C – 292

Seat No.	

B.Sc. (Part – II) (Semester – III) Examination, 2011
Paper – V : STATISTICS
Continuous Probability Distributions – I
Sub. Code : 49906

Day and Date : Tuesday, 29-11-2011 Total Marks : 40
Time : 10.30 a.m. to 12.30 p.m.

***Instructions** : 1) All questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*

1. Choose correct alternative : **8**

i) A continuous r.v. X has mean 10. The expression $E(X-10)^2$ is ________

a) μ_2 b) Var (X)
c) both a and b d) neither a nor b

ii) The value of F (x, y) lies in the interval

a) (–1, 0) b) (0, 1)
c) (–1, 1) d) $(-\infty, \infty)$

iii) If $X \to U(-4, 4)$ and $Y = \frac{4-X}{8}$ then the probability distribution of Y is ________

a) U (– 4, 4) b) U (–1, 1)
c) U (0, 1) d) none of these

iv) If $E(X/Y = y) = \frac{2}{3}y + 4$ then regression coefficient of X on Y is ________

a) $\frac{2}{3}$ b) $-\frac{2}{3}$ c) $\frac{1}{4}$ d) $-\frac{1}{4}$

P.T.O.

v) Let $X \to Exp(\theta)$. The probability distribution of $Y = e^{-\theta x}$ is ___________

a) Exp (1) b) Exp (θ) c) U (0, 1) d) none of these

vi) If Var (X) = 1, Var (Y) = 4 and Var (X – Y) = 9 then correlation coefficient between X and Y is ___________

a) $-\frac{1}{4}$ b) $\frac{1}{4}$ c) 1 d) – 1

vii) A continuous r.v. X has p.d.f.

$$f(x) = \begin{cases} kx(2-x), & 0 < x < 2 \\ 0 & , \text{ otherwise} \end{cases}$$

The value of K is

a) 1 b) $\frac{3}{4}$ c) $\frac{4}{3}$ d) $\frac{1}{4}$

viii) If $M_x(t)$ is the moment generating function of continuous r.v. X then value of $M_x(0)$ is ___________

a) 1 b) – 1

c) 0 d) none of these

2. Attempt **any two** of the following : **16**

a) Define following terms for continuous r.v. X

i) H.M. ii) Mode

iii) Median iv) Variance

b) Obtain m.g.f. and c.g.f. of exponential distribution with parameter θ. Hence find first two cumulants.

c) If X and Y are independent continuous r.v.s, show that

i) E (XY) = E (X).E (Y)

ii) $M_{X+Y}(t) = M_X(t).\ M_Y(t)$.

3. Attempt **any three** of the following : 16

a) If $X \to U(a,b)$, show that $\mu_3 = 0$.

b) Define c.d.f. of continuous r.v. X and state its properties.

c) Obtain probability distribution of $Y = -2 \log X$ if $X \to U(0, 1)$.

d) Find median of exponential distribution with parameter θ.

e) A continuous r.v. X has p.d.f.

$$f(x) = \begin{cases} 3(1-x)^2, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$$

Obtain p.d.f. of $Y = \dfrac{X}{1-X}$.

f) The joint p.d.f. of bivariate r.v. (X, Y) is

$$f(x,y) = \begin{cases} 4xy, & 0 < x < 1,\ 0 < y < 1 \\ 0, & \text{otherwise} \end{cases}$$

Find marginal p.d.f. of X and E (X).

Seat No.	

Total No. of Pages : 3

B.Sc. (Part-II) (Semester-III) Examination, 2013
STATISTICS
Continuous Probability Distributions-I (Paper-V)
Sub. Code : 49906

Day and Date : Saturday 11-05-2013

Time : 11.00 a.m. to 1.00 p.m.

Total Marks :40

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q1) Choose correct alternative: **[8]**

i) A continuous r.v. X has symmetric distribution. In this case value of β_1 is..............

