Hall Ticket Number :										

R-14

Code: 4G533

II B.Tech. I Semester Supplementary Examinations October 2020

Basic Thermodynamics

(Mechanical Engineering)

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) Explain Quasi- static process with an example
   b) A gas undergoes a reversible non flow process according to the relation P = (-3V + 15) where V is the volume in cubic meter and P is the pressure in bar. Determine the work done where the volume changes from 3 to 6 cubic meters.

OR

2. a) Define Zeroth law of Thermodynamics. Explain how it is basis for the temperature measurement.
   b) Define internal energy of a system and show that it is a property of the system.

UNIT–II

3. a) What are the two statements of Second law of Thermodynamics
   b) An engine operating on a Carnot cycle works within temperature limits of 600 K and300 K. If the engine receives 2000 KJ of heat evaluate the work done and thermal efficiency of the engine.

OR

4. a) Explain Available energy ,Availability and Irreversibility
   b) Prove Maxwell relations.

UNIT–III

5. a) What is steam quality? Develop relations for specific volume, enthalpy and internal energy for two-phase mixture.
   b) A vessel containing 5 kg of steam at 8 bar and 250^0C is cooled by pouring water over the outer surface, till the inside pressure falls to 5 bar. Calculate
   i) the final state of the steam **ii)** heat loss **iii)** loss of internal energy.

OR

6. a) Explain about critical point of steam. Why does the fusion line for water have negative slope?
   b) 10 kg of water at 45^0C is heated at a constant pressure of 10 bar until it becomes superheated vapour at 300^0C. Find the change in volume, enthalpy, internal energy and entropy.

UNIT–IV

7. a) Explain Vander wall's equation of state and derive the constants for the equation
   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 γ=1.4.

OR

8. a) State Dalton's law of additive pressure
   b) A gas mixture consists of 0.4 kg CO, 1.1 kg of CO_2 and1.5 kg of N_2. Determine
   (i) Mass fraction of each component. (ii) mole fraction of each component .(iii) average molar mass of the mixture .(iv)gas constant of the mixture.

UNIT–V

9. a) Explain the four processes of the Stirling cycle with PV and TS diagrams?
   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?

OR

10. a) What is an Air standard cycle? What are the assumptions for Air standard cycles?
    b) In a constant volume cycle the temperature at the beginning and end of the compression are 43^0C and 323^0C respectively. Calculate the **i)** air standard efficiency and **ii**) the compression ratio. Assume γ=1.4 for air.

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Hall Ticket Number :										

R-14

Code: 4G236

II B.Tech. I Semester Supplementary Examinations October 2020

Electrical Engineering and Electronics Engineering

(Common to ME, CSE & IT)

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) Define the terms
   i) Electric Current ii) Potential Difference iii) Electric Power iv) Energy
   b) Three capacitors of 2 mF, 5 mF and 10 mF are connected in series. Find the equivalent capacitance.

OR

2. a) Define the Ohm's Law and its applications.
   b) State and explain Kirchoff's laws using neat diagrams.

UNIT–II

3. a) Explain the operation of principle of DC generator.
   b) Derive the expression for Torque in a DC Motor.

OR

4. a) Derive the emf equation of DC generator.
   b) A 4-pole, lap wound, DC generator has a useful flux of 0.07Wb per pole, armature consists of 440 numbers of conductors. Calculate the generated emf when it is rotated at a speed of 900 rpm with the help of prime mover.

UNIT–III

5. a) Explain the principle of operation of single phase Transformer with neat sketch.
   b) Explain Torque-Slip Characteristics of a Three phase induction motor.

OR

6. a) Derive the expression for E.M.F equation of a transformer.
   b) Explain the principle operation of a three phase induction motor with relevant diagrams

UNIT–IV

7. Explain the operation of Half wave rectifier with relevant diagrams.

OR

8. a) Explain the operation of P-N junction diode mentioning its applications.
   b) Explain the input and output characteristics of transistor in CE configuration.

UNIT–V

9. Describe how phase and frequency are measured by using Lissajous figures.

OR

10. a) Describe how voltage, current and time period are measured by using CRO.
    b) List the applications of CRO.

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Hall Ticket Number :										

R-14

Code: 4GC31

II B.Tech. I Semester Supplementary Examinations October 2020

Mathematics-II

(Common to CE & ME)

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) Test for consistency and solve 5x+3y+7z=4; 3x+26y+2z=9; 7x+2y+10z=5 8M

   b) Show that the Eigen values of diagonal matrix are just the diagonal elements of the matrix 6M

OR

2. a) Find the rank of the matrix $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$ by reducing into Echelon form 7M

   b) Find the Eigen values and eigenvectors of $A = \begin{bmatrix} 5 & 4 \\ 1 & 2 \end{bmatrix}$ 7M

UNIT–II

3. a) Find the Cubic polynomial which takes the values. $y(0)=1$, $y(1)=0$, $y(2)=1$ and $y(3)=10$ 7M

   b) Using Newton-Raphson Method, compute $\sqrt{41}$ correct to four decimal places 7M

OR

4. Evaluate $\int_0^6 \frac{1}{1+x}\,dx$ by using

   Trapezoidal rule (ii) Simpson's 1/ 3 rule (iii) Simpson's 3/ 8 rule. 14M

UNIT–III

5. Using Euler's Method, find an approximate value of y corresponding to $x=1$, given $\frac{dy}{dx} = x + y$ and $y=1$ when x=0. 14M

