D.K.M. COLLEGE FOR WOMEN (AUTONOMOUS), VELLORE-1

DEPARTMENT OF MATHEMATICS

ELECTIVE-PROBABILITY THEORY

II M.Sc. MATHEMATICS-ODD SEMESTER(III)

QUESTION BANK

UNIT I **SECTION-A** **6 MARKS**

1. Sate and prove addition theorem.
2. State and prove absolute probability.
3. State and prove Baye's theorem with example
4. To find the distribution Z=xy.
5. To find the distribution of z=x+y
6. If $\{A_n\}$,n=1,2,3.... Be a non-increasing sequence of event and A be their product then $P(A) = \lim_{n\to\infty} P(A_n)$

SECTION-B **15 MARKS**

1. State and prove Necessary and Sufficient condition for independence of discerete type of a random variable with example
2.

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

i)find k,ii evaluate P(x<6),P(x>6).P(x0<x<5)

UNIT II **SECTION-A**

1. State and prove chebyshev inequality
2. State and prove lapunav inequality.
3. State and prove chebyshev inequality.
4. Explain regression of 1st and 2nd type.
5. x and y are not independent to findE(x+y)=E(x)+E(y),
6. Exaplain about regression line

SECTION-B **15 MARKS**

1. The equality $\rho^2 = 1$ is a necessary and sufficient condition for the relation $P(Y = aX + b) = 1$ to be hold where a and b are constant.
2. state and prove Levys uniqueness theorem.
3. The joint probability density function of random variable X and Y

is given by $f(x,y) = e^{-\left(\frac{x^2-2xy+2y^2}{2}\right)}$. Dertermine the regression curve x on y and y on x.

UNIT III SECTION-A 6 MARKS

1. Find the characteristic function and moments of normal distribution
2. Find the characteristic function and moments of normal distribution.
3. obtain characteristic function of poisson distribution.
4. If the ith moment of a random variable exists it is expressed by the formula $m_l = \frac{\varphi^l{}_{(0)}}{i^l}$ where $\varphi^l(0) is\ the\ derivative$ of the characteristic function $\varphi(t)$ of this random variable at t=0.
5. State and prove in verstion theorem.

SECTION-B 15 MARKS

1. The coefficient of correlation satisfies the double inequality the double inequality $-1 \leq \rho \leq +1$.
2. Find the mean and variance of poisson distribution using characteristic function.
3. State and prove Levy theorem.
4. Write about properties of charatersitics functions.
5. State and prove cramer's wold theorem.

UNIT IV SECTION-A 6 MARKS

1. state and prove poisson theorem.
2. Define characteristic function and prove that the properties of characteristic function.
3. Find the characteristic function and moments of normal distribution.

SECTION-B 15MARKS

1. Explain about Cauchy distribution.
2. Describe about exponential distribution.
3. Describe about exponential distribution.
4. State and prove polya distribution to binomial distribution.
5. A random variable x has one-point distribution iff the variance of x is zero.
6. Explain about normal distribution.

UNIT V SECTION-A 6 MARKS

1. Find the moment ,mean and variance in gamma distribution.
2. Prove the necessary and sufficient condition for stochastic convergence to zero.
3. State and prove weak laws of large numbers

4. State and prove demoivers laplace theorem.
5. State and prove khintchins law for large numbers.
6. State and prove kolomogorov inequality
7. State and prove borel cantelli theorem.

SECTION-B **15 MARKS**

1. State and prove lindeberg-Levy theorem.
2. State and prove Levy-cramer theorem
3. State and prove lapunav inequality.
4. State and prove Kolomogorov strong law of large numbers.