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

ii) If $X \to U(0,1)$ then the probability distribution of $1 - X$ is...............

a) U (-1, 1)
b) U (-1, 0)
c) U (0,1)
d) none of these

iii) Moment generating function is affected by change of............

a) origin
b) scale
c) origin and scale
d) neither origin nor scale

iv) Let X be exponential variable with mean θ. Median of X is................

a) $\dfrac{\log 2}{\theta}$
b) $\theta \log 2$
c) $\dfrac{\theta}{\log 2}$
d) none of these

v) If X is a continuous r.v. then $E\left(\dfrac{1}{X}\right)$ is..................

a) A.M.
b) G.M.
c) H.M.
d) none of these

P.T.O.

vi) If Var(X) = 4, Var(Y) = 9 and Var(X - Y) = 16 then correlation coefficient between X and Y is....................

a) $-\frac{1}{4}$

b) $-\frac{1}{12}$

c) $\frac{1}{12}$

d) $\frac{1}{4}$

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

$$f(x) = \begin{cases} \frac{k}{x} & ; 1 < x < 3 \\ 0 & ; \text{otherwise} \end{cases}$$

The value of k is

a) - log 3

b) log 3

c) $(\log 3)^2$

d) $\frac{1}{\log 3}$

viii) Let X be a continuous r.v. such that $P(X < 3) = \frac{1}{4}$ and $P(X > 5) = \frac{1}{4}$.

Quartile deviation of X is

a) 0

b) 3

c) 5

d) 1

Q2) Attempt any Two of the following : **[16]**

a) For a continuous r.v. X define

i) p.d.f.

ii) median

iii) mode

iv) r^{th} central moment

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

$$f(x) = \begin{cases} 1 & , 0 < x < 1 \\ 0 & , \text{otherwise} \end{cases}$$

Find r_1 and r_2. Comment about nature of the distribution.

c) For continuous bivariate r.v. (X,Y) show that

i) $E(X+Y) = E(X) + E(Y)$

ii) $E[E(X/Y)] = E(X)$

Q3) Attempt any four of the following : **[16]**

a) State and prove lack of memory property of exponential distribution.

b) Draw sketch of p.d.f.s of

i) $X \to U(0,3)$

ii) $X \to U(-2,2)$

c) If X and Y are independent r.v.s, show that $E(X\,Y) = E(X)\,E(Y)$

d) Find probability distribution of $-\frac{1}{\theta} \log X$ if $X \to U(0,1)$

e) A continuous r.v. X has c.d.f.

$$F_X(x) = \begin{cases} 0 & ; x < 0 \\ \frac{x^2}{4} & ; 0 \le x < 2 \\ 1 & ; x \ge 2 \end{cases}$$

Find E(2X).

f) The joint p.d.f. of bivariate r.v. (X,Y) is

$$f(x,y) = \begin{cases} 2 & ; 0 < x < y < 1 \\ 0 & ; \text{otherwise} \end{cases}$$

Find marginal p.d.f. of X.

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Seat No.	

B - 586

Total No. of Pages :4

B.Sc. (Part -II) (Semester -III) (New) Examination, December - 2015
STATISTICS
Probability Distributions -I (Paper - V)
Sub. Code: 63606

Day and Date : Friday, 04 - 12 - 2015
Time :12.00 noon to 2.00 p.m. **Total Marks : 50**

Instructions : 1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Choose correct alternative: **[10]**

a) Let X and Y be two independent poisson random variables with mean 4 and 6 respectively then the variance of X+Y is __________.

i) 4 ii) 6

iii) 10 iv) 2

b) If X~ G(P) then mean of X is __________.

i) $\frac{q}{p}$ ii) $\frac{q}{p^2}$

iii) $\frac{p}{q}$ iv) $\frac{p}{q^2}$

c) If X~ NBD (k, p) then p.g.f of the distribution is __________.

i) $\frac{p}{1-qs}$ ii) $\frac{q}{1-ps}$

iii) $\left(\frac{p}{1-qs}\right)^k$ iv) $\left(\frac{q}{1-ps}\right)^k$

P.T.O.

d) A continuous r.v. X has pdf $f(x) = \begin{cases} x^2 & ,0 < x \le 1 \\ kx & ,kx < 2 \\ 0 & ,o.w \end{cases}$ then the value of k is ________.

i) $\frac{4}{9}$
ii) $\frac{2}{3}$
iii) $\frac{1}{3}$
iv) $\frac{9}{4}$

e) If X is c.r.v. with pdf $f(x) = \begin{cases} 2x & ,0 < x < 1 \\ 0 & ,o.w \end{cases}$ then median of X is ________.

i) $\frac{1}{2}$
ii) $\frac{1}{\sqrt{2}}$
iii) $\frac{1}{4}$
iv) $\sqrt{2}$

f) If Var(X) = 1, Var(Y) = 4, Var(X–Y) = 9 then the Cov (X, Y) is ________.

i) 1
ii) 4
iii) 6
iv) –2

g) If E [Y/X = x] = $\frac{3}{2}$ X + 6 then the regression coefficient of Y on X is ________.

