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

Total No. of Questions : 09

B.Tech (ME) (Sem.–4)

APPLIED THERMODYNAMICS-II

Subject Code : ME-208

M.Code : 59016

Time : 3 Hrs. Max. Marks : 60

INSTRUCTIONS 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) Sketch a typical port timing diagram of a two stroke petrol engine.

b) What is the need of pre .combustion chamber in D.I. Diesel engine?

c) Explain what is work input factor in centrifugal compressors?

d) Explain the advantages of Ram jet propulsion system.

e) List the positive displacement type compressors of rotary design.

f) Give comparison between reciprocating and rotary air compressors.

g) Enlist different methods to improve thermal efficiency of open cycle gas turbine plant.

h) List down merits of gas turbine over steam turbine.

i) Give the classification of rotary compressors.

j) Differentiate between Turbojet and Turboprop.

SECTION-B

Q2 List out the factors affecting knocking in S.I. engine & explain these briefly.

Q3 Explain working of Vane type Blower, also calculate the Power input.

Q4 Define “Slip”factor in relation to Centrifugal compressor and derive an expression.

Q5 Derive an expression for Optimum Pressure Ratio for maximum specific work output of gas turbine plant.

Q6 Explain with neat diagram, working of Turbo-propeller engine.

SECTION-C

Q7 A Centrifugal compressor running at 10000 r.p.m., delivers 660m ^{3}/min. of free air. The air is compressed from 1 bar and 20°C to a pressure ratio of 4 with isentropic efficiency of 82%. Blades are radial at outlet of impeller and flow velocity of 62m/s may be assumed throughout constant. The outer radius of impeller is twice the inner and slip factor may be assumed as 0.9. The blade area co-efficient may be assumed 0.9 at inlet. Calculate :

a) Final temperature of air

b) Theoretical power

c) Impeller diameters at inlet and exit

d) Breadth of impeller at inlet

e) Diffuser blade angle at inlet

Q8 A jet propulsion unit uses 35kg of air per second when flying at 800km/hr. The air is compressed from 15°C and 1 bar to 182°C and 309 bar. The temperatures of gases entering and leaving the turbine are 815°C and 650°C and then it enters into the nozzle. Assuming the isentropic efficiency of compressor and turbine is same and nozzle efficiency 90%. Neglecting the effect of ramming and fuel mass, find the following :

a) Isentropic efficiency of compressor and turbine

b) Power required to run the compressor and

c) Thrust produced

Q9 Write short notes on :

a) Supercharging of I C engines.

b) Explain briefly : lift and drag, surging and choking in Axial flow compressors.

c) Application of Steady flow Energy equation Thermodynamics of rotary compressors.

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.