

**B.Tech. AEROSPACE ENGINEERING
(BTAE)**

Term-End Examination

June, 2017

00318

BAS-016 : PROPULSION – II

Time : 3 hours

Maximum Marks : 70

Note : Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.

1. Distinguish between turboprop and turbojet engines. Explain the working principle of a turbojet engine with the help of a neat and labelled diagram. 4+6

2. (a) What do you mean by de Laval nozzle ? Explain the flow through de Laval nozzle for different back pressure with the help of neat sketches. 2+5

- (b) Explain the starting problem of a supersonic inlet. 3

3. Explain the following terms : 5×2=10
- (a) Choking
 - (b) Bypass Ratio
 - (c) Propulsive Efficiency
 - (d) Rotating Stall
 - (e) Afterburner
4. (a) Explain the working principle of a Ramjet engine with the help of a neat and labelled sketch. Distinguish Ramjet from Turbojet. 5+2
- (b) Explain the phenomenon of Flame instability. 3
5. (a) Distinguish between centrifugal and axial flow compressors. 4
- (b) Explain the various methods of turbine blade cooling with the help of diagrams. 6
6. (a) Explain the centrifugal compressor characteristics with the help of neat plots. 5
- (b) Explain the fuel system of a typical jet engine system. 5
7. (a) Derive the expression for a typical stage pressure ratio for an axial flow compressor with the help of velocity triangles. 6
- (b) What do you mean by degree of reaction ? Explain its importance. 4

8. (a) Calculate the pressure ratio and power required to drive a single-sided centrifugal compressor using the following data : 6

Power input factor = 1.04

Slip factor = 0.9

Rotational speed = 300 rev/sec

Overall diameter of impeller = 0.5 m

Air mass flow = 10 kg/sec

Inlet stagnation temperature = 295 K

Isentropic efficiency = 0.8

- (b) What do you mean by blade spacing and stage loading? Explain their importance. 4

9. (a) Calculate the degree of reaction for a single stage axial flow turbine using the following data : 5

Temperature drop = 145 K

Mean blade speed = 350 m/s

$\alpha_1 = \alpha_3 = 0$

$C_{a2} = C_{a3}$ and $C_1 = C_3$

Flow coefficient = 0.8

- (b) Explain the factors affecting the design of a combustion chamber. 5