B.TECH. (AEROSPACE ENGINEERING) BTAE

Term-End Examination

June, 2013

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**.*

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1. (a) Answer *true* or *false* :   1x3=3
       (i)   Fuel-air ratio of 0.08 is termed as rich mixture.
       (ii) As altitude increases, air fuel mixture tends to become lean.
       (iii) Mechanical efficiency of super-charged engine is slightly more than a naturally aspirated engine.

    (b) Fill in the blanks :   1x4=4
       (i)   Ignition switch in a piston engine operates in _____ modes.
       (ii) A high viscosity index means _____ oil viscosity changes with temperature.
       (iii) Ideal cooling system for radial engines is _____ cooling.
       (iv) NO_2 emissions in a super charged engine is _____.

2. (a) Draw an Otto cycle on p-v and T-ϕ **3**
      diagram.

   (b) Derive an expression for efficiency of Otto **4**
      cycle.

3. Stroke and diameter of a diesel engine are **7**
   250 mm and 150 mm respectively. If clearance
   volume is 0.0004 m^3 and fuel injection takes place
   at constant pressure for 5% of stroke. Calculate
   engine efficiency.

4. (a) Define fourier law of heat conduction. **3**

   (b) Differentiate between white, black and **4**
      transparent body.

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

   (b) Describe the working of a rocket engine. **4**

6. (a) Calculate stoichiometry ratio of fuel C_{18} **3**
      H_{36}.

   (b) Explain the phenomenon of detonation. **4**

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

   (b) Draw a sketch and explain 7 cylinder radial **4**
      engine and number the cylinders.

8. (a) Write a short note on lean AF mixture. 3

   (b) How does BHP vary with AF ratio. Explain with a sketch/graph. 4

9. (a) Sketch a simple Float type carburettor. 3

   (b) What are the limitations of a simple float type carburettor ? 4

10. A unsupercharged engine has inlet pressure of 97.4 KN/m² and temperature of 325 K. Engine is then supercharged to a pressure ratio of 1.6 and works at adiabatic efficiency of 82% and mechanical efficiency of 90%. Calculate power required to run the supercharger. 7

11. (a) What factors lead to degradation of lubricating oils ? 3

    (b) What will happen if engines are not cooled ? 4

12. A four cylinder, 4 stroke engine has brake power of 36 kW and runs at 2250 rpm. Its diameter and stroke is 110mm and 130mm respectively. Calculate brake mean effective pressure. 7

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