Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_

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**End Semester Examination – Nov/Dec – 2018**

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| **Code :** | **14ME2051** | **Duration :** | **3hrs** |
| **Sub. Name :** | **REFRIGERATION AND AIRCONDITIONING** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | **Course**  **Outcome** | **Marks** |
| 1. | a. | List the various Air refrigeration methods and explain any one type of air refrigeration system with a sketch? | CO1 | 10 |
| b. | A dense air refrigeration machine works on the Bell-Coleman cycle with 10 TR capacity. The cooler pressure is 4.2 bar and refrigerator pressure is 1.4 bar. The air is cooled to temperature of 50°C in the cooler. The temperature of air at inlet to compressor is -20°C. Determine the COP of the system. | CO1 | 10 |
| (OR) | | | | |
| 2. | a. | Describe the working principle of a cascade refrigeration system? Draw p-h and T-S diagrams. | CO1 | 10 |
| b. | A Freon -12 compression system, operating at a condenser temperature of 40°C and an evaporator temperature of -5°C, develops 15 tons of refrigeration. Determine the COP of cycle. | CO1 | 10 |
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| 3. | a. | Describe the working principle of a water cooled condenser in a refrigeration system with a neat sketch. | CO2 | 10 |
| b. | Compare the various properties of organic refrigerants? | CO2 | 10 |
| (OR) | | | | |
| 4. | a. | Compare vapour absorption and vapour compression refrigeration systems. State merits and demerits of each system. | CO2 | 10 |
| b. | List the types of refrigerant compressor? Explain the working of a scroll compressor with neat sketch. | CO2 | 10 |
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| 5. | a. | Explain any five different psychrometric processes. | CO3 | 10 |
| b. | A sling psychrometer reads 40°C DBT and 28°C WBT. Calculate the following:   1. Specific humidity 2. Relative humidity 3. Vapour density in air 4. Dew point temperature and 5. Enthalpy of mixture per kg of dry air. | CO3 | 10 |
| (OR) | | | | |
| 6. | a. | Discuss the factors governing optimum effective temperature? | CO3 | 10 |
| b. | One kg of air at 40°C DBT and 50% RH is mixed with 2 kg of air at 20°C DBT and 20°C dew point temperature. Calculate the temperature and specific humidity of the mixture. | CO3 | 10 |
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| 7. | a. | Explain the winter air conditioning system with a sketch? | CO4 | 10 |
| b. | The following data refer to air conditioning of a public hall:  Outdoor conditions = 40°C DBT, 20°C WBT  Required inside conditions = 20°C DBT, 50% R.H  Seating capacity of hall = 1000  Amount of outdoor air supplied = 0.3 m³/min/person. If the required condition is achieved first by adiabatic humidifying and then cooling, find the capacity of the cooling coil and surface temperature of the coil if the by-pass factor is 0.25. | CO4 | 10 |
| (OR) | | | | |
| 8. | a. | Discuss briefly the different types of heat loads which have to be taken into account in order to estimate the total heat load of a large restaurant for summer air conditioning. | CO4 | 10 |
| b. | A air-conditioning system to be designed for a restaurant with the following data:  Outside design conditions = 40°C DBT, 28°C WBT  Inside design conditions = 25°C DBT, 50% R.H  Solar heat gain through walls, roof and floor = 2000 kJ/h  Solar heat gain through glass = 1800 kJ/h  Occupants = 25  Sensible heat gain per person = 200 kJ/h  Latent heat gain per person = 200 kJ/h  Internal lighting load = 15 lamps of 100 W and 10 fluorescent tubes of 80 W  Sensible heat gain from other sources = 40,000 kJ/h  Infiltrated air = 15 m³/min  If 25% of fresh air and 75% of recirculated air is mixed and passed through the conditioner coil,  Find, i) DPT of coil and ii) capacity of conditioning plant. Assume BPF = 0.2 | CO4 | 10 |
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|  | | **Compulsory**: |  |  |
| 9. | a. | Discuss the applications of air conditioning in industry? | CO5 | 10 |
| b. | Discuss briefly about the refrigerated trucks? | CO5 | 10 |