

SIR ARTHUR LEWIS COMMUNITY COLLEGE
DIVISION OF TECHNICAL EDUCATION AND MANAGEMENT STUDIES

EXAMINATION SESSION

COURSE TUTOR : Mr. Percival Beausoleil

PROGRAMME TITLE (S) :

PROGRAMME CODE (S) :

COURSE TITLE : Refrigeration Theory and Practice

COURSE CODE : EGP108

CLASS (ES) :

DATE :

COMMENCEMENT TIME :

DURATION : 2 hours

ROOM :

INVIGILATOR(S) :



INSTRUCTIONS

Section 1: Essay type Questions.

Three marks for each correct answer.

Section 2: Fill in the blank lines

One mark for each correct answer

Section 3: Multiple Choice

One mark for each correct answer.

Section 4 : The diagram of the refrigeration system.

One mark for each correct answer.

Section 1: Essay type Questions.

Three marks for each correct answer.

1. What is the relationship between pressure and the boiling point of liquid.
2. Explain the air – condition or refrigeration cycle.
3. Explain the terms superheated vapour .
4. Explain the terms sub cool liquid.
5. What happens to heat in the refrigerant while in the condenser.
6. Describe heat transfer by conduction
7. Describe heat transfer by convection.
8. Describe heat transfer by radiation.
9. What is meant by saturation temperature?
10. What is the second law of thermodynamics?

Section 2: Fill in the blank lines

One mark for each correct answer.

- 1 The four major components of an air- conditioning system are _____, _____, _____ and _____.
- 2 The boiling point for water at stand conditions is _____F
- 3 The design boiling point for most evaporator coils in a air-conditioners is _____
- 4 The design boiling point for most evaporator coils in a walk in refrigerator is _____F
- 5 The design boiling point for most evaporator coils in a walk in freezer _____F
- 6 The design boiling point for most evaporator coils in residential air-conditioners is _____F
- 7 The pressure reading on an air-condition system charged with R-22, with a evaporator coil temperature of 40 F is _____psig.
- 8 The pressure reading on an air-condition system charged with R-134a, with a evaporator coil temperature of 40 F is _____psig.
- 9 One- replacement refrigerant that can be used in retrofitting appliances with R-12 refrigerant is _____.
- 10 One- replacement refrigerant that can be used in retrofitting appliances with R-22 refrigerant is _____.

Section 3 Multiple Choice

One marks for each correct answer. Use the answer sheet provided. (40mks)

1. 4.4°C converted to degrees Fahrenheit equals :
 - a. 55
 - b. 32
 - c. 40
 - d. 75

2. 70°F converted to degrees Celsius equals :
 - a. 21.1
 - b. 22.6
 - c. 98.6
 - d. 20.3

3. 200°F converted to degrees Celsius equals :
 - a. 92.6
 - b. 94.7
 - c. 93.3
 - d. 91.0

4. 32°F converted to degrees Celsius equals :
 - a. -4
 - b. -17.8
 - c. 0
 - d. 10

5. Which of the following refrigerant lists are not banned or scheduled to be banned from production?
 - a. PFC, HCFC, HFC
 - b. HFC, PFC, HCFC, hydrocarbon
 - c. HCFC, CFC
 - d. Hydrocarbon, HFC

6. How many watts of electrical power are equal to one horsepower?
 - a. 33,000
 - b. 15,000
 - c. 746
 - d. 640

7. How many Btu are there in 8kw of electrical power
 - a. 26,286
 - b. 5,968
 - c. 27,304
 - d. 68,260

8. The unit of energy the power company uses to charge customers is the:
 - a. British thermal unit.
 - b. Joule
 - c. Horsepower.
 - d. Kilowatt-hour

9. Work is equal to
- force x power
 - force x energy
 - force x distance
 - distance x energy
10. R-22 is a refrigerant most commonly used in _____ systems
- residential air-conditioning
 - light commercial refrigeration
 - industrial refrigeration .
 - household refrigeration
11. R-12 or R-134a is a refrigerant most commonly used in _____ systems
- medium temperature
 - residential air-conditioning
 - primarily low- temperature
 - all of the above
12. Temperature is defined as:
- how hot it is Chemical absorption
 - the level of heat
 - how cold it is.
 - why is it hot.
13. Matter is commonly found in which three states:
- Solids, gases and vapors.
 - Solids, liquids and gases.
 - Vapors, gases and fluids .
 - Fluids, liquids and gases
14. The second law of thermodynamics states that:
- Water will freeze at 32 degrees Fahrenheit
 - Heat travels from a cooler substance to a warmer substance.
 - Water will boil at 212 degrees Fahrenheit
 - Heat travels from a warmer substance to a cooler substance.
15. British thermal unit is defined as the:
- The amount of heat required to increase the temperature of one pound of a water one degree Fahrenheit.
 - The amount of heat required to produce one kilowatt of electrical power.
 - Time it takes for one pound of water to boil.
 - The amount of heat required to freeze one pound of water at atmospheric pressure
16. Increased molecular motion the substance is the result of _____ the substance.
- Decreasing the pressure of
 - Heating
 - Cooling
 - Increasing the volume of

