

CT Inst. of

Roll No.

Total No. of Pages : 02

Total No. of Questions : 09

B. Tech. (ME-2011 Batch) (Sem.-3rd)
APPLIED THERMODYNAMICS-I
 Subject Code : BTME-304
 Paper ID : [A1141]

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 has to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students has to attempt any TWO questions.

SECTION-A**1. Answer briefly :**

- (a) Explain the phenomenon of knock in C.I. engines.
- (b) Define quality of steam and superheated steam.
- (c) What are boilers accessories ?
- (d) Sketch Rankine cycle on T – S & h – S planes.
- (e) What is the significance of critical pressure ratio?
- (f) Explain the effect of blade friction on velocity diagram in case of steam turbines.
- (g) What are fire tube boilers ? Name any two of these.
- (h) Why compounding of steam turbines is done ?
- (i) Explain the terms reheat factor and overall efficiency used for reaction impulse turbine.
- (j) What are the various elements of condensing unit?

SECTION-B

2. Explain the effect of engine variables on delay period.
3. Explain with sketch the working of fusible plug.
4. What is the effect of regeneration on the specific heat of heat addition, cycle efficiency and steam rate. Explain.
5. Derive the expression for critical pressure ratio for a convergent nozzle. Give physical explanation.
6. For what purpose is the steam jet air ejector used? Explain the working principle of a two stage steam jet ejector.

SECTION-C

7. A blast furnace gas has the following volumetric composition: CO = 27%; H₂ = 2% and N₂ = 60%. Find the theoretical air required for the complete combustion of 1 m³ of gas. Also find the percentage composition of dry flue gases by volume. Assume the gas contains 21% of O₂ & 79% of N₂ by volume.
8. The total tangential force on one ring of Parsons turbine is 100 kN when the blade speed is 100 m/s. The mass flow rate of steam is 1 kg/s. The blade outlet angle is 20°. Determine the steam velocity at the blades. If the friction losses which would occur in the blades, determine the heat drop per stage and the efficiency of the stage.
9. Explain with sketch the constructional details of a vertical boiler.