i) $-\frac{3}{2}$
ii) $\frac{3}{2}$
iii) $\frac{2}{3}$
iv) $\frac{1}{2}$

h) The joint pdf of (X, Y) is $f(x, y) = \begin{cases} x + y & ; 0 \le x \le 1,\ 0 \le y \le 1 \\ 0 & ; o.w \end{cases}$ then E(Y) is ________.

i) $\frac{12}{7}$
ii) $\frac{1}{4}$
iii) $\frac{7}{12}$
iv) $\frac{1}{2}$

i) A continuous r.v. X has mean M, then the expression $E[X-M]^3$ is ________.

i) μ_3
ii) k_3
iii) both (i) & (ii)
iv) none of these

j) The value of $F(x, y)$ lies in the interval ________.

i) $(-1, 0)$
ii) $(0, 1)$
iii) $(-1, 1)$
iv) $(0, \infty)$

Q2) Attempt any two of the following: **[20]**

a) For a univariate continuous r.v. X define

i) Mean

ii) Variance

iii) Quartiles

iv) Mode

v) Harmonic mean

b) If the joint p.d.f. of X and Y is $f(x,y)=\begin{cases} 8xy & , 0 \le x \le y \le 1 \\ 0 & , o.w \end{cases}$ then

i) Find marginal pdf of X and Y.

ii) Check whether X and Y are independent.

iii) Find mean of X and mean of Y.

c) Define Poisson distribution with parameter λ. Find its p.g.f. Find mean and variance of the distribution.

Q3) Attempt any Four of the following: **B - 586**

[20]

a) State and prove leak of memory property of geometric distribution.

b) If X and Y are bivariate r.v.s. then show that $E[E(X/Y)] = E(X)$.

c) Define moment generating function (mgf) for univariate continuous r.v. X. What is the effect of change of origin and scale on m.g.f.

d) A. r.v. X has the pdf $f(x)=\begin{cases}6(2-x)(x-1), 1\le X\le 2\\ 0 \quad , \quad o.w\end{cases}$ obtain the pdf of $Y=\dfrac{X}{X+1}$.

e) Define negative binomial distribution. Obtain the recurrence relation for probabilities of the distribution.

f) Define cumulant generating function (cgf). Give the relation between cumulants and central moments up to order four.

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Seat No.	

N-1338

Total No. of Pages :4

B.Sc. (Part - II) (Semester -III) Examination, June - 2015
STATISTICS
Continuous Probability Distributions - I (Paper -V)
Sub. Code : 49906

Day and Date : Wednesday, 03 - 06 - 2015
Time : 12.00 noon to 2.00 p.m. **Total Marks : 40**

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Choose correct alternative. **[8]**

a) If $M_X(t)$ is the m.g.f. of continuous r.v.X then $M_{cX}(t)$ is ______.

i) $M_X(t)$ ii) $C \cdot M_x(t)$

iii) $M_X(Ct)$ iv) $M_X\left(\frac{t}{C}\right)$

b) If $F_X(x)$ is c.d.f. of a c.r.v. X then ______.

i) $0 \le F_X(x) \le 1$

ii) $F_X(x)$ is defined for all values of X

iii) $F_X(x)$ is non decreasing

iv) all are true

c) If X and Y are independent c.r.v. such that var(X) = var (Y) = σ^2, then the correlation coefficient between X and Y is ______.

i) $\frac{1}{2}$ ii) 0

iii) 1 iv) none of these

P.T.O.

d) A continuous r.v.X has mean 'a'. The expression $E(X-a)^2$ is ______.

i) var (X)

ii) μ_2

iii) both (i) & (ii)

iv) neither (i) nor (ii)

e) If X is continuous r.v. then Harmonic mean of X is ______.

i) $E(X)$

ii) $\frac{1}{E(X)}$

iii) $\frac{1}{E\left(\frac{1}{X}\right)}$

iv) $E\left(\frac{1}{X}\right)$

f) If X~ U(0,1) then the probability distribution of $-2\log X$ is ______.

i) U(0,1)

ii) $\text{Exp}\left(\frac{1}{2}\right)$

iii) Exp (2)

iv) U(0, 2)

g) If X~U(−3,2) then $P(|X| \le 2)$ is ______.

i) $\frac{2}{5}$

ii) $\frac{4}{5}$

iii) 1

iv) $\frac{1}{2}$

h) If X has exponential variate then range of X is______.

i) 0 to ∞

ii) 0 to 1

iii) $-\infty$ to $+\infty$

iv) -1 to $+1$

Q2) Attempt any two of the following. **[16]**

a) Define following terms for continuous r.v.X.

i) p.d.f.

ii) c.d.f.

iii) m.g.f.

iv) c.g.f.

b) For bivariate continuous r.v. (X,Y) show that

i) $E(X+Y) = E(X) + E(Y)$

ii) $E[E(X/Y)] = E(X)$.

c) For exponential variate with parameter θ, find mean, median and quartiles.