17. Change in temperature of one pound of water one degree Fahrenheit will require how many Btus.
- 0.5
 - 1.0
 - 144.0
 - 100.0
18. The temperature at which molecular motion stops is:
- Zero degrees Celsius
 - Absolute zero
 - The substance boiling temperature
 - The substance freezing point
19. Heat transfer through a copper pipe is an example of which type of heat transfer
- Convection
 - Conduction
 - Radiation
 - Condensation
20. Latent heat causes:
- a rise in a thermometer.
 - temperature to rise .
 - a change in state.
 - temperature to fall.
21. High -temperature refrigeration is that produced by:
- Heat from a furnace
 - An air-conditioning system
 - The vegetable cooling system of a refrigerator.
 - The freezer section of a refrigerator
22. The system component that turn high-pressure vapour into a high-pressure liquid is:
- Compressor
 - Metering device
 - Condenser
 - Evaporator
23. The heat content in a substance is measured in:
- Degrees Fahrenheit
 - Degrees Celsius
 - British thermal unit
 - Temperature
24. The line that connects the compressor and the evaporator is called the _____ line
- Discharge
 - Expansion
 - Liquid
 - Suction
25. The system component that is responsible for rejecting system heat is the:
- Compressor
 - Condenser
 - Evaporator
 - Metering device

26. Sub-cooled refrigerants is always at a temperature that _____ saturation temperature:
- Lower than the condenser
 - higher than the condenser
 - Lower than the evaporator
 - Higher than the evaporator
27. The system component that is responsible for absorbing heat into the system is the:
- Compressor
 - Condenser
 - Evaporator
 - Expansion device
28. One desirable property of refrigerants is that they:
- Are highly flammable
 - Absorb heat at lower temperature and reject heat at higher temperatures
 - Are colour coded.
 - Behave in an unpredictable manner.
29. The state of the refrigerant at the outlet of the evaporator is:
- Low – pressure, low-temperature liquid to high –pressure, high-temperature liquid.
 - High – pressure, high-temperature vapour to a low –pressure, low-temperature vapour.
 - Low – pressure, low-temperature vapour to a high –pressure, high-temperature vapour.
 - high – pressure, high-temperature liquid to a low –pressure , low-temperature liquid
30. Refrigerant leaves the compressor through the _____ line:
- Suction
 - Expansion
 - Liquid
 - Discharge
31. One ton of refrigeration is:
- 1200Btu
 - 12,000Btu/hr.
 - 120,000Btu.
 - 120,000Btu/hr
32. 98°C converted to degrees Fahrenheit equals:
- 214.6
 - 196.0
 - 119.8
 - 208.4
33. 28°C converted to degrees Fahrenheit equals:
- 27.3
 - 26.7
 - 81.6
 - 82.4

34. 23.8°C converted to degrees Fahrenheit equals :
- 68
 - 75
 - 78
 - 40
35. What is the condenser sub-cooling if the refrigerant condenses at 125 degrees and leaves the condenser at 95 degrees:
- 30 degrees
 - 20 degrees
 - 95 degrees
 - 125 degrees
36. Good ventilation is important when working around refrigeration equipment because modern refrigerants:
- are toxic and can poison you
 - have a very unpleasant odor.
 - may get on your skin and cause a rash
 - are heavier than air and displace the oxygen around you.
37. The boiling point of a refrigerant should be low enough at atmospheric pressure so that low temperatures can be reaching and the refrigeration system will:
- Not Overheat
 - Not explode.
 - Not go into a vacuum.
 - Notice up.
38. It is believed that certain refrigerants such as CFCs and HCFCs, when allowed to escape into the atmosphere, will :
- Destroy the hydrogen layer and allow more of the sun`s rays to overheat the earth
 - Deplete the stratospheric ozone layer and allow harmful ultraviolet rays from the sun to reach the earth.
 - Reduce the nitrogen content of the air surrounding the earth.
 - Reduce the carbon dioxide necessary for plant life.
39. One ton of refrigeration is equal to :
- 1 ton of ice
 - 288,000Btu/24hr
 - 144 Btu/hr
 - A large refrigerator
40. The state of the refrigerant at the outlet of the evaporator is:
- Low -pressure, low-temperature liquid to high -pressure, high-temperature liquid.
 - High -pressure, high-temperature vapour to a low -pressure, low-temperature vapour.
 - Low -pressure, low-temperature vapour to a high -pressure, high-temperature vapour.
 - high -pressure , high-temperature liquid to a low -pressure , low-temperature liquid

Section4: The diagram of the refrigeration system. (20mks)
Marks are awarded accordingly

1) Identify the four main parts of the refrigeration system on the diagram.

2) What is the pressure, the temperature of the refrigerant in the following area on the diagram:

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

3) What is the condition of the refrigerant in the following area on the diagram:

1) _____

2) _____

3) _____

4) _____

5) _____

6) _____

7) _____

8) _____

