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Code No. : 41150 E

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SAST 11

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2018.

First/Third Semester

Statistics — Allied

STATISTICS — I

(For those who joined in July 2016 onwards)

Time : Three hours

Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. $\mu_2 =$

- (a) 1 (b) 0
(c) \bar{x} (d) σ^2

2. For a normal curve $\beta_2 =$

- (a) 0 (b) 1
(c) 2 (d) 3

3. The correlation coefficient $\gamma(x, y) =$

- (a) $\frac{\text{cov}(x, y)}{\sigma_x \sigma_y}$ (b) $\frac{\text{cov}(x, y)}{\sigma_x^2 \sigma_y^2}$
(c) $\frac{\sigma_x \sigma_y}{\text{cov}(x, y)}$ (d) $\frac{\sigma}{x} \times 100$

4. The point of intersection of the lines of regression is

- (a) (0, 0) (b) (1, 1)
(c) (\bar{x}, \bar{y}) (d) none

5. $(\alpha B) + (AB) =$

- (a) $(\alpha\beta)$ (b) (A)
(c) (B) (d) (β)

6. If $N = 1000$, $(A) = 600$, $(B) = 500$, $(AB) = 50$, then the data are

- (a) consistent (b) inconsistent
(c) not sufficient (d) none

7. $E(C) =$

- (a) 0 (b) 1
(c) C (d) C^2



8. If ϕ is the characteristic function, then $\phi(0) =$

- (a) 0 (b) -1
(c) 1 (d) 2

9. For the Poisson distribution, $\mu_2^1 =$

- (a) λ (b) λ^2
(c) $\lambda^2 - \lambda$ (d) $\lambda^2 + \lambda$

10. If $X \sim B(n, p)$, then mean =

- (a) np (b) npq
(c) pq (d) \sqrt{npq}

PART B — (5 × 5 = 25 marks)

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

11. (a) For a distribution, mean = 10, variance = 16, $\gamma_1 = 1$ and $\beta_2 = 4$. Obtain the first four moments about zero.

Or

(b) Fit a straight line for the following data :

$x: 0 \quad 5 \quad 10 \quad 15 \quad 20 \quad 25$

$y: 12 \quad 15 \quad 17 \quad 22 \quad 24 \quad 30$

12. (a) Prove : $-1 \leq r(x, y) \leq 1$.

Or

(b) Calculate the correlation coefficient for the following data.

$x: 1 \quad 3 \quad 4 \quad 5 \quad 7 \quad 8 \quad 10$

$y: 2 \quad 6 \quad 8 \quad 10 \quad 14 \quad 16 \quad 20$

13. (a) If $(AB) = 256$, $(\alpha\beta) = 768$, $(A\beta) = 48$ and $(\alpha\beta) = 144$, find whether A and B are independent, positively associated or negatively associated.

Or

(b) Prove : Yule's coefficient of association

$$\theta = \frac{2y}{1 + y^2}.$$

14. (a) Given the following ultimate class frequencies, find the frequencies of positive class : $(ABC) = 149$, $(AB\gamma) = 738$, $(A\beta C) = 225$, $(A\beta\gamma) = 1196$, $(\alpha\beta C) = 204$, $(\alpha\beta\gamma) = 1762$, $(\alpha\beta C) = 171$ and $(\alpha\beta\gamma) = 21842$.

Or



(b) If $p(x) = \begin{cases} \frac{x}{15}; & x = 1, 2, 3, 4, 5 \\ 0; & \text{elsewhere} \end{cases}$, find

$p(x = 1 \text{ or } 2)$ and $p\left(\frac{1}{2} < x < \frac{5}{2}\right)$.

15. (a) Find the value of p for a binomial variate x , if $n = 6$ and $9p(x = 4) = p(x = 2)$.

Or

- (b) Prove that for the normal distribution, the quartile deviation, the mean deviation and standard deviation are approximately in the ratio 10:12:15.

PART C — (5 × 8 = 40 marks)

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

16. (a) Find the first four moments and β_1, β_2 for the following distribution.

$x: 0 \ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8$

$f: 1 \ 8 \ 28 \ 56 \ 70 \ 56 \ 28 \ 8 \ 1$

Or

- (b) Fit a second degree parabola for the following data.

$x: 0 \ 1 \ 2 \ 3 \ 4$

$y: 1 \ 5 \ 10 \ 22 \ 38$

17. (a) Find the rank correlation coefficient for the following data.

$x: 68 \ 64 \ 75 \ 50 \ 64 \ 80 \ 75 \ 40 \ 55 \ 64$

$y: 62 \ 58 \ 68 \ 45 \ 81 \ 60 \ 68 \ 48 \ 50 \ 70$

Or

- (b) Obtain the equations of two lines of regression for the following data:

$x: 25 \ 28 \ 30 \ 32 \ 35 \ 36 \ 38 \ 39 \ 42 \ 45$

$y: 20 \ 26 \ 29 \ 30 \ 25 \ 18 \ 26 \ 35 \ 35 \ 46$

18. (a) Of 1482 persons in a village, 368 were attacked by small-pox. In the village, 343 had been vaccinated and of these only 35 were attacked. Can vaccination be regarded as a preventive measure for small-pox?

Or



- (b) Investigate the association between darkness of eye colour in father and son from the following data :
- Fathers with dark eyes and sons with dark eyes : 50 families
- Fathers with dark eyes and sons with not dark eyes : 79 families
- Fathers with not dark eyes and sons with dark eyes : 89 families
- Fathers with not dark eyes and sons with not dark eyes : 782 families.
19. (a) A coin is tossed until a head appears. What is the expectation of the number of tosses required?

Or

- (b) The diameter of an electric cable, say X , is assumed to be a continuous random variable with pdf $f(x) = 6x(1-x)$, $0 \leq x \leq 1$.
- (i) check that $f(x)$ is a pdf
- (ii) determine a number b such that $p(x < b) = p(x > b)$.

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20. (a) In a precision bombing attack, there is a 50% chance that any one bomb will strike the target. Two direct hits are required to destroy the target completely. How many bombs must be dropped to give a 99% chance or better of completely destroying the target?

Or

- (b) X is normally distributed and the mean of X is 12 and S.D. is 4. Find
- (i) $P(X \geq 20)$
- (ii) $P(X \leq 20)$
- (iii) $P(0 \leq X \leq 12)$.

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