

Register No.: ..... Name: .....

**SAINTGITS COLLEGE OF ENGINEERING (AUTONOMOUS)**

(AFFILIATED TO APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY, THIRUVANANTHAPURAM)

**SEVENTH SEMESTER B.TECH DEGREE EXAMINATION (S), FEBRUARY 2024****MECHANICAL ENGINEERING****(2020 SCHEME)****Course Code: 20MET471****Course Name: Air Conditioning and Refrigeration****Max. Marks: 100****Duration: 3 Hours*****Use of refrigeration data book, Psychrometric Chart and Steam Table are permitted******(Answer all questions. Each question carries 3 marks)***

1. Define the term Tonnes of refrigeration.
2. What is Carnot refrigeration cycle?
3. What are the advantages of multistage compression systems?
4. List the merits of steam jet refrigeration system
5. How vapour compression system differ from vapour absorption system?
6. What are the advantages and limitations of Li-Br water absorption system?
7. List any three refrigerants with its application
8. List the components of refrigeration system and functions of each?
9. Define specific humidity.
10. Explain effective temperature in air conditioning

**PART B*****(Answer one full question from each module, each question carries 14marks)*****MODULE I**

11. a) With the help of necessary figures, Derive the relation between COP of a Heat Pump and Refrigerator (6)  
b) A refrigeration system operates on the reversed Carnot cycle. The higher temperature of the refrigerant in the system is 35°C and the lower temperature is -15°C. The capacity is to be 12 Tonnes. (8)  
Determine: i) Coefficient of performance ii) Heat rejected from the system per hour and iii) Power required.

**OR**

12. Explain and compare simple air refrigeration system with boot strap air refrigeration system with the help of diagrams (14)

**MODULE II**

13. a) How a two stage multi pressure system with flash intercooling is different from the system with flash gas removal alone? Show the difference using the schematic and p-h diagrams (7)

- b) Explain any two methods of improving COP of simple vapour compression refrigeration cycle with P-h and T-s diagram (7)

**OR**

14. a) Explain the effect of operating parameters on COP in a VCR system. (10)  
b) What are the merits of VCRS over air refrigeration system? (4)

**MODULE III**

15. a) With the help of neat sketch explain the working of steam jet refrigeration system. Write its merits and demerits. (7)  
b) With support of schematic diagram, describe the working of a simple ammonia water absorption refrigeration system. (7)

**OR**

16. a) Explain with a neat sketch about the simple vapour absorption system. Write its drawbacks. (7)  
b) Explain Electrolux vapour absorption system of refrigeration with the help of line diagram. (7)

**MODULE IV**

17. a) Describe the working of Reciprocating and Centrifugal compressors used in refrigeration system using neat sketch. (8)  
b) Explain how Ozone Depletion Potential and Global Warming Potential affect the selection of refrigerant? (6)

**OR**

18. a) With neat diagrams, describe the working of any two types of condensers used in refrigeration system. (8)  
b) What are the desirable properties of refrigerants? (6)

**MODULE V**

19. a) List the factors affecting human comfort. (4)  
b) In a cooling application moist air enters the refrigeration coil at the rate of 100 kg/min at 35°C and 50% relative humidity. The apparatus dew point of the coil is 5°C and bypass factor is 0.15. Draw the process in psychrometric chart and determine: (10)  
(i) The outlet state of moist air and  
(ii) The cooling capacity of coil in TR

**OR**

20. Draw a psychrometric chart and explain the following terminologies. (14)  
(i) DBT (ii) WBT (iii) DPT (iv) Humidity ratio (v) Sensible heating  
(vi) Sensible cooling

\*\*\*\*\*