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

B.Tech II Year II Semester Supplementary Examinations February-2022

THERMODYNAMICS & HEAT ENGINES

(Agricultural Engineering)

Time: 3 hours

Max. Marks: 60

PART-A

(Answer all the Questions 5 x 2 = 10 Marks)

- 1 a What do mean by property"? 2M
 b Define Mass Balance. 2M
 c State Dalton's law. 2M
 d Explain Dry saturated steam. 2M
 e Write short note on Supercritical boiler. 2M

PART-B

(Answer all Five Units 5 x 10 = 50 Marks)

UNIT-I

- 2 a What is quasi-static process? What are its characteristics features? 5M
 b Explain about Quasi Static Process. 5M

OR

- 3 a What do you understand by path function and point function? What are the exact and inexact differentials? 5M
 b What is meant by thermodynamics equilibrium? Explains its types briefly. 5M

UNIT-II

- 4 a Derive Steady Flow Energy Equation for Nozzle. 5M
 b In a cycle, which has five processes, the following are the heat transfers at five points. $Q_1 = +50\text{KJ}$, $Q_2 = 85\text{KJ}$, $Q_3 = -30\text{KJ}$, $Q_4 = -70\text{KJ}$ and $Q_5 = +135\text{KJ}$, the work transfers are $W_1 = +60\text{KJ}$, $W_2 = -40\text{KJ}$, $W_3 = 35\text{KJ}$, $W_4 = -20\text{KJ}$ and $W_5 = +135\text{KJ}$, Find out the work transfer at the fifth point. 5M

OR

- 5 a Explain the Specific heat capacities (C_p & C_v). 5M
 b During a cycle consisting of four processes, the heat transfer are a s following. 5M
 $Q_1 = +60\text{KJ}$, $Q_2 = -40\text{KJ}$, $Q_3 = 15\text{KJ}$, and $Q_4 = -20\text{KJ}$, Determine the net work done by the system.

UNIT-III

- 6 a What is Avogadro's law? 5M
- b One kg of air in a closed system, initially at 5°C and occupying 0.3m³ volumes, 5M
undergoes a constant pressure heating process to 100°C. There is no work other than $p dv$ work. Find (i) the work done during the process, (ii) the heat transferred, and (iii) the entropy change of the gas.

OR

- 7 a Explain the differences between isothermal and adiabatic processes. 6M
- b Air contained in a cylinder fitted with a piston is compressed reversibly according to 4M
the law $p v^{1.25} = \text{const}$. The mass of air in the cylinder is 0.1 kg. The initial pressure is 100 kPa and the initial temperature 20°C. The final volume is 1/8 of the initial volume. Determine the work and the heat transfer.

UNIT-IV

- 8 a Derive an expression for the thermal efficiency and mean effective pressure of an 6M
Otto cycle by drawing PV and TS diagrams.
- b Find the change in enthalpy steam, initial pressure 15 bar and 0.95 then it will reach 4M
25 bar and 400 temperature. By using mollier diagram.

OR

- 9 a Derive an expression for the thermal efficiency of Ericson cycle and draw P-V & T- 5M
S diagrams.
- b Find the change in enthalpy steam, initial pressure 15 bar and 0.95 then it will reach 5M
25 bar and 400 temperature. By using mollier diagram.

UNIT-V

- 10 a Explain with neat sketch any one of the fire tube boiler. 5M
- b How are boiler classified? 5M

OR

- 11 a Explain Drum less Boiler, with neat sketch. 5M
- b Explain the terms with neat sketch. 5M
(i) Economizer, (ii) Air preheater, (iii) Convective super heat

END