JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST - 3 EXAMINATION (December 2025)

B.Tech. - III Semester (CSE/IT)

COURSE CODE (CREDITS): 18B11MA313 (3) MAX. MARKS: 35

COURSE NAME: PROBABILITY & STATISTICS

COURSE INSTRUCTORS: RKB* MAX. TIME: 2 Hrs

Note: *All questions are compulsory. Use of scientific calculator is allowed. The candidate is allowed to make suitable numeric assumptions wherever required for solving problems.*

Q.No	Question	CO	Marks
Q1	A problem in Statistics is given to the three students A, B and C whose chances of solving it are ½, ¾, ¼ respectively. What is the probability that the problem will be solved if all of them try independently?	CO-1	3
Q2	In a data center, three servers **A**, **B**, and **C** handle **30%**, **40%**, and **30%** of all user requests, respectively. The probabilities that a request processed by servers **A**, **B**, and **C** fails are **3%**, **2%**, and **4%**, respectively. A user request is found to have failed. What are the probabilities that this failed request was processed by **Server A**, **Server B**, and **Server C**?	CO-2	4
Q3	The probability density function (p.d.f.) of a continuous random variable X is given by $f(x) = \{ kx^2, 0 \le x < 2; k(4-x), 2 \le x \le 4 ; 0,$ otherwise$\}$. (a) Find the value of k. (b) Determine the cumulative distribution function (c.d.f.) $F(x)$.	CO-3	4
Q4	A small camera rental shop has three cameras available each day. The number of customer requests for a camera on any given day follows a Poisson distribution with mean 2.2. Using Poisson's distribution, compute: (i) The proportion of days on which no camera is rented. (ii) The proportion of days on which at least one customer request cannot be fulfilled.	CO-3	4
Q5	Suppose the lifetime (in years) of a high-efficiency battery follows an exponential distribution with a mean of 4 years. A technician installs two identical batteries in a device—one active and the second held in reserve. The reserve battery is used only when the first battery fails. What is the probability that the device will run for at least 12 years before the second battery fails?	CO-3	5
Q6	A set of three similar coins are tossed 100 times with the following results:	CO-3	5

No. of heads	0	1	2	3
Frequency (f)	36	40	22	2

(a) Calculate the mean of the data.

(b) Use Binomial distribution to estimate the frequencies.

Q7 (CO-4, 5)

In an attempt to determine whether a relationship exists between the price of a home and the number of days it takes to sell the home, a real estate agent collected the following data from recent sales in his city:

Price (in $1000s)	265	225	160	325	430	515	180	423
Days to sell home	136	125	120	140	145	121	122	145

Calculate and interpret Spearman rank correlation coefficient.

Q8 (CO-5, 5)

It has been reported that the average U.S. teenager sends 80 text messages per day. For purposes of this exercise, we will assume the daily number of text messages sent is normally distributed with a standard deviation of 15.0 messages. For a randomly selected group of 10 teenagers, and considering these persons to be a simple random sample of all U.S. teens, answer the following:

(a) Determine the standard error of the sampling distribution of the mean for these simple random samples of size 10.

(b) What is the probability that the group will send at least 900 text messages (i.e., a sample mean of at least 90 messages per teen) in the coming Friday?

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