Registration no: | | | | | | | | | | |

Total Number of Pages: 02

MCA
MCC504

5th Semester Regular / Back Examination 2017-18
Quantitative Techniques – II (Modelling & Simulation)
Branch:MCA
Time: 3 Hours
Max Marks: 70
Q.CODE : B708

Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.

Q1 **Answer the following questions:** **(2 x 10)**

a) What are the criteria to choose the constants for congruential generator of random numbers.

b) What is the difference between mixed congruential generator and multiplicative congruential generator?

c) If $x_0=5$ and $x_n= (3x_{n-1}+ 7) \bmod 10$, find $x_1,x_2,\ldots,x_{10}$.

d) Describe the method to generate discrete uniform random variable which take on any value 1,2,…,n.

e) Discuss the inverse transform method to generate discrete random variables.

f) Define stochastic process

g) What is Markovian property?

h) Write Chapman-Kolmogorov equations.

i) When do the states i and j are said to be communicate?

j) What are the different techniques to reduce variance?

Q2 **a)** Explain the method to generate Binomial random variable. **(5)**

b) Give an efficient algorithm to simulate the value of a random variable X such that P{X=1}=0.15, P{X=2}=0.3, P{X=3}=0.1, P{X=4}=0.25 and P{X=5}=0.2 **(5)**

Q3 **a)** Explain the generation of standard normal random variable using polar method. **(5)**

b) Describe the method to estimate π. **(5)**

Q4 **(a)** Use random numbers to evaluate the integral **(5)**

$$\int_2^5 x^2\,dx$$

(b) By using Inverse transform method generate a random variable x having distribution function $F(x)=x^n$, $0<x<1$ **(5)**

Q5 Write and explain the algorithm for queuing system with two servers in series. **(10)**

Q6 **a)** Explain the use of control variates in variance reduction. **(5)**

b) Show that the variance is reduced if anitithetic variables are used to estimate $\theta=E[e^{U}]= \int_{-0}^{1} e^{x}\, dx$ **(5)**

Q7 A housewife buys three kinds of cereals: A, B and C. She never buys the same cereal on successive weeks. If she buys cereal A, then next week she buys cereal B. However if she buys either B or C, then the next week she is three times as likely to buy A as the other brand. Obtain the transition probability matrix and find out the steady state probabilities. **(10)**

Q8 **Write Short notes on (Any TWO) :** **(5 x 2)**

a) Acceptance rejection technique to generate discrete random variables.

b) Characteristics of a Markov Process.

c) Stratified Sampling

d) Importance Sampling