

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

NOVEMBER – 2018

15CAST1A

ALLIED : MATHEMATICAL STATISTICS - I

Time : 3 Hrs

Max. Marks : 75

SECTION-A (10 x 2 = 20)

Answer ALL the questions.

1. If two dice are thrown, what is the probability that the sum is greater than 8?
2. For three non-mutually exclusive events A,B and C , $P(A \cup B \cup C) = ?$
3. Define Distribution function.
4. Define Moment Generating function.
5. Define Characteristic function.
6. State Uniqueness Theorem.
7. Prove that Two independent variable are uncorrelated.
8. Write Spearman's formula for rank correlation coefficient.
9. Define Regression.
10. If one of the regression coefficient is greater than unity, Prove that other must be less than unity.

SECTION-B (5 x 5 = 25)

Answer any FIVE of the following questions.

11. Two dice are tossed. Find the probability of getting 'an even number on the first dice or a total 8'.
12. State and prove Additional Theorem of Probability.
13. A continuous R.V X has a p.d.f $f(x)=3x^2, 0 \leq x \leq 1$. Find a and b such that

(i) $P(X \leq a) = P(X > a)$, and

(ii) $P(X > b) = 0.05$

14. Let X be R.V with the following probability distribution:

x:	-3	6	9
P(X=x):	1/6	1/2	1/3.

Find $E(2X+1)^2$

15. Find the characteristic function for the probability mass function $P(x) = nc_x p^x q^{n-x}, x = 0,1,2, \dots n$.
16. Prove that Correlation coefficient is independent of change of origin and scale.
17. Prove that Correlation coefficient is the geometric mean between the regression coefficients.
18. The following are the ranks obtained by 10 students in statistics and mathematics:

Statistics	1	2	3	4	5	6	7	8	9	10
Mathematics	1	4	2	5	3	9	7	10	6	8

To what extent is the knowledge of students of students in the two subjects related?

SECTION-C (3 x 10 = 30)

Answer ALL the questions.

19. (a) There are 3 boxes containing respectively 1 white, 2 red, 3 black balls, 2 white, 3 red, 1 black balls; 3 white, 1 red and 2 black balls. A box is chosen at random and from it two balls are drawn at random and from it two balls are drawn at random. The two balls are 1 red and 1 white. What is the probability that they come from

- (i) the first box
- (ii) second box
- (iii) third box?

(Or)

(b) Let X be R.V with the following probability distribution:

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

(a) Find k (b) Evaluate $P(X < 6)$, $P(X \geq 6)$ and $P(0 < X < 5)$ (c) if $P(X \leq a) > 1/2$, find the minimum value of a .

20. (a) A continuous R.V X has a p.d.f $f(x) = 6x(1-x), 0 \leq x \leq 1$.

- (i) Obtain an expression for the c.d.f of X
- (ii) Compute $P(X \leq \frac{1}{2} / \frac{1}{3} \leq X \leq \frac{2}{3})$, and
- (iii) Determine the number k such that $P(X < k) = P(X > k)$.

(Or)

(b) Find the density function $f(x)$ corresponding to the characteristic function defined as follows

$$\phi(t) = \begin{cases} 1 - |t|, & |t| \leq 1 \\ 0, & |t| > 1 \end{cases}$$

21. (a) Find Karl Pearson's coefficient of correlation from the following data between height of father (x) and son (y).

X	64	65	66	67	68	69	70
Y	66	67	65	68	70	68	72

Comment on the result.

(Or)

(b) In a partially destroyed laboratory, record of an analysis of correlation data, the following results only are legible: Variance of $X = 9$, Regression equations: $8X - 10Y + 66 = 0$, $40X - 18Y = 214$.

What are

- (i) the mean values X and Y ,
- (ii) the correlation coefficient between X and Y , and
- (iii) the standard deviation of Y ?

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