

NED UNIVERSITY OF ENGINEERING & TECHNOLOGY, KARACHI
FINAL YEAR (COMPUTER SCIENCE AND INFORMATION TECHNOLOGY)
ANNUAL EXAMINATION 2007
BATCH 2003-04

Time: 3 Hours

Dated: 30-10-2007

Max. Marks: 80

00094

MODELING & SIMULATION
(CT-452)

- Instructions:** 1. Attempt any FIVE questions.
 2. All questions carry equal marks.

Q-1. Give short answer any Eight of following.

16

- (i). What is modeling?
- (ii). What is Simulation?
- (iii). Explain the Monte Carlo Process.
- (iv). Characteristic of Random Number.
- (v). Modeling of Geometrically Similar Objects.
- (vi) The queue discipline.
- (vii). The calling Population.
- (viii).The arrival rate.
- (ix). The service rate.

Q-2. (a). A single server queuing system with an infinite calling population and a first-come first served queue discipline has the arrival rate $\lambda = 16$ and service rate $\mu = 24$. Determine $P_0, P_3, L, L_q, W, W_q, U$. 08

(b). The new accounts loan officer of a Bank interviews all customers for new accounts. 08
 The customer desiring to open new accounts arrive at the rate of four per hours
 According to poisson distribution and account officer spend an average 12 minutes
 with each customer setting up a new account. Now a multiple-server queuing
 system with two channel, Determine the operating characteristics.

Q-3. The number of air-conditioning units sold over the past 16 months is given in table

Month, t	Sales Yt	Month, t	Sales y _t
1	25	9	60
2	15	10	40
3	30	11	40
4	38	12	38
5	58	13	40
6	62	14	35
7	85	15	50
8	88	16	60

(i). Use the Forecasting Model, Moving Average Technique, compute the three-months 06
 moving average forecast next months demand (t = 17)

(b). Use the Forecast Model, Exponential Smoothing Technique ($\alpha = 0.2$), compute the 10
 forecast next month demand (t = 17)

Q-4. Member of a Rescue Squad know from past experience that they will receive between zero and six emergency calls each night, according to following discrete probability distribution.

16

calls	Probability
0	.05
1	.10
2	.17
3	.22
4	.25
5	.15
6	.06
	1.00

The rescue squad classifies each emergency call into one of three categories, minor, regular, or major emergency. The probability that a particular call will be each of emergency is as follows.

Emergency type	probability
Minor	0.25
Regular	0.62
Major	0.13
	1.00

The type of emergency call determine the size of the crew sent in response. A minor emergency require a two-person crew, a regular call requires a three-person crew and a major emergency require a five-person crew.

- (i). Simulate the emergency calls received by the rescue squad for 15 nights.
- (ii). Compute the average number of each type of emergency call each night.
- (iii). Determine the maximum number of crew members that might be needed on any given night.

Q-5.. A manufacturing company produces a product on a number of machines .The elapse time between a breakdown of machine is define by following continuous probability distribution .

16

$$f(x) = x/8, \quad 0 < x < 4$$

When a machine breakdown it must be repaired takes either one, two, three or four days for the repair to be completed according to given probability distribution.

ma chine repair time y days	Probability of Repair time P(y)
1	0.10
2	0.55
3	0.25
4	0.10

- (a). Simulate the machine breakdowns and repair system for one year (52 weeks)
- (b). Compute total repair time.

Q-6. What is software Reliability Modeling?. Discuss Software Failure Mechanism and the bathtub curve for Software Reliability.

16

Q-7. What is benchmarking?. Write the procedure for benchmarking. Discuss the advantage and disadvantage of benchmarking and cost of bench marking.

16

Q-8. Write notes on any TWO of following.

- (a). Birth-Death Process.
- (b). Measurement Techniques.
- (c). Petri-Nets.

16