Roll No. _____

END SEMESTER EXAMINATION
SEMESTER- V

COURSE CODE :CE 409 **DURATION : 3 (THREE)HRS**
COURSE TITLE: WATER & WASTE WATER ENGG. **MAXIMUM MARKS : 75**
SESSION : JULY-DEC'2021 **PASS MARKS : 35 %**

NOTE: *1. Attempt any 5 (five) questions.*
3. Mark for each question is shown against it.
4. Assume suitable logical data wherever necessary.

1. (a) Explain any five (5) types of data's that need to be collected/considered while preparation of any water supply project. **(5)**

(b) What do you understand by the term per capita demand? **(5)**
In any water supply project, losses/wastes of supply water happens due to various reasons. You being an engineer associated with such important project, explain the measures that you would take to control such losses/wastes.

(c) The population of 5 decades for Erangel from 1980 to 2020 are given below in table. Find out the population after two (2) and five (5) decade beyond the last known decade by using arithmetic increase method. **(5)**

Year	1980	1990	2000	2010	2020
Population	25000	28000	34000	42000	47000

2. (a) In water supply project, what do you understand by the term Domestic Water Demand? State the minimum domestic water demand with reference to IS 1172-1993 for various town/cites. **(2)**

(b) Sketch and describe briefly the various methods used for drawing water from a tube well. **(5)**

(c) Differentiate **(8)**
i) Infiltration Well and Infiltration Galleries
ii) Wet Intake Tower and Dry Intake Tower

3. (a) Why are absolutely pure water never found in nature? Explain the plant count test for detecting bacteriological impurities in drinking water. **(5)**

(b) Indicate the normally acceptable value and maximum permissible limits for the standards of drinking water for turbidity, pH, total hardness as $CaCO_3$, Iron and Fluoride as per IS-10500:2012. **(5)**

(c) Define water softening process. Explain any one method for removing permanent Hardness present in water. **(5)**

4. (a) Define Sedimentation in water treatment. **(6)**
If the water contains fine clay and colloidal impurities, is sedimentation process sufficient for its removal. If not, explain in detail any process that can be adopted for such removal.

(b) What are the essential requirements of an ideal disinfectant? **(4)**

(c) Explain Break Point Chlorination with the help of a suitable graph. **(5)**

5. (a) What is water carriage system of sanitation? Write the merits and demerits of water carriage system of sanitation. **(5)**

(b) State the situations where we can adopt separate system in sewerage system. **(5)**

(c) Define and indicate the recommended values for these which may be used in design **(5)**
i) Self-Cleansing Velocity
ii) Non-Scouring Velocity

6. (a) State the functions of the following in a sewerage system **(8)**

i) Manhole
ii) Inverted Siphon
iii) Lamp Hole
iv) Grease and Oil Trap

(b) The main sewer was designed for an area of 50 sq.km. Density of population of the town is 200 persons/hectare. The average flow is 250 litre/capita/day. The peak discharge is one and half times more than average flow. Rainfall equivalent of 8mm in 24 hours, all of which are runoff. **(7)**

i) What should be the capacity of the sewer in m3/sec.
ii) Find the minimum velocity and gradient required to transport sewage containing coarse sand of 1mm diameter through a sewer of 35cm diameter, specific gravity of particles is 2.65 and values of K = 0.06 and f = 0.03

7. (a) Calculate 1 day 37 ºC BOD of sewage sample whose 5 day 20 ºC BOD is 100 mg/l. Assume K_D at 20 ºC as 0.1. **(5)**

(b) Describe in detail the various stages of self-purification of a river, stating characteristics of each stage. **(5)**

(c) Distinguished between **(5)**

i) Aerobic Digestion and Anaerobic Digestion
ii) BOD and COD

8 (a) Explain the dilution method of sewage disposal. Also state the conditions when it can be adopted for sewage disposal. **(4)**

(b) In water supply project meant for a small town, which type of filter you would choose for filtration of water. Explain its working operation and cleaning operation with the help of a typical sectional diagram. **(6)**

(c) Discuss the factors governing the selection of source of water supply scheme for a city. **(5)**

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