(33)

Exam.Code:0940
Sub. Code: 7046

1059

B.E. (Mechanical Engineering)

Fourth Semester

MEC-401: Applied Thermodynamics – II

Time allowed: 3 Hours Max. Marks: 50

NOTE: *Attempt five questions in all, including Question No. I which is compulsory and selecting two questions from each Part.*

x-x-x

Q.1. Attempt the following:-

1) What is the purpose of gas turbine in an aircraft engine?
2) Give any 2 disadvantages of ramjet.
3) Under which circumstances is the use of supercharger in engines recommended?
4) What is meant by compressor turbine?
5) How is thrust and power related to effective speed ratio in a propeller device?

(5x2=10)

PART A

Q-2)
1) An SI engine has fuel air ratio .067, How much air(kg/hour) is required for a brake output of 73.6kW for an overall brake thermal efficiency of 20%? How much air(m3/hour) is required if density of air is 1.15kg/m^3. If fuel vapour has density 4 times that of air, then how much mixture(m^3/hour) is required? CV of fuel is 42000kJ/kg.
1) Explain construction, working and advantages of a pulse jet engine.

(5,5)

Q-3)
1) Determine ideal efficiency of a diesel engine having cylinder bore 250mm, stroke 375mm, clearance volume 1500cc, with fuel cut-off occurring at 5% of stroke.
2) What are the benefits of a Wankel engine over conventional engine?

(5,5)

Q-4)
1) Prove that polytropic efficiency is more than overall compressor efficiency for a multi-stage compression process.

P.T.O.

2) Prove that in a Brayton cycle based turbine system, maximum work output is obtained when the exit compressor temperature is same as exit turbine temperature.

(5,5)

PART B

Q-5)

1) An axial flow air compressor of 50% reaction design has blades with 45° and 10° inlet and outlet angles respectively. The compressor is to produce pressure ratio 6:1 with overall isentropic efficiency 0.85 when inlet static temperature is 37°C. Blade speed of 200m/s and axial velocity remain constant. Find out the number of stages if work done factor is 0.87 for all stages

2) Differentiate between PV diagram of rotor and vane type compressor.

(5,5)

Q-6)

1) Discuss velocity diagrams for different shapes of blades for centrifugal compressors.

2) Derive the expression of minimum work for a 5-stage reciprocating compressor

(5,5)

Q-7)

Write short notes on any 2 of the following:-

1) Effect of clearance volume in compressors

2) 50% reaction turbines

3) Propeller and propulsive efficiency

(5,5)

x-x-x