

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

**Term-End Examination**

**00273**

**June, 2017**

**BAS-013 : PROPULSION – I**

*Time : 3 hours*

*Maximum Marks : 70*

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

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1. (a) Differentiate between the following : 3×4=12
  - (i) Otto cycle and Diesel cycle
  - (ii) IHP and BHP
  - (iii) 2-stroke and 4-stroke engines
- (b) Explain the importance of mean effective pressure. 2
2. (a) Distinguish between turbojet and turbofan engines.
- (b) Explain the working of a turbofan engine with the help of a neat sketch (showing various components).
- (c) Write the equation for thrust of a turbofan engine. 4+8+2

3. (a) Explain an ideal Dual cycle with the help of a p-v diagram.
- (b) An oil engine takes in air at 1.01 bar, 19°C and the maximum cycle pressure is 68 bar. The compression ratio is 18 : 1. Calculate the air standard thermal efficiency based on the dual combustion cycle. Assume that the heat added at constant volume is equal to the heat added at constant pressure. 4+10
4. (a) Explain supercharging and give its importance. What are the various types of superchargers ? Explain the working of any one of them. 4+2+4
- (b) Explain the importance of intake and exhaust manifolds in case of a multi-cylinder engine. 4
5. (a) Differentiate between S.I. and C.I. engines. Classify S.I. engines. Explain the working of a four-stroke S.I. engine with the help of a neat diagram. 4+1+5
- (b) Draw indicator diagrams for 2-stroke and 4-stroke S.I. engines. 4
6. Write short notes on the following : 6+8
- (a) Engine Lubricants and Additives
- (b) Cooling Systems

7. (a) Derive the expression for heat flow through a sphere.
- (b) A small hemispherical oven is built of an inner layer of insulating firebrick of 125 mm thickness and an outer covering of 85% magnesia of 40 mm thickness. The inner surface of the oven is at  $800^{\circ}\text{C}$  and the heat transfer coefficient for the outside surface is  $10 \text{ W/m}^2 \text{ K}$ . The room temperature is  $20^{\circ}\text{C}$ . Calculate the rate of heat loss through the hemisphere, if the inside radius is 0.6 m. Take the thermal conductivities of firebricks and 85% magnesia as 0.31 and 0.05 W/m K respectively. 7+7
8. Describe the following in detail : 8+6
- (a) Fuel System of a Multi-cylinder Piston Engine
- (b) Ramjet Engines
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