Code: 7G534

II B.Tech. I Semester Supplementary Examinations February 2022
Manufacturing Technology
(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	CO	Blooms Level

UNIT–I

1. Draw the sketches of Risers, Runner and Gating system in the castings.   14M

OR

2. Classify the types of pattern allowances with neat sketches.   14M

UNIT–II

3. State the advantages and limitation of TIG and MIG welding   14M

OR

4. Explain Soldering and brazing with neat sketch and mention its uses   14M

UNIT–III

5. Define the term Bending? Explain types of Bending with neat sketches.   14M

OR

6. Explain the defects in Rolled products with neat sketches   14M

UNIT–IV

7. Define the stages of Drop forging with practical example   14M

OR

8. Describe tools and dies used in forging with neat sketches   14M

UNIT–V

9. Explain the working principle of blow and injection moulding with neat sketch?   14M

OR

10. Explain the working of Extrusion process and mention its uses and limitations.   14M

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Code: 7G533

R-17

II B.Tech. I Semester Supplementary Examinations February 2022
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) Write short notes on (i) Zeroth law of Thermodynamics. (ii) First law of Thermodynamics.   8M
   b) Prove that Internal energy is a property of the system.   6M

OR

2. A stationary mass of gas is compressed without friction from an initial state of $0.3m^3$ and 0.105MPa to a final state of $0.15m^3$ and 0.105MPa. There is a transfer of 37.6KJ of heat from the gas during the process. How much does the internal energy of the gas change?   14M

UNIT–II

3. a) 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
   b) Bring out the concept of entropy and importance of T-s diagram.   7M

OR

4. a) Derive an expression for Clausius inequality and explain its utility.   10M
   b) Write a short notes on Third law of Thermodynamics   4M

UNIT–III

5. a) Steam enters in an engine at a pressure of 10 bar absolute and 250^0C. It is exhausted at 0.2 bar. The steam exhaust is 0.9dry. Find i) drop in enthalpy ii) Change in entropy   8M
   b) Explain the concept of Triple point.   6M

OR

6. a) Derive an expression for Clausius Clapeyron equation applicable to fusion and Vaporization.   10M
   b) What is a pure substance?   4M

UNIT–IV

7. a) A spherical shaped balloon of 10 m diameter contains hydrogen at 33 ^0C and 1.3 bar. Find the mass of hydrogen in the balloon.   5M
   b) $0.3 m^3$ of air at pressure 8 bar expands to $1.5 m^3$. The final pressure is 1.3 bar. Assuming the expansion to be polytropic. Calculate the heat supplied and change of internal energy. Assume =1.4   9M

OR

8. a) Explain Vander wall's equation of state and derive the constants for the equation   10M
   b) What is the significance of Vanderwaal's constants : a & b.   4M

UNIT–V

9. a) Write a short note on the Gravimetric Analysis.   7M
   b) Briefly discuss about the Volumetric Analysis.   7M

OR

10. a) The following volumetric composition relate to a mixture of gases: - N_2 = 81%, CO_2=11%, O_2 = 6%, CO = 2% Determine i) the gravimetric composition.ii) Molecular weight and iii) gas constant R for the mixture.   10M
    b) Establish the relation between mass fraction and mole fraction   4M

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Code: 7GC32

II B.Tech. I Semester Supplementary Examinations February 2022
Engineering Mathematics-III
(Common to All Branches)

Max. Marks: 70   Time: 3 Hours
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)
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UNIT–I

1. a) Apply fourth order Runge-Kutta method to $\dfrac{dy}{dx} = 3x + \dfrac{1}{2}y$, $y(0) = 1$ determine $y(0.1)$ correct to four decimal places.   7M

   b) Find a real root of the equation $3x = \cos x + 1$ by Newton-Raphson's method correct to four decimal places.   7M

OR

2.   Find a real root of the equation $3x = \cos x + 1$ by Newton-Raphson's method correct to four decimal places.   14M

UNIT–II

3. a) Using Newton's forward interpolation formula and the given table of values

x	1.1	1.3	1.5	1.7	1.9
F(x)	0.21	0.69	1.25	1.89	2.61

   Obtain the value of f(x) when x = 1.2   7M

   b) Find the first and second derivatives of the function tabulated below at the point x = 1.5

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

          7M

OR

4.   The following table of values of x and y is given.

x	0	1	2	3	4	5	6
y	6.9897	7.4036	7.7815	8.1291	8.4510	8.7506	9.0309

   Find $\dfrac{dy}{dx}$ *and* $\dfrac{d^2 y}{dx^2}$ at x=6   14M

UNIT–III

5.   Form the partial differential equation by eliminating the arbitrary constants $x^2 + y^2 + (z-c)^2 = a^2$ 14M

OR

6. a) Form a partial differential equation by eliminating the arbitrary functions from $z = f(x+at) + g(x-at)$. 7M

   b) Solve $(x^2 - yz)p + (y^2 - zx)q = (z^2 - xy)$ 7M

UNIT–IV

7. a) Find the Fourier series to represent $f(x) = f \ x$ in $0 \le x \le 2$ 7M

   b) Find the half range cosine series for the function $f(t) = t - t^2$, in $0 < t < 1$ 7M

OR

8. a) Find the Fourier series to represent $f(x) = |x|$ when $-f < x < f$ and deduce that $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \dots = \dfrac{f^2}{8}$ 7M

   b) Find the half range cosine series for the function $f(x) = x$, when $0 < x < f$ hence show that $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \dots = \dfrac{f^2}{8}$ 7M

UNIT–V

9. a) Find the Fourier cosine transform of $f(x) = e^{-ax} \ (x > 0, a > 0)$. 7M

   b) Find the Fourier transform of $f(x)$ given by $f(x) = \begin{cases} 1, & for \ |x| < 1 \\ 0, & for \ |x| > 1 \end{cases}$ hence evaluate $\displaystyle\int_0^\infty \dfrac{\sin x}{x}\,dx$ 7M

OR

10. Find the finite Fourier sine and cosine transforms of $f(x)$ defined by

$$f(x) = \begin{cases} 1, 0 < x < \dfrac{f}{2} \\ -1, \dfrac{f}{2} < x < f \end{cases}$$

14M

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Code: 7G532

II B.Tech. I Semester Supplementary Examinations February 2022

Metallurgy and Material Science

(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	CO	Blooms Level

UNIT–I

1.	Define Solid Solution. Classify and explain types of solid solutions with neat sketches	14M

OR

2.	State and explain Hume Rothery's rules for the formation of Substitutional solid solution.	14M

UNIT–II

3.	Explain the phase diagram for "Two components completely soluble in Liquid state and completely soluble in solid state"	14M

OR

4.	Draw the phase diagram for "Two components completely soluble in Liquid state and partially soluble in solid state" and briefly explain it.	14M

UNIT–III

5.	a)	Briefly explain the characteristics of cast irons	7M
	b)	Classify Cast Irons Explain any one of them	7M

OR

6.	a)	Explain the microstructure, properties and applications of Grey cast iron	7M
	b)	Discuss about malleable cast iron mentioning its properties and applications	7M

UNIT–IV

7.	Describe the steps involved in construction of TTT diagram	14M

OR

8.	Outline the principle of Induction hardening. How is induction hardening carried out. Also mention its advantages and disadvantages.	14M

UNIT–V

9.	Write about the Bessemer process of steel making with a neat sketch	14M

OR

10.	a)	Differentiate between acidic and basic OH process	7M
	b)	Define powder metallurgy process and applications of powder metallurgy	7M

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