**SAMPLE QUESTION BANK**

**Program: BE (Mechanical Engineering)**

Curriculum Scheme: **Rev2019 C Scheme**

Course: Heating, Ventilation, Air conditioning and Refrigeration and Course Code : MEC603

**MCQ- SAMPLE SET**

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|  | **Choose the correct option for following questions.** |
| 1. | In HVACR industry refrigerant Air is designated as |
| Option A: | R-717 |
| Option B: | R-744 |
| Option C: | R-764 |
| Option D: | R-729 |
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| 2. | One ton of Refrigeration is equal to |
| Option A: | 210 KJ/min |
| Option B: | 21 KJ/min |
| Option C: | 420 KJ/min |
| Option D: | 840 KJ/min |
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| 3. | If the temperature of cold body is -25 deg C and the hot body is 55 deg C then the ideal COP refrigeration cycle is |
| Option A: | 0.3125 |
| Option B: | 3.1 |
| Option C: | -0.3125 |
| Option D: | -3.1 |
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| 4. | COP of heat pump is |
| Option A: | 1 + COP of Refrigerator |
| Option B: | 1 - COP of Refrigerator |
| Option C: | 1 ÷ COP of Refrigerator |
| Option D: | 1 × COP of Refrigerator |
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| 5. | The subcooling is the process of cooling the refrigerant in vapour compression refrigeration system |
| Option A: | Before compression |
| Option B: | After compression |
| Option C: | Before throttling |
| Option D: | After expansion |
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| 6. | The refrigerant used in Li-Br VAR cycle is |
| Option A: | Ammonia |
| Option B: | Aqua - Ammonia |
| Option C: | Water |
| Option D: | R 134a |
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| 7. | The value of dryness fraction on dry saturated vapour line is |
| Option A: | 0 |
| Option B: | 0.25 |
| Option C: | 0.5 |
| Option D: | 1 |
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| 8. | For simple vapour compression cycle, enthalpy at suction = 1600 kJ/kg, enthalpy at discharge from the compressor = 1800 kJ/kg, enthalpy at exit from condenser = 600 kJ/kg. What is the COP for this refrigeration cycle? |
| Option A: | 3 |
| Option B: | 4 |
| Option C: | 5 |
| Option D: | 6 |
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| 9. | In heat pump,meaning of SEER is |
| Option A: | Seasonal Energy Efficiency Ratio |
| Option B: | Sensible Energy Efficiency Ratio |
| Option C: | Sensible Effective Energy Ratio |
| Option D: | Seasonal Effective Energy Ratio |
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| 10. | The maximum COP of VAR cycle may be written as |
| Option A: | COP of Carnot refrigerator + Efficiency of Carnot Engine |
| Option B: | COP of Carnot refrigerator - Efficiency of Carnot Engine |
| Option C: | COP of Carnot refrigerator × Efficiency of Carnot Engine |
| Option D: | COP of Carnot refrigerator ÷ Efficiency of Carnot Engine |
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| 11. | In three fluid vapour absorption system which of the following fluid is used to increase the rate of evaporation in evaporator |
| Option A: | Water |
| Option B: | Hydrogen |
| Option C: | Ammonia |
| Option D: | Aqua-Ammonia |
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| 12. | Atmospheric air with DBT of 28oc and WBT of 17oc is cooled to 15oc without changing its moisture content. Find original relative humidity, Final relative humidity and Final wet bulb temperature. |
| Option A: | 34% ,73% , 12oc repectively |
| Option B: | 64% ,33% , 12oc repectively |
| Option C: | 74% ,23% , 12oc repectively |
| Option D: | 94% ,13% , 12oc repectively |
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| 13. | In load estimation, RSH = 39 and RLH = 13 then what will be value of RSHF |
| Option A: | 0.29 |
| Option B: | 0.36 |
| Option C: | 0.47 |
| Option D: | 0.75 |
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| 14. | If the human body temperature is 37 deg. C and the ambient temperature is 37.8 deg. C then to feel comfortable the human body must |
| Option A: | Give off some of its generated heat |
| Option B: | Gain some of ambient heat |
| Option C: | Neither absorb nor reject the heat from body |
| Option D: | Idle |
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| 15. | During Sensible Cooling which of the following parameter remains constant |
| Option A: | DBT |
| Option B: | WBT |
| Option C: | Moisture Content |
| Option D: | RH |