Q3) Attempt <u>any four</u> of the following: **[16]**

a) If X and Y are independent r.v.s then show that $M_{X+Y}(t) = M_X(t) \cdot M_Y(t)$.

b) If $f(x,y) = \begin{cases} 8xy, & 0 \le x \le y \le 1 \\ 0 \quad , & \text{otherwise} \end{cases}$

check whether X and Y are independent or not.

c) If X is r.v. with pdf $f(x) = \begin{cases} \theta\, e^{-\theta x} & , x \ge 0, \theta > 0 \\ 0 \quad , & \text{otherwise} \end{cases}$

Find the pdf of $y = \theta x$.

d) If X~U(a,b), then find the distribution of $Y = \frac{X - \overline{a}}{b - \overline{a}}$.

e) State and prove lack of memory property of exponential distribution.

f) If X~U(a,b), find m.g.f. of X.

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Seat No.	

N-1339

Total No. of Pages :4

B.Sc. (Part - II) (Semester -III) (New) Examination, June - 2015
STATISTICS
Probability Distributions - I (Paper -V)
Sub. Code : 63606

Day and Date : Wednesday, 03 - 06 - 2015

Time : 12.00 noon. to 2.00 p.m. **Total Marks : 50**

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**

Q1) Choose the correct alternative. **[10]**

a) Let X be geometric variate with mean 1.5 then $P(X=1)$______.

i) 0.4 ii) 0.24

iii) 0.6 iv) 0.5

b) For Negative Binomial Distribution ________.

i) mean $=$ variance ii) mean $<$ variance

iii) mean $>$ variance iv) None of these

c) Let X be r.v. Then for

$$f(x) = Ke^{-2x}, \ x \geq 0$$
$$= 0 \quad , \text{otherwise}$$

to be density function, K must be

i) 2 ii) $\frac{1}{2}$

iii) 4 iv) 1

d) Let X be continuous r.v. with p.d.f. $f(x)=e^{-x}$, $x \geq 0$ then p.d.f. of $Y=e^{-x}$ is $f(y) =$ ______.

i) $2, \ -1 \leq Y \leq 1$ ii) $1, \ 0 \leq Y \leq 1$

iii) $-1, \ -1 \leq Y \leq 0$ iv) $1, \ -1 \leq Y \leq 0$

P.T.O.

e) The joint p.d.f. of (X,Y) is

$$f(x,y) = (X+Y), \; 0 \le x; y \le 1$$
$$= 0 \qquad , \text{otherwise}$$

Then marginal p.d.f. of Y is $f(y)$ = ______.

i) $\frac{(2Y+1)}{2}$ ii) 2X+1

iii) 2Y iv) 2X

f) Harmonic mean of continuous r.v. is ______.

i) E(X) ii) $\frac{1}{E(X)}$

iii) $\frac{1}{E\left(\frac{1}{X}\right)}$ iv) $E\left(\frac{1}{X}\right)$

g) Let $K_x(t)$ and $K_Y(t)$ be c.g.f.s of independent r.v.s. X and Y respectively. Then a r.v. X+Y has c.g.f. ______.

i) $K_X(t) + K_Y(t)$ ii) $K_X(t) \cdot K_Y(t)$

iii) $K_X(t) - K_Y(t)$ iv) $K_X(t) / K_Y(t)$

h) For any two r.v.s X and Y, $E(E(X/Y))$ = ______.

i) Var (X) ii) E(X)

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

i) Let X has Poisson distribution with mean 3. Then variance of (2X+3) is ______.

i) 12 ii) 3

iii) 6 iv) zero

j) If $M_X(t)$ is the moment generating function of r.v.X then value of $M_X(0)$ is ______.

i) 0

ii) -1

iii) 1

iv) None of these

Q2) Attempt any two from the following. **[20]**

a) For continuous bivariate r.v. (X,Y) define

i) Joint p.d.f.

ii) $E(X/Y)$

iii) $Var(X/Y)$

iv) $Cov(X,Y)$

v) $Corr(X,Y)$

b) Derive Poisson distribution as a limiting case of Binomial distribution. Also obtain mean and variance.

