Hall Ticket Number :										

R-14

Code: 4G533

II B.Tech. I Semester Supplementary Examinations August 2021

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)

****

UNIT–I

1. a) Classify the types of thermodynamic systems with the help of suitable example. 7M
   b) Identify the differences between open system and closed system in thermodynamics. 7M

OR

2. a) A mass of gas is compressed in a quasi-static process from 80KPa, 0.1m^3 to 0.4 MPa, 0.03m^3. Assuming that pressure and volume are related by PV^n= constant. Find the work interaction during the process. Identify whether it a work producing system or work absorbing system. 8M
   b) Differentiate between Reversible process and Irreversible Process with the help of suitable examples. 6M

UNIT–II

3. a) Determine the expression for the measurement of performance for reversible heat engines, heat pump and refrigerators. 10M
   b) State Carnot theorem. 4M

OR

4. a) Derive Maxwell relations and deduce two “Tds” equations 10M
   b) Define the following Terms i) Availability ii) Irreversibility 4M

UNIT–III

5. a) Write about the Mollier Chart and its use. 7M
   b) Draw and explain P-V diagram for pure substance. 7M

OR

6. a) Draw a neat sketch of throttling calorimeter and explain how dryness fraction of steam is determined. 7M
   b) Find the internal energy and enthalpy of unit mass of steam of a pressure of 7 bar when (i) its quality is 80 % (ii) it is dry saturated (iii) Superheated the degree of superheat being 65 ^{0}C. 7M

UNIT–IV

7. a) 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 γ=1.4 7M
   b) Derive the expressions for heat transfer and work done during a reversible isothermal process. 7M

OR

8. a) One kg of CO_2 has a volume of 1 m^3 at 100°C. Compute the pressure by a) Vander Waal’s equation b) Perfect gas equation The Vander Waal’s constants a = 362850 Nm^4 /$(kg\text{-}mol)^2$ and b=0.0423 m^3 /(kg-mol). 10M
   b) List out the assumptions made in the ideal gas equation. 4M

UNIT–V

9. a) State Dalton’s law of additive pressure and Amagat’s law of additive volumes 6M
   b) Explain Mass fraction .Mole fraction, Internal energy and specific heat of gas mixtures 8M

OR

10. A gas mixture consists of 0.4kg of carbon monoxide and 1.1 kg of carbon dioxide Calculate the mass fraction, mole fraction, molar mass and gas constant. 14M

***

Hall Ticket Number :										

R-14

Code: 4GC31

II B.Tech. I Semester Supplementary Examinations August 2021

Mathematics-II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *any five* full questions by choosing one question from each unit (5x14 = 70 Marks)

****

UNIT–I

1. Find the values of λ for which the equations (λ-1)x+(3λ+1)y+2λz=0; (λ-1)x+(4λ-2)y+(λ+3)z=0; 2x+(3λ+1)y+3(λ-1)z=0 are consistent and find the ratios of x:y:z when λ has the smallest of these values. What happens when λ has the greatest of these values?

OR

2. Find the characteristic of the matrix A= $\begin{bmatrix} 1 & 1 & 3 \\ 1 & 3 & -3 \\ -2 & -4 & -4 \end{bmatrix}$ and hence find its inverse

UNIT–II

3. a) Find a real root of the equation x^3-2x-5=0 by the method of false position correct to three decimal places.

   b) Find the cubic polynomial which takes the following values:

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

OR

4. Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using (i) Trapezoidal rule, (ii) Simpson's 1/3 rule (iii) Simpson's 3/8 rule.

UNIT–III

5. Employ Taylor's method to obtain approximate value of y at x=0.2 for the differential equation dy/dx=2y+3e^x, y(0)=0.Compare the numerical solution obtained with the exact solution.

OR

6. Using Runge-Kutta method of order 4, find y for x=0.1,0.2,0.3 given that dy/dx=xy+y^2, y(0)=1.Continue the solution at x=0.4 using Milne's method.

UNIT–IV

7. Obtain the Fourier series for $f(x)=x$ in the interval $-® < x < ®$

OR

8. Find the half range sine and cosine series of $f(x)=x$ in $0<x<2$

UNIT–V

9. Determine p such that the function $f(z)=\frac{1}{2}\log\left(x^2+y^2\right)+i\tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function

OR

10. Evaluate $\int_c \frac{e^z}{\left(z^2+®^2\right)^2}dz$ where c is $|z|=4$

***

Hall Ticket Number :										

R-14

Code: 4G531

II B.Tech. I Semester Supplementary Examinations August 2021

Mechanics of Solids

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five* full questions by choosing one question from each unit (5x14 = 70 Marks)

****

UNIT–I

1. a) Draw the stress-strain diagram of mild steel specimen subjected to tensile test and explain the salient points. 7M

   b) An aluminium bar 60mm diameter when subjected to an axial tensile load 100KN elongates 0.20mm in a gauge length 300mm and the diameter is decreased by 0.012mm. Calculate the modulus of elasticity and the poisson's ratio of the material. 7M

OR

2. a) Draw Mohr's circle when the component is subjected to mutually perpendicular tensile stresses.. 7M

   b) Prove that the maximum stress induced in a body due to suddenly applied load is twice the stress induced when the same load is applied gradually. 7M

UNIT–II

3. A beam ABC 8 m long has the support at the end A and other support at B 6 m from A. It carries a uniformly distributed load of 6 kN/m over the entire length and a point load of 10kN at the end C. Draw the shear force and bending moment diagrams 14M

OR

4. A simple supported beam of length 8m rests on supports 6m apart, the right hand end is overhanging by 2 m. The beam carries a uniformly distributed load of 1500 N/m over the entire length. Draw the shear force and bending moment diagrams and find the point of contra flexure, if any? 14M

UNIT–III

5. a) Prove that for a rectangular section the maximum shear stress is 1.5times the average stress. Sketch the variation of shear stress. 7M

   b) Circular beam of 100mm diameter is subjected to a shear force of 10 KN. Calculate
   i. Average shear stress.
   ii. Maximum shear stress.
   Also sketch the variation of the shear stress along the depth of the beam. 7M

OR

6. a) Derive the section modules for a hollow rectangular section 4M

   b) A beam is simply supported and carries a U.D.L of 40kN/m run over the whole span. The section of the beam is rectangular having depth as500mm. If the maximum stress in the material of the beam is 120N/mm^2 and moment of inertia of the section is 7× 10^8 mm^4, find the span of the beam. 10M

UNIT–IV

7. a) Derive the relationship between slope, deflection and radius of Curvature of a simply supported beam. 7M

   b) A beam of 6 meter long simply supported at its ends, carries a point load 'W' at its centre. If the slope at the ends of the beam is not to exceed 1^0, find the maximum deflection. 7M

OR

8. A beam ABC of length 10 m has one support at the left end and the other support at a distance of 6 m from the left end. The beam carries a point load of 1 kN at right end and also carries a UDL of 3 kN/m over a length of 4 m from right end 'C'. Determine the slope and deflection at point 'C'. Take E= 2 X 10^5 N/mm^2 and I = 5 X 10^8 mm^4. 14M

UNIT–V

9. State and explain Lame's theory for thick cylindrical shells. Derive the Lame's equations. 14M

OR

10. A compound cylinder is made by shrinking a cylinder of external diameter cylinder of 30 cm and internal diameter25cm over another cylinder of external diameter 25cm and internal diameter20cm. After shrinking the radial pressure at the common junction was 8 N/mm2. Find the final stresses set up across the section when the compound cylinder is subjected to an internal fluid pressure of 84.5 N/mm^2. 14M

***