1256

Code : 15AT31T

Register Number | | | | | | | |

III Semester Diploma Examination, April/May-2018

HEAT POWER ENGINEERING

Time : 3 Hours] **[Max. Marks : 100**

Note : (i) Answer any **6** out of **9** form Part - **A**.
(ii) Answer any **7** out of **10** from Part - **B**.

PART – A

1. Define the terms Pressure, Volume, Temperature, Enthalpy and Entropy. **5**

2. Explain Zeroth law of thermodynamics. **5**

3. Define Boyle's law & Charle's law. **5**

4. Derive an equation for characteristic gas equation. **5**

5. Define Thermodynamic process and list out the types of thermodynamic processes. **5**

6. What do you understand by a thermodynamic cycle ? Distinguish between reversible and irreversible cycle. **5**

7. List the advantages and disadvantages of liquid fuels. **5**

8. Explain the phenomenon of knocking in S.I. engine. **5**

9. Define delay period. Mention variables affecting delay period. **5**

PART – B

10. (a) Derive steady flow energy equations (SFEE) . 5

(b) What do you mean by property of a system ? Distinguish extensive and intensive properties of a system. 5

11. (a) Distinguish between mechanical and thermal equilibrium. 5

(b) Determine final pressure of a gas when 2 m^3 of gas at 6 bar is heated by keeping temperature constant. Final volume is 6 m^3. 5

12. (a) What is the difference between characteric gas constant and universal gas constant ? 5

(b) Derive an expression for the workdone during Isobaric process. 5

13. A certain gas occupies a space of 0.3 m^3 at a pressure of 2 bar and temperature of 77 °C. It is heated at constant volume until the pressure is 7 bar. Determine temp. at the end of process, mass of gas, change in internal energy and change in enthalpy, during the process. Assume C_p = 1.005 kJ/kg K, C_v = 0.712 kJ/kg K & R = 287 J/kg K. 10

14. 0.1 m^3 of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m^3. Calculate the final pressure of gas and heat supplied during the process. 10

15. An engineer claims an engine to develop 3.75 kW. After testing engine consumes fuel of 0.44 kg/hr having C_v = 42000 kJ/kg K. Maximum temperature recorded in the cycle is 1400 °C & until the temperature becomes 350 °C. Find whether engineer justifies his claim. 10

16. Derive an expression for air standard efficiency of Otto cycle. 10

17. (a) Represent diesel cycle on P-V & T-S diagram. 5

(b) A sample of coal has the following composition by weight Carbon – 72%, Hydrogen – 7%, Oxygen – 9%, Nitrogen 3%, Sulphur – 2%, Ash – 7%. Find HCV & LCV per kg of coal. 5

18. (a) Explain the conversion of volumetric analysis into mass analysis. 5

(b) Calculate the minimum mass of air required for complete combustion. 5

19. With the help of P-θ diagram, explain the stages of combustion in SI engine. 10