KATHMANDU UNIVERSITY
End Semester Examination
January/February 2024

Level : B.Arch.
Year : III
Time : 2 hrs. 30mins.

26 JAN 2024

Course : CIEG 332
Semester : I
F. M. : 40

SECTION "B"

Attempt *ALL* questions.

1. Briefly describe any two types of deep tube wells with their functions and suitability. [5]

2. a. State the Bernoulli's equation and its basic assumptions / limitation. [3]

   b. Water flows through a horizontal pipe (figure 1) with the cross-section area of 4.0 m^2 with the velocity of 3m/sec with the pressure of 60kPa at point A. At point B, the cross-sectional area of the pipe is 2.0 m^2, (i) what is the velocity of water at point B, (ii) calculate the pressure at point B. [8]

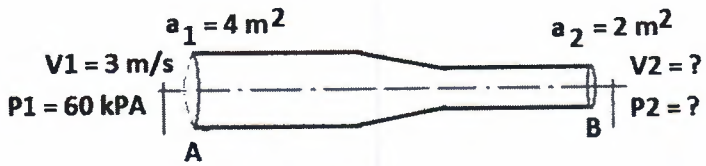

Figure 1

3. Briefly describe the drinking water treatment process from raw water to distribution reservoir with neat schematic diagram. [5]

4. Design a 500m long pipe AB for a 3400 population with the 200 LPCD with peak factor 3.0. Existing residual head at point A (RL=800m) is 16m and at point B (or any point) should not be less than 15m. Hazen William's constant C=100. [5]

$$HL = \frac{10.68 * L * Q^{1.85}}{d^{4.87} * C^{1.85}} \qquad d = \left[\frac{10.68 * L * Q^{1.85}}{H_L * C^{1.85}}\right]^{\frac{1}{4.87}}$$

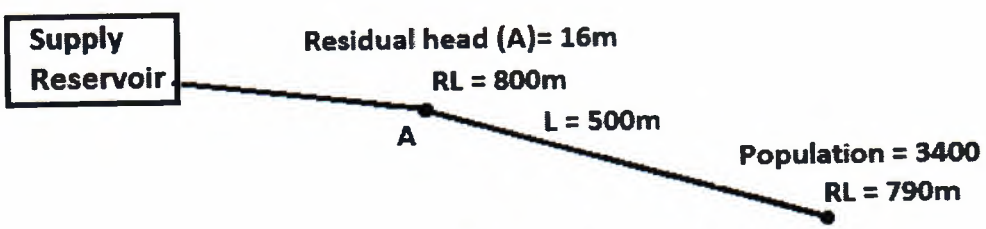

Figure 2

5. Briefly describe the Tree Type (or Dead End) and Grid Iron Pattern water supply system and critically differentiate them in terms of merit and demerits. [5]

6. Write short notes on *ANY THREE*. [3+3+3=9]

a. Importance of water and its functions to a human body.
b. Any 4 (four) Chemical parameters of drinking water quality standard of Nepal and their harmful effects on human body.
c. Functions of Trickling Filter and Clarifier in secondary treatment of wastewater.
d. Steps in designing surface water drainage of the entire site.
e. Causes and Remedial measures to avoid cavitation problem in water pump.

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Marks Scored:

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F. M. : 10

Registration No.:

Date :

SECTION "A"

[20Q. × 0.5 =10 marks]

Choose and encircle the most appropriate option from each set of choices.

1. We feel thirsty if water in our body is reduced by:
   a. 0.5% b. 1.0% c. 1.5% d. 2.0%

2. A simple and cheaper tube well that draws water from the bottom of the well is:
   a. Strainer type tube well
   b. Slotted type tube well
   c. Cavity type tube well
   d. Infiltration gallery

3. Trachoma and Conjunctivitis are the water related eye diseases that is called
   a. Water born disease.
   b. Water washed disease
   c. Water vector disease.
   d. Water-based disease

4. National Drinking water quality standard, Nepal states that Turbidity should be 5-10 NTU. Turbidity is caused by:
   a. presence of clay, silt, inorganic and organic compound, algae, and other organic compound.
   b. dissolved matters, in the form of ions, concentration of minerals, metals, organic materials, and salts, and ions of magnesium, calcium, sodium, potassium.
   c. Presence of bacteria and other pathogens.
   d. Presence of residual chlorine.

