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SEAT No. :

P-933

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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 : **[5]**

A) Choose the correct alternative in each of the following :

a) If $X \rightarrow NB(9, 0.6)$ then Var (X) is

i) 10 ii) 9

iii) 5.4 iv) 6

b) If $(X_1, X_2, X_3) \rightarrow MD(n, p_1, p_2, p_3)$ then CoV (X_1, X_3) is

i) $n\ p_1\ p_3$ ii) $-n\ p_1\ p_3$

iii) $n\ p_1\ q_1$ iv) $n\ p_3\ q_3$

c) In time series analysis, method of simple averages is used to estimate.

i) Trend ii) Seasonal Indices

iii) Cyclical variation iv) Random variation

B) State whether each of the following statement is true or false : **[1 each]**

a) Truncated distribution is distribution over a reduced range of corresponding r.v.

b) If $(X_1, X_2, ...X_k) \rightarrow MD(n, p_1, p_2, ... p_k)$ then number of variables in the real sense are K.

P.T.O.

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

a) State c.g.f. of negative binomial distribution and hence find mean and variance.

b) Define multinomial distribution of k dimentional random vector $\underline{X} = (X_1, X_2, ... X_k)$. Derive its joint m.g.f.

c) Describe the method of ratio to trend for computing seasonal indices.

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

a) State and prove additive property of negative binomial distribution.

b) Define poisson distribution truncated below at x = 0 and find its mean.

c) State the equation of exponential smoothing. Discuss the following cases of smoothing constant :

i) $\alpha = 0$,

ii) $\alpha = 1$

iii) α closer to 0

iv) α closer to 1

Q4) Attempt any one of the following :

a) i) Estimate trend for 2022 by fitting straight line equation for the following time series. **[7]**

Year	2014	2015	2016	2017	2018	2019	2020	2021
Profit (in '000 Rs.)	90	100	102	93	104	109	102	114

ii) What is truncated distribution. State the p.m.f. of truncated binomial distribution at $x = 0$. Also give one real life situation. **[3]**

b) i) Ten independent observations are made on a r.v. X having p.d.f.

$$f(x) = \frac{1}{3} \quad ; \quad 1 \le x \le 4$$
$$= 0 \quad ; \quad \text{otherwise}$$

Using the multinomial law, find the probability that 4 observations will be less than mean, 3 will be grater than mean but less than 3 and remaining observations grater than 3. **[7]**

ii) Define time series. State its utility. **[3]**

x x x

Total No. of Questions : 4]

SEAT No. :

P934

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S.Y.B.Sc. (Regular)
STATISTICS
ST 232 : Continuous Probability Distributions
(2019 Pattern) (Semester -III) (Credit System) (23172)

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 meaning.***

Attempt each of the following

Q1) A) Choose the correct alternative in each of the following : **[1 each]**

a) If X and Y are independent random variables (r.v.) then E(X/Y) is

i) E(X) / E(Y) ii) 1/Y E(X)

iii) X E(1/Y) iv) E(X). E(1/Y)

b) For U(a, b) distribution Q_2 is

i) $(Q_3+Q_1)/2$ ii) $(Q_3- Q_1)/2$

iii) $Q_1+Q_{3/2}$ iv) $Q_3+Q_{1/2}$

c) If x$\rightarrow$Exp (Mean = 2) then P(X> x) is

i) exp (-2x) ii) 1- exp (-2x)

iii) exp (- x/2) iv) 1- exp (-x/2)

B) State whether each of the following statements is true or false :**[1 each]**

a) For joint r.v.(X, Y) E(X/Y) is the function of X.

b) The mean of U (a, b) distribution is $\frac{a+b}{2}$.

P.T.O.

Q2) Attempt <u>any two</u> of the following : **[5 each]**

a) Find moment generating function (m.g.f.) of N (μ, σ^2) distribution. Hence find the distribution of Y = 2X +3.

b) State and interprete lack of memory property of exponential distribution.

Hence if X $\rightarrow$ E*x*p (Mean = 4) find P(X>5 / X>2).

c) If X is r.v. with probability density function (p.d.f)

$f(x) = 4(x-3)^3;\ 3 \le x \le 4$

$= 0$; otherwise

find E(X) and median. Also comment on skewness.

Q3) Attempt <u>any two</u> of the following : **[5 each]**

a) If X and Y are independent standard normal variables.

Find P (X + Y $\le$ 1, X- Y $\le$ 0).

b) A r.v. X has p.d.f.

$f(x) = (x^2 e^{-x})/2;\ x \ge 0$

$= 0$; otherwise

Find E (X^r), r>0. Hence find third order centralmoment.

c) Find Var (2X+Y) where X and Y are independent r.v with joint p.d.f.

$f(x, y) = 1/8;\ 0 \le x \le 2,\ 0 \le y \le 4$

Q4) Attempt <u>any one</u> of the following :

a) i) Obtain the points of inflexion of $N(\mu, \sigma^2)$ distribution. **[7]**

ii) E(Y/X) = 7+8X .Find E (Y) if E(X) = 10. **[3]**

b) i) Let r.v. x follow U(a, b) distribution the find p.d.f. of $Y = \frac{b-x}{b-a}$. **[3]**

ii) The joint p.d.f of r.v.(x, y) is

$f(x, y) = 1; 0 < x < 1, -x < y < x$

$= 0$; otherwise.

Find marginal p.d.f. of x. Also find E(Y/X). **[7]**

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