

**DIPLOMA IN MECHANICAL ENGINEERING  
(DME)**

**Term-End Examination**

**December, 2017**

00202

**BME-053 : APPLIED THERMAL ENGINEERING**

*Time : 2 hours*

*Maximum Marks : 70*

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

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1. Choose the correct answer from the given four alternatives.  $7 \times 2 = 14$
- (a) Enthalpy of an ideal gas depends on
- (i) Pressure
  - (ii) Temperature
  - (iii) Volume
  - (iv) Molecular weight
- (b) For the same compression ratio and heat rejection, the most efficient cycle is
- (i) Otto cycle
  - (ii) Diesel cycle
  - (iii) Dual cycle
  - (iv) Brayton cycle

- (c) The material for piston in case of a petrol engine is
- (i) Cast-iron
  - (ii) Aluminium
  - (iii) Phosphorus-bronze
  - (iv) Cast steel
- (d) The air standard Otto cycle comprises of
- (i) Two constant pressure processes and two constant volume processes
  - (ii) Two constant pressure processes and two constant entropy processes
  - (iii) Two constant volume processes and two constant entropy processes
  - (iv) None of the above
- (e) In a four-stroke cycle petrol engine, during suction stroke
- (i) Only air is sucked in
  - (ii) Only petrol is sucked in
  - (iii) A mixture of petrol and air is sucked in
  - (iv) None of the above
- (f) The ratio of brake power to indicated power of an I.C. engine is called
- (i) Mechanical efficiency
  - (ii) Thermal efficiency
  - (iii) Volumetric efficiency
  - (iv) Relative efficiency

- (g) Carburetor is used for
- (i) S.I. engines
  - (ii) Gas engines
  - (iii) C.I. engines
  - (iv) None of the above

2. Answer any *two* of the following : 2×7=14

- (a) What are the factors that limit the compression ratio that can be used in petrol engines ? Also explain pre-ignition and auto-ignition.
- (b) The efficiency of an Otto cycle is 50% and  $\gamma$  is 1.5. What is the compression ratio ?
- (c) A Carnot engine working between 400°C and 40°C produces 130 kJ of work.

Determine

- (i) The engine thermal efficiency
- (ii) The heat added
- (iii) The entropy changes during heat rejection process

3. Answer any *two* of the following : 2×7=14

- (a) What are primary fuels ? List down some important primary fuels. What qualities are desired in fuels to inhibit detonation ?
- (b) A fuel has the following composition by weight :
- Carbon = 86%; Hydrogen = 11.75%, and Oxygen = 2.25%
- Calculate the theoretical air supply per kg of fuel and the weight of products of combustion per kg of fuel.

- (c) What do you mean by the term 'carburetion'? What is a carburetor? Why is a choke used in a carburetor?

4. Answer any *two* of the following :  $2 \times 7 = 14$

- (a) Enumerate lubrication systems and explain wet sump lubrication system with the help of a neat sketch.
- (b) What do you understand by "crankcase ventilation"? What is the difference between open crankcase and closed crankcase systems?
- (c) Why is cooling necessary for I.C. engines? Why is overheating and overcooling of I.C. engines harmful?

5. Write short notes on any *four* of the following :  $4 \times 3 \frac{1}{2} = 14$

- (a) Cetane Number
- (b) Magento-Ignition System
- (c) CNG Engine
- (d) Closed Cycle Gas Turbine
- (e) Specific Fuel Consumption
- (f) Anti-Freezing Mixtures
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