4480

BOARD DIPLOMA EXAMINATION, (C-14)
OCT/NOV—2018

DME—FOURTH SEMESTER EXAMINATION

HEAT POWER ENGINEERING-I

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

PART—A　　　　　　　　　　　　3×10=30

Instruction : (1) Answer **all** questions. Each question carries **three** marks.

(2) Answers should be brief and straight to the point and shall not exceed **five** simple sentences.

1. Draw P-V and T-S diagrams for Diesel cycle.
2. Mention any two reasons for higher efficiency of Carnot cycle over other cycles.
3. Write the differences between CI engine and SI engine in respect of

   (*a*) Basic Cycle

   (*b*) Introduction of Charge

   (*c*) Method of Ignition.
4. Define the terms Bore, Stroke and TDC with respect to an IC engine.
5. Write any three differences between battery ignition system and magneto ignition system.
6. Why lubricant is mixed with petrol while filling the fuel tank in some vehicles?
7. State any six applications of compressed air.
8. A single stage reciprocating air compressor is required to compress 60 m³ of air from 1 bar abs to 8 bar abs. Find the work to be supplied if the polytrophic index of compression is 1.25.
9. Write any three differences between constant pressure gas turbine and constant volume gas turbine.
10. Write any three differences between Turbo Prop Engine and Turbo Jet Engine.

PART—B 10×5=50

Instruction : (1) Answer any **five** questions and each question carries **ten** marks.

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

11. In an ideal diesel cycle, the pressure and temperature are 1.03 bar and 27°C respectively. The maximum pressure in the cycle is 47 bar and heat supplied during the cycle is 545 kJ/kg.

Determine

(*a*) the compression ratio

(*b*) the temperature at the end of compression

(*c*) temperature at the end of constant pressure combustion

(*d*) the air standard efficiency

Assume $\Upsilon = 1.4$ and $C_P = 1.004$ kJ/kg-K for air.

12. Explain the working principle of a two stroke petrol engine with neat sketch.

13. (*a*) What is the necessity of lubrication system in an IC engine?

(*b*) Explain about Splash lubrication method with neat sketch.

14. (*a*) State the necessity of cooling in an IC engine.

(*b*) Explain about Thermo siphon cooling system with neat sketch.

15. The following details refer to a four stroke engine

Cylinder diameter = 220 mm,

Length of stroke = 330 mm,

Speed = 5 rev/sec,

Effective brake load = 500 N

Mean circumference of the brake drum = 4.5 m

Indicated mean effective pressure = 5.6 bar

Calculate :

(*a*) Indicated Power,

(*b*) Brake power and

(*c*) Mechanical efficiency

16. A single acting -single stage compressor has a cylinder of 200 mm diameter and 300 mm stroke. It runs at speed of 500 RPM. The air is taken in at standard atmospheric pressure and temperature. The compression pressure is 6 bar abs. The clearance volume is 5% of the stroke volume. The index of compression and expansion is 1.3.

Determine

(*a*)   The volumetric efficiency, and

(*b*)   The brake power required to drive the compressor, if the 20% of the indicated power is lost due to friction.

17. (*a*)   Explain the working of Ram Jet engine with neat sketch.

(*b*)   What are the limitations of constant volume gas turbine?

18. (*a*)   Explain the working of axial flow air compressor with neat sketch.

(*b*)   An engine working on Otto cycle has a cylinder diameter of 160 mm and stroke of 250 mm. The clearance volume is 1250 CC. Find the air standard efficiency of the engine. Assume $Y = 1.4$.

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