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

Total No. of Questions : 09

B.Tech.(AE) (2011 Onwards) (Sem.–3)
APPLIED THERMODYNAMICS
Subject Code : BTAE-302
M.Code : 54110

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.**

SECTION-A

Q1. Write briefly :

a) Write short note on gas turbine efficiency.

b) What are the fields of applications for gas turbine power plant?

c) Draw the PV and TS diagram of Brayton cycle.

d) Define swept volume and clearance volume.

e) Write down the expression of volumetric efficiency for centrifugal compressor.

f) Write down the application of SFEE.

g) What is the physical significance of angle of attack?

h) What do you understand by stalling in axial flow compressor?

i) Write down the expression of thermal efficiency for Brayton cycle.

j) What are the types of rocket motors?

SECTION-B

Q2.   Describe the working principle of centrifugal compressor.

Q3.   What do you understand by surging and chocking phenomena?

Q4.   Discuss the significance of intercooling upon the performance of multi stage compression.

Q5.   Compare the axial flow compressor with centrifugal compressor.

Q6.   What are the fundamental difference between the jet propulsion and rocket propulsion?

SECTION-C

Q7.   Discuss the effect of intercooling, reheating and regeneration on gas turbine cycle with the help of PV and TS diagram.

Q8.   A reciprocating compressor of single stage and double acting type is running at 200 rpm with mechanical efficiency of 85%. Air flow into compressor at the rate of 5 m3/minute measured at atmospheric condition of 1.02 bar and 27 Oc. Compressor has compressed air leaving at 8 bar with compression following polytropic process with index of 1.3. Compressor has clearance volume of 5% of stroke volume. During suction of air from atmosphere into compressor its temperature rises by 100c. There occurred pressure losses of 0.03 bar during suction and pressure los of 0.05 bar during discharge passes through valves. Determine the dimension of cylinder, Volumetric efficiency and power input required to drive the compressor if stroke to bore ratio is 1.5.

Q9.   In an air standard Brayton cycle the minimum and maximum temperature are 300 K and 1200K respectively. The pressure ratio is that which maximize the network developed by the cycle per unit mass of air flow. Calculate the compressor and turbine work, each in KJ/kg air, and thermal efficiency of the cycle.

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.