KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.Arch.
Year : II

Course : ARCH 201
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 20

Registration No.:

Date : 26 JUN 2023

SECTION "A"
[20 Q. × 1 = 20 marks]

Encircle the most appropriate answer.

1. Which statement is **TRUE** in case of Urban Climate?
   a. Temperature increases as we go far from city center
   b. Temperature decreases as we go far from city center
   c. Temperature remains same irrespective of distance from the city center
   d. City doesn't create micro climate

2. Which of the following is not the character of buildings in mountain region of Nepal?
   a. Less openings
   b. Oriented opposite to the wind direction
   c. Low floor to floor height
   d. Courtyard System of Planning

3. Mahoney Table gives better design recommendations for a building to be designed/ planned in which of the climatic zone?
   a. Temperate Climate
   b. Alpine Climate
   c. Tropical Climate
   d. All Climate Condition

4. Dew point temperature is the temperature at which
   a. Relative humidity reaches to 50%
   b. Moisture content in air is minimum
   c. Air can no more hold the moisture content in the air
   d. Condensation of moisture stops

5. Which of the following can be considered as a renewable source of Energy?
   a. Bio Mass b. Geo-thermal c. Nuclear d. Fossil Fuel

6. Passive Solar Technique can be applied in a building to
   a. make building aesthetically beautiful
   b. minimize energy costs
   c. decrease construction cost
   d. increase construction cost

7. Which of the following is the feature of Solarium or Sun-Space?
   a. Usable space between wall and glazing
   b. Minimum glazing area
   c. No opening in glazing
   d. Preferred in west side

8. Concept of green building getting popular in the present context due to
   a. the development of various rating systems
   b. mandatory provisions by law
   c. awareness towards environment and energy
   d. global trend of value addition to the building

9. Idea of Green building from design phase, construction phase and operation & maintenance phase revolves around optimizing
   a. energy use and carbon emission
   b. use of natural resources
   c. waste generation
   d. usage of renewable energy source

10. Total Life Cycle Costing is widely accepted calculation for analyzing a Green Building. TLCC basically estimates
    a. Total energy cost of the building
    b. Total cost of building construction
    c. Climate, weather, micro and macro & urban climate
    d. Total carbon footprint of a building

11. Green building rating system proposed by various countries globally (like LEED, GRIHA, Energy Star, BREEAM) largely focus
    a. on site waste management
    b. on site water management
    c. use of renewable energy sources
    d. holistic marking based on energy usage, site consideration, material use, including a, b, & c

12. Proper management of organic waste, which accounts more than 50% of total municipal waste generation, helps to
    a. increase Compost production
    b. increase bio-gas production
    c. decrease greenhouse gas production
    d. increase income generation

13. Which statement is true in case of Constructed Horizontal Flow (HF) and Vertical Flow (VF) Wet-Land in terms of per capita surface area requirement?
    a. HF and VF have same surface area
    b. HF requires less surface area than VF
    c. VF & HF cannot be compared
    d. VF requires less surface area than HF

14. Which of the following is **NOT** associated with the removal of hardness of water?
    a. Heating
    b. Lime - soda ash softening
    c. Precipitation of Ca and Mg
    d. Filtration of the water

15. Wear process that occurs at the contact area between two materials under load and subject to minute relative motion by vibration or some other force causes
    a. Fretting Corrosion
    b. Galvanic Corrosion
    c. Erosion Corrosion
    d. Atmospheric Corrosion

16. Corrosion is faster in a metal which have
    a. cathodic character
    b. anodic character
    c. neutral character
    d. magnetic character

Fill in the blanks with appropriate answer/s

17. Dew point temperature is the temperature at which .....of water vapor present in the air occurs.

18. Screening, Grit removal, Pre-Aeration and Flow Metering and Sampling is done during ..... treatment of waste water.

19. ..... and ..... are two methods commonly used for land filling.

20. ..... is a type of corrosion which doesn't shows significant changes in shape and size but are very hazardous.

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Time : 2 hrs. 30 mins.

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F. M. : 55

SECTION "B"
[5Q × 5 = 25 marks]

Attempt *ALL* questions.

1. What are the features of the Mahoney table and how it is useful in architectural design? Elaborate your answers with design recommendations provided by Carl Mahoney.

2. How can active solar techniques be used in a building for energy and thermal comfort? Give a few examples with reference to your theoretical understanding.

OR

Define and explain indirect solar gain concept. Support your answers with necessary sketches.

3. What is Green Building rating system? Explain major considerations of various rating system worldwide (take an example of any of the following rating system; GRIHA/ CASBEE / LEED/ BREEAM)

4. What is land filling? Explain process and types of land filling with necessary sketches.

5. Why is corrosion considered important in Building and Architecture? What are the various ways of preventing corrosion?

OR

Why treatment of hardness of water is considered important? Explain various ways of treating hardness of water

SECTION "C"
[3Q × 10 = 30 marks]

Attempt *ANY THREE* questions.

6. What are the passive techniques of heating and cooling a building? Explain working mechanism of sun-space in summer and winter/ day and night. [5+5]

7. What are the different ways of minimizing outside surface temperature using sun shading devices? It is required to prevent direct sunlight to enter the room on 22nd June at 12:00 (noon) hours. If the orientation of window is towards 15° west of south, find vertical shadow angle and length of horizontal projection. Take window height as 1.5 meters and sill height 0.9m. [4+6]

8. What are the features and advantages of a Green Building? What components do you consider while designing a green building of your own? Briefly mention the green features of the buildings/ site from your recent field visit. [4+3+3]

9. Explain the components of Construction wetland and various types of construction wetlands commonly in practice.
Also, calculate the size of Primary Treatment Unit and specific area of Construction Wetland for an office of average daily users of 150. Per capita water use is 60 LPCD and 80 % water comes out as a wastewater in a primary treatment unit. Biological Oxygen Demand after 5 days, BOD_5 is 40g/ Pe.D. Assume that 30% of the BOD_5 is removed by the primary treatment unit and effluent BOD_5 concentration to be maintained at 30mg/l. K_{BOD} is 0.15m/d and 0.2 m/d for Horizontal Flow wetland and Vertical Flow wetland respectively.

$$A = \frac{Q_d (\ln C_i - \ln C_e)}{K_{BOD}}$$

[4+6]