

**BACHELOR OF ARCHITECTURE EXAMINATION, 2017**  
**(B. Arch. 3rd year 2nd Semester)**

**SUBJECT: SERVICES & EQUIPMENT- II**

Time : Three hours

Full Marks: 100

Instructions: Answer for 100 marks. Use sketches wherever necessary

01. Mention the conditions on which human comfort depend. Mention the comfortable temperature and humidity conditions in summer and winter.

With the help of a suitable sketch, describe "Refrigeration Cycle". Describe Psychrometry and application of a Psychrometric Chart for numerical calculations and interpretation of properties of air.

Solve the following numerical problem:

Given:

Total air quantity required: 14000 cfm

Return air quantity : 8000 cfm

Return air temperature : 85F DB and 65WB

Outdoor air quantity : 6000 cfm

Outdoor air temperature : 90F DB and 75F WB

Find: (a) DBT of air mixture and (b) WBT of air mixture

25

02. What do you understand by the term "Enthalpy"? Describe (a) the process of cooling and dehumidification and (b) Heating and humidification

Given: Initial DBT: 95F

Initial WBT: 80F

Final DBT: 55F

Final WBT: 45F

Find: A. Sensible heat removed

B. Latent heat removed and

C. Total heat removed

Calculation should be supported by Psychrometric chart

25

03. With the help of suitable sketches, describe the different layout arrangements of Ducts in air conditioning. Mention any two methods adopted in calculating the sizes of ducts in air conditioning. Discuss in brief any one of such methods. Discuss the benefits and shortcomings of ducts of cross sections of rectangular and circular types.

For a commercial application, solve the following:

Given: Air required in main supply duct: 25000 cfm

Air velocity permitted: 1400 fpm

Length of main supply duct: 140 ft

Find: (a) Main supply duct diameter for circular cross section and any two recommendable rectangular sizes and (b) Friction loss

25

04. Describe how the various sources of heat contribute towards heating an interior environment.

Describe Infiltration in details.

Solve the following numerical problem with the data given:

Ventilation air: 1000 cfm

Outdoor temperature: 85 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

05. Describe the processes of cooling of the condensers in air conditioning.

Describe how the space between the main ceiling and the false ceiling is utilized in ductable air conditioning.

A. Solve the following:

Given: Window surface temperature: 35 F and Indoor temperature: 65 F.

Find the Relative Humidity at which condensation will not form on the window glazing.

B. Solve the following:

Given: Unconditioned space DBT: 80 F. Unconditioned space WBT: 75 F. Cold air duct surface temperature: 65 F.

Find the Dew point temperature and determine whether condensation will form on the surface of the duct. 25

06. Describe Airconditioning using VRF. Discuss the advantages of the VRF system over conventional airconditioning. Describe the role of 'Heat Pumps' in airconditioning using Geothermal energy. 25

07. Answer any five: (5X5)= 25

- (i) HVAC
- (ii) ASHRAE & ISHRAE
- (iii) Equal friction method
- (iv) Diffusers and Registers relating to ducting in airconditioning
- (v) AHU and FCU
- (vi) Dampers
- (vii) CFM
- (viii) Infiltration
- (ix) Heat exchanger
- (x) Enthalpy