6244

C16–M–303

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BOARD DIPLOMA EXAMINATION, (C–16)
OCT/NOV—2018
DME—THIRD SEMESTER EXAMINATION

THERMAL 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 mole and universal gas constant.

2. Define quasi-static process.

3. Stete the statements of Celsius and Kelvin-Planck.

4. Represent the following processes on T-s diagram :

(a) Isothermal process.

(b) Adiabatic process.

(c) Constant pressure process.

5. What is the difference between isentropic and adiabatic process?

6. Draw P-V and T-s diagrams of diesel cycle.

7. Differentiate between rotary and reciprocating IC engines.

8. State the advantages of multicylinder engines.

9. What is the significance of Morse test?

10. Write the applications of compressed air.

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PART–B

10×5=50

Instructions : (1) Answer *any* **five** questions.
(2) Each questions carries **ten** marks.
(3) Answers should be comprehensive and the criteria for valuation are the content but not the length of the answer.

11. A steel cylinder of 50 liter capacity contains carbon dioxide at 18^{o}C and at a pressure of 120 bar. Calculate (a) mass of gas, (b) the mole volume, (c) density of the gas.

12. (a) What is reversible and irreversible processes? Give two examples each.

(b) State the condition for reversibility.

13. An engineer claims his engine to devlop 5kW. On testing, the engine consumers 0.44 kg of fuel per hour having the calorific value 60000 kJ/kg, the maximum temperature recorded in the cycle is 1400^{o}C and the minimum is 356^{o}C. Find whether the engineer is justified in his claim.

14. 0.2 m^3 of a gas at 1.1 bar and 87^{o}C is compressed to a volume of 0.05 m^3 and final pressure becomes 6.3 bar. Determine (a) mass of the gas, (b) polytropic index, (c) heat rejected or received during comperssion. Assume C_p = 1.005 kJ/kg-K, C_v = 0.718 kJ/kg-K.

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15. In an ideal Otto cycle the air at the beginning of isentropic compression has pressure of 1 bar temperature of 15^{o}C. The compression ratio is 8. The heat added is 1008 kJ/kg during constant volume process.

Take γ = 1.4 and C_v = 0.714 kJ/kg-K. Determine :

(a) Max. Temperature of the cycle (b) Air standard efficiency

(c) Work done per kg of air (d) Heat rejected per kg of air

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16. State the necessity of engine governing and explain the hit and miss type governing with the help of a neat sketch.

17. The percentage composition of a sample of fuel by mass is found to be C- 76%, H_2 - 5.2%, O_2 - 2.7%, S- 1.2%. Calculate the minimum amount of air necessary for complete combustion of one kg of fuel and percentage composition by mass of dry products of combustion.

18. Explain the working of following rotary compressors with line diagram :

(a) Centrifugal compressor.

(b) Vane type compressor.

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