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B.E./ B. Tech. Degree Examinations
DEPARTMENT OF SCIENCE & HUMANITIES
CONTINUOUS ASSESSMENT TEST-I

Subject : Probability and Statistics **Max. Marks : 50**
Subject code : MA8391 **Date : 22.03.2021**
Branch/Sem/Year : IT/IV/II **Time:9:15am-10:45 am**

PART-A(2X5=10)
Answer all the Questions

1. State and prove memoryless property for geometric distribution. (CO1) (R)
2. A continuous random variable *X* that can assume any value between x=2 and x=5 has a density function given by $f(x) =$ *k (1 +* x). Find *P (X* < 4). (CO1) (R)
3. If X_1 and X_2 are independent poisson variates, show that $X_1 - X_2$ is not a poisson variate. (CO1) (R)
4. A die is tossed until 6 appear.What is the probability that it must be tossed more than 5 times? (CO1) (R)
5. Check whether the following is a probability density function or not: $f(x)=\begin{cases}\lambda e^{-\lambda x}, x \geq 0\\ 0\end{cases}$ (CO1) (R)

PART B(2X13=26)

6. (a) A random variable X has the following probability distribution:

X	0	1	2	3	4	5	6	7
P(X=x)	0	K	2k	2k	3k	k^2	$2k^2$	$7k^2+k$

Find (i) k (ii) Evaluate P(x<6), P(X≥6) and P(0<x<5)

(iv) If P(X≤k) > $\frac{1}{2}$, find the least value of k

(v) Find the cumulative distribution function of X. (CO1) (R)

(b) Let X be a continuous random variable with pdf $f(x) = \{ax; 0 < x < 1\ a; 1 < x < 2\ -ax + 3a; 2 < x < 3\ 0; otherwise$

(i) Determine the constant "a"

(iii) Find cumulative distribution function. (CO1) (R)

(OR)

(c) There are 3 true coins and 1 false coin with 'head' on both sides. A coin is chosen at random and tossed 4 times. If 'head' occurs all the 4 times, what is the probability that the false coin has been chosen and used? (CO1) (R)

(d) The p.d.f of a random variable X is

$$f(x) = \{0 \quad ; x \leq -a \ \frac{1}{a^2}(a + x) \quad ; \ -a < x < 0 \ \frac{1}{a^2}(a - x) \quad ; 0 < x \leq a \ 0 \quad ; x \geq a$$

(i) Verify that $\int_{-\infty}^{\infty} f(x)dx = 1$

(ii) Find the cumulative distribution function. (CO1) (R)

7. (a)In a certain 20% samples of the population is literate and assume that 200 investigators take samples of 10 individuals to see whether they are literate. How many investigators would you expect to report that 3 people or less and literates in the samples? (CO1) (R)
(b) The daily consumption of milk in excess of 20000 litres in a town is approximately exponential distribution with parameter 1/3000. The town has a daily stock of 35,000 litres. What is the probability that of 2 days selected at random the stock is insufficient for both days? (CO1) (R)

(OR)

(c)Suppose that a trainee soldier shoots a target in an independent fashion. If the probability that the target is shot on any one shot is 0.8
(i) What is the probability that the target would be hit on the 6th attempt.
(ii) What is the probability that it takes him less than 5 shots. (CO1) (R)
(d)In a book of 520 pages, 390 typographical errors occur. Assuming X is a poisson variate for number of errors per page, find the probability that a random sample of 5 pages will contain no error. (CO1) (R)

PART C(1X14=14)

8. (a) Derive M.G.F, mean and variance of the poisson distribution. (CO1) (E)

(b) A discrete random variable X has moment generating function $M_X(t) = \left(\frac{1}{4} + \frac{3}{4}e^t\right)^5$ .Find E(X) and Var(X). (CO1) (R)

(OR)

(c) Derive M.G.F, mean and variance of the uniform distribution. (CO1) (E)

(d) If the probability of success on each trial is 1/3 , What is the expected number of trials required for the first success. (CO1) (R)

R2017	MA8391	PROBABILITY AND STATISTICS	L	T	P	C
			4	0	0	4

1	Understand the fundamental knowledge of the concepts of probability and have knowledge of standard distributions which can describe real life phenomenon
2	Understand the basic concepts of one and two dimensional random variables and apply in engineering applications
3	Apply the concept of testing of hypothesis for small and large samples in real life problems.
4	Apply the basic concepts of classifications of design of experiments in the field of agriculture and statistical quality control.
5	Have the notion of sampling distributions and statistical techniques used in engineering and management problems
6	Students get an idea to solve real time problems based on probability, sampling and quality control.