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

$$f(x) = kx(1-x), \quad 0 < x < 1$$
$$= 0 \quad , \text{ otherwise}$$

find k, mean, variance and mode of X.

Q3) Attempt <u>any four</u> of the following: **[20]**

a) Define negative binomial distribution with parameter (k,p) find its mean.

b) A r.v.X has p.d.f. $f(x) = 2x, \; 0 < x < 1$
$\quad\quad = 0 \quad , \text{ otherwise}$

calcuate

i) $P(0.1 < X < 0.5)$

ii) median

c) The joint p.d.f. of (X,Y) is $f(x,y) = kxe^{-y}, \; 0 < x < 1, \; 0 < y < \infty$
$\quad\quad = 0 \quad , \text{ otherwise}$

find

i) k

ii) marginal p.d.f. of X,Y.

d) A r.v.X has p.d.f. $f(x) = 3(1-x)^2, \; 0 < x < 1$
$\quad\quad = 0 \quad , \text{ otherwise}$

find p.d.f. of $Y = \frac{X}{1-X}$.

e) State and prove lack of memory property for geometric distribution.

f) For continuous bivariate r.v. (X,Y) show that E(X+Y) = E(X) + E(Y).

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Seat No.	

D – 896

Total No. of Pages : 4

B.Sc. (Part - II) (Semester - III) Examination, May - 2016

STATISTICS

Probability Distributions - I (Paper - V)

Sub. Code : 63606

Day and Date : Thursday, 12 - 05 - 2016

Time : 12.00 noon to 02.00 p.m. **Total Marks : 50**

Instructions : 1) All questions are compulsory.

2) Figures to the right indicate full marks.

Q1) Choose the correct alternative **[10]**

a) If X is continuous r.v. then $P(a \leq x \leq b)$ is ________.

i) $F(a) - F(b)$

ii) $F(b) - F(a)$

iii) $1 - F(a) + F(b)$

iv) none of these

b) $X \sim B(n, p)$ tends to poisson (λ) distribution if ________.

i) $n \to \infty, p \to ½$

ii) $n \to \infty, p \to \infty$

iii) $n \to \infty, p \to 0, np = \lambda < \infty$

iv) none of these

c) The variance of negative binomial distribution with parameter (k,p) is______.

i) $\frac{Kq}{p}$ ii) $\frac{Kq}{p^2}$

iii) $\frac{Kp}{q^2}$ iv) $\frac{Kp}{q}$

P.T.O.

d) If x has p.d.f.

$f(x) = Kx^3, \ 0 \le x \le 1$

$= 0$ otherwise

then value of K is ______.

i) 3

ii) 2

iii) 1

iv) 4

e) If x and y are independent contiuous r.v. then ______.

i) E(xy) = E(x)E(y)

ii) cov(xy) = 0

iii) Corr(xy) = 0

iv) All of these

f) If x ~ G(p) then $p\left[x \ge 6 / x \ge 3 \right] =$ ______.

i) $p(x \ge 6)$

ii) $p(x \ge 3)$

iii) $p(x \ge 2)$

iv) none of these

g) Let $K_x^{(t)}$ and $K_y^{(t)}$ be the c.g.f.s of x and y. If x and y are independent then c.g.f. of (x + y) is ______.

i) $K_x^{(t)} . K_y^{(t)}$

ii) $K_x^{(t)} - K_y^{(t)}$

iii) $K_x^{(t)} + K_y^{(t)}$

iv) none of these

h) E(y/x) is called _____ of y on x.

   i) regression coefficient

   ii) correlation

   iii) line of regression

   iv) none of these

i) The mean and variance of the _____ are same.

   i) Poisson distribution

   ii) Geometric distribution

   iii) Negative binomial distribution

   iv) None of these

j) Harmonic mean of continuous r.v. x is _____.

   i) $\dfrac{1}{E\left(\dfrac{1}{x}\right)}$

   ii) $E(x)$

   iii) $E\left(\dfrac{1}{x}\right)$

   iv) $\dfrac{1}{E(x)}$

Q2) Attempt any two **[20]**

a) For a continuous r.v. x define

   i) Harmonic mean

   ii) Mode

   iii) Median

   iv) Moment generating function

   v) Distribution function

b) Define poisson distribution with mean λ. Obtain its mean and variance.

