth is two times the width and the stress in the timber is not to exceed 8 N/mm^2.Find the suitable dimensions of the section.	7M	3	3

OR

7.	a)	Prove that the maximum shear stress in a circular section of a beam is 4/3 times the average shear stress.	5M	3	2

	b)	A beam of cross section of an isosceles triangle is subjected to a shear force of 30 kN at a section where base width = 150 mm and height = 450 mm. Determine: (i) Horizontal shear stress at the neutral axis (ii) distance of the top of the section where shear stress is maximum and (iii) value of maximum shear stress.	7M	3	3

UNIT-IV

8.		A beam of length 6 m is simply supported at its ends and carries two point loads of 48 KN and 40 KN at a distance of 1m and 3 m respectively from the left support. Find : (i) Deflection under each load (ii) maximum deflection and (iii) the point at which maximum deflection occurs. Given $E = 2X10^5$ N/mm^2 and $I = 85X10^6$ mm^4	12M	4	3

OR

9.	a)	A cantilever of length 2 m carries a uniformly varying load of 25 KN/m at the free end to 75 KN/m at the fixed end, If $E = 1X10^5$ N/mm^2 and $I = 10^8$ mm^4.Determine the slope and the deflection of the cantilever at the free end.	6M	4	3
	b)	Derive an expression for maximum deflection of a simply supported beam carrying a Uniformly distributed load.	6M	4	6

UNIT-V

10.	a)	Derive the expressions for circumferential and longitudinal stresses for a thin shell subjected to an internal pressure	5M	5	6
	b)	Calculate: (i) the change in diameter, (ii) change in length and (iii) change in volume of a thin cylindrical shell 100 cm diameter,1 cm thick and 5 m long when subjected to internal pressure of 3 N/mm^2.Take the value of $E = 2X10^5$ N/mm^2 and poisson's ratio = 0.3	7M	5	4

OR

11.	a)	Derive the expressions for change in diameter, change in length and change in volume of a thin cylindrical shell subjected to an internal pressure 'P'.	6M	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.	6M	5	6

*** End ***

Hall Ticket Number :										

R-20

Code: 20AC31T

II B.Tech. I Semester Supplmentary Examinations August 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)	Explain the Method of false position.	CO1	L1
b)	Define forward differences.	CO2	L2
c)	Write formulas for first and second derivatives using Newton's backward interpolation formula.	CO3	L3
d)	Explain Euler's method to solve the IVP $\frac{dy}{dx} = f(x,y)\ with\ y(x_0) = y_0$.	CO4	L2
e)	Write the suitable solution of one dimensional heat equation.	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)	Find a real root of the equation $x \log_{10} x = 1.2$ by regula-falsi method correct to four decimal places.	6M	CO1	L4
b)	Develop an Iterative formula to find the k^{th} root of a positive number N .Using Newton-Raphson method.	6M	CO1	L3
	(OR)			
3. a)	Using bisection method, compute the real root of the equation $x^3 - x - 11 = 0$.	6M	CO1	L3
b)	Find a real root of the equation $2x - \log_{10} x = 7$, using iteration method.	6M	CO1	L4
	UNIT–II			
4. a)	Evaluate $\Delta\left(e^x \log 2x\right)$.	6M	CO2	L2

b) Using Newton's forward formula compute $f(142)$ from the following table:

x	140	150	160	170	180
$f(x)$	3.685	4.854	6.302	8.076	10.225

6M CO2 L4

(OR)

5. a) Use Lagrange's interpolation formula to find the value of y when x=10 if the following values of x and y are given.

x	5	6	9	11
y	12	13	14	16

6M CO2 L3

b) Find the polynomial $f(x)$ from the following data

x	0	1	4	5
y	4	13	24	39

6M CO2 L4

UNIT–III

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

x	0	1	2	3	4	5
y	0	1	8	27	64	125

6M CO3 L4

b) Evaluate $\int_0^1 x^3\,dx$ with five sub-intervals by Trapezoidal Rule

6M CO3 L3

(OR)

7. a) Find $\int_0^1 \frac{dx}{1+x^2}$ by Simpson's 3/8th rule taking $h = 1/6$.

6M CO3 L3

b) Evaluate, $\int_0^2 e^{-x^2}\,dx$ by using Trapezoidal rule and Simpson's $\frac{1}{3}$ rd rule taking $h = 0.25$.

