

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. IST Semester–Remedial Examination – July- 2011****Subject Code: 711104****Subject Name: Modeling, Simulation and Computer Application.****Date:13/07/2011****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) Explain static and dynamic systems. Give suitable practical examples. **05**
 (b) Classify system variables and write their relative importance. **09**
- Q.2** (a) Classify different models. Explain the importance of each model keeping in view their characteristics. **07**
 (b) Giving a physical model of an automobile suspension system using three mass system (One for the body, the other two for front and rear wheels), write only the system equations with state space representation. **07**
- OR**
- (b) What are random variables? Explain their significance. **07**
- Q.3** (a) It is required to model and simulate a mechanical accelerometer to obtain the characteristics in terms of the response of the same. Give step by step procedure for doing that. **09**
 (b) Give different models for generating random variables. **05**
- OR**
- Q.3** (a) Make a model for an inverted pendulum mounted on a moving cart. Derive system equations and write a MATLAB program, if the pendulum is constrained using a pivot in the vertical plane. **09**
 (b) Describe the idealized rotational passive elements giving their basic governing mathematical representation. **05**
- Q.4** (a) Derive an expression for the dynamic response of the spring-mass-damper mechanical system for free damped vibrations. Write a MATLAB program for studying the effects of damping ratio ζ on the response. Give appropriate sketches. **08**
 (b) What are different simulation tools available. Give the basic features that are required in any simulation tool. **06**
- OR**
- Q.4** (a) Explain RC circuit and its importance. Write a program for showing the effect of circuit parameters. Give resembling mechanical system. **06**
 (b) How will you model a DC motor for predicting its performance? Write system equations and give a MATLAB program for the same. **08**
- Q.5** (a) When are we forced to use analogy? Explain in brief with examples. **07**
 (b) Explain conversion of state space representation to transfer function form by giving any suitable example. **07**
- OR**
- Q.5** (a) Explain, by giving importance of each parameters, the RLC circuit and make a model to simulate a second order system. Write a MATLAB program. **08**
 (b) Give a brief note on Monte Carlo simulation technique. **06**
