K – 54

Seat No.	

B.C.S. (Part – I) Examination, 2010
STATISTICS (Paper – II) (New)
Probability and Probability Distribution

Day and Date: Monday, 19-4-2010 Total Marks: 100
Time: 3.00 p.m. to 6.00 p.m.

Instructions : *1) **All** questions are **compulsory**.*
*2) Use of calculator and statistical table is **allowed**.*
*3) Answer to the **two** Sections should be written in **one** and **same** answer book.*

SECTION – I

1. Select correct alternative :

I) Probability of impossible event is

a) 1 b) 0.5 c) 0 d) none of these

II) A coin is tossed until 'tail' appears for first time, for this experiment the sample space is

a) { } b) Countably finite
c) Countably infinite d) Uncountably infinite

III) Probability that a leap year selected at random will contain 53 Sundays is

a) 6/7 b) 1/7 c) 2/7 d) None of these

IV) If A and B are independent event with P(A) = 0.5 and P(B) = 0.4 then $P(A' \cap B')$ is

a) 0.3 b) 0.2 c) 0.9 d) None of these

V) If A and B are independent event with P(A) = 0.2 and P(B) = 0.6 then P(A|B) is

a) 0.2 b) 0.6 c) 1/3 d) None of these

VI) If $A \subset B$, with p(A) = 0.2 and P(B) = 0.5 then P(B|A) is

a) 0 b) 0.5 c) 1 d) None of these

VII) If M_0 is mode of random variable X then $P[M_0]$ is

a) Maximum b) Minimum c) 1 d) 0

VIII) If E(X) = 5, then E(2X + 4) is

a) 5 b) 14 c) 4 d) 10

IX) If X ~ B (10, 0.5), then E (X) is

a) 5 b) 2.5 c) 10 d) 0.5

X) If X follows Poisson distribution with mean 3 then variance of X is

a) 6 b) 3 c) 1.5 d) None of these

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

1) Explain the terms :

a) Sample space

b) Event

c) Probability of an event

d) Mutually exclusive event

e) Discrete sample space

2) I) Define pair wise independence and mutual independence in case of three event.

II) A box contain eight ticket with number 111, 112, 121, 211, 122, 212, 221, 222 and one ticket drawn from the box at random. Let Ai (i = 1, 2, 3) be the event that ith digit on the ticket drawn is 1. Test whether Ai (i = 1, 2, 3) are mutually independent events.

3) Illustrate the terms :

a) Discrete random variable

b) p.m.f. of discrete random variable

c) Distribution function of discrete random variable

d) Mean and variance of discrete random variable

e) Probability Generating function

Attempt **any four** of the following :

1) For any two event A and B, show that $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

2) Let A, B and C be three mutually exclusive and exhaustive event defined on a probability space Ω. If 3P (A) = 2P (B) = P(C). Find $P(A \cup B)$.

3) If A and B are independent event then show that A' and B' are independent.

4) Let X be a discrete random variable with p.m.f.

$P(X = x) = X/15$ $x = 1, 2, 3, 4, 5$

$= 0$ otherwise

Find a) $E(X)$ b) $E(2X + 5)$

5) Define discrete uniform distribution. Obtain mean and variance of a discrete uniform r.v. taking value 1,2 and 3.

6) State the probability generating function of Poisson distribution and hence find variance.

SECTION – II

4. Select correct alternative :

I) Lack of memory property is followed by distribution

a) Exponential   b) Uniform

c) Normal   d) Chi-square

II) Box-Muller transformation is used for

a) Fitting of distribution   b) Testing of hypothesis

c) Simulation   d) None of above

III) p.d.f. of r.v. X is given by, $f(x) = 3x^2, 0 < x < 1$; = 0, otherwise, then E (X) is

a) 3/4   b) 0   c) 1/4   d) 2/3

IV) $X \sim \cup(1, 5)$, then variance of X is

a) 1   b) 1/2   c) 4/3   d) 1/4

V) If X ~ N (0, 1), Y ~ N (0, 1) and X and Y are independent then E (X + Y) is

a) 0   b) 1   c) 2   d) None of these

VI) $X \sim \chi^2$ with 5 degrees of freedom then variance of X is

a) 5   b) 10   c) 25   d) 0

VII) If r.v. X has t-distribution with n degrees of freedom then X^2 has

a) t-distribution with n^2 degrees of freedom

b) Fn, n distribution

c) F1, n distribution

d) Fn, 1 distribution

VIII) Let r.v. X has F distribution with n1 and n2 degrees of freedom. Then X lies between

a) n1 and n2   b) 0 and n1   c) 0 and n2   d) None of these

IX) Region of rejection is called as

a) level of significance
b) critical region
c) acceptance region
d) none of these

X) Rejecting H_0 when it is True is

a) Type one error
b) Type two error
c) test criteria
d) level of significance

5. Attempt **any two** of the following :

1) Explain the terms :

a) Continuous sample space
b) Continuous random variable
c) c.d.f. of continuous r.v.
d) Expectation of continuous r.v.
e) Variance of continuous r.v.

