



Try in the following questions

**Question One (35 Marks)**

- 1- a)** Explain the type of sedimentation used in surface water treatment.
- b)** Discuss the theories of filtration for purification water supply.
- c)** Design the filtration house and connecting pipes in a water treatment plant of 100,000 m<sup>3</sup>/day with rate of filtration of 180 m<sup>3</sup>/m<sup>2</sup>/day.
- Draw plan and sections** for the designed filtration house with its connecting pipes.

**Question Two (25 Marks)**

- 2- a)** Discuss the different method of disinfection and their disinfection by products.
- b)** Explain the different mode of Water Hardness, its effect on water supply and methods of reducing Hardness.
- c)** Design a water softening plant working 16 hrs/day, of flow 3000 m<sup>3</sup>/day, raw water hardness 450 mg/l, allowable hardness in treated water 35 mg/l, ion exchange capacity of used resin 25 kg/m<sup>3</sup>, capacity of regeneration salt 50 kg/m<sup>3</sup>.

**Question Three (20 Marks)**

- 3-a)** Discuss briefly the reasons for removing high concentrations of Iron and Manganese in water supply.
- b)** Explain using sketches the methods of removal Iron and Manganese in water supply, describe one in details.

**Question Four (20 Marks)**

- 4-a)** Discuss with using flow diagram the common methods employed in desalinations.
- b)** Explain in details the use of **Reverse Osmosis** for sea water desalination (idea, advantage, disadvantages, flow diagrams).

*With my best wishes*

*Prof. M. Elsheikh*

This exam contribute by measuring in achieving Program Academic Standards NARS			
Question No.	Q1-a, Q1-b, Q2-a, Q3-a, Q4-a	Q2-c, Q3-b	Q1-c, Q2-b, Q4-b
Skills	A-3	B-3	C-1
	Knowledge & Understanding	Intellectual Skills	Professional Skills