Printed Pages—4 **AS402**

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 199401 **Roll No.** | | | | | | | | | | |

B.Tech.

(SEM. IV) THEORY EXAMINATION 2013-14

BASICS OF SYSTEM MODELLING AND SIMULATION

Time : 3 Hours *Total Marks : 100*

Note :– The question paper contains **three** Sections, Section B and Section C. Follow the instruction as given in each Section.

SECTION—A

1. Attempt **all** parts : **(2×10=20)**

(a) Classify the different types of models.

(b) Write the component of system with example.

(c) What is the system modeling ?

(d) Compare Analytical and Simulation Model.

(e) What are the properties of C.D.F. ?

(f) What do you mean by parameter estimator ?

(g) Define Service Utilization ?

(h) Define Kendall notation for queuing theory.

(i) What do you mean by reliability estimation ?

(j) What is the real world application of simulation ?

SECTION—B

2. Attempt any **three** parts of following : **(3×10=30)**

(a) Define the entities, attributes and activities of any five of the following :

(i) A cafeteria

(ii) A grocery store

(iii) A hospital emergency room

(iv) A fast food restaurant

(v) A laundromat

(vi) A university library.

(b) Write down the principles and steps in creating system modeling with required flow table.

(c) The CDF for a certain random variable is given as :

$$F_X(x) = \begin{cases} 0, & -\infty < x \le 0 \\ kx^2, & 0 < x \le 10 \\ 100k, & 10 < x < \infty \end{cases}$$

(i) Find the value of k;

(ii) Find the value of $P(X \le 5)$

(iii) Find the value of $P(5 < X \le 7)$

(iv) Find the expression for PDF.

(d) In car-wash service facility, cars arrive for service according to a poisson distribution with mean of 30 per hour. The time for washing and cleaning follows an exponential distribution with a mean of 1.2 min/car. There is only one washing station in the facility. Assume that there

is no storage of parking spaces for arriving cars then find out L_S, L_Q, W_S, W_Q and find out the probability when six customers in the system.

(e) Explain any **three** parts the following :

(i) Transfer line model

(ii) Inventory system model

(iii) Interpretation of confidence interval of a parameter

(iv) Deadlock detection model.

SECTION—C

Note :– Attempt **all** questions with their instructions : **(5×10=50)**

3. Attempt any **two** parts of the following :

(a) What is the Simulation ? What are the needs, advantages and disadvantages of simulation modeling ?

(b) Discuss the merits and demerits of simulation.

(c) What is the criterion of selecting appropriate modeling techniques ?

4. Attempt any **two** parts of following :

(a) What is the model ? What is the type of system model and what are the differences between static and dynamic model ?

(b) Write a short note on the following :

(i) Validation

(ii) Calibration

(iii) Verification.

(c) What is the Monte Carlo method ? Explain with any one example.

5. Attempt any **two** parts of following :

   (a) What are GOOD-OF-FIT tests ? Explain any one method with the example.

   (b) What is the Distributed Lag Model and COBWEB Model ? Explain with example.

   (c) Find out The Maximum likelihood function for the Exponential Distribution, $\theta = \beta, \beta > 0, f_p(x) = \frac{1}{\beta} e^{\frac{-x}{\beta}}$ for $x \geq 0$.

6. Attempt any **two** parts of following questions :

   (a) Find steady state probability (P_n) in queuing model M/M/1/GD/∞/∞/ and obtain expression for $\mathbf{P_0}$, $\mathbf{L_S}$, $\mathbf{L_Q}$, $\mathbf{W_S}$, $\mathbf{W_Q}$..

   (b) Discuss the Poisson distribution. Derive an expression of it.

   (c) Explain the Multi Server M/M/c/GD/∞/∞ model.

7. Explain any **three** parts the following :

   (a) Computer network model

   (b) Capital recovery model

   (c) Job shop model

   (d) Pi value estimation

   (e) What is just-in-time model ?