M.E. (Civil) (Water Resources & Environmental Engg.)
ADVANCED WATER & WASTE WATER TREATMENT
(2013 Course) (Semester - III)

Time : 3 Hours]   *[Max. Marks : 50*
Instructions to the candidates:
   1)   Answer any five questions.
   2)   Neat diagrams must be drawn wherever necessary.
   3)   Figures to the right indicate full marks.
   4)   Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator
       and steam tables is allowed.
   5)   Assume suitable data, if necessary.

Q1) Explain in detail the principle and working of electro dialysis and ion exchange for water and waste water treatment. **[10]**

Q2) Discuss the principle, concept and necessity of aeration. Explain various method of aeration with neat sketches. **[10]**

Q3) What is the theory of disinfection? State the factors affecting disinfection. Explain break point chlorination. **[10]**

Q4) Design an aerated grit chamber for the treatment of municipal wastewater. The average flow rate is 0.5 m³/s. Take peak factor as 2.75. **[10]**

Q5) Design an activated sludge process for municipal wastewater flow rate of 8000 m³/day, BOD of settled effluent = 180 mg/l, excepted BOD of treated effluent = 10 mg/l, yield coefficient = 0.5 kg/kg, K_d = 0.05/day, MLSS = 3000 mg/l, return sludge solids concentration = 10,000 mg/l, and mean cell resisdence time is 10 days. Determine **[10]**
   a)   Volume of reactor
   b)   F/M ratio
   c)   VLR
   d)   Oxygen requirment
   e)   Recycle ratio
   f)   BOD removal efficency

Q6) Design a high rate trickling filter using NRC equations for   **[10]**
   a)   Sewage flow = 5MLD

   b)   Recirculation ratio = 1.5

   c)   BOD of raw sewage = 300 mg/l

   d)   BOB removal in PST = 35%

   e)   Final effluent BOD desired = 30 MG/L.

Q7) State the design parameters, principle, advantages and disadvantages of UASBR. Draw a neat sketch of the reactor.   **[10]**

Q8) State the sources of waste water from manufacturing process, characteristics of effluent for dairy and automobile industry. Draw the treatment flow charts.   **[10]**

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