

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. - SEMESTER – I • EXAMINATION – SUMMER • 2013****Subject code: 711104N****Date: 06-06-2013****Subject Name: Modeling, Simulation and 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.

- Q.1** (a) Explain system modeling and simulation as applied to Mechanical Engineering. **07**  
(b) Classify system variables and write their relative importance. **07**
- Q.2** (a) When are we forced to use analogy? Explain in brief with examples. **07**  
(b) What are random variables? Explain their significance. **07**
- OR**
- (b) A practical system is simplified as shown in figure 1; develop a model using blocks available in MATLAB SIMULINK. And write the commands to be given at command window for running successful running of program. **07**
- Q.3** (a) Explain RLC circuit and its importance. Write a program for showing the effect of circuit parameters. Give resembling practical system. **07**  
(b) Classify different models. Explain the importance of each model with respect to their characteristics. **07**
- OR**
- Q.3** (a) Give different models for generating random variables. **07**  
(b) What are different simulation tools available? Give basic features that are required in any simulation tool. **07**
- Q.4** (a) For modeling mechanical systems, describe idealized translational and rotational passive elements. Mention only governing equations clearly with appropriate sketches. **07**  
(b) Explain use of probability in simulation. Describe the following probability density function and cumulative distribution function: (i) Poisson's distribution and (ii) Gamma distribution. **07**
- OR**
- Q.4** (a) Give detailed classification of (i) Systems and (ii) Models. **07**  
(b) Model and simulate a mechanical accelerometer and which is mounted on a jet engine test sled. Show clearly the characteristics of the accelerometer and mention how we can reduce the response time. **07**
- Q.5** (a) Describe the analysis and simulation of Linear and Non-linear systems. **07**  
(b) Give transfer function form of a second order differential equation representing a damped system. **07**
- OR**
- Q.5** (a) For the truck trailer system shown in figure-3, write system equations and hence get only the transfer function form, if mass of truck is  $M_1$ . **07**  
(b) Write a short note on Lumped and distributed system. **07**

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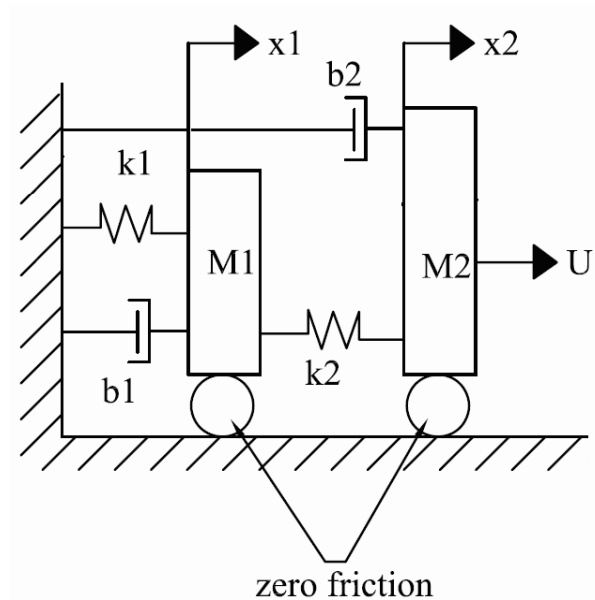


Figure -1 [Q-2 (b)]

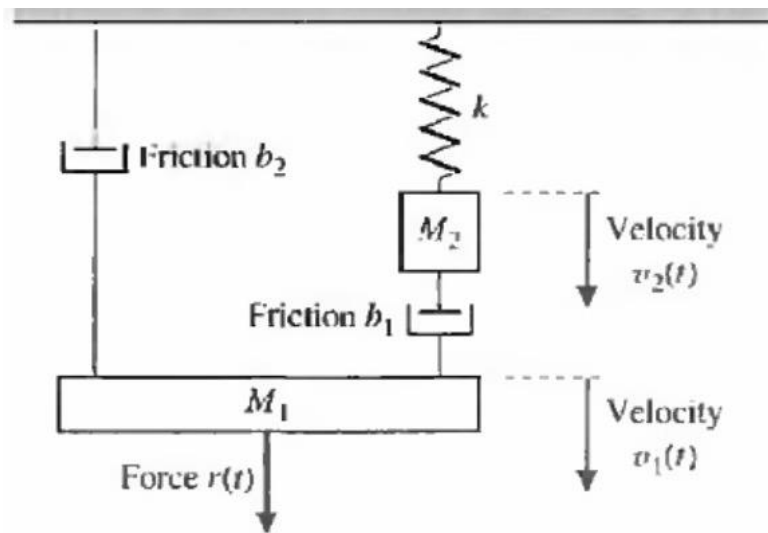


Figure -2 [Q-4 (b) OR]

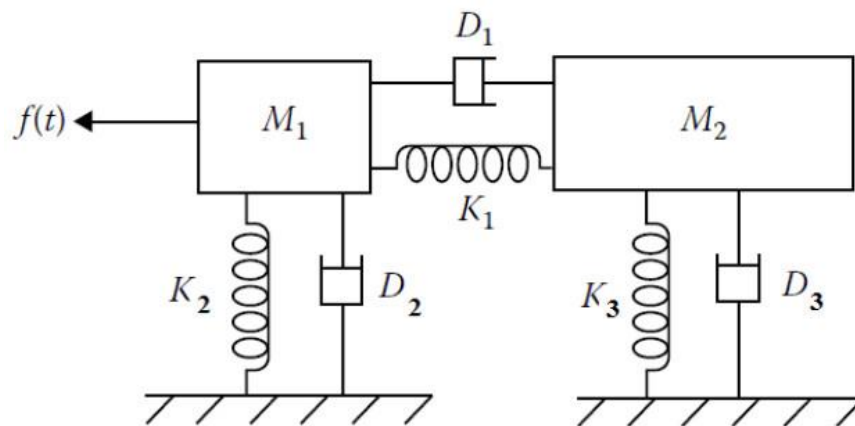


Figure -3 [ Q-5 (a) OR]