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BOARD DIPLOMA EXAMINATION, (C–14)

SEPTEMBER/OCTOBER - 2020

DME—FOURTH SEMESTER EXAMINATION

HEAT POWER 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 the term reversible cycle.

2. Write the expression for air standard efficiency of Otto cycle and state the terms involved in it.

3. Define the terms stroke, swept volume and BDC.

4. Draw the valve timing diagram for 4-stoke diesel engine.

5. Differentiate air-cooling and water-cooling systems used in d.c. engines.

6. What are the limitations of simple carburetor?

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7. Write the expression for work done by single-stage, single-acting reciprocating air compressor.

8. Give the detailed classification of compressors.

9. Differentiate open-cycle gas turbines and closed cycle gas turbines.

10. Define propellant. Give two examples.

PART—B

10×5=50

Instructions : (1) Answer *any* **five** questions.

(2) Each question carries **ten** marks.

(3) Answers should be comprehensive and the criterion for valuation is the content but not the length of the answer.

11. In an ideal Otto cycle the air at the beginning of isentropic compression is 1 bar and 15 °C. The ratio of compression is 8 and the heat added is 1008 kJ/kg during constant volume process. Take y 1 4 and C_v 0 714 kJ/kg-K. Determine—

(a) the maximum temperature in the cycle;

(b) the work done per kg of air;

(c) the heat rejected per kg of air.

12. Explain the working principle of 4-stroke diesel engine with neat line diagrams.

13. Explain the working principle of battery ignition system with neat sketch.

14. Explain the working principle of pressure lubrication system with neat sketch.

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15. A 4-cylinder, 4-stroke petrol engine develops 8 kW brake power at 35 rps. The bore is 65 mm, stroke is 80 mm and the mean effective pressure is 6 bar; 0·075 litres of petrol is consumed per minute. The specific gravity of the petrol is 0·75 and calorific value of 42000 kJ/kg. Determine—

(a) the brake thermal efficiency;

(b) the indicated thermal efficiency;

(c) the mechanical efficiency.

16. Explain the working principle of axial compressor with neat sketch.

17. Explain the working principle of turbojet with neat sketch.

18. *(a)* Explain the working principle of roots blower with neat sketch.

(b) Find the efficiency of an engine working on the Carnot cycle if heat is supplied at 540 °C and rejected at 45 °C. If the engine working on this cycle absorbs 120 kJ/s from the hot body, calculate the net work done per second.

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