2) Define Normal, chi-square, t and F distribution. Also state relation between Normal and

a) chi-square
b) t
c) F distribution

3) Explain Large sample test for testing

a) mean
b) proportion

6. Attempt **any four** of the following :

1) Let X be a continuous r.v. with p.d.f. given by

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

Find :

(I) k
II) E (X)

2) Let X ~ N (3, 4), Find

a) P [X > 5]
b) P [x<1]
c) P [X < 6]
d) P [2 < X < 6]
e) P [x > 0]

3) State Mean, Variance, additive property and Normal approximation of Chi-square distribution.

4) Explain the terms :

a) Parameter and statistic
b) Types of error

5) Give merits and demerits of simulation

6) Find variance of exponential distribution.

W – 932

Seat No.	

B.C.S. (Part – I) (Semester – I) Examination, 2011
STATISTICS (Paper – II)
Probability and Discrete Probability Distribution

Day and Date : Thursday, 12-5-2011

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.*
*3) Use of Calculators and Statistical tables is **allowed**.*

1. Choose the correct alternative : **8**

i) If $P(A \cup B) = P(A) + P(B)$, then events A and B are

a) Equally likely
b) Mutually exclusive
c) Exhaustive
d) Independent

ii) For a discrete random variable X, E(aX+b) =

a) X E(a) + b
b) a E(X) + b
c) E(X)
d) None of these

iii) If F(x) be distribution of function of r.v., then F(x) has

a) Decreasing function
b) Increasing function
c) Negative function
d) None of these

iv) The variance of Binomial distribution is

a) n p
b) n q
c) n p q
d) p q

v) Probability of an impossible event is

a) 1
b) 0
c) – 1
d) None of these

vi) Probability of an event always lies between

a) – 1 to + 1
b) 0 to 1
c) $-\infty$ to $+\infty$
d) 0 to ∞

vii) If A and B are independent, then P(A) P(B) =

a) $P(A \cap B)$
b) $P(A \cup B)$
c) $P(A/B)$
d) $P(A)/P(B)$

viii) If $X \to B(n, p)$ and E(X) = 5/3 and $q=\frac{2}{3}$ then the value of n is

a) 25
b) 1/25
c) 1/5
d) 5

P.T.O.

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

a) Let X be a discrete random variable with p.m.f.

$P(X = x) = 1/15, \quad$ for x = 1, 2, ------- 15

$= 0 \quad$ otherwise

Find :

i) $E(X)$ ii) $E(3X + 5)$ iii) $Var(X)$ iv) $Var(3X + 5)$

b) Define :

i) Discrete sample space

ii) Power set

iii) Baye's Theorem

iv) Conditional Probability.

c) Define Binomial distribution. Establish recurrence relation for probabilities. If $X \rightarrow B(n = 10, p = 0.3)$ find $P(X = 1)$.

3. Attempt **any four** of the following :

a) For three independent events A, B, C on a sample space,

Prove that, i) A and B are independent.

ii) A, B and C are pair wise independent

b) State and prove additive property of poisson distribution.

c) Let X be a discrete uniform random variable taking the values 1, 2, 3, 4, 5, 6.

Find :

i) $P(X \leq 2)$ ii) $P(X > 3)$

d) If A and B are two events defined on Ω such that $A \subset B$, show that $P(A) \leq P(B)$.

e) If A and B are independent with $P(A) = 1/4$, $P(B) = 1/3$

Find :

i) $P(A \cup B)$ ii) $P(A^C \cap B^C)$

f) If $X \rightarrow P(m = 2)$ find :

i) $P(X = 1)$ ii) $P(X \leq 1)$

Seat No.	

B.C.S.(Part - I) (Semester -I)Examination, 2013
STATISTICS (PAPER - II)
Probability & Discrete Probability Distributions
Sub. Code : 55978

Day and Date : Monday, 15 - 04 - 2013 **Total Marks : 50**
Time : 3.00 p.m. to 5.00 p.m.