5. 'Anthracite' is also used in water 'pressure filters' to remove:
   a. flocks of colloids
   b. suspended ions.
   c. odor, taste, and colour
   d. harmful chemicals.

6. If water is flowing in a pipe, the dynamic pressure of the water cannot be measured by pitot tube or piezometric tube, but it can be calculated by following formula:
   a. $\frac{V^2}{\sigma g h}$ b. $\frac{V^2}{\sigma g}$ c. $\frac{V^2}{2g}$ d. $\frac{V^2}{gh}$

7. Water is pumped from ground floor to the roof tank through a pipe with a constant diameter. With the help of Bernoulli's equation, we can say that the pressure at the upper end of pipe is:
   a. Higher than point near the pump
   b. Lower than the point near the pump
   c. Equal to the pressure near pump
   d. Depended on the power of the pump

8. Frictional head loss in water (supply pipe) increases with:
   a. increase the diameter of pipe
   b. decrease in diameter of pipe
   c. decrease in velocity of water
   d. decrease in length of pipe

9. Tuberculation is a form of:
   a. corrosion in copper pipe
   b. erosion in any metal pipe
   c. corrosion in concrete pipe
   d. corrosion in cast iron pipe

10. The material used in potable water supply pipes, electrical and telephone cables, and sewer pipes, also used for door window-frame is:
   a. cPVC b. uPVC c. PVC d. HDPE

11. Hydraulic radius is the ratio of:
   a. Wetted area /wetted perimeter
   b. wetted area / total perimeter of pipe
   c. Wetted perimeter / wetted area
   d. wetted perimeter / area of a pipe

12. In the hot water central supply system, where circuit is long and chances of pressure loss is high, the best water supply system would be:
   a. Down feed system
   b. Up feed system
   c. Reverse circulation system
   d. Thermo-symphonic action

13. The average numbers of years within which a given rainfall event will be expected to occur at least once is called:
   a. time of concentration
   b. frequency of rainfall
   c. rainfall duration
   d. return period

14. In the absence of proper sewage treatment plant, it is mandatory to construct a septic tank. As a designer, you will go for the following plumbing system for your multi-story building.
   a. Two pipe system.
   b. One pipe system
   c. Single stake (partially ventilated)
   d. Single stake system

15. Water flows in drinking water pipe due to pressure along the flow, whereas water flows in the sanitary drainage due to:
   a. atmospheric pressure
   b. gravity
   c. gases of the wastewater
   d. vapour pressure.

16. The NBC 208: 2003 of Nepal has recommended that maximum pick flow velocity not exceed:
   a. 1.5 m/sec b. 2.0m/sec c. 2.4m/sec d. 2.5 m/ sec

17. In the secondary treatment (or biological treatment) of the wastewater, the Trickling Filter or Oxidation Pond is used to supply oxygen to bacteria to:
   a. kill bacteria by oxidation
   b. reduce COD
   c. enhance bacteria's metabolization
   d. reduce nuisance and foul smell.

18. Anaerobic digestion of wastewater in septic tank produces following gases:
   a. H_2S and CO_2
   b. NH_3 and CH_4
   c. H_2S, CH_4 and CO_2
   d. H_2S, NH_3 and CO_2.

19. A short pipe with threads on both the edge on outer side is called:
   a. Socket b. Nipple c. Union d. Plug

20. Rainwater storage-tank must be protected from sunlight entering it because:
   a. it causes algal growth
   b. it helps bacteria grow
   c. it helps larvae growth
   d. it destroys disinfectant