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| 16. | During Humidification which of the following parameter remains constant |
| Option A: | DBT |
| Option B: | WBT |
| Option C: | Moisture Content |
| Option D: | RH |
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| 17. | Which of the following is the source of sensible as well as latent heat? |
| Option A: | Solar heat gain though wall |
| Option B: | Solar heat gain though glass |
| Option C: | Electric Lights |
| Option D: | Occupants Load |
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| 18. | Which of the following is not the factor affecting the BPF |
| Option A: | Velocity of Air flow |
| Option B: | Number of fins per unit length |
| Option C: | Cross sectional area of coil |
| Option D: | The number of rows of coil in the direction of flow. |
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| 19. | For summer air conditioner which of the following psychrometric process is applicable |
| Option A: | Cooling & Dehumidification |
| Option B: | Only Cooling |
| Option C: | Cooling & Humidification |
| Option D: | Only dehumidification |
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| 20. | During evaporative cooling which of the following parameter remains constant? |
| Option A: | DBT |
| Option B: | WBT |
| Option C: | RH |
| Option D: | Specific Humidity |
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| 21. | Aspect ratio of rectangular duct is equal to |
| Option A: | Ratio of longer to shorter sides |
| Option B: | Sum of longer and shorter sides |
| Option C: | Difference of longer and shorter sides |
| Option D: | Product of longer and shorter sides |
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| 22. | If the duct is 0.3 m square cross section and the velocity passing though circular & rectangular duct is same then the equivalent diameter of circular duct is |
| Option A: | 0.15 m |
| Option B: | 0.3 m |
| Option C: | 1.2 m |
| Option D: | 0.9 m |
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| 23. | Which of the following is the correct sequence of component of AHU? |
| Option A: | Fresh Air-Damper-Filter-Cooling coil-Heating coil-supply air |
| Option B: | Fresh Air-Damper-Filter-Heating coil-cooling coil-supply air |
| Option C: | Fresh Air-filter-Damper-Cooling coil-Heating coil-supply air |
| Option D: | Fresh Air-Damper-Cooling coil-Filter -Heating coil-supply air |
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| 24. | Hydraulic mean depth is |
| Option A: | The product of cross sectional area of duct and wetted perimeter of duct |
| Option B: | The sum of cross sectional area of duct and wetted perimeter of duct |
| Option C: | The difference of cross sectional area of duct and wetted perimeter of duct |
| Option D: | The ratio of cross sectional area of duct to wetted perimeter of duct |
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| 25. | Which of the following pressure act on the diaphragm of Automatic expansion valve? |
| Option A: | Spring Pressure |
| Option B: | Evaporator Pressure |
| Option C: | Spring & Evaporator Pressure |
| Option D: | Spring, Bulb & Evaporator Pressure |
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| 26. | For VCR cycle in which of the following components the throttling process takes place |
| Option A: | Compressor |
| Option B: | Condenser |
| Option C: | Capillary tube |
| Option D: | Receiver |
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| 27. | For VCR cycle in which of the following components the heat is rejected to atmosphere from the refrigerant |
| Option A: | Compressor |
| Option B: | Condenser |
| Option C: | Expansion Device |
| Option D: | Evaporator |
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| 28. | For VCR cycle in which of the following components the heat is absorbed by the refrigerant |
| Option A: | Compressor |
| Option B: | Condenser |
| Option C: | Expansion Device |
| Option D: | Evaporator |
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| 29. | An enclosed space in which airborne particulates, contaminants, and pollutants are kept within strict limits is |
| Option A: | Solar air conditioning technology |
| Option B: | Clean room technology |
| Option C: | Dairy technology |
| Option D: | Transport air conditioning technology |
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| 30. | The brine solution used in ICE plant is  A Primary Refrigerant  B Secondary Refrigerant  C Mixture of Salt & Water |
| Option A: | A & B only |
| Option B: | B & C only |
| Option C: | A & C only |
| Option D: | C only |

