

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – WINTER • 2013****Subject code: 731801****Date: 26-11-2013****Subject Name: Advanced Wastewater Treatment Technologies****Time: 10.30 am – 01.00 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) Define Advanced Oxidation Processes (AOP). Prepare a list of different AOPs and explain any one in detail. **07**
- (b) Enlist the advantages and limitations of MBR as compared to conventional treatment systems. What according to you is the main limitation in Indian context? **07**
- Q.2** (a) Write a short note on construction and working of “Filter press”. **07**
- (b) Express your views on ‘increasing demand for reuse of treated wastewater in industry’ **07**
- OR**
- (b) Explain in brief the construction and working of “Rotary Drum filter” **07**
- Q.3** (a) Explain the mechanism of Reverse Osmosis and high light the advantage and disadvantages of RO. **07**
- (b) Prepare a list of common Advanced Wastewater Treatment Processes and the pollutant they remove. **07**
- OR**
- Q.3** (a) With the help of a neat diagram explain the ‘Ion exchange’ process for removal of hardness. Highlight its applications and limitations. **10**
- (b) Briefly explain the reason why it is not possible to achieve zero hardness by chemical precipitation. Is zero hardness required? **04**
- Q.4** (a) With the help of neat sketch, write a brief note on **10**
- (i) Moving bed biological reactor.
- (ii) Static aerobic fixed film reactor
- (b) Define the terms: Influent, Permeate, reject, flux **04**
- OR**
- Q.4** (a) Define and differentiate between Advanced Wastewater Treatment and tertiary treatment with appropriate examples. **08**
- (b) Explain the applications of membrane technologies in wastewater treatment. **06**
- Q.5** (a) With the help of neat sketches explain the modes of operation in membrane filtration unit of MBR. **06**
- (b) Draw a neat sketch of Membrane Bioreactor (MBR) and explain its various components. **08**
- OR**
- Q.5** (a) Prepare a list of sources of sludge at the Sewage Treatment Plant and briefly describe the characteristics of each. **08**
- (b) Differentiate between : (i) External MBR and immersed MBR **06**
- (ii) Maintenance cleaning and recovery cleaning of MBR
