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| Q-1 A R-12 vapour compression system has saturated suction temperature of -5°C and saturated discharge temperature of 40°C. The refrigerant vapour is dry-saturated at the suction of compressor and becomes superheated after compression. For one ton of refrigeration capacity, Calculate (i) Refrigerating effect (ii) mass flow rate (iii) Power and (iv) COP of the system.  Q – 2 An air refrigerator working on Bell coleman cycle takes in air at 1 bar and at a temperature of 100 C. The air is compressed to 5 bar abs. The same is cooled to 250 C in the cooler before expanding in the expansion cylinder to cold chamber pressure of 1 bar. The compression and expansion laws followed are : pv**1.35** = C and pv**1.3** = C respectively. Determine C.O.P of the plant and net refrigeration effect per kg of air.  Take Cp = 1.009 kJ/kg K and R = 0.287 kJ/kg K for air.   |  | | --- | | Q-3 The atmospheric air at 300C dry bulb temperature and 75 % relative humidity enters a cooling coil at the rate of 200 m3/min. The coil dew point temperature is 140C and the by-pass factor of the coil is 0.1. Determine: 1. The temperature of air leaving the cooling coil; 2. The capacity of the cooling coil in tonnes of refrigeration 3. The sensible heat factor for the process.  Q-4 Following data is available for an air conditioning system comprising of filter, cooling coil, fan and distribution system using only fresh air for the purpose of maintaining comfort conditions in summer. RSH = 11.63 KW, RLH = 2.33 KW. Outside design condition: 28°C DBT, 20°C WBT. Inside design condition: 21°C DBT, 50% RH. Temperature of air entering the room = 11°C. Calculate (i) RSHF (ii) Coil bypass factor (iii) rate of flow of air kg/hr. (iv) Load on cooling coil (v) Coil ADP  Q-5 A small office hall of 25 persons capacity is provided with summer air conditioning system with the following data:  Outside conditions = 340 C DBT and 280 C WBT  Inside conditions = 240 C DBT and 50 % RH  Volume of air supplied = 0.4 m3/min/person  Sensible heat load in room = 125600 kJ/h  Latent heat load in the room = 42000 kJ/h  Find the sensible heat factor of the plant.  Q-6 A circular duct of 40 cm is selected to carry air in an air conditioned space at a velocity of 440 m/min to keep the noise level at desired level. If this duct is replaced by a rectangular duct of aspect ratio of 1.5, find out the size of rectangular duct for equal friction method when (a) the velocity of air in two ducts is same, (b) the discharge rate of air in two ducts is same.  Q-7 The sling- psychrometer reads 400C DBT and 280C WBT calculate followings: (i) Specific humidity (ii) Relative humidity (iii) Vapor density in air (iv) Dew point temperature (v) Enthalpy of the mixture per kg of dry air. Assume atmospheric pressure to be 1.03 bar. | |