C09–M–**305**

3249

BOARD DIPLOMA EXAMINATION, (C–09)

OCT/NOV—2018

DME—THIRD SEMESTER EXAMINATION

THERMAL ENGINEERING- I

Time : 3 hours] [*Total Marks* : 80

PART—A 3×10=30

***Instructions* :** (1) Answer **all** questions.
(2) Each question carries **three** marks.
(3) Answers should be brief and straight to the point and shall not exceed *five* simple sentences.

1. Define thermodynamic system. List the types of thermodynamic systems.

2. State Boyle's law and Charles law.

3. Write the expression for change of entropy in a constant pressure process.

4. 0.056 m^3 of air at 1.4 bar is compressed isothermally to a volume of 0.014 m^3. Determine the work done for compression.

5. Define the fual. List out any three advantages of liquid fuels.

6. Compare between Solid fuels and gaseous fuels. Write any three points.

7. Show Otto cycle on PV and TS diagram.

8. What is the steam condition if its pressure is 10 bar and enthalpy is 2700kJ/kg.

9. Define out any six methods of refrigeration.

10. List out any six methods of refrigeration.

PART–B

10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each questions carries **ten** marks.
(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. A system undergoes s cycle composed of four processes and energy transfers are tabulated below:

Process	Q (kJ/min)	W (kJ/min)	du (kJ/min)
1-2	550	230	-
2-3	230	-	380
3-4	-550	-	-
4-1	0	70	-

(a) Complete the table, (b) Determine the rate of work in kW.

12. (a) Air occupying 6 m^3 at 2.5 bar compressed to a pressure of 8.5 bar at constant temperature. what is its final volume.

(b) Drive an expression for air standard efficiency of Diesel cycle.

13. Derive an expression for work done in adiabatic process.

14. A cylinder contains 180 liters of gas at a pressure of 1 bar and temperature of 45^0C. If the gas is compressed polytropically to $1/10^{th}$ of its volume and the pressure is then 20 bar, find the (a) Mass of the gas. (b) Temperature at the end of compression, (c) Index of compression, (d) Change of internal energy.

Assume ratio of specific heats = 1.4 and R=0.287 kJ/kg.k.

15. Explain the working of Junkers gas Calorimeter with a neat sketch.

16. (a) Sketch the PV and TS diagram for Otto cycle.

(b) Develop the formula for ideal thermal efficiency of Otto cycle.

17. A vessel of volume $0.025m^3$ contains saturated steam at 15 bar. Determine the mass and enthalpy of the steam it is (a) wet with dryness fraction 0.8 , (b) Superheated with 400^0C temperature.

18. (a) Explain the air refrigerator working on a reversed carnot cycle.

(b) Derive expression for its COP.

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