*Seat No.: _____* *Enrolment No._____*

# GUJARAT TECHNOLOGICAL UNIVERSITY

**BE SEM-VI Regular Examination May 2011**

**Subject code: 160604**

**Subject Name: Water and Waste Water Engineering**

**Date: 21/05/2011** **Time: 10.30 am – 01.00 pm**

**Total Marks: 70**

## Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

**Q.1** **(a)** What is Design period of a water supply project? Discuss the factors considered for fixing design period and state the design periods for various components of a water supply project. **07**

**(b)** Enlist the population forecasting methods and describe any two of them. Forecast the population after 30 years for a small town having following data by Geometrical Increase method. **07**

| Year | 1961 | 1971 | 1981 | 1991 | 2001 |
|---|---|---|---|---|---|
| Population | 35400 | 41600 | 49400 | 64900 | 83200 |

**Q.2** **(a)** What is an intake structure? Sketch and explain construction and working of a river intake. **07**

**(b)** What are the different types of pipes used for water supply? Discuss, Cast iron pipes and Concrete pipes in details. **07**

**OR**

**(b)** A city with 1.5 lakh population is to be supplied water at 100 lpcd from a river 1km away. The difference in water level of sump and reservoir is 30m. If the demand has to be supplied in 8 hours, determine the size of the main and B.H.P. of the pumps required. Assume maximum demand as 1.5 times the average demand. Take $f$ =0.0075, velocity in the pipe as 2.00 m/s and efficiency of pump as 75%. **07**

**Q.3** **(a)** What objectives are achieved by aeration of water? Sketch and discuss different types of aerators. **07**

**(b)** Discuss various rapid and slow mixing devices. **07**

**OR**

**Q.3** **(a)** Explain coagulation and flocculation process. Discuss any one type of coagulant and its application for water treatment. **07**

**(b)** What is sedimentation? Explain sedimentation type-1 for discrete particles. **07**

**Q.4** **(a)** Sketch and explain working of a rapid sand filter. **07**

**(b)** Discuss, disinfection of water supply. **07**

**OR**

**Q.4** **(a)** Sketch and discuss septic tank and soak pit arrangement as a low cost sanitation system for a house. **07**

**(b)** Calculate the velocity of flow and corresponding discharge in a circular sewer having a diameter of 1.00 m laid at a gradient 1 in 400. The sewer is running at 0.60 m depth. Take N = 0.012 in Manning's formula. **07**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Sketch and explain construction and working of a trickling filter. | **07** |
| | **(b)** | Sketch and discuss, Manhole, Drop manhole and Lamp hole as sewer appurtenances. | **07** |

**OR**

| | | | |
|---|---|---|---|
| **Q.5** | **(a)** | Discuss, aerobic suspended growth treatment of domestic waste water. | **07** |
| | **(b)** | Discuss sludge digestion and Sludge drying beds as ultimate treatment of the domestic waste water. | **07** |

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