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

Total No. of Questions : 09

B.Tech.(ME) (Sem–3)

APPLIED THERMODYNAMICS–I

Subject Code : BTME-304

M.Code : 59114

Date of Examination : 15-06-2023

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) Why excess air is supplied for combustion?

b) What are Octane and Cetane numbers?

c) Differentiate between conventional and high pressure boilers.

d) Why 2-Stroke engines have been phased out?

e) What is degree of reaction?

f) Explain clearly the equivalent evaporation from and at 100°C.

g) What is Dryness Fraction, how it is evaluated?

h) What do you mean by the stage efficiency and overall efficiency of Impulse turbine?

i) What is bleeding and for what is this carried out?

j) What is the use of Cooling Tower in Steam Power Plant?

SECTION-B

2. Calculate the minimum quantity of air required for complete combustion of lm3 of gaseous fuel which has the following composition by volume : H_2=30%., CH_4=40%, CO=15%, CO_2=5%, O_2=2% andN_2=8%.

3. Describe construction and working of any one High Pressure Boiler with a neat sketch.

4. What is the need of Compounding of Turbines? Explain methods of compounding of Impulse Turbine.

5. What is the effect of air leakage in a condenser? Explain. Explain the working of air extraction pump with a neat sketch.

6. Derive an expression for evaluating Height of Chimney.

SECTION-C

7. A five stage steam turbine has steam entering at 20 bar, 300°C and leaving at 0.05 bar and 0.95 dry. Determine the Reheat factor, condition of steam at exit from each stage considering efficiency ratio (η_s) = 0.555 and all stages doing equal work.

8. A steam nozzle is supplied with steam at 15 bar and 350°C and discharges steam at 1 bar. If the diverging portion of nozzle is 80 mm long and throat diameter is 6 mm, Determine the cone angle of the divergent portion. Assume 12% of total available enthalpy drop is lost in friction in divergent portion. Also determine the velocity and temperature of steam at throat.

9. Write short notes on following :

   (a) Describe the phenomenon of detonation in I.C. engines. On what factors does detonation depend? (b) Binary Vapour Power Cycle (c) Adiabatic Saturation process and its applications.

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.