**Descriptive Questions- SAMPLE SET**

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| 1 | Define refrigerant and classify refrigerant giving examples of each. |
| 2 | State the necessity of aircraft air cooling system |
| 3 | Explain simple vapour absorption system |
| 4 | Define: COP of Heat Pump, Primary Energy Ratio, Energy Efficiency Ratio, Heating Season Performance & Seasonal Energy Efficiency Ratio |
| 5 | Explain standard VCR cycle with schematic, p-h & T-s diagram |
| 6 | A standard VCR cycle using R-12 refrigerant works between a temperature limits of -25 deg C & 40 deg C. Find the enthalpies at salient points & Ideal COP. |
| 7 | State the effect of changing evaporator pressure & condenser pressure on COP of VCR cycle. |
| 8 | Write short note on Effective Temperature |
| 9 | Write short note on Thermal Comfort |
| 10 | The readings from sling psychrometer are as follows: DBT = 35 deg C, WBT = 24 deg C; Barometer reading = 740 mm of Hg. Using psychrometric relations find DPT; RH & Specific Humidity. |
| 11 | State various types of internal and external sources of heat gain in cooling load estimation. |
| 12 | Define: Specific Humidity, Relative Humidity, DBT, WBT & DPT |
| 13 | A duct of 650 mm diameter and 15 m long carries 144 m3/mm of air at 20 deg C. Find the pressure loss in the duct by using the friction chart. |
| 14 | Write Short note on AHU |
| 15 | Classify compressor used in HVACR and Explain construction and working of any one type of compressor. |
| 16 | Write short note on Thermostatic Expansion Valve |
| 17 | Write a note on Solar refrigeration. |
| 18 | Write a note on ICE plant. |
| 19 | A boot strap cooling system of 10 TR Capacity is used in an aeroplane. The ambient air temperature and pressure are 20 deg C & 0.85 bar respectively. The pressure of air increases from 0.85 bar to 1 bar due to ramming action of air. The pressure of air discharged from the main compressor is 3 bar. The discharge pressure of air from the auxiliary compressor is 4 bar. The isentropic efficiency of each compressor is 80%, while that of turbine is 85%. The heat exchanger effectiveness for both the heat exchanger is 60%. Assuming ramming action to be isentropic, the required cabin pressure of 0.9 bar and temperature of air leaving the cabin not more than 20 deg C, find: Power required to operate the system, COP of system. |
| 20 | A vapor compression refrigerator uses R-12 as a refrigerant and operates between pressure limits of 2.5 bar and 9 bar. At entry to the compressor, the refrigerant is dry and saturated and after compression it acquires a temperature of 44 oc. Find  Coefficient of Performance of the refrigerator, Draw T-s and P-h diagram   |  |  |  |  |  | | --- | --- | --- | --- | --- | | Pressure in bar | Saturation Temperature in oc | Enthaply in kJ/kg | | Entropy of saturated vapour in kJ/kg.K | | Liquid | Vapour | Vapour | | 9.0 | 36 | 70.55 | 201.8 | 0.6836 | | 2.5 | -7 | 29.62 | 184.5 | 0.7001 | |
| 21 | A vapour compression system using ammonia works between -15 deg C & 40 deg C as evaporator and condenser temperatures respectively. The vapour is superheated by 5 deg C before entering the compressor and liquid is subcooled by 5 deg C. using P-h chart determine:  COP  Mass flow of refrigerant per TR  Piston displacement per TR using volumetric efficiency = 80 %  Heat rejected in the condenser per TR  Ideal COP |
| 22 | Dry bulb temperature =30oc  Wet bulb temperature = 20oc  Barometer reading = 740 mm of Hg  Using steam tables . Determine   1. Partial pressure of water vapour 2. Relative humidity 3. Dew point temperature 4. Specific humidity 5. Vapour density |
| 23 | An air conditioning plant is required to supply 60 m3 of air per minute at a Dry bulb temperature of 21 deg C and 55% Relative humidity. The outside air is at dry bulb temperature of 28 deg C and 60% relative humidity. Determine the mass of water drained and capacity of the cooling coil. Assume the air conditioning plant first to dehumidify and then to cool the air |
| 24 | The following data refers to the office of air conditioning plant having maximum seating capacity of 25 occupants.  Outside design conditions: 34oc DBT and 28oc WBT  Inside design conditions: 24oc DBT and 50% RH  Solar heat gain: 9120 W  Latent heat gain per occupant : 105 W  Sensible heat gain per occupant : 90 W  Lightening load: 2300 W  Sensible heat load from other sources : 11630 W  Infiltration load: 14 m3/min  Assuming 40% fresh air and 60 % of recirculated air passing through the veporator coil and the by pass factor of 0.15, Find dew point temperature of the coil and capacity of the plant. |
| 25 | Write short note on: Duct design methods |
| 26 | A rectangular duct section of 500 mm x 350 mm size carries 75 m3/min of air having density of 1.15 kg/m3. Determine the equivalent of a circular duct if (a) the quantity of air carried in both the cases is same, and (b) the velocity of air in both the cases is same.  If *f* = 0.01 for sheet metal find the pressure loss per 100 m length of duct. |
| 27 | Classify cooling towers. Explain any one type in details. Define Tower Range, Tower Approach & Tower Efficiency. |