Total No. of Questions : 10]

SEAT No. :

P2983

[Total No. of Pages : 2

[5154]-538
B.E.(Mech.)
GAS TURBINES & PROPULSION
(2012 Pattern) (End Semester-I) (402045A) (Elective-II)

Time : 2½ Hours] *[Max. Marks : 70*

Instructions to the candidates:

1) ***Answer Q.1or Q.2, Q.3 or Q.4, Q.5 or Q.6, Q.7 or Q.8, and Q.9 or Q.10.***
2) ***Neat diagram must be drawn wherever necessary.***
3) ***Figures to the right indicate full marks.***
4) ***Assume data if necessary.***

Q1) a) Compare atmospheric jet engines and rocket engines with suitable examples. **[6]**

b) Explain cogeneration cycle. **[4]**

OR

Q2) Write notes on: **[10]**

a) Single-shaft and twin-shaft gas turbine arrangements.

b) Industrial applications of gasturbines.

Q3) a) Explain thermodynamic analysis of a turbojet engine. **[7]**

b) What are stagnation & static properties. **[3]**

OR

Q4) Write short notes on: **[10]**

a) Pressure losses and heat exchanger effectiveness in gas turbines.

b) Polytropic and isentropic efficiency.

Q5) a) Discuss various losses associated with axial flow turbines. **[6]**

b) Write notes on: **[10]**

i) Performance curves of gas turbines.

ii) Velocity triangle of axial flow turbines.

OR

P.T.O.

Q6) a) A single stage axial flow turbine (Impulse) is supplied with a gas at stagnation conditions of 4 bar & 650°C. The expansion of gas in nozzle is upto a pressure of 1 bar. The nozzle discharge angle is 15° to the plane of wheels. The blade speed is 360 m/s and the gas leaves the rotor blade in axial direction with a speed of 300 m/s. Assuming a nozzle efficiency of 96% find: **[10]**

i) Rotor blade angles at inlet & outlet.

ii) Power developed for 25 kg/sec of gas flow.

iii) Utilisation factor and stage efficiency.

b) Write a note on blade materials of axial flow turbines. **[6]**

Q7) a) Explain for axial flow compressor: **[6]**

i) Work alone factor.

ii) Choking and stalling.

b) A multistage axial flow compressor delivers 20 kg/sec of air. The inlet conditions are 1 bar and 22° C. Determine the delivery pressure. Also find the no.of stages and internal efficiency of compressor when the stage efficiency is 0.9 and the power input is 4500 kW. Assume the stage pressure ratio is constant and the temperature rise in the first stage is 18° C. **[10]**

OR

Q8) Write notes on: **[16]**

a) Cas cade of blade.

b) Velocity triangles for the rotor of an axial flow compressor.

c) Blade loading and flow coefficient.

Q9) Explain: **[18]**

a) Types and requirements of a combustion chambers.

b) Mixing and dilution.

c) Stability limits and combustion intensity.

OR

Q10)a) Discuss flame tube cooling. **[8]**

b) Write notes on: **[10]**

i) Combustion chamber with swirl vanes.

ii) Theories of combustion.

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