# University of Mumbai

## Examination 2020 under cluster 4 (PCE)

Program: BE Mechanical Engineering
Curriculum Scheme: Rev2016
Examination: Third Year Semester VI
Course Code: MEC604 and Course Name: Refrigeration and Air Conditioning
Time: 1 hour Max. Marks: 50

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Note to the students: - All the Questions are compulsory and carry equal marks.

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|---|---|
| Q1. | In a boot strap air evaporative cooling system, the evaporator is provided between the |
| Option A: | combustion chamber and the first heat exchanger |
| Option B: | first heat exchanger and the secondary compressor |
| Option C: | secondary compressor and the second heat exchanger |
| Option D: | second heat exchanger and the cooling turbine |
| | |
| Q2. | A heat pump working on a reversed Carnot cycle has a COP of 5. it works as a refrigerator taking 1 kW of work input. the refrigerating effect will be |
| Option A: | 1 kW |
| Option B: | 2 kW |
| Option C: | 3 kW |
| Option D: | 4 kW |
| | |
| Q3. | The relative coefficient of performance is equal to |
| Option A: | Theoretical COP/Actual COP |
| Option B: | Actual COP/Theoretical COP |
| Option C: | Actual COP x Theoretical COP |
| Option D: | Actual COP - Theoretical COP |
| | |
| Q4. | The air cooling system mostly used in transport type aircraft is |
| Option A: | simple air cooling system |
| Option B: | reheating air cooling system |
| Option C: | boot strap air cooling system |
| Option D: | regenerative air cooling system |
| | |
| Q5. | How is the condensation process in VCR cycle carried out. |
| Option A: | at constant volume |
| Option B: | at constant pressure |
| Option C: | at constant enthalpy |
| Option D: | at constant entropy |
| | |
| Q6. | Capillary tube is not used in large capacity refrigeration system because: |
| Option A: | capacity control is not possible |
| Option B: | cost is too high |
| Option C: | it is made of copper |
| Option D: | required pressure drop cannot be achieved |
| | |
| Q7. | How does outside air enter into the wet cooling system? |
| Option A: | Air vents |

| | |
|---|---|
| Option B: | Louvers |
| Option C: | Tuyeres |
| Option D: | Vacuum |
| | |
| Q8. | Which of the statement is false for the Refrigerant? |
| Option A: | The freezing temperature of a refrigerator should be well below the operating evaporator temperature. |
| Option B: | A refrigerant should have a low latent heat of vaporization at the evaporator temperature. |
| Option C: | The boiling temperature of the refrigerant at the atmospheric pressure should be low. |
| Option D: | The critical temperature of the refrigerant should be well above the highest condensing temperature. |
| | |
| Q9. | The boiling point of Ammonia is: |
| Option A: | 262.5 deg K |
| Option B: | 243 deg K |
| Option C: | 239.7 deg K |
| Option D: | 195.3 deg K |
| | |
| Q10. | The work done during compression on a simple Ammonia VCRs is 659.53kJ/min and the capacity of the system is 18TR. The heat rejected to compressor cooling water is 83.33 kJ/min. Determine the COP of the system. |
| Option A: | 5.1 |
| Option B: | 0.024 |
| Option C: | 5.7 |
| Option D: | 0.027 |
| | |
| Q11. | In domestic type absorption refrigerator _____ is uses as absorbent and _____ as refrigerant |
| Option A: | Water , ammonia |
| Option B: | ammonia, water |
| Option C: | hydrogen, ammonia |
| Option D: | ammonia, hydrogen |
| | |
| Q12. | Electrolux refrigerator is called as |
| Option A: | Single fluid absorption system |
| Option B: | three fluid absorption system |
| Option C: | four fluid absorption system |
| Option D: | two fluid absorption system |
| | |
| Q13. | For a same pressure the saturation temperature of ammonia is |
| Option A: | higher than the saturation temperature of water |
| Option B: | lower than the saturation temperature of water |
| Option C: | same as the saturation temperature of water |
| Option D: | Independent of the saturation of water |
| | |
| Q14. | On a Psychrometric chart, what does a vertical upward line represent? |

