No. of Printed Pages : 4

BAS-016

00415

B.TECH. (AEROSPACE ENGINEERING) PROGRAMME (BTAE)

Term-End Examination

June, 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 permitted.*

1. (a) Fill in the blanks : **1x4=4**

   (i) The ratio of specific heats of a gas at constant pressure and constant volume (γ) varies with _____.

   (ii) Jet engine works on _____ cycle.

   (iii) For effective burning of aviation turbine fuel, air - fuel ratio should be of the order of _____

   (iv) Exhaust gas pipe (jet - pipe) is subjected to high temperature, thus it is generally made of _____.

   (b) Indicate True / False. **1x3=3**

   (i) A large amount of turbulence is generated in a combustion chamber although turbulence causes losses and pressure drop.

(ii) Stresses in turbine disc increases as the square of engine rotational speed.

(iii) A nozzle is said to be chocked when throat velocity reaches the speed of sound.

2. (a) Differentiate between centrifugal and axial flow compressor. 3

(b) With a sketch, differentiate between turbofan and turboprop engine. 4

3. (a) With a neat sketch explain two - spool engine. 3

(b) Draw and explain Brayton cycle on P - V and T - S diagram. 4

4. An engine operating at sea level with speed of 220 m/sec and drawing 50 kg/sec air has nozzle exit temperature of 850 K and pressure 1.35 kg/cm^2. Calculate engine thrust and exit area of the nozzle. 7

5. Steam expands in a nozzle from 3 bars to 1 bar. The initial velocity is 80 m/s and initial temperature of steam is 150°C. Nozzle efficiency is 92% calculate exit velocity of steam. 7

6. (a) Draw a neat sketch of jet engine lubrication system. 3

(b) Explain briefly functions of various components of lubrication system. 4

7. (a) Explain the phenomenon of compressor surge. 3

(b) Explain the flow through a convergent - divergent nozzle. 4

8. (a) What are the requirements of a starting system of a jet engine ? 3

(b) Explain briefly the functioning of surface discharge Igniter used in jet engines. 4

9. (a) Write 'thrust equation' and explain various terms used in it. 3

(b) List out various types of combustion used in gas turbine cycle chambers and explain any one of them. 4

10. An aircraft is operating at 8 km altitude at a speed of 0.86 Mach where ambient pressure is 0.35 kg/cm^2. What will be the pressure and temperature at exit from air intake (entry to compressor) assuming that the flow to be isentropic. Make suitable assumptions for data not given. 7

11. (a) List out the occasions when only starting or ignition system is used in a jet engine. 3

(b) What is gas (flame) speed and how is it achieved in a combustion chamber ? 4

12. Air enters a compressor at 0.85 bars and 30°C, at a rate of 60 kg/sec. Find the power required by compressor if compressor efficiency is 88%. 7