

BACHELOR OF ARCHITECTURE EXAMINATION, 2018  
(B. Arch. 3<sup>rd</sup> year 2<sup>nd</sup> Semester)

**SUBJECT: SERVICES & EQUIPMENT- II**

Time : Three hours

Full Marks: 100

Instructions: Answer for 100 marks

**Q.01.** Draw and label a schematic diagram of a Refrigeration cycle. Describe the role of a refrigerant and its changing physical conditions during operation of the process of 'Refrigeration' in a 'Refrigeration Cycle'. Explain how this acts as the basic governing principle of Air conditioning.

Discuss the conditions of comfort. Citing advantages and disadvantages of various systems of air conditioning, describe different types of Air conditioning systems used in Office buildings. (25)

**Q.02.** Describe in detail the various sources of heat that are taken into account for estimation and calculation of 'cooling load' in airconditioning.

Given:

Ventilation air: 1600 cfm  
Outdoor temperature: 90 F and 50% RH  
Indoor temperature: 75 F and 45% RH

Calculate (a) Ventilation air sensible cooling load in Btu/hr and (b) Ventilation air Latent cooling load in Btu/hr (25)

**Q.03.** Describe when ducting for supply of conditioned air could be avoided. Describe the role of AHU and FCU in airconditioning. Describe airconditioning using 'water as liquid chiller'. With the help of suitable sketches, describe the various kinds of ducting arrangement in airconditioning. Citing a suitable numerical example, show how the duct sizing is calculated. Explain the flexibilities offered by the standard charts and formulae in sizing of ducts of equivalent cross-sectional areas.

Given: A main supply duct D-1 carrying 12000 cfm branches out into 2 nos ducts (D-2 with flow velocity of 1400 fpm & D-3 with flow velocity of 1600 fpm ) having supplying capacity of one-third and two-third of the flow of D-1; respectively. Calculate the Supply Duct sizes (i) and (ii) Friction losses for D-2 and D-3. (25)

**Q.04.** Describe the concept of "U-Factor" with reference to Airconditioning. Describe the concept of 'Sensible heat' and 'Latent heat' as applicable to Refrigeration cycle. Describe 'Heating and Humidification' and 'Cooling and Dehumidification' with their physical significance and depiction in the Psychrometric Chart.

**Solve the following:**

**Given:** Unconditioned space DBT: 95F, Unconditioned space WBT: 75F, Cold air Supply Duct Temperature: 65F.  
**Find:** Dew Point Temperature and determine whether condensation will form on the Duct. (25)

**Q.05.** Describe why a Condenser in an Airconditioning process is required to be cooled. What are the ways and means by use of which usually a Condenser is cooled in an airconditioning process. Cite a couple of ideas how the process of cooling a condenser could be integrated with design of a building or its ambience.

Describe the process of 'Surveying' and 'Estimation of cooling load' for residential airconditioning. (25)

**Q.06. Write short notes on (any five):** (5 X 5 = 25)

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| (i) Evaporator                                | (ii) Evaporative cooling   |
| (iii) Liquid Chiller                          | (iv) Role of space between the main ceiling and the false ceiling in Airconditioning |
| (v) Dew Point                                 | (vi) Insulation for Airconditioning Ducts  |
| (vii) Definition of 1 Ton of Refrigeration    | (viii) Role of space between the main and false ceiling in A/C                       |
| (ix) Formula for calculation of Sensible Heat |  |
| (x) Enthalpy                                  |  |