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BIME-010

B.Tech. – VIEP – MECHANICAL ENGINEERING (BTMEVI)

00112

Term-End Examination

December, 2017

BIME-010 : THERMAL ENGINEERING – II

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Use of scientific calculator is permitted.*

1. Describe with a neat sketch the construction and working of a single-stage single-acting reciprocating air compressor. *10*

2. How are the fuels for spark ignition engines rated ? Explain the effect of octane number on the performance of a spark ignition engine. *10*

3. What is the effect of acceleration on the performance of a simple carburettor ? How is it taken care of in a modern carburettor ? *10*

4. A diesel engine contains 0·1 m^3 of air at 0·98 bar and 30°C at the beginning of compression. The compression ratio is 15 and the volume at cut-off is 0·0125 m^3. Determine for the corresponding air standard cycle

(a) the cut-off ratio,

(b) the percent clearance,

(c) the work done, and

(d) the air standard efficiency.

Take C_p = 1·005 kJ/kg and γ = 1·4. *10*

5. An automobile has a three-litre S.I. V-6 engine which operates on a four-stroke cycle at 3000 rpm. The compression ratio is 9·5. During a test, it is connected to a dynamometer which gives a brake output torque reading of 205 Nm at 3000 rpm. The air enters at 85 kPa and 60°C. The mechanical efficiency of the engine is 85% and bore is equal to stroke (L = D) for the engine. Calculate : *10*

(a) Cylinder bore and stroke length

(b) Clearance volume of one cylinder

(c) B.P. and I.P.

(d) Brake mean effective pressure

6. Discuss the difference between theoretical and actual value timing diagrams of a diesel engine. *10*

7. Describe with a suitable sketch the two-stroke cycle spark ignition (S.I.) engine. How does its indicator diagram differ from that of a four-stroke cycle engine ? *10*

8. The output of an I.C. engine is measured by a rope brake dynamometer. The diameter of the brake pulley is 750 mm and rope diameter is 50 mm. The dead load on the tight side of the rope is 400 N and the spring balance reading is 50 N. The engine consumes 4·2 kg/hr of fuel at a rated speed of 1000 rpm. The calorific value of fuel is 43900 kJ/kg.

   Calculate : *10*

   (a) Brake specific fuel consumption

   (b) Brake thermal efficiency

9. Explain the phenomenon of auto-ignition. Explain how auto-ignition is responsible for knocking in S.I. engines. *10*

10. What is the difference between air cycle and fuel-air cycle ? What are the assumptions in fuel-air cycle ? *10*
