Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2714007 **Date: 31/12/2015**

Subject Name: Modelling & Simulation of Rubber Processing (MSRP)

Time:2:30 pm to 5:00 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 optimization, design and simulation and differentiate them giving two examples for examples.	**09**
	(b)	What is a Model? List out attributes of a good mathematic model of a process.	**05**
Q.2	**(a)**	Differentiate steady state and dynamic processes giving examples. Also highlight the difference in their model equations with example.	**07**
	(b)	Differentiate distributed parameter and lumped parameter models, deterministic and stochastic models.	**07**
		OR	
	(b)	List out applications of simulation in rubber technology discussing benefits and limitations.	**07**
Q.3	**(a)**	A fluid of constant density is pumped into a Spherical tank. Outlet pipe at the bottom of the tank extended up to $1/8^{th}$ 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. Derive the model equation describing the system.	**07**
	(b)	The continuously stirred mixing tank with 200 liter of volumetric capacity is initially filled with pure water. 0.01 kg/liter salt solution at 8 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 0.02 kg/liter. No reaction takes place in the tank.	**07**
		OR	
Q.3	**(a)**	List out different ways by which training/learning takes place in ANN and briefly explain each. Discuss importance of training/learning.	
	(b)	Discuss degree of freedom analysis for modelling. Discuss partitioning of equation for deciding the sequence of solution for a set of simultaneous nonlinear equations.	
Q.4	**(a)**	Explain the concept of ANN and working of it with example. List out applications of ANN in Rubber technology.	**07**
	(b)	Discuss different mathematical functions used in ANN and discuss role of them in working of ANN.	**07**
		OR	

Q.4	**(a)**	Discuss importance of Pre-process, Analysis and Post processing in FEA with simple example.	**07**
	(b)	Discuss ten common mistakes engineers do in applying FEA.	**07**
Q.5	**(a)**	Discuss role for FEA for design and analysis using example of any rubber product.	**07**
	(b)	Discuss meshing for FEA highlighting its importance. Discuss does and donâts of meshing.	**07**

OR

Q.5	**(a)**	Discuss a model to estimate the rubber paint coating thickness.	**06**
	(b)	Discuss briefly Static FEA, Non Linearity in FEA, Dynamic analysis in FEA, Thermal analysis in FEA.	**08**

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