6M CO3 L3

UNIT–IV

8. a) Find $y(0.1)$ by Taylor's series expansion when

$$\frac{dy}{dx} = x - y^2,\ y(0) = 1$$

6M CO4 L3

b) Apply Runge-Kutta method of 4th order, to find an approximate value of y when $x = 0.2$ given that

$$\frac{dy}{dx} = x + y,\ y(0) = 1.$$

6M CO4 L3

(OR)

9. a) Given that $\frac{dy}{dx} = 2 + \sqrt{xy}$, $y(1) = 1$.

Find $y(2)$ in steps of 0.2 using the Euler's method. 6M CO4 L3

b) Obtain Picard's second approximate solution of the initial value problem $\frac{dy}{dx} = \frac{x^2}{y^2 + 1}$, $y(0) = 0$.

6M CO4 L3

UNIT–V

10. Solve the wave equation $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ under the conditions

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

$y(x,0) = f(x)$ and $\left(\frac{\partial y}{\partial t}\right)_{t=0} = g(x)$, $0 < x < L$.

12M CO5 L2

OR

11. A homogeneous rod of conducting material of length 100 cm has its ends kept at zero temperature and the temperature initially is

$$u(x,0) = \begin{cases} x\ , & 0 \le x \le 50 \\ 100 - x\ , & 50 \le x \le 100 \end{cases}.$$

Find the temperature $u(x,t)$ at any time. 12M CO5 L3

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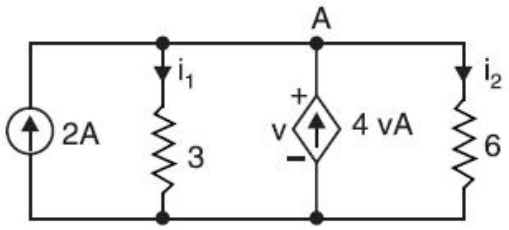
Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. In Part-A, each question carries **Two mark.**
3. Answer **ALL** the questions in **Part-A** and **Part-B**

PART-A
(Compulsory question)

		CO	Blooms Level
1.	Answer ***all*** the following short answer questions (5 X 2 = 10M)		
a)	What is Fleming's right hand rule?	1	L1
b)	Draw and explain speed torque characteristics of a DC shunt motor?	2	L2
c)	Define Slip of an induction motor? What happens if slip becomes zero?	3	L1
d)	Explain the concept of negative resistance region?	4	L2
e)	Enumerator various types of cables?	5	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)	State and explain Fleming's Right hand rule and Lenz's law?	6M	1	L2
	b)	Find the values of v,i1 and i2 in the circuit shown which contains a voltage dependent current source. Resistances values are in ohms.	6M	1	L3



OR

3.	a)	State Ohm's law and mention the limitations of ohm's law?	6M	1	L2
	b)	The air gap in a magnetic circuit is 1.5 mm long and 2500mm^2 in cross-sectional area. Calculate the (i) reluctance of the air gap (ii) m.m.f required to set up a flix of 800X10^{-6} Wb in the air gap.	6M	1	L3
		UNIT–II			
4.	a)	Derive an expression for EMF in DC Motor	6M	2	L3
	b)	A 6 pole has an armature with 90 slots and 8 conductor/slot and running at 1000 rpm, the flux per pole is 0.05 wb. Determine the induced EMF if the winding is Lap connected.	6M	2	L3

OR

5.	a)	Describe the working and principle of operation of a DC Generator?	6M	2	L2
	b)	A 500V shunt motor takes 4 A on no load. The armature resistance including that of brushes is 0.2Ω and the field current is 7 A. Estimate the output and efficiency when input current is (i) 20 A (ii) 100A	6M	2	L3

UNIT–III

6.	a)	Determine the voltage regulation of an alternator using synchronous impedance method?	6M	3	L3
	b)	A 3-phase, 4-pole, 50 Hz induction motor has a starting torque which is 20% of the max torque. If the rotor resistance is 0.3Ω per phase, calculate (i) rotor leakage reactance (ii) slip at max torque (iii) speed at max torque.	6M	3	L3

OR

7.	a)	State various losses occurring in a single phase transformer? On what factors do they depend?	6M	3	L2
	b)	A 315KVA, 50 Hz single phase transformer has full load copper loss 1900 watts and iron loss of 1800 watts. Calculate the efficiency of a transformer at full load and at 0.8pf lagging.	6M	3	L3

UNIT–IV

8.	a)	Explain in detail about full wave rectifier with capacitor filter with neat sketches	6M	4	L2
	b)	What is meant by transistor biasing? And explain the need of biasing in a transistor amplifier. Mention few method of biasing.	6M	4	L2

