No. of Printed Pages : 4

BAS-013

B.Tech. AEROSPACE ENGINEERING (BTAE)

Term-End Examination

00296

June, 2015

BAS-013 : PROPULSION – I

Time : 3 hours *Maximum Marks : 70*

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

1. Compare Otto, Diesel and Dual cycles for the

$4 \times 3\frac{1}{2} = 14$

(a) same compression ratio and heat input

(b) same maximum pressure and heat input

(c) same maximum pressure and temperature

(d) same maximum pressure and work output

2. A turbojet engine consumes air at the rate of 60·2 kg/s when flying at a speed of 1000 km/hr. Calculate : *14*

(a) Exit velocity of the jet when the enthalpy change for the nozzle is 230 kJ/kg and velocity coefficient is 0·96

(b) Fuel flow rate in kg/s when air-fuel ratio is 70 : 1

(c) Thrust specific fuel consumption

(d) Thermal efficiency of the plant, if the combustion efficiency is 92% and calorific value of the fuel used is 42,000 kJ/kg

(e) Propulsive power

(f) Propulsive efficiency

(g) Overall efficiency

3. State the relative advantages and limitations of the following : $4 \times 3\frac{1}{2} = 14$

(a) Battery and Magneto ignition system

(b) Splash and Dry sump lubrication system

(c) Propeller and Turboprop engine

(d) Air cooling and Steam cooling

4. (a) Derive the general heat conduction equation. 7

(b) Explain Kirchhoff's Law of Radiation. 7

5. (a) Briefly describe the working principle of Ramjet engine with a neat sketch. 7

(b) A simple jet carburetor is required to supply 5 kg of air and 0·5 kg of fuel per minute. The fuel specific gravity is 0·75. The air is initially at 1 bar and 300 K. Calculate the throat diameter of the choke for a flow velocity of 100 m/s. Velocity coefficient is 0·8. If the pressure drop across the fuel metering orifice is 0·80 that of the choke, calculate orifice diameter assuming, C_{df} = 0·60 and γ = 1·4, where the symbols have their usual meaning. 7

6. (a) Explain the combustion process of an SI engine. 7

(b) Derive the expression for calculating mean effective pressure. List the parameter by which performance of an engine is evaluated. 7

7. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Overall heat transfer coefficient

(b) Black body

(c) Four-stroke CI engine

(d) Two-stroke SI engine

(e) Lubricants and Additives