| | |
|---|---|
| Option A: | Adiabatic saturation |
| Option B: | Sensible cooling |
| Option C: | Dehumidification |
| Option D: | Humidification |
| | |
| Q15. | Which one of the following is correct? During sensible cooling of moist air, its relative humidity |
| Option A: | Increases |
| Option B: | does not change |
| Option C: | Decreases |
| Option D: | affects specific humidity |
| | |
| Q16. | Moist air exists at a pressure of 1.01 bar. The partial pressure and saturation pressure of water vapour are 0.01 bar and 0.02 bar respectively.<br>What are the relative humidity and humidity ratio of the moist air, |
| Option A: | 50% and 0.00622 |
| Option B: | 100% and 0.0126 |
| Option C: | 50% and 0.0126 |
| Option D: | 100% and 0.00622 |
| | |
| Q17. | The index which correlates the combined effects of air temperature, relative humidity and air velocity on the human body is called |
| Option A: | Sensible heat factor |
| Option B: | Dew point temperature |
| Option C: | Effective temperature |
| Option D: | Mean radiant temperature |
| | |
| Q18. | Atmospheric air at 15˚C DBT and 11˚C WBT enters a heating coil whose temperature is 41˚C. Assuming BPF of heating coil as 0.5, the DBT of air leaving heating coil will be _____˚C |
| Option A: | 28 |
| Option B: | 54 |
| Option C: | 11 |
| Option D: | 93 |
| | |
| Q19. | The conditioned air supplied to the room must have the capacity to take up |
| Option A: | room sensible heat load |
| Option B: | room latent heat load |
| Option C: | sum of room sensible and latent heat load |
| Option D: | difference of room sensible and latent heat load |
| | |
| Q20. | 343kg/min of fresh air having enthalpy 65KJ/kg of dry air is mixed with 945kg/min of re-circulated air having 42 kJ/kg of dry air. The enthalpy of the mixture in kJ/kg of dry air will be |
| Option A: | 52 |
| Option B: | 48 |
| Option C: | 60 |
| Option D: | 35 |

| | |
|---|---|
| | |
| Q21. | The optimum effective temperature for human comfort is |
| Option A: | higher in winter than in summer |
| Option B: | lower in winter than in summer |
| Option C: | same in winter and summer |
| Option D: | not dependent on season |
| | |
| Q22. | A rectangular duct is having one of its side of its cross-section as 500mm. The equivalent diameter of the circular duct is 0.41m. If the velocity of air in both the cases is same, the size of the other side rectangular cross-section duct is |
| Option A: | 0.91m |
| Option B: | 347m |
| Option C: | 910m |
| Option D: | 0.347m |
| | |
| Q23. | In which method of food freezing the temperature maintained ranges from -17 C to -40C? |
| Option A: | Slow or sharp freezing |
| Option B: | air blast freezing |
| Option C: | immersion freezing |
| Option D: | indirect contact freezing |
| | |
| Q24. | The maximum storage period for long term ranges from ____ for ripe tomatoes |
| Option A: | six to seven months |
| Option B: | Seven to ten days |
| Option C: | nine to twelve month |
| Option D: | one to two year |
| | |
| Q25. | Claude system is advantageous than linde system because.... |
| Option A: | Claude system gives enhanced liquefaction |
| Option B: | specific work of claude system is more |
| Option C: | air compressed at higher pressure in claude system |
| Option D: | in claude system all the air is throttled irreversibly |

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| Question | Correct Option (Enter either 'A' or 'B' or 'C' or 'D') |
|---|---|
| Q1. | D |
| Q2. | D |
| Q3. | B |
| Q4 | C |
| Q5 | B |
| Q6 | A |
| Q7 | B |
| Q8. | B |
| Q9. | C |
| Q10. | A |
| Q11. | A |
| Q12. | B |
| Q13. | B |
| Q14. | D |
| Q15. | A |
| Q16. | A |
| Q17. | C |
| Q18. | A |
| Q19. | C |
| Q20. | B |
| Q21. | B |
| Q22. | D |
| Q23. | A |
| Q24. | B |
| Q25. | A |