OR

9.	a)	Briefly explain the operation of NPN and PNP transistors.	6M	4	L2
	b)	Explain volt ampere characteristics of diode using diode current equation.	6M	4	L2

UNIT–V

10.	a)	Explain the measurement of current and frequency with the help of CRO.	6M	5	L2
	b)	What is the necessity of earthing or grounding? Explain different methods of earthing.	6M	5	L3

OR

11.	a)	Explain the procedure of energy consumption calculation.	6M	5	L2
	b)	Write about various errors and compensations in measuring instruments.	6M	5	L2

*** End ***

Hall Ticket Number :										

R-20

Code: 20A333T

II B.Tech. I Semester Supplmentary Examinations August 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 state and property of a substance.	1	L1
b)	Define PMM1 and PMM2.	2	L1
c)	What do you mean by critical point and triple point during change of phase of a pure substance?	3	L2
d)	Define compressibility factor. What is the use of compressibility chart?	4	L2
e)	Draw p-v and T-s diagrams for dual cycle.	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)	Prove that internal energy is a property of a system.	6M	1	L2
	b)	A turbine operating under steady flow conditions receives 5000kg of steam / hour. The steam enters the turbine at a velocity of 3000m / min, an elevation of 5 m and a specific enthalpy of 2787kJ/kg. It leaves the turbine at a velocity of 6000m / min, an elevation of 1 m and a specific enthalpy of 2259kJ / kg. Heat losses from the turbine to the surroundings amount to 16,736kJ/hour. Determine the power output of the turbine.	6M	1	L3
		OR			
3.	a)	Compare heat and work.	6M	1	L2
	b)	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.	6M	1	L3
		UNIT–II			
4.	a)	State the Kelvin-Planck and Clausius statements of 2nd law of thermodynamics and establish their equivalence.	6M	2	L2
	b)	In a reversible process the rate of heat transfer to the system per unit temperature rise is given by $\delta Q / T$ = 0.5 kJ/K. Find the change in entropy of system if its temperature rises from 500 K to 800 K.	6M	2	L3
		OR			

5.	a)	Define Gibb's and Helmholtz's functions. What are the differences between them?	6M	2	L2
	b)	A fish freezing plant requires 50 tons of refrigeration. The freezing temperature is - 40^0 C while the ambient temperature is 35^0 C. If the performance of the plant is 15 % of the theoretical reversed Carnot cycle working within the same temperature limits, calculate the power required.	6M	2	L3

UNIT–III

6.	a)	Explain the following terms relating to steam formation: Sensible heat of water, Latent heat of steam, Dryness fraction of steam, Enthalpy of wet steam, Dry saturated steam and Super-heated steam.	6M	3	L2
	b)	Find the enthalpy and entropy of steam when the pressure is 2MPa and the specific volume is 0.09 m^3 / kg.	6M	3	L3

OR

7.	a)	Give a brief account about experimental method of calculating dryness fraction of steam using throttling calorimeter.	6M	3	L2
	b)	Determine the enthalpy, volume, internal energy and entropy of superheated steam at 15 bar and 220^0 C. The volume of water may be neglected and take the specific heat of superheated steam equal to 2.2 kJ / kg.	6M	3	L3

UNIT–IV

8.	a)	Explain the throttling process and free expansion process.	6M	4	L2
	b)	A fluid undergoes a reversible adiabatic compression from 0.5MPa, 0.2 m^3 to 0.05 m^3 according to the law $\boldsymbol{pv^{1.3}=constant}$. Determine the change in enthalpy, internal energy, entropy, heat transfer and work transfer during the process.	6M	4	L3

OR

9.	a)	State Van Der Walls equation of state of a gas and obtain expressions for the two constants of the equation.	6M	4	L2
	b)	Find the increase in entropy when 2 kg of oxygen at 60^0 C are mixed with 6 kg of nitrogen at the same temperature. The initial pressure of each constituent is 103 kPa and is the same as that of the mixture.	6M	4	L3

UNIT–V

10.	a)	Draw p-v and T-s diagrams for Otto cycle and derive expressions for its air standard efficiency.	6M	5	L2
	b)	An engine equipped with a cylinder having a bore of 15 cm and stroke of 45 cm operates on an Otto cycle. If the clearance volume is 2000 cm^3, compute the air standard efficiency.	6M	5	L3

OR

11.	a)	Draw p-v and T-s diagrams for Diesel cycle and derive an expression for its M.E.P.	6M	5	L2
	b)	A Diesel engine has a compression ratio of 14 and cut-off takes place at 6 % of the stroke. Find the air standard efficiency.	6M	5	L3

*** End ***