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BME-033

DIPLOMA IN MECHANICAL ENGINEERING (DME) / ADVANCED LEVEL CERTIFICATE COURSE IN MECHANICAL ENGINEERING (DMEVI / ACMEVI)

00203

Term-End Examination

June, 2015

BME-033 : HEAT POWER TECHNOLOGY

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. Use of scientific calculator is allowed.*

1. The following data were recorded from a test on a single cylinder four-stroke diesel engine.

Cylinder bore = 150 mm,

engine stroke = 250 mm,

area of indicator diagram = 450 mm^2,

length of indicator diagram = 50 mm,

indicator spring rating = 1·2 mm,

engine speed = 420 rpm,

brake torque = 217 Nm,

fuel consumption = 2·95 kg/h,

calorific value of fuel = 44,000 kJ/kg,

cooling water rate of flow = 0·068 kg/sec,

cooling water temperature rise = 45 K,

specific heat capacity of the cooling water = 4·1868 kJ/kg K.

Calculate :

(a) The mechanical efficiency

(b) The brake thermal efficiency

(c) The specific fuel consumption *14*

2. The torque delivered by a two-stroke engine is represented by

$$T = (1000 + 300 \sin 2\theta - 500 \cos 2\theta) \text{ N-m}$$

where θ is the angle turned by the crank from the inner-dead centre. The engine speed is 250 rpm. The mass of the flywheel is 400 kg and radius of gyration is 400 mm. Determine :

(a) The power developed,

(b) The total percentage fluctuation of speed,

(c) The angular acceleration of flywheel when the crank has rotated through an angle of 60° from the inner-dead centre. *14*

3. (a) Discuss the basic requirement of a spark-ignition system. *7*

(b) What are the main disadvantages of a battery ignition system ? How can these be overcome ? *7*

4. (a) What are the functions of lubricating oil in IC engines ?

(b) Briefly describe the wet sump water cooling system of a multi-cylinder CI engine. *2×7=14*

5. (a) What are the various methods of measuring indicating power ? Briefly compare their relative accuracy. *7*

(b) Describe with a sketch, the principle of a hydraulic dynamometer. *7*

6. Discuss the working of an engine on Otto-cycle. In an Otto-cycle the air at 15°C and 1·05 bar is compressed adiabatically until the pressure is 13 bar. Heat is added at a constant volume until the pressure rises to 35 bar. Calculate the air standard efficiency, the compression ratio, and the mean effective pressure for the cycle. Take $C_v = 0{\cdot}718$, $R = 0{\cdot}287$. *14*

7. Write short notes on the following : *2×7=14*

(i) Qualitative Governing

(ii) Hit and Miss Governing
