Roll No. | | | | | | | | | | | | | Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(ME) (2012 Onwards) (Sem.–3)
APPLIED THERMODYNAMICS–I
Subject Code : BTME-304
M.Code : 59114

Time : 3 Hrs. **Max. Marks : 60**

INSTRUCTION TO CANDIDATES :

1. **SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.**
2. **SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.**
3. **SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.**
4. **Use of steam tables is allowed.**

SECTION-A

1. Answer briefly :

a. Define Adiabatic Flame Temperature.

b. What is scavenging in two stroke engines?

c. Define Critical Point.

d. What is fusible plug and state where it is located in a boiler?

e. Why ideal regenerative cycle is not practicable?

f. What is critical pressure ratio of a steam nozzle?

g. Define Blade Velocity Coefficient and carry over coefficient.

h. What is need of compounding of steam turbines?

i. What do you understand by co-generation?

j. What is the necessity of cooling towers?

SECTION-B

2. Explain with the help of (temperature-heat) diagram the formation of steam and the connected terms.

3. Explain the working of Loeffler boiler with the help of a neat sketch. State its merits.

4. Steam enters a group of nozzles of a steam turbine at 12 bar and 220° C and leaves at 1.2 bar. The steam turbine develops 220 KW with specific steam consumption of 13.5 Kg/KWh. If the diameter of nozzles at throat is 7 mm, calculate the number of nozzles.

5. Explain construction and working of Edwards's air pump.

6. A steam power plant is supplied with dry saturated steam at a pressure of 12 bar and exhausts into a condenser at 0.1 bar. Calculate the Rankine efficiency by using 1. Steam tables and 2. Mollier chart.

SECTION-C

7. What is the significance of controlling delay period in C.I. engines? Explain any five factors which cause reduction in delay period.

8. In a condenser test, the following observations are made : Vacuum = 690 mm of Hg; Barometer reading = 750 mm of Hg; Mean temperature of condensation = 35° C; Hot well temperature = 28°C; Mass of cooling water = 50000 kg/h; Inlet temperature = 17°C; Outlet temperature = 30°C; Mass of condensate per hour = 1250 kg.

   Find :

   a. The mass of air present per m3 of condenser volume;

   b. The state of steam entering the condenser; and

   c. The vacuum efficiency. Take R for air = 287 J/Kg K.

9. A parson's reaction turbine, while running at 400 r.p.m. consumes 30 tonnes of steam per hour. The steam at a certain stage is at 1.6 bar with dryness fraction of 0.9 and the stage develops 10 KW. The axial velocity of flow is constant and equal to 0.75 of the blade velocity. Find mean diameter of the drum and the volume of steam flowing per second. Take blade tip angles at inlet and exit as 35° and 20° respectively.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.