2nd Semester Back Examination – 2016-17
AIR CONDITIONING AND VENTILATION SYSTEMS
BRANCH(S): , HEAT POWER & THERMAL ENGG, HEAT POWER ENGG, THERMAL ENGG, THERMAL POWER ENGG
Time: 3 Hours
Max Marks: 70
Q.CODE:Z800
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** (2 x 10)
a) What do you mean by Sensible heat factor and bypass factor?
b) Define Dalton's law of partial pressure.
c) What are the parts of a Summer air Conditioning?
d) Distinguish between GSHF and ERSHF?
e) What are the types of air filter used in air conditioning?
f) What is comfort index?
g) What is the use of Air washer?
h) State the principle of ventilation.
i) What do you mean acoustic control in an Air conditioning?
j) What are the requirements of comfort air conditioning?

Q2 a) Discuss briefly the air flow in a duct. Explain static and velocity pressure in ducts? (5)
b) What are the different types of ducts and explain in detail with sketch? (5)

Q3 Explain clearly the term commercial ventilation system. What are the factors taken to be considered for the ventilation of commercial building? (10)

Q4 It is required to design an air conditioning plant for an office room for full winter air conditions. (10)
Outdoor conditions=12°C DBT and 10°CWBT
Required conditions=20°C DBT and 60% RH
Amount of air circulation=0.3m3 /min/person
Seating capacity of the office=50
The required condition is achieved first by heating and then by adiabatic humidifying. Determine the following using psychometric chart.
(i) Heating capacity of coil in kW and surface temperature required, if the bypass factor is 0.2
(ii) (ii) Capacity of the humidifier.

Q5 a) What are the requirements of comfort-Air conditioning and explain? What are indoor parameters in comfort Air conditioning and explain? (5)
b) With neat sketch explain the working principle of winter air conditioning? (5)

Q6 a) Air at 28°C DBT and 1 bar has a specific humidity of 0.016 kg per kg of dry air.   (5)
        Determine (i) partial pressure of water vapor (ii) relative humidity (iii) dew point
        temperature (iv) specific enthalpy of moist air (v) Degree of saturation
    b) Derive the following   (5)

$$\phi = \frac{\mu}{1 - (1 - \mu)Ps/Pb}$$

Where μ Is degree of saturation, ϕ is relative humidity And P_s, P_b are saturation
pressure and barometric pressure respectively.

Q7   Given for a conditioned space RSH=20 kW, RLH=5kW Outside conditions: 43°C   (10)
        DBT, 27.5°C WBT Inside design conditions: 25°C DBT, 50% RH BPF of the
        cooling coil: 0.1 The return air from the space is mixed with the outside air before
        entering the cooling coil in the ratio of 4:1 by weight. Determine
        (i) ADP
        (ii) Condition of air leaving cooling coil
        (iii) Dehumidified air quantity
        (iv) Ventilation air mass and volume flow rates
        (v) Ventilation air mass and volume flow rates
        (vi) Total refrigeration load on the air conditioning plant.

Q8   **Write Short note**:   (5 x 2)
    a) Comfort chart
    b) Humidifier
    c) Insulation material used in Air Conditioning
    d) Effective temperature for Comfort Conditioning