

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

**Term-End Examination**

**December, 2016**

**BME-033 : HEAT POWER TECHNOLOGY**

*Time : 2 hours*

*Maximum Marks : 70*

***Note :** Answer **five** questions in all. Question no. 1 is compulsory. Answer **four** more questions from the remaining questions. Use of scientific calculator is permitted.*

**1. Attempt *all* seven parts :** **7×2=14**

- (a) In a four-stroke engine, the working cycle is completed in
- (i) One revolution of the crank-shaft
  - (ii) Two revolutions of the crank-shaft
  - (iii) Three revolutions of the crank-shaft
  - (iv) Four revolutions of the crank-shaft
- (b) A petrol engine has compression ratio from
- (i) 6 to 10
  - (ii) 10 to 15
  - (iii) 15 to 25
  - (iv) 25 to 40

- (c) The number of instantaneous centres for a mechanism consisting of  $n$  links is

(i)  $\frac{n}{2}$

(ii)  $n$

(iii)  $\frac{n-2}{2}$

(iv)  $\frac{n(n-1)}{2}$

- (d) Two pulleys of diameters  $d_1$  and  $d_2$  and at distance  $x$  are connected by means of an open belt drive. The length of the belt is

(i)  $\frac{\pi}{2}(d_1 + d_2) + 2x + \frac{(d_1 + d_2)^2}{4x}$

(ii)  $\frac{\pi}{2}(d_1 - d_2) + 2x + \frac{(d_1 - d_2)^2}{4x}$

(iii)  $\frac{\pi}{2}(d_1 + d_2) + 2x + \frac{(d_1 - d_2)^2}{4x}$

(iv)  $\frac{\pi}{2}(d_1 - d_2) + 2x + \frac{(d_1 + d_2)^2}{4x}$

- (e) Which of the following is **not** related to a spark ignition engine ?

(i) Ignition coil

(ii) Spark plug

(iii) Distributor

(iv) Fuel injector

- (f) A spark plug gap is kept from
- (i) 0.3 to 0.7 mm
  - (ii) 0.2 to 0.8 mm
  - (iii) 0.4 to 0.9 mm
  - (iv) 0.6 to 1.0 mm
- (g) When the sleeve of a porter governor moves upwards, the speed of the governor
- (i) increases
  - (ii) decreases
  - (iii) remains unaffected
  - (iv) None of these

2. (a) Explain the working of four-stroke compression ignition engine with the help of a neat sketch.

(b) Define the following terms :

- (i) Stroke
- (ii) Swept Volume
- (iii) Total Cylinder Volume
- (iv) Compression Ratio
- (v) Mean Effective Pressure

$$2 \times 7 = 14$$

3. (a) A six-cylinder two-stroke engine produces a torque of 1100 Nm at a speed of 2100 rpm. It has a bore of 123 mm and a stroke of 127 mm. What is its bmep ?

- (b) What do you understand by the term carburetion ? State the function of a carburettor in a petrol engine.  $2 \times 7 = 14$
4. (a) Write the advantages and disadvantages of water cooling systems.
- (b) What are the different modes of heat transfer that occur in an Internal Combustion Engine ?  $2 \times 7 = 14$
5. Power is transmitted by a 5 mm thick open belt drive at a speed of 1700 m/minute. Find the maximum stress developed in the belt when the effective tension developed in the belt should not exceed 6.87 N/mm width of the belt. Angle of lap  $\theta = 165^\circ$ ,  $\mu = 0.3$  and the density of the belt material is  $9800 \text{ N/m}^3$ .  $14$
6. (a) With the help of a neat sketch, explain the working of a battery ignition system.
- (b) State the main function of a spark plug. Draw a neat sketch of a spark plug and label its components.  $2 \times 7 = 14$
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