BME-052

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

Term-End Examination

December, 2018

00783

BME-052 : BASICS OF THERMAL ENGINEERING

Time : 2 hours   *Maximum Marks : 70*

*Note : **All** questions are **compulsory**. All questions carry equal marks. Use of scientific calculator is permitted. Use of Steam tables and Mollier diagram is permitted.*

1. Choose the correct answer from the *four* alternatives given below :   *7×2=14*

    (a) The draught produced by steel chimney as compared to that produced by brick chimney for the same height is

        (i)   less

        (ii) more

        (iii) same

        (iv) may be more or less

(b) In a boiler installation the natural draught is produced due to the fact that

    (i) furnace gases being light, go through the chimney giving place to cold air from outside to rush in

    (ii) pressure at the grate due to cold column is higher than the pressure at chimney base due to hot column

    (iii) at the chimney top the pressure is more than its environmental pressure

    (iv) All of the above

(c) In a surface condenser, if air is removed, there is

    (i) fall in absolute pressure maintained in condenser

    (ii) rise in absolute pressure maintained in condenser

    (iii) no change in absolute pressure in the condenser

    (iv) rise in temperature of condensed steam

(d) The heat transfer is constant when temperature

    (i) remains constant with time

    (ii) decreases with time

    (iii) increases with time

    (iv) Any of the above

(e) The coefficient of thermal conductivity is defined as

  (i) quantity of heat transfer per unit area per one degree drop in temperature

  (ii) quantity of heat transfer per one degree temperature drop per unit area

  (iii) quantity of heat transfer per unit time per unit area

  (iv) quantity of heat transfer per unit time per unit area per one degree temperature drop per unit length

(f) When a liquid boils at constant pressure, which of the following parameters increases ?

  (i) Temperature

  (ii) Latent heat of vaporisation

  (iii) Kinetic energy

  (iv) Entropy

(g) The entropy of a system

  (i) can never decrease

  (ii) can never increase

  (iii) may increase or decrease

  (iv) will always remain constant

2. Answer any *two* of the following : $2\times7=14$

   (a)   (i)   State and explain the Zeroth law of thermodynamics.

           (ii) A pressure gauge reads 2·5 MPa and the barometer reads 98 kPa. Calculate the absolute pressure in MPa.

   (b)   State and explain the Kelvin-Planck statement of the Second law of thermodynamics.

   (c)   What are the causes of entropy increase ?

3. Answer any *two* of the following : $2\times7=14$

   (a)   Draw p-V and T-s diagram for water starting from its liquid phase to superheated phase.

   (b)   State the condition of steam in the following case :

          (i)   At a pressure of 10 bar, total heat is 2646 kJ/kg

          (ii) At a pressure of 7 bar, specific volume is $0\cdot25$ m^3/kg

   (c)   Explain the difference between a fire tube boiler and a water tube boiler. State which type of boiler is used for power generation and why.

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

(a) Explain the various processes of steam power plant with the help of block diagram.

(b) State briefly the advantages of a regenerative feed heating in steam power cycle.

(c) What do you mean by a steam condenser ? Explain its function.

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

(a) Discuss in brief the three modes of heat transfer with suitable examples.

(b) Explain the concept of black body and grey body in radiation terminology.

(c) Describe renewable energy sources for power generation.