OR

6. Use Runge-Kutta method to evaluate $y(0.1)$ and $y(0.2)$ given that $y' = x + y$, $y(0)=1$ 14M

UNIT–IV

7. Find the half range sine and cosine series of $f(x)=x$ in $0<x<2$ 14M

OR

8. a) Find the Fourier series expansion for $f(x)=e^x$ in $0<x<2$® 10M

   b) Form the partial differential equations (by eliminating the arbitrary constants and arbitrary functions) from $z = ax + by + a^2 + b^2$ 4M

UNIT–V

9. a) Apply C-R conditions to $f(z)=z^2$ and show that the function is analytic everywhere. 7M

   b) Evaluate $\int_c \frac{1}{(z-1)(z-3)}\,dz$ with C: $|z|=2$ using Cauchy's Integral Formula 7M

OR

10. Determine p such that the function $f(z) = \frac{1}{2}\log(x^2+y^2) + i\tan^{-1}\left(\frac{px}{y}\right)$ be an analytic function 14M

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Hall Ticket Number :										

R-14

Code: 4G532

II B.Tech. I Semester Supplementary Examinations October 2020

Metallurgy and Material Science

(Mechanical Engineering)

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. List the various types of bonds occurring in a crystal. Discuss the metallic bond and its characteristics 14M

OR

2. a) What is the necessity of alloying? 7M

   b) Write a note on intermediate phases. 7M

UNIT–II

3. What are peritectic reactions? And explain the equilibrium diagrams with neat sketch. 14M

OR

4. Explain phase rule, Lever rule and composition rule. 14M

UNIT–III

5. Explain the microstructure, properties and applications of Grey Cast Iron. 14M

OR

6. a) Explain season cracking in brasses and how it can be prevented? 7M

   b) What is dezincification? How it may be minimized? 7M

UNIT–IV

7. a) State the objectives of annealing. 7M

   b) What is age hardening treatment? 7M

OR

8. Describe the steps in construction of TTT diagram with an example 14M

UNIT–V

9. Define composites and classify them. Explain any two methods of production of composites. 14M

OR

10. Explain Open Hearth process of steel making with neat sketch. List out its advantages and disadvantages. 14M

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Hall Ticket Number :										

R-14

Code: 4G531

II B.Tech. I Semester Supplementary Examinations October 2020

Mechanics of Solids

(Mechanical Engineering)

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) Explain stress strain diagram for mild steel specimen for tensile test in detail? 7M

   b) Find the modulus of elasticity for a rod which tapers uniformly from 30mm to 15mm in a length of 350 mm .The rod is subjected to an axial load of 5.5kN and extension of the rod is 0.025mm 7M

OR

2. A tensile test was conducted on a mild steel bar .The following data was obtained from the test i) diameter of the steel bar =3 cm ii) gauge length of the bar =20cm iii) load at which elastic limit =250 kN iv) extension at a load of 150 kN is 0.21 mm V) Maximum load=380KN .vi)Total extension =60 mm. viii) diameter of the rod at the failure =2.25 cm. Determine the i) young's modulus ii)stress at elastic limit iii) percentage elongation iv)percentage decrease in area . 14M

UNIT–II

3. a) Define shear force, bending moment & point of contra flexure. 7M

   b) Draw shear force diagram and bending moment diagram for a simply supported beam of length 9m carrying a uniformly distributing load of 10KN/m for a distance of 6m from the left end. Also calculate the maximum bending moment on the section. 7M

OR

4. Draw shear force and bending moment diagram for a simply supported beam of length 9m and carrying a UDL of 10KN/m for a distance of 6m from the left end .Also calculate maximum bending on the section 14M

UNIT–III

5. a) State the assumptions made in the theory of simple bending and derive the bending equation? 7M

   b) A rectangular beam 100mm wide and 250mm deep is subjected to a maximum shear force of 50KN.determine i) Average shear stress ii) maximum shear stress and iii) shear stress at a distance 25 mm above the netural axis 7M

OR

6. An I section beam 350 mm x 150 mm has a web thickness of 10 mm and a flange thickness of 20mm .If the shear force acting on the section is 40 KN ,find the maximum shear stress developed in the I section? Sketch the shear stress distribution across the section. 14M

UNIT–IV

7. Derive an expression for max deflections for a simply supported beam subjected to UDL by double integration method. 14M

OR

8. A hollow circular shaft 200 mm external diameter and thickness of metal 25 mm is transmitting power at 200 rpm. The angle of twist over a length of 2 m was found to be 0.5 degrees. Calculate the power transmitted and the maximum shear stress induced in the section. Take modulus of rigidity of material as 84 kN/mm^2. 14M

UNIT–V

9. A thin cylindrical shell, 2m long has 200 mm diameter and thickness of metal 10 mm. It is filled completely with fluid at atmospheric pressure. If an additional 25000 mm^3 fluid is pumped in, find the pressure developed and hoop stress developed. Find also the changes in diameter and length. Take E=2 X10^5 N/mm^2 and μ=0.3. 14M

OR

10. A hollow cast from iron whose outside diameter is 200 mm and has a thickness of 20 mm is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine's formulae using a factor of safety of 2.5.Find the ratio of Euler's to Rankine's loads. Take E=1X10^5 N/mm^2 and Rankines constant=1/1600 for both ends pinned case and f_c=550 N/mm^2. 14M

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