IH Used Paper BTECH-28-10-20

Code No: 135CH **R16**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year I Semester Examinations, October - 2020
FUNDAMENTALS OF MECHANICAL ENGINEERING
(Common to CE, EEE, CSE, MIE)

Time: 2 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1. Write short notes on the following:
   a) Global warming
   b) Ozone depletion. [7+8]

2.a) Define enthalpy. Why does the enthalpy of an ideal gas depend only on temperature?
b) A mass of 1.5 kg of air is compressed in a quasi-static process from 0.1 MPa to 0.7 MPa for which *pv* = constant. The initial density of air is 1.16 kg/m^3. Find the work done by the piston to compress the air. [7+8]

3. What is boiler? Discuss Construction and working of Cochran boiler with neat sketch. [15]

4. A pressure cooker contains 1 *kg* of saturated steam at 6 *bar*. Find the quantity of heat which must be rejected to reduce the quality of steam to 0.8. Determine the pressure and temperature of steam at the new state. [15]

5. In an air-standard Otto cycle, the pressure and temperature at the start of the compression stroke are 0.1 MPa and 300 K, respectively. The temperature at the end of the compression and at the end of the heat addition processes are 600 and 1,600 K, respectively. Calculate: (a) thermal efficiency, (b) heat added, (c) net work per kg of air, and (d) mean effective pressure. [15]

6.a) How are I.C. engines classified? Draw *P–V* diagrams of Otto and diesel engine cycles.
b) Derive an expression for the efficiency of Otto cycle. [8+7]

7. A single stage single acting air compressor has intake pressure 1 bar and delivery pressure 10 bar. The compression and expansion follow the law $pV^{1.3}$ = constant. The piston speed and rotations of the shaft are 200 m/min and 360 rpm, respectively. Indicated power is 40 kW and volumetric efficiency is 90%. Determine the bore and stroke. [15]

8. Explain the working of Vapor compression refrigeration system with the help of a neat sketch. Mention the advantages of vapor compression refrigeration system over air refrigeration system. [15]

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