c) The joint p.d.f. of (xy) is

$$f(xy)=\frac{3}{2}y^2,\ 0\le x\le 2$$
$$=0,\quad 0\le y\le 1$$

Otherwise

i) Determine marginal p.d.f. of x

ii) Determine marginal p.d.f. of y

iii) Are x and y independent

iv) Conditional p.d.f. of $\left(x/_{y}=y\right)$

Q3) Attempt any four **[20]**

a) The p.d.f. of continuous r.v. x is

$$f(x)=2x,\ 0\le x\le 1$$
$$=0,\quad \text{Otherwise}$$

Find E(y) where y = 3x + 3.

b) Define Negative binomial distribution. Obtain its recurrance relation.

c) A continuous r.v. x has p.d.f.

$$f(x)=ke^{-x},\ \ x\ge 0$$
$$=0,\quad \text{otherwise}$$

Find K, E(x).

d) For continuous r.v. (x,y) show that

E(x + y) = E(x) + E(y).

e) State and prove lack of memory property of geometric distribution.

f) Define c.g.f of continuous r.v. Prove that relation between cumulants and central moments (upto order three).

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Seat No.	

D-618

Total No. of Pages : 4

B.Sc. (Part - II) (Semester - III) (New) Examination, May - 2017
STATISTICS
Probability Distributions - I (Paper - V)
Sub. Code : 63606

Day and Date : Saturday, 27 - 05 - 2017
Time : 12.00 noon to 2.00 p.m. **Total Marks : 50**

Instructions :
1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q1) Choose the correct alternatives: **[10]**

a) If $X \rightarrow$ Geometric (P) then P[X>10/X>5]= ________.

i) P(X>5) ii) P(X>10)

iii) P(X>15) iv) None of these

b) If X is continuous r.v. on $(0, \infty)$ with p.d.f. $f(x)$ then geometric mean is given by ________.

i) Antilog [E(X)] ii) Antilog [E log (1/X)]

iii) Antilog [E (log X)] iv) Antilog [E(X log X)]

c) If X and Y are independent continuous r.v. such that $V(X) = V(Y) = \sigma^2$ then correlation coefficient between X and Y is ________.

i) 1/3 ii) 1

iii) 0 iv) None of these

d) The variance of negative binomial distribution with parameter (K,P) is ________.

i) kq/p ii) kp/q

iii) kp/q^2 iv) kq/p^2

P.T.O.

e) If $M_X(t)$ is m.g.f. of X then $M_{X-m}(t)$=_________.

i) $e^{-mt}.M_X(t)$ ii) $M_X(t) - e^{-mt}$

iii) $e^{mt}.\ M_X(t)$ iv) $M_X(t) - e^{mt}$

f) If (X,Y) is a continuous bivariate random variable then E(XY) –E(X).E(Y) is _________.

i) corr(X,Y) ii) 0

iii) V(X–Y) iv) COV(X,Y)

g) Fourth cumulant of a continuous r.v. X is _________.

i) μ_4 ii) μ_4'

iii) $\log \mu_4$ iv) $\mu_4 - 3K_2^2$

h) If X→Poison (λ) such that $P(X=2)=\frac{3}{2}P(X=1)$ then E(X)=_________.

i) 2 ii) 3

iii) 5 iv) None of these

i) The joint p.d.f. of (X,Y) is _________

$$f(xy) = X+Y\ ;\ 0\leq X,Y\leq 1$$
$$= 0\ ;\ \text{Otherwise.}$$

then marginal p.d.f of X is f(X) = _________.

i) $2.\frac{Y+1}{2}$ ii) $\frac{2X+1}{2}$

iii) 2X iv) None of these

j) Let $K_X(t)$ and $K_Y(t)$ be c.g.f.s. of independent r.v.s. X and Y respectively. Then a r.v. X+Y has c.g.f. _________.

i) $K_X(t) + K_Y(t)$ ii) $K_X(t) \cdot K_Y(t)$

iii) $K_X(t) - K_Y(t)$ iv) $K_X(t)/K_Y(t)$

Q2) Attempt any two: **[20]**

a) Define Poison distribution. Show that Poison distribution is limiting case of binomial distribution.

b) For continuous univariate r.v. X define

i) Probability density function (p.d.f.)

ii) Geometric Mean (G.M.)

iii) Harmonic Mean (H.M.)

iv) Moment generating function (M.g.f.)

v) Cumulant generating function (C.g.f.)

c) The joint p.d.f. of (XY) is

$$f(x,y) = ke^{-(x+y)} \; ; \; 0 \leq y \leq x < \infty$$
$$= 0 \qquad ; \text{ elsewhere}$$

i) Determine k.

ii) Verify wheather X and Y are independent.

iii) E(X).

iv) V(X).

