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

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

SEMESTER EXAMINATIONS

NOVEMBER – 2016 **15CAST1A**

ALLIED : MATHEMATICAL STATISTICS - I

Time: 3 Hrs **Max. Marks: 75**

SECTION – A (10 X 2 =20)

Answer ALL the questions.

1. State mathematical definition of probability.
2. Define Independent events with an example.
3. Find the expectation of the number on a dice when thrown.
4. Find the rth moment about the origin of the distribution whose p.d.f is given by
   $f(x)=\begin{cases} 2(1-x), & 0<x<1 \\ 0, & els\ ewhere \end{cases}$
5. State Inversion theorem on characteristic function.
6. Prove $\emptyset_{a\,x+b}$(t) $=e^{itb}\ \emptyset_x$(at)
7. Define positive correlation with an example.
8. Write down the formula to calculate Karl Pearson's correlation co-efficient.
9. For two variables x and y the equations of the regression lines are 5x – y = 22 and 64 x – 45 y=24. Find the mean values of x and y.
10. Write down the formula to find the angle between the two regression lines.

SECTION – B (5 X 5 =25)

Answer any FIVE of the following questions.

11. A Problem in statistics is given to three students A, B and C where chances of solving it are $1/2,\ 3/4,$ and $1/4$ respectively what is the probability that the problem will be solved if all of them try independently.
12. The probabilities of X, Y and Z becoming managers are $4/9,\ 2/9,\ and\ 1/3$ respectively. The possibilities that the bonus scheme will be introduced if X,Y and Z become managers are $\frac{3}{10}$, $\frac{1}{2}$, and $\frac{4}{5}$ respectively. If the bonus scheme has been introduced, what is the probability that the manager appointed was X?
13. Given the pdf of a continuous random variable x as follows $f(x)=\begin{cases} kx(1-x) & for\quad o<x<1 \\ 0 & otherwise. \end{cases}$
    Find K and cdf.
14. Given the following bivariate probability distribution obtain
    i) Marginal distributions of X and Y ii) The conditional distribution of X when Y=2.

$x\rightarrow$ / $\downarrow y$	-1	0	1
0	$1/15$	$2/15$	$1/15$
1	$3/15$	$2/15$	$1/15$
2	$2/15$	$1/15$	$2/15$

15. Find the characteristic function of the Poisson distribution $P(x) = \frac{e^{-\lambda}\lambda^x}{x!}$, $x = 0,1,2$ and hence obtain its mean.

16. Find the rank correlation coefficient for the following data.

X	92	89	87	86	86	77	71	63	53	50
Y	86	83	91	77	68	85	52	82	37	57

17. Prove that the correlation coefficient lies between -1 and +1.

18. State and prove any two properties of regression coefficient.

SECTION – C (3 X 10 =30)

Answer ALL the questions.

19. a) State and prove Boole's inequality.

(Or)

b) If X and Y are two random variable having joint density function.

$$f(x,y) = \begin{cases} \frac{1}{8}(6-x-y), 0 \le x \le 2, 2 \le y \le 4 \\ 0 \quad , otherwise \end{cases}$$

Find i) P $(x < 1 \cap y < 3)$

ii) P $(x + y < 3)$

iii) P $(x < 1 /\ y < 3)$

20. a) Find the moment generating function of the binomial distribution $p(x) = nc_x p^x \quad q^{n-x}$ $x = 0,1,2 \dots \dots n$ and hence deduce its mean and variance.

(Or)

b) The characteristic function of a random variable X is given by

$$\emptyset(t) = \begin{cases} 1-|t| & for\ |t| \le 1 \\ 0 & for\ |t| > 1 \end{cases}$$ Find its density function.

21. a) If X and Y are two uncorrelated random variables and if U = X + Y and V = X - Y, find the correlation between U and V.

(Or)

b) Obtain the equations of two lines of regression for the following data. Also obtain the estimate of X for Y=70.

X :	65	66	67	67	68	69	70	72
Y :	67	68	65	68	72	72	69	71

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