2005 ANDHRA UNIVERSITY M.C.A

MASTER'S DEGREE MASTER IN COMPUTER MANAGEMENT - M.C.M MCA QUESTION PAPER

MCA 1.1.4

PROBABILITY, STATISTICS & QUEUEING THEORY

Time : 3 hour
Mark : 100

First Question is Compulsory

Answer any four from the remaining

Answer all parts of any Question at one place.

a) State the axioms of probability.
b) Explain confident intervals in estimation.
c) Explain the method of least squares.
d) Explain Principle of least square.
e) Explain Type I and II errors.

2. a) State and prove Baye's formula on conditional probability.

b) We are given three urns as follows:
Urn A contains 3 red and 5 white marbles
Urn B contains 2 red and 1 white marble
Urn C contains 2 red and 2 white marbles.
An urn is selected at random and a marble is drawn from the urn. If the Marble is red, what is the probability that it came from urn A?

3. a) Define mathematical expectation of a random variable. Show that the expectations of the sum of two random variables is equal to the sum of their expectations.
b) Suppose that a pair of dice are tossed and let the random variable X denote the sum of the points. Find the expectation of X.

4. a) Define the mean to failure of a component. For aq series systems show that 0 = E(X) = min [E(Xc)].
b) Derive Markov inequality. Hence or otherwise state and prove Chebychev inequality.

5. a) Find the moment generating function about origin of the normal distribution.
b) Prove that a linear combination of normal variate is also a normal variate.

6. a) Derive normal equations to fit y = a + bx by the method of least squares.
b) Fit a least squares parabola having the form y = a + bx + cx-2 to the following data:

X: 1.2 1.8 3.1 4.9 5.7 7.1 8.6 9.8
Y: 4.5 5.9 7.0 7.8 7.2 6.8 4.5 2.7

7. a) Show that the correlation coefficient lies between x and y -1 and +1

b) Calculate the correlation coefficient between x and y for the following data.

X: 65 66 67 67 68 69 70 72
Y: 67 68 65 68 72 72 69 71

8. Arrivals at a telephone booth are considered to be Poisson with an average time of 12 min. between one arrival and the next. The length of a phone call is assumed to be distributed exponentially with mean 4 min.

a) Find the average number of persons waiting in the system.

b) What is the probability that a person arriving at the booth will have to wait in the queue?

c) What is the probability that it will take him more than 10 mm. altogether to wait for the phone and complete his call?

d) Estimates the fraction of the day when the phone will be in use.

e) The telephone department will install a second booth, when convinced that an arrival has to wait on the average for at least 3 min. for phone. By how much the flow of arrivals should increase in order to justify a second booth?