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

Q1) Select the correct alternative to answer the following sub-questions : **[10]**

a) If A and B are mutually exclusive events then P(A/B) is equal to ________.

i) 1 ii) P(A)

iii) 0 iv) P(B)

b) Which of the following is a pair of mutually exclusive events in the drawing of a single card from a deek of 52 playing cards ?

i) A heart and a queen ii) An even number and a spade

iii) A club and red card iv) An ace and an odd number

c) If A and B are independent events with P(A)=0.4, P(B)=0.5 then P(A'nB)=________.

i) 0.03 ii) 0.9

iii) 0.1 iv) 0.3

d) Which of the following statement is true ?

i) A and A' form partition of Ω

ii) A and Ω form partition of Ω

iii) A and A' do not form partition of Ω

iv) Only two events cannot form a partition of Ω

e) If a discrete sample space contains 5 elements then its power set will contain ________ elements.

i) 5 ii) 10

iii) 32 iv) 25

f) A discrete random variable takes values 1, 2, ..., k with equal probabilities and if the mean of x is 6then the value of k is ________.

i) 6 ii) 13

iii) 12 iv) 11

g) Mean = variance is true for which of the following discrete distribution

i) Discrete uniform distribution ii) binomial distribution

iii) poisson distribution iv) none of these

h) If for a binomial variate the mean is 9 and variance is 6 then the value of n is ________.

i) 8 ii) 12

iii) 27 iv) 30

i) If E(x) = 5 then E(2x+6) is ________.

i) 16 ii) 10

iii) 6 iv) 20

j) If E(x) = m then $E(x-m)^2$ represents ________.

i) Variance ii) μ_2 (Second central movement)

iii) both (i) and (ii) iv) none of these

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

a) If P(A) = x , P(B) = y , P(A n B) = z then express $P(A\cup B)$, $P(A'\cap B')$, $P(A'\cap B)$, $P(A'\cup B)$ and $P(A'\cup B')$ in terms of x, y and z.

b) Define binomial distribution with parameters n and P. Find its pgf, hence or otherwise find mean and variance of the distribution.

c) If A and B are independent then show that :

i) A and B' are independent.

ii) A' and B are independent.

iii) A' and B'are independent.

Q3) Attempt any **Four** of the following : **[20]**

a) If $A \subseteq B$ then show that $P(A) \subseteq P(B)$

b) Define partition of the sample space. write the statement of Bayes' theorem.

c) Define expectation of a random variable x.

Show that $E(ax+b) = aE(x) + b$

d) Find the recurreance relation for probabilities of binomial distribution.

e) Find mean and variance for Poisson distribution.

f) Suppose x is a discrete random variable with Pmf

$$P(x=x)=\begin{cases} k \quad x^2, & \text{x}=1,2,3 \\ 0 & \text{ow} \end{cases}$$

Find k and E(x).

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C – 257

Total No. of Pages : 3

B.C.S. (Part - I) (Semester - II) Examination, 2013

STATISTICS (Paper - III)
Descriptive Statistics - II
Sub. Code : 58180

y and Date : Saturday, 04 - 05 - 2013

me : 3.00 p.m. to 5.00 p.m.

Total Marks : 50

Instructions : 1) All questions are compulsory.

2) Use of calculators and statistical table is allowed.

2) Figures to the right in the bracket indicate full marks.

1) Choose the correct alternative : **[10]**

a) If $\gamma_2 < 0$, then the frequency curve is _____.

i) mesokurtic
ii) platykurtic
iii) leptokurtic
iv) any of the above

b) If $r = \pm 1$, the angle between the two lines of regression is _____.

i) 90°
ii) 45°
iii) 0°
iv) 30°

c) If there exists perfect correlation between X and Y then correlation coefficient (r) is _____.

i) 0
ii) 1
iii) −1
iv) −1 or +1

d) If $byx = -\left(\frac{1}{4}\right)$ and $bxy = -1$ then correlation coefficient (r) is _____.

