

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

Term-End Examination

December, 2016

BAS-013 : PROPULSION - I

00483

Time : 3 hours

Maximum Marks : 70

Note : Attempt any five questions. Each question carries equal marks. Use of scientific calculator is permitted.

1. Differentiate between Otto cycle and Diesel cycle. Show that thermal efficiency of an Otto cycle is given by

$$\eta = 1 - \frac{1}{\gamma_v^{\gamma-1}}, \text{ where } \gamma_v = \text{compression ratio.}$$

Calculate the ideal air standard cycle efficiency based on the Otto cycle for a petrol engine with a cylinder bore of 55 mm, a stroke of 75 mm and a clearance volume of 21.5 cm³. 4+6+4

2. Differentiate between turboprop and turbojet engines. Explain the working principle of a turboprop engine with the help of a neat sketch. Write the equation for thrust for a turboprop engine. 5+7+2

3. (a) Distinguish between S.I. and C.I. engines. Explain the working of a four-stroke C.I. engine with the help of p-v diagram and indicator diagram. 4+6
- (b) What is supercharging ? Explain its importance with respect to aircraft. 4
4. (a) What are the various arrangements for multi-cylinder aircraft engines ? Which type of arrangement is used currently for light aircraft and why ? 4+4
- (b) Draw power available and power required diagram for a piston engine aircraft. How does altitude affect the performance of a piston engine aircraft ? 3+3
5. Write notes on the following : 7+7
- (a) Splash and Dry Sump Lubrication System
- (b) Pressure Cooling and Steam Cooling
6. Explain the following terms and give their relevance : 7×2=14
- (a) Abnormal Combustion
- (b) Mean Effective Pressure
- (c) SHP
- (d) Specific Fuel Consumption
- (e) Emissive Power
- (f) Firing Order
- (g) Stoichiometric Mixture

7. What do you mean by carburetion ? Explain the function of various elements of a carburettor system of a multi-cylinder piston engine with the help of a sketch. How will you calculate fuel orifice size ? 3+7+4
8. (a) Distinguish between conduction and convection. Derive the general equation of 2-D heat conduction. 4+6
- (b) State and explain Planck's distributive law. 4
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