Reg. No. : | | | | | | | | | | |

Question Paper Code: 44021

B.E. / B.Tech. DEGREE EXAMINATION, AUGUST 2021

Fourth Semester

Computer Science and Engineering

14UMA421 - APPLIED STATISTICS AND QUEUEING NETWORKS

(Common to Information Technology)

(Regulation 2014)

Duration: 1:45 hour Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

1. A continuous RV has a pdf $f(x) = kx^2e^{-x}, x \geq 0$. Find k, mean and variance.

2. The joint probability mass function of (X, y) is given by $p(x, y) = k)2x + 3y), x = 0,1,2; y = 1,2,3$. Find the marginal distribution and also find the joint probability distribution of X + Y.

3. What are the basic principles of the design of experiments?

4. Define Kendal's Notation.

5. Define Open Jackson Networks?

6. If the probability that an applicant for a driver's license will pass the road test on any given trial is 0.8. What is the probability that he will finally pass the test in fewer than 4 trials?

7 The random variable (X, Y) have the joint p.d.f $f(x, y) = x + y \quad 0 \leq x \leq 1, \ 0 \leq y \leq 1$.Find the marginal density function of Y.

8. What do you understand by design of experiments?

9. A system has a single server which can accommodate maximum of 10 persons. If the arrival is 10 / hr and service is 5 minutes / per customer find the traffic intensity.

10. Define Open Jackson Networks?

11. State Baye's theorem.

12. The random variable (X, Y) have the joint p.d.f $f(x,y) = x + y \quad 0 \le x \le 1,\ 0 \le y \le 1$.Find the marginal density function of Y.

13. What do you understand by design of experiments?

14. Define Steady State and Transient state?

15. Define Open Jackson Networks?

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. A bag contains 5 balls and it is not know how many of them are white. Two balls are drawn at random from the bag and they are noted to be white. What is the change that all the balls in the bag are white? (10)

17. Two random variables X and Y have joint probability density function $f(x,y) = \begin{cases} c(4-x-y), 0 \le x \le 2, 0 \le y \le 2 \\ 0, \quad \textit{elsewhere} \end{cases}$. Find the equation of two lines of regression. (10)

18. The following data represent the number of units of production per day turned out by different workers using 4 different types of machines.

		Machine Type			
	1	44	38	47	36
	2	46	40	52	43
Workers	3	34	36	44	32
	4	43	38	46	33
	5	38	42	49	39

(i) Test whether the five mean differ with respect to mean productivity

(ii) Test whether the mean productivity is the same for the four different machine types.

$(F_{0.05}(4,12) = 3.26\ ; F_{0.05}(3,12) = 3.49)$. (10)

19. Arrivals of a telephone in a both are considered to be Poisson with an average time of 12 minutes between one arrival and the next. The length of a phone call is assured to be distributed exponentially with mean 4 minutes.

(1) Find the average number of persons waiting in the system?

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

(3) What is the probability that it will take him more than 10 minutes altogether to wait for the phone and complete his call?

(4) Estimate the fraction of the day when the phone will be in use.

(5) The telephone department will install a second booth, when convinced that an arrival has to wait on the average for atleast 3 minutes for phone. By how much the flow of arrivals should increase to justify a second booth?

(6) What is the average length of the queue that forms from time to time? (10)

20. Derive Pollaczek – Khinchine Formula. (10)