KATHMANDU UNIVERSITY
End Semester Examination [C]
June/July 2024

Level : B.E.
Year : I
Time : 2 hrs. 30 mins.

09 JUL 2024

Course : ENVE 101
Semester : II
F.M. : 55

SECTION "B"
[5Q × 5 = 25 marks]

Attempt *ALL* questions. Make a logical assumption wherever required.

1. Explain three types of environmental studies of the projects conducted in Nepal as per Environmental Protection Act (EPA), 2076?

2. Define flow rate and hydraulic retention time (HRT). Derive the equation that defines the HRT of fluid in a cubical tank.

3. Calculate the Annual evapotranspiration (m/year) of a hydrological system with river basin of area 11839 km^2 and average Annual runoff (R_{out}) of 144.4 m^3/s. The average annual precipitation (P) is 1.08 m. Assume no loss by infiltration. The net change in water storage (ΔS) over a year is zero.

4. Draw the schematic diagram of sewer networks and briefly explain its components.

5. Describe briefly about collection system of solid waste.

OR

What is green engineering? Explain two principles of green engineering

SECTION "C"
[6Q × 5 = 30 marks]

6. State the general Mass Balance Equation (MBE). [2]
Also deduct the general MBE to
i. Steady state. [1]
ii. Unsteady state conservative system. [1]
iii. Steady state non-conservative system without reaction. [1]
iv. Steady state non-conservative system with reaction and generation. [1]

7. Describe briefly about the sources of solid waste. [2]
Estimate the total moisture content, total dry mass and overall density of solid waste sample obtained in a landfill site. [1+1+2=4]

Components	% by mass	Dry mass%	Density kg/m^3
Food waste	20	30	290
Paper	40	94	85
Cardboard	10	95	50
Plastics	10	98	65
Garden trimmings	10	40	105
Wood	5	80	240
Tins, Cans	5	97	90

P.T.O.

8. Define Air Quality Standards (AQS) and Air quality Indexes (AQI) with examples. Explain why air pollution reaches maximum during winter in Nepal? What is the purpose of green sticker in the vehicle? [1.5+1.5+2+1=6]

9. Differentiate between *ANY THREE* of the following. [2+2+2=6]
   a. Mass Extensive and Mass Intensive system
   b. Cyclone and Electrostatic Precipitator
   c. Water and Wastewater
   d. Hazardous and Non-Hazardous waste

10. Write Short Notes on *ANY TWO* of the following. [3+3=6]
   a. Nepal Engineering Council (NEC)
   b. Components of Drinking water supply system
   c. Life Cycle Assessment (LCA)

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Marks Scored:

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Time: 30 mins.
F. M. : 20

Registration No.:
Date 09 JUL 2024

SECTION "A"
[20Q. × 1 = 20 marks]

Choose and encircle the most appropriate answer.

1. Internal Rate of Return (IRR) is _____.
   a. an estimate of the lowest total cost.
   b. an environmental impacts caused by the project activities.
   c. an indicator to reflect the profit of the projects.
   d. the information of synthesized solution

2. The mass flow rate of a stream of 25 lps if the sediment load is 2000 mg/l is _____ kg/day.
   a. 432 b. 864 c. 500 d. 0.05

3. The retention time of a lagoon with a volume of 1512 m^3, and the flow into the lagoon is 3 m^3/hr is _____
   a. 189 days b. 21 days c. 504 days d. 4536 days

4. The area of land draining into a stream or a water course at a given location is known as_____.
   a. discharge b. infiltration c. catchment d. runoff

5. The annual runoff from the catchment of 2000 ha if the annual precipitation is 1400 mm and annual evapotranspiration is 800 mm is _____m^3.
   a. 12×10^6 b. 1.2×10^6 c. 44×10^6 d. 4.4×10^6

6. Which of the following stream skips one or more system?
   a. Feed b. Purge c. Recycle d. Bypass

7. Release of methane from anaerobic wastewater treatment is example of _____.
   a. Gas-liquid mass transfer
   b. Liquid-solid mass transfer
   c. Solid-gas mass transfer
   d. Liquid-gas mass transfer

8. If water is to be transported from higher elevation to lower elevation on the hill, required additional unit or chamber is _____.
   a. Pumping system
   b. Digital meter
   c. Control Valve and Sensors
   d. Break Pressure Tank

9. The estimated arithmetic populations of a city after 20 years will be_____ if average population growth is 10,350 and the population of the base year is 74100.
   a. 84,450 b. 95,000 c. 138,000 d. 74,100

10. _____is the first step of water treatment which has openings of uniform size for removing large suspended or floating matters.
a. Filtration b. Aeration c. Screening d. Sedimentation

11. The sewer that unloads the sewage at the point of treatment is called _____sewers.
a. outfall b. branch c. laterals d. sub-Mains

12. NTU is the unit to measure_____.
a. taste b. turbidity c. color d. hardness

13. A wastewater treatment plant discharges a flow of 1.5 m^3/s at a solids concentration of 20 mg/L. How much solids is the plant discharging each day?
a. 26 kg b. 2.6 kg c. 2600 kg d. 260 kg

14. The means of access for inspection and cleaning sewer line is known as _____.
a. Manhole b. Inlet c. Catch basin d. Cover

15. Silver treatment is an example of _____.
a. filtration b. aeration c. screening d. disinfection

16. Which of the following is not a criteria pollutant?
a. CH_4 b. NO_x c. TSP d. O_3

17. The sound power level results from combining the 65 dB, 60 dB, and 70 dB is_____.
a. 72 b. 75 c. 70 d. 65

18. Which has the lowest degree of freedom?
a. Incrementalism
b. Redefining the system boundary
c. Re-engineering the system
d. Redefining the problem

19. _____is the place where local waste collection vehicles will deposit their waste cargo prior to loading into larger vehicles.
a. Landfill b. Alley c. Compost Plant d. Transfer station

20. The process of burning municipal waste under suitable temperature in a specific furnace is called_____
a. Landfill
b. Recycling
c. Incineration
d. Vermi-composting