**Q.P. Code : 21640**

**[Time: Three Hours]** **[ Marks:80]**

N.B: 1. Question.No.1 is compulsory.
2. Answer any three questions out of remaining five questions.
3. Assume suitable data wherever required
4. Figures to the right indicate full marks.

**Q. 1** **(20)**

a) Explain the importance & necessity for planned water supplies.
b) What is per capita demand? What are the factors which affect per capita demand?
c) Explain : i) Coagulation ii) Flocculation
d) Write a note on well water disinfection.

**Q. 2** **(10)**

a) Two primary setting basins are 26m in diameter with a 2.1m side water depth single effluent weirs are located on the peripheries of the tank for a water flow of 26,000 $m^3$/day calculate,
i) Surface area & volume
ii) Overflow rate in $m^3/m^2.d$.
iii) Detention time in hr.
iv) Weir loading in $m^3/m.d$.

b) Explain with neat sketch working & operation of pressure filters. **(10)**

**Q. 3**

a) Determine the quantity of alum required in order to treat 10 million liters of water per day at a treatment plant, where 10 ppm of alum dose is required. Also determine the amount of $CO_2$ gas which will be released per liter of water treated. **(10)**

b) Explain in brief methods of removing permanent hardness. **(10)**

**Q. 4** Write short notes on any 4. **(20)**

a) River intake
b) Tube settlers
c) Reverse osmosis
d) Hazardous waste
e) Fixtures & Fittings

**Q. 5** a) Explain physical properties of municipal solid waste. **(05)**
b) Enumerate the difference between slow sand filters & rapid gravity filters. **(05)**
c) What are the requirements of good distribution systems? **(05)**
d) Draw a neat sketch of water connection from the municipal main. **(05)**

**Q. 6** a) Explain with neat flow sheet treatment given to the river water for potable purpose. **(10)**
b) Design a rapid sand filter unit for 4 million liters per day of water supply. Assume the suitable data required. **(10)**

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