



C14-M-404

**4480**

**BOARD DIPLOMA EXAMINATION, (C-14)**

**OCT / NOV-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. What is the difference between Otto cycle and Diesel cycle in terms of  
a) Heat Addition      b) Applications?
2. What is the effect of compression ratio and cut-off ratio on the ideal efficiency of Diesel cycle.
3. Write any six differences between a four - stroke engine and a two- Stroke engine.
4. Name the parts involved in operation of valves with proper timing in four - Stroke engine.
- \* 5. Write any three the objectives of super-charging.
6. Write how the ignition takes place in Diesel Engines.
7. What are the conditions for minimum work required in multistage compression?
8. Define a) Isothermal Efficiency b) Adiabatic Efficiency with respect to air compressors.

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9. Write any six advantages of Gas turbine over IC engine.
10. Draw a neat sketch of closed cycle gas turbine and label its parts.

**PART - B**

10 X 5 = 50

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

(2) Each question carries ten marks.

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

11. Describe Otto cycle with P-V and T-S diagrams and derive the expression for the Air Standard efficiency of Otto cycle.
12. a) Draw the valve timing diagrams for four stroke petrol engines and four stroke diesel engine.  
b) Write any five advantages of IC engines over External combustion engines.
13. Draw a neat sketch of simple carburetor and explain its working.
14. a) Write any five differences between air cooling system and water cooling system in an IC engine.  
b) State any five reasons for preventing overheating of an IC engine.
15. A single -acting, single-stage compressor is belt driven from an electric motor at 400 rpm. The cylinder diameter is 150 mm and the stroke 175 mm. The air is compressed from 1.03 bar to 7.2 bar and the polytrophic index of compression is 1.3. Find the power of the motor, if the transmission efficiency is 97% and the mechanical efficiency of the compressor is 90% Neglect clearance effect.
- \* 16. Explain the different methods to improve the overall efficiency of a gas turbine.
17. a) Explain the working of Radial flow compressor with neat sketch.  
b) An oil engine operating on a ideal diesel cycle has a compression ratio 15:1 and the cut - off takes place at  $1/5^{\text{th}}$  of the stroke volume. Calculate the efficiency of the cycle assuming  $\gamma = 1.4$ .

18. The following <sup>\*</sup> observations were recorded during test on two-stroke oil engine on minute basis.

Speed = 1000 rpm.  
Bore = 250 mm  
Stroke = 290 mm  
Brake drum radius = 1.1 m  
Brake load = 500 N  
Spring Balance reading = 40 N  
Mean Effective pressure = 330 kN/m<sup>2</sup>  
Mass of fuel consumed = 10.5 Kg/hr  
Calorific Value of the fuel = 43 MJ/Kg  
Mass of cooling water circulated = 420 kg/hr  
Water inlet temperature = 30°C  
Water outlet temperature = 52°C  
Mass of exhaust gases = 4.5 Kg/min  
Specific Heat of exhaust gases = 1kJ/Kg-K  
Rise in exhaust gas temperature = 290°C  
Specific heat of water = 4.187 kJ/Kg-K  
Neglecting the diameter of the rope calculate

- i. Brake Power 2.5 marks
- ii. Indicated Power 2.5 marks
- iii. Draw the heat balance sheet- 5 marks

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