4480

BOARD DIPLOMA EXAMINATION, (C–14)
MARCH/APRIL—2017
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 air standard efficiency. List any two assumptions made in the analysis of air standard cycles. 1+2

2. A Carnot engine working between 400 °C and 40 °C produces 130 kJ of work. Determine the thermal efficiency of the engine and heat added.

3. Write any three advantages of IC engines over EC engines.

4. State the functions of the following parts of IC engine :

(a) Piston

(b) Connecting rod

(c) Cylinder head

5. Define carburetion. Write any two functions of a carburetor. 1+2

6. What is the necessity of cooling system in IC engine?

7. State any three advantages of multistage compression.

8. Write any three differences between centrifugal compressor and axial flow compressor.

9. List the fuels used in gas turbines.

10. Write any three applications of gas turbines.

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. Calculate the air standard efficiency of constant volume cycle with the following data :

Compression ratio = 9 : 1

Maximum pressure = 40 bar

Suction conditions are 1 bar and 15 °C

Also find the maximum temperature and the temperature at the end of expansion.

12. Draw a neat sketch of an IC engine, label its parts and explain their functions.   4+2+4

13. What is the purpose of governing in IC engines? Explain the quality and quantity methods of governing.   2+4+4

14. Explain the working of magneto ignition system with neat sketch.   5+5

15. A 4-cylinder and 4-stroke petrol engine having 70 mm bore and 90 mm stroke is tested at full throttle at constant speed. The fuel supply is fixed at 0·065 kg/min and plugs of the 4 cylinders are successively short circuited without change of speed and brake torque being correspondingly adjusted. Following power measurements are made under different conditions :

   BP with all cylinders firing = 11·92 kW

   BP with cylinder no. 1 short circuited = 8·46 kW

   BP with cylinder no. 2 short circuited = 8·57 kW

   BP with cylinder no. 3 short circuited = 8·61 kW

   BP with cylinder no. 4 short circuited = 8·50 kW

   (a) Determine IP of the engine under these conditions.

   (b) Determine indicated thermal efficiency if the CV of fuel is 43680 kJ/kg.

   (c) Write the relative efficiency based on IP, if clearance volume is 69 5 cm^3.

16. Explain different methods of saving the work required in air compressors with *P–V* diagrams.

17. Describe the working principle of rocket engine with a neat sketch.

18. *(a)* Explain the factors influencing the volumetric efficiency of an air compressor. 6

   (b) Draw *P–V* and *T–S* diagrams for Carnot cycle. 2+2

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