



C14-M-404

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BOARD DIPLOMA EXAMINATION, (C-14)  
MARCH/APRIL—2018  
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. A gas engine working on Otto cycle has cylinder diameter of 120 mm and stroke of 300 mm, the clearance volume is  $0.0022 \text{ m}^3$ . Determine the compression ratio.
2. Explain the limitations of Carnot cycle.
3. Explain the function of cam mechanism.
4. State the disadvantages of a 2-stroke engine over 4-stroke engine.
5. List the objectives of supercharging.

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6. Differentiate coil ignition system with magnetoignition system.
7. Write an expression for work required of a single-stage reciprocating air compressor.
8. State any three differences between a reciprocating air compressor and a rotary air compressor.
9. List the fuels used in gas turbines.
10. State the merits and demerits of closed-cycle gas turbine over open-cycle gas turbine.

**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. Determine the air standard efficiency and work done of a constant volume cycle with a compression ratio of 8, initial temperature 333 K and the heat supplied 2310 kJ/kg. Take,  $\gamma = 1.4$  and  $C_v = 0.718$  kJ/kg-K. 5+5
12. Describe the working principle of a 4-stroke petrol engine with legible sketches. 4+6
13. Explain different methods adopted in a cooling of an IC engine. Explain any one of them in detail. 4+6
14. (a) Explain the functions of a carburettor. 3  
(b) Explain the constructional features of Zenith carburettor with a legible sketch. 3+4

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- 15.** The following particulars refer to single-cylinder oil engine having cylinder diameter 250 mm, stroke 400 mm and working on a 4-stroke cycle :

Speed = 250 RPM

Gross MEP = 7.25 bar

Pumping MEP = 0.75 bar

Net load = 1080 N

Effective brake wheel diameter = 1.6 m

Determine (a) BP and IP, and (b) mechanical efficiency. 4+3+3

- 16.** A two-stage compressor is used to compress 1 kg of free air from 1 bar and 32 °C to 26 bars. The value of  $n$  1.3 and  $R$  0.287 kJ/kg-K. Determine the—

(a) intermediate pressure;

(b) work required for best performance;

(c) work for a corresponding single-stage compressor;

(d) percentage saving in work in a two-stage compressor.

2+3+3+2

- 17.** Describe the construction and working principle of rocket engine with a legible sketch.

5+5

- 18.** (a) An engine working on the Carnot cycle has maximum and minimum temperature of 1310 °C and 320 °C. Determine its efficiency and the heat supply per minute when the output is 24 kW.

2½+2½

(b) A single-acting two-stage air compressor with complete intercooling delivers 10 kg/min of air at 16 bars. The suction occurs at 1 bar and 15 °C. The compression and expansion processes have index,  $n$  1.25. Assuming perfect intercooling, calculate the power required.

2+3

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