(Paper Code and Roll No. to be	e filled in your Answer Book)
Roll No. :[

M. Tech.

(SEM. II) THEORY EXAMINATION 2010-11 *ROBABILITY STATISTICS: AND QUEUING MODEL

Time . 3 Hours

Total Marks : 100

- Note: -(1) Attempt all questions.
 - (2) Alf questions carry equal marks.
 - (3) Notations used have usual meanings.
 - (4) Assume any relevant data, if missing:
- Attempt any four parts at the following:
 - (a) A box contains n identical balls numbered I through n, suppose k balls are drawn in succession.
 - (i) What is the probability that mais the largest number
 - (ii) What is the probability that the largest number drawn less than or equal to m?
 - (b) A standard pack of cards has 52 cards, 13 in each of a way. Suppose 4 players are dealt 13 cards each from a well shuffled pack. What is the probability of dealing a cardy thank is a cardy thank in a cardy thank in a cardy thank.

(P-45)

$$\frac{n(n-1)---(n-k+1)}{1,2----k} = \frac{n!}{k!(n-k)!}$$

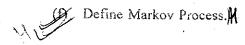
- State and prove Bayes' theorem.
- (e) A box contains 3 blue and 2 red marbles while another box contain 2 blue and 5 red marbles. A marble drawn at random from one of the boxes turn out to be blue. What is the probability that it came from the first box?
- (1)Find the probability that n people n ≤ selected at random will have n different birthdays.

Attempt any two:

- Define queuing systems. Describe the characteristics according to which they are classified.
- Discuss the (M/M/1): (K/FIFO) Single server with finite capacity model.
 - (c) in a railway marshalling yard; goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival (infefollows an exponential distribution with an average 36 minutes. Calculate the following:
 - (i) The average number of trains in the queue.
 - The probability that the queue size exceeds 10.

- 3. Attempt any four:
 - (a) Derive the mean and variance for binomial distribution;
 - (b) The probability of a student passing a subject is 0.8. What is the probability that he will pass the subject before the third attempt?
 - (c) Six coins are tossed 2400 times using Poisson approximation. Obtain an expression for getting four heads.
 - (d) What are the properties of expectation of a random variable?
- Death process.

 Determine the steady state equations for the Birth and



- 4. Attempt any two:
 - (a) Explain M/M/r/r (Erlang's Model).
 - (b) State and prove Burke's theorem.
 - (c) A petrol pump has two pumps. The service time follows the exponential distribution with a mean of 4 minutes and cars arrive for service in a Poisson process with a rate of 10 cars per hour. Find the probability that a customer has to wait for service.

. Attempt any two:

- (a) Discuss Pollaczek-Khinchin (P-K) mean value formula.
- (b) Write short notes on:
 - (i) Cyclic queues
 - (ii) MMSE.
- (c) State and prove Nyquist theorem.