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

e) Given two regression lines as $X + 4Y - 8 = 0$ and $X - 2Y + 4 = 0$ then Mean $(\overline{X}, \overline{Y})$ of X and Y are _____.

i) (4, 5)
ii) (2, 1)
iii) (4, 1)
iv) (0, 2)

P.T.O.

f) For a platykurtic curve _____.
   i) $\gamma_2 < 0$ ii) $\gamma_2 > 0$
   iii) $\gamma_2 = 0$ iv) $\beta_2 < 3$

g) The partial regression coefficient $b_{12.3}$ is of order _____.
   i) one ii) two
   iii) zero iv) three

h) Expenditure on Advertisement and scale have _____.
   i) Positive correlation ii) Negative correlation
   iii) Perfect Negative correlation iv) No correlation

i) Correlation coefficient always lies between _____.
   i) 0 to 1 ii) −1 to 1
   iii) 0 to ∞ iv) −∞ to ∞

j) Given that, Mean = 1, Variance = 3 and $\mu_3 = 0$ then given distribution is _____.
   i) positively skewed ii) negatively skewed
   iii) symmetric iv) leptokurtic

Q2) Attempt any two of the following : **[10 + 10 = 20]**

a) When are two Variables said to be correlated? Describe scatter diagram and explain its utility in the study of correlation.

b) Define multiple and partial correlation coefficient for a trivariate data. State their limits. State the necessary and sufficient condition for the three regression planes to coincide.

c) Derive the two equations of lines of regression by using least square method.

Q3) Attempt any four of the following : **[5 + 5 + 5 + 5 = 20]**

a) State the properties of regression coefficients.

b) If $R_{1.23} = 1$, then show that $R_{2.13} = 1 = R_{3.12}$.

c) If correlation coefficient between two random variables X and Y is 0.8, find the correlation coefficient between

   i) 12X and 10Y ii) $\frac{X-12}{S}$ and $\frac{12-Y}{S}$

   iii) $\frac{X}{12}$ and $\frac{Y}{12}$

   Justify your answer.

d) Compute regression coefficient from the following data.

$n = 8$, $\sum(X-45) = -40$, $\sum(X-45)^2 = 4400$

$\sum(Y-150) = 280$, $\sum(Y-150)^2 = 167432$,

$\sum(X-45)(Y-150) = 21680$

e) Describe scatter diagrams.

f) Explain the term Kurtosis.

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Seat No.	

B.C.S. (Part - I) (Semester - I) Examination, November - 2014
STATISTICS (Paper - II) (New)
Probability and Discrete Probability Distributions
Sub. Code : 59701

Day and Date : Wednesday, 05 - 11 - 2014 **Total Marks : 50**

Time : 12.00 noon. to 2.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of calculator and statistical table is allowed.**

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

i) If sample space of an experiment has n sample points then its power set contains.

a) 3^n subsets b) 2^n subsets

c) 2n subsets d) 3n subsets

ii) For a sample space $\Omega = \{e_1, e_2, e_3, e_4\}$, $P(e_1) = P(e_2) = \frac{1}{8}$ $P(e_3) = K$, $P(e_4) = \frac{1}{2}$. For what value of K will this be a probability model.

a) 0 b) $\frac{1}{3}$

c) $\frac{1}{4}$ d) $\frac{1}{8}$

iii) If A and B are independent events then p(A|B) is

a) P(A) b) P(B)

c) $\frac{P(A)}{P(B)}$ d) 0

iv) Symbolic notation of occurance of both the events A and B is

a) $A \cup B$ b) $A \cap B$

c) $(A \cup B)'$ d) $(A \cap B)'$

v) If $E(x) = 2$ and $E(x^2) = 6$ then $V(x)$ is

a) 2 b) 4

c) 6 d) 8

vi) If $E(x) = 4$ then $E(3x-1)$ is

a) 4 b) 3

c) 11 d) 12

vii) If $x \sim B(10, 0.4)$ then mean of x is

a) 8 b) 2.4

c) 10 d) 4

viii) A distribution in which the probability at each draw is $\frac{1}{n}$ then the distribution is

a) Uniform b) Binomial

c) Poisson d) None of these

ix) If X and Y are poisson variates with parameters 2 and 3 then the distribution of X+Y is

a) P(1) b) P(6)

c) P(5) d) P(3)

x) If for a binomial variate mean is 12 and variance is 6 then the value of n is

a) 6 b) 24

c) 12 d) 3

Q2) Attempt any two : **[10 + 10 = 20]**

a) If A and B are independent then show that

i) A and B' are Independent

ii) A' and B are Independent

iii) A' and B' are Independent

b) Define binomial distribution with parameters (n,p). Find mean and variance.

c) Define the following terms with suitable example.

i) Random experiment

ii) Sample space

iii) Event

iv) Power set

v) Impossible event

Q3) Attempt any <u>four</u> : **[5 + 5 + 5 + 5 = 20]**

a) If $B \subset A$ then show that $P(B/A) = \dfrac{P(B)}{P(A)}$ & $P(A|B) = 1$.

b) Suppose X is discrete random variable with p.m.f.

$$P(X=x) = \begin{cases} \dfrac{x+1}{10}, & x = 0,1,2,3 \\ 0, & O.w. \end{cases}$$ Find mean and variance of X.

c) Define mathematical expectation of a discrete random variable X and show that E(aX+b) = aE(x) + b where a and b are any constants.

d) Define discrete Uniform distribution and find its mean.

e) Find the recurrence relation for probabilities of poisson distribution.

f) Define pairwise and mutual independence for three events A,B and C.

