Reg. No. :

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

Third Semester

Computer Science Engineering

15UMA322 - PROBABILITY, STATISTICS AND QUEUEING SYSTEMS

(Common to Information Technology branch)

(Regulation 2015)

(Statistical tables are may be permitted)

Duration: 1:45 hour   Maximum: 50 Marks

PART A - (10 x 2 = 20 Marks)

(Answer any ten of the following questions)

1.	A fair coin is tossed twice; find$(X \leq 1)$ where X denotes number of heads in each experiment.	CO1- R
2.	Define Conditional distribution for two-dimensional discrete and continuous random variable.	CO2- R
3.	List out the three basic principles of experimental design.	CO3- R
4.	Write Little's formula for Queuing Theory.	CO4- R
5.	Define: Open Jackson Networks.	CO5- R
6.	Define Moment generating function	CO1-App
7.	Describe the conditional distribution of the two dimensional random variable	CO2- R
8.	Construct the ANOVA table for Complete Randomised design	CO3- R
9.	Explain the Queueing system	CO4- R
10.	State the characteristics of open Jackson networks	CO5- R
11.	For a triangular wave distribution $f(x) = \begin{cases} x, 0 < x < 1 \\ 2 - x, 1 < x < 2 \end{cases}$, find the mean?	CO1- R
12.	State any one form of central limit theorem.	CO2- R

13. In (M/M/1) : (k/FCFS) model $\lambda = 3$ /hr and $\mu = 4$ / hr and $P_0 = 0.28$. What is the effective arrival rate of a customer?   CO3- R

14. Define a two stage tandem queue.   CO4- R

15 What are the uses of analysis of variance?   CO5- R

PART – B (3 x 10= 30 Marks)

(Answer any three of the following questions)

16. In a certain binary communication channel, the probability a transmitted zero is received as zero is 0.95 and the probability that a transmitted one is received as a one is 0.90. Assuming that the probability a zero is transmitted is 0.4. Find   CO1- App   (10)

   (a) probability a one is received

   (b) probability a one was transmitted given a one was received.

17. The joint probability distribution of two dimensional random variable (X,Y) is given by f(x,y)=$\frac{1}{3}$(x+y), $0 \le x \le 1, 0 \le y \le 2$. Find the correlation coefficient. Also find the equations of two lines of regression.   CO2- App   (10)

18. Analyze the following latin square experiment.   CO3- Ana   (10)

A 105	B 95	C 125	D 115
C 115	D 125	A 105	B 105
D 115	C 95	B 105	A 115
B 95	A 135	D 95	C 115

9   In a railway marshalling yard, goods trains arrive at a rate of 30 trains per day. Assuming that the inter-arrival time follows an exponential distribution and the service time distribution is also exponential with an average of 36 minutes. Calculate (i) the probability of yard is empty (ii) the average queue length assuming the line capacity of the yard is 9 trains.   CO4- App   (10)

20. Derive the Pollaczek-Khintchine formula   CO5- U   (10)

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