Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY M. E. - SEMESTER - I • EXAMINATION - WINTER • 2013

Subject code: 711104N Date: 30-12-2013 Subject Name: Modeling, Simulation & Computer Application 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.
- (a) Explain modern concept of system modeling and simulation. Give any three 07 **Q.1** examples to strengthen your answer.
 - Discuss advantage of Matlab and discuss various simulation toolboxes available 07 **(b)** in it.
- 07 **Q.2** (a) Describe Monte Carlo simulation technique with a suitable example.
 - Model and simulate a mechanical accelerometer which is mounted on a jet 07 **(b)** engine test sled. Show clearly the characteristics of the accelerometer and mention how can reduce the response time.

OR

(b) Model any first order system and write a Matlab program for it. State inputs and 07 outputs of the system clearly.

07 0.3 (a) Discuss types of model with an example of each.

(b) What are Random variables? Explain their significance.

OR

- (a) Extract from the following description the entities, attributes, and activities of the 07 0.3 system. Ships arrives at a port. They dock at a berth if one is available; otherwise, they wait until one becomes available. They are unloaded by one of several work gangs shoes size depends upon the ship's tonnage. A warehouse contains new cargo for the ship. The ship is loaded and then departs. Suggest two exogenous events (other than arrivals) that may need to be taken into account.
 - (b) Explain the use of probability in simulation. Describe the following probability 07 density function and cumulative distribution function: (i) Binomial distribution (ii) Exponential distribution, (iii) Poisson's distribution and (iv) Gamma distribution.
- (a) Explain static and dynamic systems using suitable practical examples. 07 0.4 (b) Make a model of any one thermo-mechanical system. 07

OR

- For modeling mechanical systems, describe idealized translational and rotational 07 **Q.4** (a) passive elements. Mention only governing equations clearly with appropriate sketches.
 - (b) Give transfer function form of a second order differential equation representing a 07 damped system.
- 0.5 (a) Explain RLC circuit and its importance. Write a program for showing the effect 07 of circuit parameters. Give resembling practical system.
 - A practical system is simplified as shown in Figure 1, develop a model 07 **(b)** using blocks available in MATLAB SIMULINK. And write the commands to be given at command window for running successful running of program.

07



OR

- (a) Give a physical model of (i) an automobile and (ii) its suspension system. Write only system equations for the suspension system.
 (b) Make a state space model only for the system shown in Figure 2. Q.5 07 07

 x_2 u x_1 k₂ ₩₩ m_2 m_1 ₩₩ ₩₩ Ð k3 k_{I} b