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C - 467

Total No. of Pages :4

Seat No.	

B.C.S. (Part - I) (Semester - I) Examination, November- 2017
STATISTICS (Paper - II)
Probability and Discrete Probability Distributions
Sub. Code: 59701

Day and Date :Friday, 17 - 11 - 2017 **Total Marks : 50**
Time :3.00 p.m. to 5.00 p.m.

Instructions :
1) **All questions are compulsory.**
2) **Figures to the right indicate full marks.**
3) **Use of calculator and statistical table is allowed.**

Q1) Choose the Correct Alternative. **[10]**

a) If one card is drawn at random from a well shuffled pack of 52 card, then probability that the card is not a diamond is ________.

i) 13/52 ii) 3/4

iii) 1/13 iv) 1/2

b) If X has Poisson distribution, then ________.

i) Mean = Variance ii) Mean > Variance

iii) Mean < Variance iv) None of these

c) ________ condition is true for independence of 2 events A and B

i) $P(A \cap B) = P(A).P(B)$ ii) $P(A / B) = P(A)$

iii) $P(B / A) = P(B)$ iv) All the above

P.T.O.

d) Consider the following probability distribution:

X	1	2	3	4
P(X)	1/4	1/4	1/4	1/4

The value of median is ________.

i) 2

ii) 3

iii) 1

iv) Not unique value

e) If $X \rightarrow B(n,p)$ with mean 2 and variance 1 then values of n,p are ________.

i) 2,0.10

ii) 10,0.4

iii) 4,0.5

iv) None of these

f) If A and B are independent events with $P(A)=1/2$, $P(A \cup B)=2/3$ then $P(B^c/A)=$ ________.

i) 1/3

ii) 1/2

iii) 2/3

iv) 1

g) Probability of the event either A or B happens is ________.

i) P(A).P(B)

ii) P(A)+P(B)

iii) $P(A \cup B)$

iv) $P(A \cap B)$

h) In a single throw of a die, the outcomes of a variable of the type ________.

i) Discrete random variable

ii) Continuous random variable

iii) Both (i) and (ii)

iv) None of these

i) Mean of discrete uniform distribution on 1,2,3,............ n is ________.

i) $\frac{n+1}{2}$ ii) $\frac{n-1}{2}$

iii) $\frac{n(n-1)}{2}$ iv) $\frac{n}{2}+1$

j) If a fair coin is tossed twice then probability both heads is

i) 0 ii) 1/8

iii) 1 iv) 1/4

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

a) Define Discrete random variable. A discrete random variable X has following probability distribution:

X	−2	−1	0	1	2	3
P(X)	0.1	k	0.2	2k	0.3	3k

Find

i) k

ii) Distribution function

iii) $P(X \geq 2)$

iv) $P(-2 < X < 2)$

v) $P(X = odd)$

b) Define Binomial distribution. State real life examples, mean, variance, recurrence relation and additive property of binomial distribution.

c) Define probability of event. If A and B events defined on sample space, then prove that:

i) If A is subset of B then $P(A) \leq P(B)$.

ii) $P(A \cup B) = P(A) + P(B) - P(A \cap B)$.

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

a) If A and B are independent events then, show that

i) A and   ii) A^c and B^c are independent.

b) Define distribution function. State it's properties.

c) The customers are arriving to a service counter on an average rate of 2 customers per minute. Find probability that

i) no customer will arrive in one minute

ii) three customers will arrive in one minute.

iii) at least two will arrive in one minute

d) Let A,B,C are thre mutually exclusive and exhaustive events defined on sample space. If $3P(A) = 2P(B) = P(C)$. Find $P(A \cup B)$.

e) If X is a r.v. with pmf

$P(X = x) = kx$; $x = 1,2,3$

Find k, E(X) and Var(X).

f) Given that $P(A_1) = P(A_2) = P(A_3) = 1/3$ and $P(B/A_1) = 2/7$, $P(B/A_2) = 4/9$

and $P(B/A_3) = 1/5$. Find $P(A_1/B)$.