INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech IV Semester End Examinations (Regular), November – 2020
Regulation: IARE–R18
APPLIED THERMODYNAMICS-I

Time: 2 Hours   (ME)   **Max Marks: 70**

Answer any Four Questions from Part A
Answer any Five Questions from Part B

PART – A

1. Write the differences between four and two stroke engines. **[5M]**

2. Explain the various factors that influence the flame speed. **[5M]**

3. With neat sketch explain the working of any one type of blower. **[5M]**

4. Brief about (i) slip factor and (ii) power input factor **[5M]**

5. With P-h Chart write about (i) Super heating and (ii) Sub cooling **[5M]**

6. Classify C.I engine fuel injection systems and explain CRDI system. **[5M]**

7. Briefly explain the rating of C.I engine fuels. **[5M]**

8. Distinguish the reciprocating and rotary compressors. **[5M]**

PART – B

9. Draw the valve timing diagram of four stroke cycle diesel engine. **[10M]**

10. With neat sketch explain the working of Thermo syphon water cooling system **[10M]**

11. What is meant by pre ignition? And explain the effect of various engine variables on S.I engine knock. **[10M]**

12. How to reduce the knocking in S.I engines and list various antiknock additives. **[10M]**

13. The following details were noted in a test on a four – cylinder, four stroke engine, 100 mm diameter,120 mm stroke, 1600 rpm engine speed, 0.2 kg/min fuel consumption, calorific value of fuel is 44000 kJ/kg, difference in tension on either side of the brake pulley is 40 kg, brake circumference 300 cm. If the mechanical efficiency is 80%, calculate, (i) Brake thermal efficiency,(ii) Indicated thermal efficiency,(iii) Indicated mean effect pressure,(iv)Brake specific fuel consumption. **[10M]**

14. Classify the compressors and with neat sketch explain the working of Roots blower compressor. **[10M]**

15. Air at a temperature of 300 K flows in a centrifugal compressor running at 18000 rpm. The other details are, Isentropic total heat efficiency is 0.76, outer diameter of blade tip is 550 mm, slip factor is 0.82. Calculate (i) The temperature rise of air passing through the compressor, (ii) The static pressure ratio. Assume that the absolute velocities of air at inlet and exit of the compressor are same. Take CP is 1005 J/kg. K. **[10M]**

16. Differentiate axial flow and centrifugal compressors. With neat sketch explain the working of centrifugal compressor. **[10M]**

17. A simple vapour compression plant produces 5 tonnes of refrigeration. The enthalpy values at inlet to compressor, at exit from the compressor, and exit from the condenser are 183.19, 209.41, and 74.59 kJ/kg respectively. Estimate (i) The refrigeration flow rate, (ii) The C.O.P, (iii) The power required to drive the compressor, and (iv) The rate of heat rejection to the condenser. **[10M]**

18. Explain briefly an air refrigeration system and derive the expression for its C.O.P. **[10M]**

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