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BME-043

Diploma in Electrical and Mechanical Engineering

Term-End Examination

June, 2012

01969

BME-043 : RAC/UTILIZATION

Time : 2 hours *Maximum Marks : 70*

Note : *Question No 1 is **compulsory**. Answer **four** more questions from Q2 to Q7. Use of calculator is **permitted**.*

1. Choose the correct answer from the given alternatives : **14x1=14**

(a) Transmission of heat by conduction is :
  (i) a reversible process
  (ii) an irreversible process
  (iii) adiabatic process
  (iv) None of the above

(b) In air conditioning design for summer months, the condition inside a factory where heavy work is performed as compared to a factory in which light work is performed should have :
  (i) lower dry bulb temperature and lower relative humidity.
  (ii) lower dry bulb temperature and higher relative humidity.
  (iii) lower dry bulb temperature and same relative humidity.
  (iv) same dry bulb temperature and same relative humidity.

(c) The expression $0.622\frac{p_v}{p_t - p_v}$ is used to determine :

(i) relative humidity

(ii) specific humidity

(iii) degree of saturation

(iv) partial pressure

(d) The heat transfer is constant when :

(i) temperature remains constant with time

(ii) temperature decreases with time

(iii) temperature increases with time

(iv) any of these

(e) A refrigerator with its power on, is kept in a closed room, with its door open. The temperature of room will :

(i) rise

(ii) fall

(iii) remains the same

(iv) depends on area of the room

(f) Stefan - Boltzmann law is expressed as :

(i) $Q = \sigma AT^4$ (ii) $Q = \sigma A^2T^4$

(iii) $Q = \sigma AT^2$ (iv) $Q = AT^4$

(g) In centrifugal air compressor the pressure developed depends on :

(i) impeller tip velocity

(ii) inlet temperature

(iii) compression index

(iv) all of the above

(h) Heat energy from the sun reaches the earth by :

(i) scattering

(ii) convection and radiation

(iii) radiation

(iv) convection

(i) During sensible heating of moist air, enthalpy :

(i) increases

(ii) decreases

(iii) remains constant

(iv) none of the above

(j) The running of fan makes us comfortable during summer, because it

(i) decreases temperature of air

(ii) increases the thermal conductivity of air

(iii) increases the rate of evaporation of perspiration

(iv) cuts off the thermal radiation reaching us

(k) The relative humidity, during sensible heating :

(i) can increase or decrease

(ii) increases

(iii) decreases

(iv) remains constant

(*l*) The relative humidity, during cooling and dehumidification of moist air :

(i) increases

(ii) decreases

(iii) can increase or decrease

(iv) remains constant

(m) Two spheres of same material have radii 1 m and 4 m and temperature 4000K and 2000K respectively. The energy radiated per second by the first sphere is :

(i) greater than that by the second

(ii) less than that by the second

(iii) equal in both cases

(iv) the information is incomplete to draw any conclusion.

(n) A sphere, a cube, and a thin circular plate, all made of the same material and having the same mass are initially heated to a temperature of 3000^0 C. Which of these will cool fastest ?

(i) Sphere (ii) Cube

(iii) Plate (iv) None of these

2. (a) What do you understand by the terms 'convective heat transfer coefficient', and 'over all heat transfer coefficient' ? 7 + 7

(b) classify the heat exchangers according to the flow directions of fluid and give few examples of each in actual field of application.

3. (a) Enumerate the main parts of the equipment in the aircondition cycle. How are air - conditioning systems classified ? 7 + 7

(b) A fan running at 900 rpm delivers 15 m^3/min of air developing a static pressure of 15 mm of water gauge and consumer $\left(\frac{1}{10}\right)$ hp. If the fan speed is doubled, then find the air quantity, static pressure and horse power.

4. (a) List out the major sources of heat gain sensible and latent for airconditioning load estimation. 7 + 7

(b) Describe in brief the routine maintenance work of a refrigeration plant.

5. (a) State the factors which should be taken into consideration while selecting a system of air - conditioning. 7 + 7

(b) What is the optimum inside design conditions for comfort airconditioning ?

6. (a) What purpose is served by a fan in an air - conditioning system ? How are fans classified ? **7 + 7**

(b) What is the purpose of fins on evaporator coils ? Why is defrosting of an evaporator necessary in low - temperature application .

7. Write short notes on *any four* of the following : **4x3½ = 14**

(a) Fabric heat gain

(b) polyurethane

(c) Air Filter

(d) Desert cooler

(e) Air cooled condenser

(f) Fouling Factor