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Total No. of Questions : 18

B.Tech. (ME) (2012 Onwards)   (Sem.–4)
APPLIED THERMODYNAMICS–II
Subject Code : BTME-404
M.Code : 59132

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :
 1.   SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks e ach.
 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.

SECTION-A

Answer briefly :

1.   Draw Brayton cycle.

2.   What is effect of clearance in working of reciprocating air compressor?

3.   What is surging and choking?

4.   What do you mean by degree of reaction?

5.   List merits of gas turbines over I.C engines.

6.   Name the different components of axial flow compressors.

7.   State the assumptions made in an ideal cycle's analysis of gas turbine.

8.   Define Work Ratio and Temperature Ratio.

9.   What is the principle of jet propulsion?

10. What is Turbojet?

SECTION-B

11. A simple closed cycle gas turbine plant receives air at 1 bar and 15°C and compressor it to 5 bar and then heats it to 800°C in the heating chamber. The hot air expands in a turbine back to 1 bar. Calculate the power developed per kg of air supplied per second. Take Cp for air as 1 kJ / kgK.

12. Derive the-equation for work per Kg of air compressed by reciprocating air compressor with and without clearance.

13. Describe briefly the distinction between rotary compressor and the reciprocating piston compressor.

14. A turbojet engine flying at a speed of 800 km/hr consumes air at the rate of 45kg/s. Calculate

    (a) Jet exit velocity, the enthalpy change for the nozzle is 44.5 kcal/kg and the velocity coefficient is 0.95.

    (b) Fuel flow in kg/hr and thrust specific fuel consumption assuming that air fuel ratio is 80.

15. A multistage axial flow compressor absorbs 6000 H.P. when delivering 20 kg/s of air from stagnation condition of 1 Kgf/cm^2 and 288 K. If polytropic efficiency of compression is 0.9 and if the stage stagnation pressure ratio is constant. Calculate pressure at compressor outlet.

SECTION-C

16. A centrifugal compressor delivers 580 m^3 of free air when running at 800 rpm. Using the following data: inlet pressure and temperature of air = 1.013 bar and 20°C, compressor ratio = 3.5, isentropic efficiency = 83%, flow velocity throughout the compressor = 62 m/s, the blades are radial at the outlet of the impeller tip diameter = 2 times eye diameter, blade area coefficient = 10.94. Find :

    (a) The input power required to run the compressor.

    (b) Impeller diameters at inlet and outlet.

    (c) Breadth of impeller at inlet.

    (d) Impeller blade angle at inlet.

17. Draw T-S diagram for a single stage reciprocating air compressor and explain it.

18. Explain :

    (a) Difference between adiabatic and isentropic process.

    (b) Function of impeller and diffusion in centrifugal compressor.

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.