

(8 pages)

Reg. No. :.....

Code No. : 20469 E

Sub. Code : CAST 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2021

First Semester

Mathematics — Allied

STATISTICS - I

(For those who joined in July 2021 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer:

1. When Co-efficient of skewness is negative
 - (a) $Q_3 + Q_1 = 2md$
 - (b) $Q_3 + Q_1 < 2md$
 - (c) $Q_3 + Q_1 > 2md$
 - (d) $Q_3 + Q_1 = -2md$

2. If for a distribution, the co-efficient of Kurtosis $r_2 > 0$ the frequency curve is
 - (a) leptokurtic
 - (b) platykurtic
 - (c) mesokurtic
 - (d) none of these

3. Correlation Coefficient is independent of
- Origin
 - Scale
 - Both origin and scale
 - Neither origin and scale
4. The geometric mean of two regression coefficients b_{yx} and b_{xy} =
- r
 - r^2
 - 1
 - none of these
5. Attributes A and B are said to be positively associated, if
- $(AB) > \frac{(A) \times (B)}{N}$
 - $(AB) = \frac{(A) \times (B)}{N}$
 - $(AB) < \frac{(A) \times (B)}{N}$
 - None of these
6. Class frequencies of type (α) , (β) , $(\alpha\beta)$, $(\alpha\beta r)$... known as
- Positive class frequencies
 - Negative class frequencies
 - Contrary frequencies
 - None of these
7. Characteristic function is denoted by
- $E(e^{tx})$
 - $E(x)$
 - $\phi_x(t)$
 - $E(e^x)$

8. If X is a random variable then $E(aX + b) =$
- _____
- (a) $aE(X)$ (b) $a^2 E(X)$
(c) $aE(X) + b$ (d) None of these
9. Mean of the Binomial distribution is
- (a) np (b) npq
(c) \sqrt{np} (d) \sqrt{npq}
10. The third central moment of poisson distribution is
- (a) λ (b) λ^2
(c) $\lambda^3 + \lambda$ (d) None of these

PART B — (5 × 5 = 25 marks)

Answer ALL questions by choosing either (a) or (b).

11. (a) Calculate the Karl Pearson's coefficient of skewness for the data :
- | | | | | | | | |
|-------------------|----|----|----|----|----|----|----|
| Wage per Item Rs. | 12 | 15 | 20 | 25 | 30 | 40 | 50 |
| No. of Items | 10 | 25 | 40 | 70 | 32 | 13 | 10 |

Or

- (b) Using the principle of least square, fit a straight line.

12. (a) Obtain the two regression lines from the following data:

$$n = 20, \sum x = 80, \quad \sum y = 40, \quad \sum x^2 = 1,680, \\ \sum y^2 = 320, \sum xy = 480 .$$

Or

- (b) Calculate the Coefficient of Correlation between x and y .

x	1	3	5	8	9	10
y	3	4	8	10	12	11

13. (a) Given $(A) = 30, (B) = 25, (\alpha) = 30, (\alpha\beta) = 20$.

Find

- (i) N
(ii) β
(iii) (AB)

Or

- (b) In a class test in which 135 candidates were examined for proficiency in Physics and Chemistry, it was discovered that 75 students failed in Physics, 90 failed in Chemistry and 50 failed in both. Find the magnitude of association and state if there is any association between failing in Physics and Chemistry.

14. (a) Define Discrete and continuous Random Variable.

Or

- (b) Show that if a random variable has the probability density $f(x) = \frac{1}{2}e^{-|x|}$ for $-\infty < x < \infty$, the m.g.f is given by $M_x(t) = \frac{1}{1-t^2}$.

15. (a) Determine the Binomial distribution for which the mean is 8 and variance is 6. Also find $P(X \geq 2)$.

Or

- (b) Suppose the heights of individuals of a college are normally distributed with mean 16 cms and S.D = 10 cms. Determine the probability that Q randomly selected person is
- (i) above 180 cms
 - (ii) below 150 cms

PART C — (5 × 8 = 40 marks)

Answer ALL questions by choosing (a) or (b).

16. (a) Fit a straight line for

x	0	1	2	3	4
y	2.1	3.5	5.4	7.3	8.2

Or

- (b) Calculate the Bowley's Co-efficient of skewness.

No. of children per family	0	1	2	3	4	5	6
No. of families	7	10	16	25	18	11	8

17. (a) Calculate the Correlation Coefficient between age of husband and the age of wife from the following data.

Or

- (b) For two variable X and Y , the equations of the regression lines are $9Y - X - 288 = 0$ and $X - 4Y + 38 = 0$. Find

- (i) Mean values of X and Y
(ii) Coefficient of Correlation between X and Y
(iii) Ratio of standard deviations of Y to that of X .

18. (a) Show that for n attributes A_1, A_2, \dots, A_n ,
 $(A_1 A_2 \dots A_n) \geq (A_1) + (A_2) + \dots + (A_n) - (n-1)N$,
where N is the total number of observations.

Or

- (b) Find the greatest and least values of (ABC) if $(A) = 50$, $(B) = 60$, $(C) = 80$,
 $(AB) = 35$, $(AC) = 45$ and $(BC) = 42$.

19. (a) A random variable X has the following probability function

$$\begin{array}{l} x_i : \quad -2 \quad -1 \quad 0 \quad 1 \quad 2 \quad 3 \\ p(x_i) : 0.1 \quad k \quad 0.2 \quad 2k \quad 0.3 \quad k \end{array}$$

Find

- (i) k
- (ii) Mean
- (iii) Variance
- (iv) $P(X \geq 2)$, $P(X < 2)$
- (v) $P(-1 < X < 3)$

Or

- (b) A random variable X has the probability density function

$$f(x) = \begin{cases} K x e^{-\lambda x}; & x \geq 0, \lambda > 0 \\ 0; & \text{otherwise} \end{cases}. \text{ Find } K, \text{ mean}$$

and variance of X .

20. (a) Obtain the characteristics function of the Poisson distribution and also find its mean and variance.

Or

- (b) Find the characteristic function of the normal distribution also find its mean and variance.
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