

GUJARAT TECHNOLOGICAL UNIVERSITY**M.E Sem-III Regular Examination January 2011****Subject code: 731801****Subject Name: Advanced Wastewater Treatment Technologies****Date: 08 /01 /2011****Time: 02.30 pm – 05.00 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) Under what circumstances the need for advanced wastewater treatment arises? **07**
Brief description with appropriate example is expected.
- (b) Highlight the advantages and limitations of MBR as compared to conventional **07**
treatment systems.

- Q.2** (a) You have been invited by a textile process house to evaluate the possibility of **07**
reuse of treated wastewater in the process. Enlist and briefly discuss the possible
operations/ processes.
- (b) Identify the basic processes for treatment and briefly describe each with the help **07**
of graphical representation and/or figure.

OR

- (b) Using the following primary settling tank data , determine the daily sludge **07**
production:
- (i) Flow=0.150m³/s
 - (ii) Influent SS=280 mg/L
 - (iii) Removal efficiency=59%
 - (iv) Sludge concentration=5%
 - (v) Volatile solids=60%
 - (vi) Sp. Gravity of volatile solids=0.999.
 - (vii) Fixed solids=40%
 - (viii) Sp gravity of fixed solids=2.65

- Q.3** (a) Express your views on ‘increasing demand for reuse of treated wastewater in **07**
industry’
- (b) Define ‘sludge’. With the help of a neat diagram, identify the sources of sludge at **07**
sewage treatment plant.

OR

- Q.3** (a) With the help of a neat diagram explain the ‘Ion exchange’ operating process for **07**
removal of hardness.
- (b) Enlist and discuss the advantages and limitation of ion exchange as compared to **07**
chemical precipitation softening.

- Q.4** (a) Write short notes on any two: **08**
(i) Filter press
(ii) Rotary drum filter
(iii) Nutsche filter
- (b) Explain the applications of membrane technologies in wastewater treatment. **06**

OR

- Q.4** (a) Enlist the various advanced oxidation processes for removal of complex organic constituents of wastewater and explain any one in detail. **08**
- (b) Prepare a list of advantages and disadvantages of Reverse osmosis treatment system. **06**
- Q.5** (a) Draw a neat sketch of Membrane Bioreactor and explain the location and function of following components of MBR: **08**
- (i) Biological process blowers
 - (ii) Mixed liquor recirculation pumps
 - (iii) Back pulse pump
 - (iv) Permeation system
- (b) Answer the following questions : **06**
- (i) Explain clearly the difference between :Influent, Permeate and reject with reference to membrane filtration process.
 - (ii) Define the term “flux”.
 - (iii) What is Trans Membrane Pressure?
- OR**
- Q.5** (a) Explain in brief the following advanced biological treatment systems: **08**
- (i) Moving bed biological reactor.
 - (ii) Static aerobic fixed film reactor
- (b) Differentiate between maintenance cleaning and recovery cleaning of MBR. **06**
- Prepare a list of chemicals used for cleaning of MBR.
