

B.TECH. (AEROSPACE ENGINEERING) (BTAE)

01421

Term-End Examination

December, 2012

BAS-016 : PROPULSION - II

Time : 3 Hours

Maximum Marks : 70

Note : *Question 1 is compulsory. In addition answer any other 9 questions. All questions carry equal marks. Use of steam tables and calculator is permissible.*

1. (a) Fill in the blanks : **1x4=4**
- (i) Mach number (ratio of speed of an object to speed of sound in same medium) varies with _____.
 - (ii) Brayton cycle is basically constant _____ cycle.
 - (iii) Air intake duct converts air velocity into higher static pressure. This is called _____.
 - (iv) In a centrifugal compressor, air enters _____ and leaves _____.
- (b) Indicate True or False : **1x3=3**
- (i) Where higher pressure ratios are required, only axial flow compressors are suitable.
 - (ii) Efficiency of a combustion chamber is of the order of 88-90%.

- (iii) In a twin-spool gas turbine engine, first stage turbine drives low-pressure compressor.
2. (a) Differentiate between two-stage and double-entry centrifugal compressors. 3
 - (b) Differentiate between thrust augmentation and thrust reversal. 4
 3. (a) With a neat sketch explain a by-pass engine. 3
 - (b) Draw and explain Brayton cycle on a p-v and T-S diagram. 4
 4. Steam enters a nozzle at 10 bars and 250°C and leaves at 2 bars. Assuming negligible inlet velocity and isentropic expansion, calculate exit velocity and nozzle throat area. $m = 10\text{kg/sec}$ 7
 5. (a) Draw a neat sketch of jet engine fuel system. 3
 - (b) Explain briefly function of various components of fuel system. 4
 6. An engine is drawing air at a rate of 60 kg/sec. It has turbine entry temp of 1300 K and comp exit temp of 580 K. Calculate fuel flow rate. Assume suitable values of data not given. 7
 7. (a) Why is a conical dome used in jet pipe? 3
 - (b) Explain Turbo-jet with the help of a neat diagram. 4

8. (a) What are the basic requirements of an ignition system ? 3
(b) List out various types of starting systems used in a turbo-jet engine. 4
9. (a) Write 'thrust equation' and explain various terms used on it. 3
(b) With a neat sketch describe flow process through a combustion chamber indicating various flow zones. 4
10. An aircraft is operating at 6 km altitude at a speed of 0.75 Mach where ambient pressure is 0.54 kg/cm². What will be the pressure and temperature at exit from air-intake assuming isentropic flow ? Assume suitable assumption for data not given. 7
11. (a) Draw a typical starting system (time-speed) graph for a jet engine. 3
(b) What do you understand by ignition limits ? Explain. 4
12. Jet engine turbine entry temperature is 1200 K. Air leaves combustion chamber at 7 bar and power required to run compressor and various accessories is 14,000 kW. Calculate turbine exit pressure and temperature when turbine efficiency is 90%. Mass flow rate is 50 kg/sec. 7
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