C16-**M-303**

# 6244

## BOARD DIPLOMA EXAMINATIONS
## SEPTEMBER/OCTOBER - 2020
## DME – THIRD SEMESTER

THERMAL ENGINEERING - I

Time: 3 hours | Max. Marks: 80

**PART – A** **3 X 10 = 30**

***Instructions***: *1. Answer **all** questions.*
*2. Each question carries **Three** Marks.*
*3. Answer should be brief and straight to the point and should not exceed Five simple sentences.*

1. State Joule's law and Avogadro's law.
2. How do you classify thermodynamic properties? Give example.
3. State first law of thermodynamics.
4. What is the difference between throttling and Isenthalpic process?
5. Represent the following process of T-S diagram.
   i) Isothermal Process.
   ii) Constant volume process
   iii) Constant pressure process
6. Show all the process of Carnot cycle On P-V and T-S diagrams.
7. Write any three advantages of IC engine over EC engine.
8. Differentiate between a fly wheel and a Governor.
9. Define specific fuel consumption and piston speed.
10. State how are the air compressors classified.

**[Cont..,**

## PART – B 5 X 10 = 50

***Instructions:*** *1. Answer any **Five** questions*
*2. Each question carries **TEN** Marks.*
*3. Answer should be comprehensive and a criterion for valuation is the content but not the length of the answer.*

11. A vessel of 2.5 $m^3$ capacity contains 1 kg-mole of nitrogen at $100^0$C. If the gas is cooled to $30^0$C, calculate final pressure, change in specific internal energy and specific enthalpy.
Take, $\gamma$ = 1.4 and 1 kg-mole nitrogen is 28 kg.

12. a) What is Reversible and Irreversible processes and give two examples each.
b) State the condition for Reversibility.

13. A reversible heat engine convert one – sixth of heat input into work. When the temperature of the sink is reduced by $62^0$C, its efficiency is doubled. Find the temperature of the source and the sink.

14. Write any five differences between
a) Adiabatic and Isentropic Processes.
b) Isenthalpic and Throttling Processes.

15. In an engine working on a diesel cycle has compression ratio of 15:1 and expansion ratio 8:1. The pressure and temperature at beginning of compression is 2 bars and $50^0$C respectively pressure before the heat rejection is 4 bar. Determine a) Air standard efficiency of the cycle b) Maximum Temperature and Pressure attained in the cycle. Assume $\gamma$ = 1.4.

16. Explain the working of a coil ignition system with the help of a line diagram.

**[Cont..,**

17. A four cylinder petrol engine develops a brake power of 51.45 kW at 2000 rpm. A Morse test was carried out and the brake torque readings were 179.7 N-m, 172.8 N-m, 170 N-m and 177 N-m. Calculate I.P and mechanical efficiency of the engine.

18. Explain the working of following Rotary Compressors with line diagram.
    a) Vane type Compressor
    b) Centrifugal Compressor

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