Form A: Paper –Setting Blank

**Ref No.: Ex/CE/5/T/305/22**

**B.E (Civil Engineering) (Evening) (3rd YEAR 2nd SEMESTER) EXAMINATION, 2022**
**(~~1st~~/ 2nd Semester / ~~Repeat / Supplementary / Annual / Biannual~~)**
**SUBJECT: WATER SUPPLY ENGINEERING**

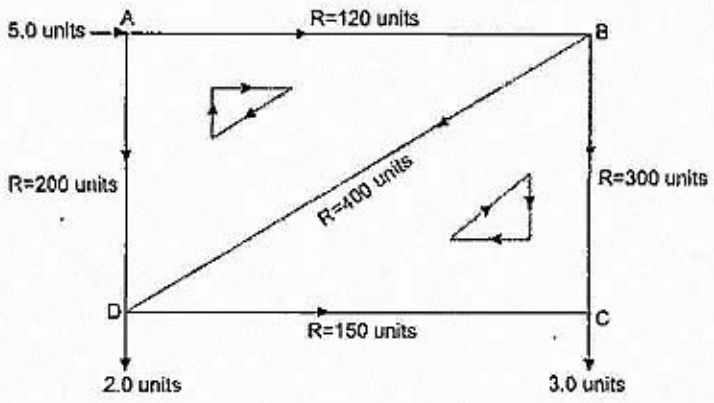
Time: ~~Two hours~~/Three hours~~/Four hours/ Six hours~~

Full Marks: 100
(50 marks for each part)

**Use a separate Answer-Script for each part**

| No. of Question | Part-I | Marks |
|---|---|---|
| | **Group-A: Answer any two questions (2 * 15 =30)** | |
| **Q. 1)** | Determine the future population for the year **2030** from following data for a town; estimate by both **Geometrical increase method** and **Incremental increase method.** | **15** |
| **Q. 2)** | A pipe network with two loops is shown in Fig. Determine the flow in each pipe for an inflow of 5 units at the junction A and outflows of 2.0 units and 3.0 units at junctions *D* and *C* respectively. The resistances R for different pipes are shown in the figure. | **15** |
| **Q. 3)** | The estimated hourly consumptions of water for a town for one day are given in the table. Determine the capacity of the distribution reservoir if the pump installed can supply the water in the reservoir at a uniform rate of **1.45 cu. m/sec.** | **15** |

| Year | 1910 | 1920 | 1930 | 1940 | 1950 | 1960 | 1970 |
|---|---|---|---|---|---|---|---|
| Population | 25,000 | 27,500 | 34,000 | 41,000 | 47,050 | 54,500 | 61,000 |



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**B.E (Civil Engineering) (Evening) (3rd YEAR 2nd SEMESTER) EXAMINATION, 2022**
**(~~1st~~/ 2nd Semester / ~~Repeat / Supplementary / Annual / Biannual~~)**
**SUBJECT: WATER SUPPLY ENGINEERING**

Time: ~~Two hours~~/Three hours~~/Four hours/ Six hours~~

Full Marks: 100
(50 marks for each part)

| No. of Question | Part-I | Marks |
|---|---|---|

| Time in hr | Consumption In ML/hr | Time in hr | Consumption In ML/hr |
|---|---|---|---|
| 1 | 2.45 | 13 | 7.55 |
| 2 | 2.25 | 14 | 6.35 |
| 3 | 2.14 | 15 | 5.95 |
| 4 | 2.30 | 16 | 5.75 |
| 5 | 2.55 | 17 | 5.65 |
| 6 | 2.60 | 18 | 7.45 |
| 7 | 3.50 | 19 | 7.30 |
| 8 | 5.25 | 20 | 7.25 |
| 9 | 6.10 | 21 | 5.65 |
| 10 | 6.55 | 22 | 4.50 |
| 11 | 7.25 | 23 | 3.70 |
| 12 | 7.35 | 24 | 2.85 |

**Group B: Answer any four questions (4 * 5 =20)**

| | | |
|---|---|---|
| Q. 4) | Calculate the hydraulic gradient for a concrete pipe of **diameter 2.5 m** carrying a flow of **3.5 cumecs** by **Modified Hazen William's formula.** Assume CR for concrete pipe =1.0 | 5 |
| Q. 5) | Discuss the Bacteriological quality guidelines for water in distribution system. | 5 |
| Q. 6) | For a city of a population **1,50,000**, find the followings<br>a) Domestic and Non-Domestic demand b) Fire demand<br>c) Maximum hourly demand for the maximum day | 5 |
| Q. 7) | What are the factors affecting **per capita water demand?** | 5 |
| Q. 8) | What are the acceptable limits of the following parameters for drinking water?<br>**a) Turbidity (units in JTU) b) Total dissolved solids (mg/l) c) Iron as Fe (mg/l) d) Arsenic as As (mg/l) e) Total Hardness as $CaCO_3$** | 5 |
| Q. 9) | Draw the **Radial system, Ring system** and the **Dead end system** of water supply network and discuss the **merits** of each system. | 5 |

**BACHELOR OF ENGINEERING (CIVIL ENGG.) EXAMINATION 2022**
**III RD YEAR ,SECOND SEMESTER 2022**
**SUB:- WATER SUPPLY ENGINEERING**

Time: Three hours

Full Marks 100
(50 marks part II)

Use a separate Answer-Script for each part

**Part-II**

Answer any **three (3)** questions
Two ( 2 ) marks are reserved for neatness and to the point answer.
*(Assume any data, if required, reasonably)*

Question no 1

a) What are the major pollutants in water supply sources?
Describe with necessary flow sheet different types of unit operation for making such water fit for potable purpose.

b) Alum , Al2 (SO4 )3, 15 $H_2O$ is to be used for coagulation purpose in a water treatment plant with a capacity of 15000000L per hour. The raw water has a natural alkalinity 0f 16mg/l,as CaCO3, how much Ca (OH)2 shall be required daily for optimum coagulation? The alum dose is 40mg/l. ( 3+7+6 )

Question no 2.

a) What is the purpose of sedimentation?
What are different types of settling process?
b) Explain the different forces acted upon on a settleable particle during settling.
From the above concept, deduce the necessary equation for determining terminal velocity of a settling particle.
c) Determine the terminal velocity of a spherical particle with 0.040 cm and sp gr of 2.65.The temperature of water is 20°C.μis 1.002 x $10^{-3}$ NS/m2.check Reynolds number. ( 4+6+6)

Question no 3.

a) What are colloids? Why they are persistence in nature when suspended in water? Explain with the help of Guoy –Stern theory of double layer ionic principle.
b) How you can get overflow rate for an ideal settling tank ?
c) An ideal horizontal flow settling basin is 3 m deep having surface area 920m2. Water flows at 8225m3 /day with μ =1x $10^{-3}$ Kg/m-sec.Assuming Stokes Law to be valid , determine how much proportion of spherical sand particles 0.015 mm in diameter with specific gravity 2.65 that will be removed in the tank. Check the retention time in hrs.

( 2+3+4+7)

Question no 4.

a) How alum is used as destabilize colloidal particle?
b) What are hydrophobic colloids? Give suitable example.
c) Why filtration of water is done?
d) Discuss the principal mechanisms of filtration process.
e) Compare two important types of filter process. (4+3+2+4+3)