Q3) Attempt any Four: **[20]**

a) For continuous bivariate r.v. (XY). Show that E(X+Y) = E(X) + E(Y).

b) Obtain recurrence relation for finding probabilities of negative binomial distribution.

c) Define

i) Central moments.

ii) Raw moments.

d) From the following p.d.f. of continuous random variable X.

$f(x) = Kx(2-x)$; $0 \leq x \leq 2$.

$= 0$;otherwise

Find

i) K

ii) H.M.

e) If $f(x,y) = \begin{cases} 8xy, & 0 \leq x \leq y \leq 1 \\ 0, & \text{otherwise} \end{cases}$

check whether X and Y are independent or not.

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

$$f(x) = \frac{3}{2}x^2 ; -1 \leq x \leq 1$$

$=0$; Otherwise

Find probability distribution of $Y=X^2$.

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Seat No.	

C-696

Total No. of Pages : 3

B.Sc. (Part - II) (Semester - III) Examination, November-2017
STATISTICS
Probability Distributions - I (Paper - V)
Sub. Code : 63606

Day and Date : Saturday, 11 - 11 - 2017
Time : 12.00 noon to 2.00 p.m.

Total Marks : 50

Instructions :
1) All questions are compulsory.
2) Figures to the right in the bracket indicate full marks.
3) Use of calculators and statistical tables is allowed.

Q1) Choose the most correct alternative: **[10]**

a) If X~G (0.2) then mean of X is __________.
   i) 1/4   ii) 1/2
   iii) 3/4   iv) 4

b) Binomial distribution tends to Poisson distribution if __________.
   i) $n \to \infty, p \to 0, np = \lambda < \infty$ ii) $n \to \infty, p \to 1/2$
   iii) $n \to \infty, p \to 1$ iv) none of these

c) Suppose X~NBD (5, 0.5) then variance of X is __________.
   i) 5   ii) 10
   iii) 15   iv) 20

d) If $f(x) = kx^2$, $0 \le x \le 3$, is p.d.f. then the value of k is __________.
   i) 1/4   ii) 2/3
   iii) 1/9   iv) 1/3

e) If $M_X(t)$ is m.g.f. of X then, $M_X(0)$ is __________.
   i) 0   ii) 1
   iii) ∞ iv) none of these

f) Moment generating function is affected by change of __________.
   i) origin   ii) scale
   iii) origin and scale   iv) neither origin nor scale

g) The second cumulant of r.v. X is 9 then s.d. of X is __________.
   i) 9   ii) 3
   iii) 81   iv) 0

P.T.O.

h) If μ_{rs} represents the central moment of order (r,s) for bivariate distribution with variables X and Y then correlation coefficient r_{XY} is ______.

i) $\frac{\mu_{11}}{\sqrt{\mu_{20}\mu_{02}}}$ ii) $\frac{\mu_{11}}{\sqrt{\mu_{10}\mu_{02}}}$

iii) $\frac{\mu_{12}}{\sqrt{\mu_{10}\mu_{02}}}$ iv) $\frac{\mu_{22}}{\sqrt{\mu_{20}\mu_{02}}}$

i) If Var (X)=9, Var (Y)=25 and Cov(x, Y)= -5/2 then correlation coefficient between X and Y is ______.

i) -2/5 ii) -3/5

iii) -5/6 iv) -1/6

j) If a random variable X has p.d.f.

$$f(x)=\begin{cases}2x, & 0<x<1,\\ 0, & \text{otherwise}\end{cases}$$

If Y=2x-1, then p.d.f of Y is ______.

i) $f(y)=y/2,\ 0<y<2$ ii) $f(y)=(1+y)/4,\ -1<y<1$

iii) $f(y)=2y,\ 0<y<1$ iv) none of these

Q2) Attempt any two of the following three. **[20]**

a) Define Negative binomial distribution. Find its mean and variance.

b) The joint p.d.f. of bivariate r.v. (X, Y) is

$$f(x,y)=\begin{cases}k(2x+3y), & 0<x<1, 0<y<1\\ 0, & \text{otherwise}\end{cases}$$

find (i) k,

(ii) marginal p.d.f. of X

(iii) marginal p.d.f. of Y

(iv) Mean of X

(v) Mean of Y

c) Define the following terms for a univariate continuous r. v. X.

