B.TECH. (AEROSPACE ENGINEERING) BTAE

Term-End Examination
December, 2012

BAS-013 : PROPULSION - I

Time : 3 hours   *Maximum Marks : 70*

Note : *Question 1 is compulsory. In addition, answer any other 9 questions. Use of calculator is* **permitted.**

1. (a) Fill in the blank.   **1x3=3**

   (i) For a given compression ratio, efficiency of diesel engine is _____ than that of otto cycle.

   (ii) Wavelength of thermal radiation is _____ than X and gamma rays.

   (iii) In an IC engine, at one stage both inlet and outlet valves are open for as much as _____ degrees.

   (b) Answer True or False.   **1x4=4**

   (i) Reciprocating engines are ideal for cruise speeds upto 600 kmph.

   (ii) Very rich air fuel ratios lead to excessive carbon deposits in exhaust.

   (iii) Super-charged engines are also known as naturally - aspirated engines.

   (iv) Turbocharger is a centrifugal compressor driven by exhaust gases.

2. (a) Draw a diesel Cycle on p-v and T- φ diagram **4**

   (b) With a sketch/graph, compare efficiency of diesel cycle with otto cycle for a range of compression ratios **3**

3. Air enters an engine working on otto cycle at 100 KPa and 27°C. The engine compression ratio is 8 and heat added per cycle is 1500 KJ/kg. Calculate thermal efficiency of the engine (take r = 1.4, Cv = 0.72 KJ/kg-K) by calculating work done. **7**

4. (a) Describe Stefan-Boltzman's law for radiation **3**

   (b) Differentiate between black, opaque and grey bodies **4**

5. (a) State advantages of IC engines over external combustion engines. **3**

   (b) Explain the working a four stroke SI engine **4**

6. (a) Calculate Stoichiometric ratio of fuel $C_{12} H_{24}$ **3**

   (b) Define and explain pre-ignition and knocking in SI engines. **4**

7. (a) Describe various types of reciprocating engines. **3**

   (b) With the help of a sketch explain variation of specific fuel consumption with air fuel ratio. **4**

8. (a) Write a short note on Rich air-fuel mixtures. **3**

 (b) Sketch and explain 6 opposed cylinder engine indicating cylinder numbers. **4**

9. (a) Describe carburettor icing **3**

 (b) Draw a line diagram of battery ignition system. **4**

10. An engine produces 80 kW power at 80% mech. efficiency. BSFC of engine is 260gm/kW-hr. A design improvement through better lubrication, reduces engine friction by 4kW. Assuming thermal efficiency to remain constant, calculate savings in fuel per hour **7**

11. (a) Compare liquid cooling of engines vis-a-vis air cooling **3**

 (b) What are the requirements of a good lubrication system ? **4**

12. A four-stroke for cylinder engine develops 14.7 kW when running at 1000 rpm. Mean effective pressure is 5.5 bar. Calculate diameter and stroke of piston when length of stroke is 1.5 times that of the diameter. **7**