



Try in the following questions

**Question One (30 Marks)**

- 1- a)** “Coagulation is essential in modern water treatment”. Discuss with explaining types and theory of their functions.
- b)** Compare with using sketches different types of water clarification (normal, pulsator, tube-settlers, super high rate, and floatation).
- c)** Design the sedimentation basins and their inlet, outlet and sludge structures for a water treatment plant of 120,000 m<sup>3</sup>/day.  
- Draw plan and sections for the designed basin with its structures.

**Question Two (30 Marks)**

- a)** Explain different types, theories, operation and cleaning of filtration processes.
- b)** Design the filtration house and connecting pipes in a water treatment plant of 250,000 m<sup>3</sup>/day with rate of filtration of 200 m<sup>3</sup>/m<sup>2</sup>/day.  
- Draw plan and sections for the designed filtration house with its connecting pipes.
- c)** Discuss the disinfection by products in water treatment for common disinfectants.

**Question Three (20 Marks)**

- a)** Discuss bad effect of high concentrations of Hardness, Iron and Manganese in water supply and their common method of removal.
- b)** Design a water softening plant working 12 hrs/day, of flow 2500 m<sup>3</sup>/day, raw water hardness 400 mg/l, allowable hardness in treated water 50 mg/l, ion exchange capacity of used resin 10 kg/m<sup>3</sup>, capacity of regeneration salt 45 kg/m<sup>3</sup>.

**Question Four (20 Marks)**

- a)** State with using sketches the main difference among the common methods employed in desalinations.
- b)** Explain in details the use of Multistage Flash “MSF” Distillation (thermal evaporation) 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,	Q2-c, Q3-b	Q1-c, Q2-b, Q4-b	Q3-a, Q4-a
Skills	DK3	DI2, DI5	DP1	DT4
	Knowledge & Understanding	Intellectual Skills	Professional Skills	General Skills