(i) pdf (ii) mgf (iii) cgf (iv) r^{th} raw moment (v) r^{th} central moment

Q3) Attempt any four of the following. **[20]**

a) State and prove the lack of memory property of geometric distribution.

b) Define Poisson distribution with parameter λ. Obtain the recurrence relation for successive probabilities.

c) Define c.d.f. of continuous r.v. X and state its important properties.

d) For continuous bivariate r.v. (X, Y) show that E[E (Y/X)]= E(Y).

e) If X and Y are independent continuous r.v.s, then show that

$M_{X+Y}(t) = M_X(t) \cdot M_Y(t)$

f) If X is a.r.v. with p.d.f. $f(x) = x/2; 0 \le x \le 2$ then find the pdf of Y=4X-1.

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Seat No.	

B.Sc.(Part-II) (Semester-III)
Examination, May - 2018
STATISTICS
Probability Distributions-I (Paper-V)
Sub. Code : 63606

Day and Date : Monday, 28-05-2018 **Total Marks : 50**

Time : 12.00 noon to 2.00 p.m.

Instructions :
1) All questions are compulsory.
2) Figures to the right in the bracket indicate full marks.
3) Use of calculators and statistical tables is allowed.

Q1) Choose the most correct alternative: **[10]**

a) If X~Poisson(2) then mean of X is ________.

i) 4 ii) 2

iii) $\sqrt{2}$ iv) None of these

b) Suppose X~ G(p) then ________.

i) mean= variance ii) mean < variance

iii) mean > variance iv) none of these

c) Suppose X~NBD(k,p) then variance of X is ________.

i) kq/p ii) kq/p^2

iii) kp/q iv) kp/q^2

d) If $f(y)=ky(2-y)$, $0 \leq y \leq 2$, is p.d.f. then the value of k is ________.

i) 2/3 ii) 3/2

iii) 4/3 iv) 3/4

e) If $M_X(t)$ is mgf of X then, mgf of aX+b is ________.

i) $e^{bt}M_X(at)$ ii) $M_X(at)-e^{-bt}$

iii) $e^{bt}M_X(t)$ iv) $M_X(t)-e^{bt}$

P.T.O.

f) If $F(x)$ is distribution function and $x_1 < x_2$ then ________.

i) $F(x_2) < F(x_1)$ ii) $F(x_2) > F(x_1)$

iii) $F(x_2) \leq F(x_1)$ iv) $F(x_2) \geq F(x_1)$

g) Suppose (X,Y) is a bivariate random variable with joint probability density function $f(x,y)$, then the marginal probability density of X is ________.

i) $\int_{0}^{\infty} f(x,y)dy$ ii) $\int_{-\infty}^{\infty} f(x,y)dx$

iii) $\int_{-\infty}^{\infty} f(x,y)dy$ iv) $\int_{0}^{\infty} f(x,y)dx$

h) If X and Y are independent continuous r.v. then ____________.

i) E(XY)=E(X)E(Y) ii) cov(X,Y) =0

iii) Corr(X,Y) =0 iv) All of these

i) If $K_X(t)$ and $K_Y(t)$ be the c.g.f. of X and Y. If X and Y are independent then c.g.f. of (X+Y) is ________.

i) $K_X(t) * K_Y(t)$ ii) $K_X(t) - K_Y(t)$

iii) $K_X(t) + K_Y(t)$ iv) None of these

j) If F(X,Y) be the cumulative distribution function of bivariate random variable (X,Y) then $F(X,\infty)$ is distribution function of ________.

i) X alone ii) Y alone

iii) Both X and Y iv) None of these

Q2) Attempt any two of the following three. **[20]**

a) Define Poisson distribution and find its probability generating function. Also find its mean and variance.

b) The joint p.d.f. of bivariate r.v.(X,Y) is

$$f(x,y)=\begin{cases}8xy, & 0<x<y<1\\0, & \text{otherwise}\end{cases}$$

find i) marginal p.d.f. of X

ii) marginal p.d.f. of Y

iii) Mean of X and Mean of Y

iv) Conditional distribution of X given Y

v) Are X and Y independent

c) For a univariate continuous r.v. X define.

i) Mean

ii) Median

iii) Mode

iv) Harmonic mean

v) Quartiles

Q3) Attempt any four of the following. **[20]**

a) Define geometric distribution and find the recurrence relation for probabilities.

b) Define c.d.f. of continuous r.v. X and state its properties.

c) Define cumulant generating function (cgf). Give the relation between cumulants and central moments up to order three.

d) For continuous bivariate r.v. (X,Y) show that E[E(X/Y)]=E(X).

e) Explain the terms (i) Conditional mean (ii) Conditional variance.

f) If X is a r.v. with pdf $f(x)=3(1-x)^2;\ 0\le x\le 1$ then find the pdf of $Y=X/(1-X)$.

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