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SEAT No. :

P4767

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[5822]-314

S.Y. B.Sc.

STATISTICS

ST - 231 : Discrete Probability Distributions and Time Series
(2019 Pattern) (Semester - III) (23171)

Time : 2 Hours]

[Max. Marks : 35

Instructions to the candidates:

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Use of calculator and statistical table is allowed.
- 4) Symbols and abbreviations have their usual meanings.

Q1) Attempt each of the following :

- a) Choose the correct alternative in each of the following : [1 each]
 - i) If $X \rightarrow NB(k, p)$ then for $k = 1$, x follows.
 - a) Geometric Distribution
 - b) Binomial Distribution
 - c) Poisson Distribution
 - d) None of the above
 - ii) Suppose $\underline{x} = (x_1, x_2, x_3) \rightarrow MD\left(5, \frac{1}{3}, \frac{1}{3}, \frac{1}{3}\right)$ then $\text{var}(x_2)$ is _____.
 - a) 9/10
 - b) 10/9
 - c) 5/3
 - d) 10/3
 - iii) If $y = 600$, $T = 430$, $s = 90$, $I = 40$ then under additive model $c =$ _____.
 - a) 50
 - b) 30
 - c) 40
 - d) 1160
- b) State whether each of the following statement is true or false : [1 each]
 - i) The mean of $B(n, p)$ truncated below at $x = 0$ is $\frac{np}{q^n}$
 - ii) Seasonal variations have period less than one year.

P.T.O.

Q2) Attempt any Two of the following : [5 each]

- a) Derive the expression for mean and variance of NB (K, P).
- b) If $(x_1, x_2, x_3) \rightarrow MD (n, p_1, p_2, p_3)$ show that the multiple correlation coefficient $R_{1.23} = 1$.
- c) Suppose X_T is poisson r.v with $\lambda = 5$ truncated below at $x = 0$ find
 - i) $P (X_T \leq 1)$
 - ii) $P (X_T = 2.5)$
 - iii) $E (X_T)$
 - iv) $P (X_T \geq 2)$

Q3) Attempt any Two of the following : [5 each]

- a) Distinguish between seasonal variations and cyclical variations.
- b) State and Prove additive property of negative binomial distribution.
- c) Estimate trend for 2021 by fitting straight line equation for the following time series.

Year	2015	2016	2017	2018	2019
Sales in 10,000 Rs.	35	56	79	80	82

Q4) Attempt any One of the following :

- a) i) If $\underline{X} = (x_1, x_2, x_3) \rightarrow MD (8, \frac{1}{2}, \frac{1}{4}, \frac{1}{4})$, find : correlation and dispersion matrix of x and also obtain their ranks. [7]
- ii) Explain what is the truncated probability distribution with illustration. [3]
- b) i) Discuss any two components of time series in detail. [4]
- ii) If $(x_1, x_2, x_3, \dots, x_k) \rightarrow MD (n, p_1, p_2, p_3, \dots, p_k)$ find the marginal distribution of x_1 hence $E (x_1)$. [6]

