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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)

B.Tech I Year I Semester Regular & Supplementary Examinations March-2023
BASIC THERMODYNAMICS
(Agricultural Engineering)

Time: 3 hours

Max. Marks: 60

(Answer all Five Units 5 x 12 = 60 Marks)

UNIT-I

- 1 a Compare work transfer and heat transfer with neat sketches. CO1 L1 6M
b Describe the concept of temperature in zeroth law of thermodynamics. CO1 L2 6M

OR

- 2 a What do mean by property? Distinguish between intensive and extensive property. CO1 L1 6M
b What is a thermodynamic system? Explain different types of systems with suitable examples. CO1 L2 6M

UNIT-II

- 3 a Prove equivalence Clausius statement with Kelvin Plank CO2 L3 6M
b One kg of Air is heated from 20°C to 105° C. Find the change of internal energy and change of enthalpy. Assume $C_p=1.01$ KJ/KgK and $C_v=0.72$ KJ/KgK. CO2 L3 6M

OR

- 4 What is Steady Flow Process? Derive Steady Flow Energy Equation(SFEE) for an open system. CO2 L3 12M

UNIT-III

- 5 a Draw P-V and T-S diagrams on Isochoric process, Isobaric, Isothermal process. CO3 L1 3M
b Develop the expression of work transfer for an ideal gas in reversible isothermal process. CO3 L3 9M

OR

- 6 A cylinder contains 0.45 m³ of a gas at 1×10^5 N/m² and 80°C. The gas is compressed to a volume of 0.13 m³, the final pressure being 5×10^5 N/m². Determine: (i) The mass of gas ; (ii) The value of index γ for compression; (iii) The increase in internal energy of the gas; The heat received or rejected by the gas during compression. Take $\gamma = 1.4$, $R = 294.2$ J/kg°C CO3 L3 12M

UNIT-IV

- 7 a A Dry Saturated steam at a Pressure of 10 bar enters a turbine. Calculate its Enthalpy and entropy. CO4 L4 4M
b Develop the expression for air standard efficiency for diesel engine. CO4 L6 8M

OR

- 8 An engine of 250 mm bore and 375 mm stroke works on Otto cycle. The clearance volume is 0.00263 m³. The initial pressure and temperature are 1 bar and 50°C. If the maximum pressure is limited to 25 bar, find the following:
(i) The air standard efficiency of the cycle. (ii)The mean effective pressure for the cycle. Assume the ideal conditions CO4 L3 12M

UNIT-V

- 9 Describe the different operations of Rankine cycle and also derive the expression for its efficiency. CO5 L1 12M

OR

- 10 A power plant operating between 30 bar and 0.02 bars. If the steam supplied is 350°C and the cycle of operation is Rankine, find (i) Draw its TS & HS Diagrams (ii) cycle efficiency (ii) change in enthalpy. CO5 L3 12M

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