

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – I • EXAMINATION – WINTER • 2014

Subject code: 2714007**Date: 06-01-2015****Subject Name: Modelling & Simulation of Rubber Processing (MSRP)****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) Discuss history of FEA techniques/applications for Rubber product/process design. **07**

(b) Differentiate steady state and dynamic simulation listing applications of each in Rubber Processing. **07**

Q.2 (a) Give concept of ANN and discuss its application in rubber technology. **07**

(b) Explain working of ANN with example. **07**

OR

(b) Discuss importance of training/learning in ANN. Briefly explain different methods for training/learning. **07**

Q.3 (a) Give Step by step procedure with all stages in the development of a complete mathematic model of a process. **07**

(b) Discuss cost analysis and De-Bottlenecking with an example of any rubber product plant. **07**

OR

Q.3 (a) Discuss different stages in implementation of FEA for product design and analysis and explain role of engineer in analysis, modeling and result interpretation considerations for FEA. **07**

(b) List out software tools in use for rubber product FEA design and discuss about feature of any one tool. **07**

Q.4 (a) Explain the theory/working of FEA with simple example. **07**

(b) Discuss ten common mistakes engineers do in applying FEA. **07**

OR

Q.4 (a) List out expected features of a mesh generation tool to be used for good performance of FEA. Discuss does and don'ts of meshing. **07**

(b) Discuss role for FEA for design and simulation of dock fender. **07**

Q.5 (a) Write a mathematical model for the spherical tank with PID level controller. Outlet pipe at the bottom of the tank extended up to $1/8^{\text{th}}$ of diameter of the tank from bottom to avoid settled precipitates going out with liquid. The flow out from the tank is proportional to the square root of the height of the liquid head above the end of the pipe and valve opening. **07**

- (b) The continuously stirred mixing tank with 600 liter of volumetric capacity is initially filled with pure water. 0.1 kg/liter salt solution at 10 lit/min is continuously charged to it. Solution at the same rate is coming out of the tank, hence volume remains constant. Write a model stating the assumptions and using that model, calculate the time required to reach the concentration of the out coming stream to 0.01 kg/liter. No reaction takes place in the tank. **07**

OR

- Q.5** (a) What is a model? List out model classifications. Differentiate deterministic and stochastic model with example. **05**
- (b) Discuss degree of freedom analysis for modelling. Illustrate its impotence with example. **05**
- (c) Discuss partitioning of equation for deciding the sequence of solution for a set of simultaneous nonlinear equations. **04**
