Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/BBA(H)/BIRM/BSCM/SEM-2/BBA-203/2012

2012

STATISTICS - II

Time Allotted : 3 Hours Full Marks : 70

The figures in the margin indicate full marks.

Candidates are required to give their answers in their own words as far as practicable.

GROUP – A

(Multiple Choice Type Questions)

1. Choose the correct alternatives for any *ten* of the following : $10 \times 1 = 10$

i) Probability of the sample space is

a) 1 b) 4

c) $\frac{1}{7}$ d) none of these.

ii) If $\bar{A}$ is the complement of the event A, then

a) $P(\bar{A}) = 1 - P(A)$ b) $P(\bar{A}) = P(A)$

c) $P(\bar{A}) = P(A) - 1$ d) none of these.

iii) If a die is rolled thrice, the total number of possible outcomes is

a) 6 b) 216

c) 36 d) none of these.

iv) A box contains 6 white and 4 black balls. One ball is drawn at random, the probability that it is white is

a) $\frac{2}{5}$ b) $\frac{3}{5}$

c) $\frac{4}{5}$ d) none of these.

v) If A and B are two independent events, then $P(AB)$ is equal to

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

c) $P(A)P(B)$ d) none of these.

vi) In a binomial distribution the mean and standard deviation are 12 and 2 respectively. Then n is

a) 16 b) 18

c) 20 d) none of these.

vii) If a random variable X follows a Poisson ditribution with parameter m, then the mean and variance of the distribution are respectively

a) m and $\frac{1}{m}$ b) $\frac{1}{m}$ and m

c) $\frac{1}{m}$ and $\frac{1}{m}$ d) m and m.

viii) The probability density function (*p.d.f.*) of a random variable is $f(x) = kx(x - 1)$, where $1 \leq x \leq 2$.

Then the value of k is

a) $\frac{6}{5}$ b) $\frac{1}{2}$

c) $\frac{8}{9}$ d) 1.

ix) A binomial distribution may be approximated by a Poisson distribution provided

a) n is small and p is large

b) n is large and p is small

c) n is large and p is large

d) n is small and p is small.

x) The expectation of a random variable cannot be negative.

a) True b) False

c) Partially True d) None of these.

xi) Let X follows normal distribution with mean 10 and variance 25, then $E(2x + 3)$ is equal to

a) $\frac{5}{4}$ b) $\frac{5}{2}$

c) 5 d) none of these.

xii) Accepting false null hypothesis is a error of

a) Type I b) Type III

c) Type II d) Sampling.

xiii) $E(XY) = E(X)E(Y)$ implies that the random variables X and Y are

a) independent b) uncorrelated

c) linearly related d) none of these.

xiv) Critical region is a region of

a) acceptance b) rejection

c) indecision d) none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following. $3 \times 5 = 15$

2. In a shooting competition, the probability of a man hitting the target is $\frac{1}{5}$. If he fires 5 times, what is the probability of hitting the target at least twice ?

3. There are two identical boxes containing respectively 4 white and 3 red balls & 3 white and 7 red balls. A box is chosen at random and a ball is drawn from it. Find the probability that the ball is white.

4. Prove that for two discrete random variablex X and Y $E(X + Y) = E(X) + E(Y)$.

5. Find the maximum likelihood estimate for parameter having Poisson distribution.

6. If a random variable X has mean m and stanard deviation σ, show that

$E\left(\frac{x-m}{\sigma}\right) = 0$ and $E\left(\frac{x-m}{\sigma}\right)^2 = 1$.

GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following. $3 \times 15 = 45$

7. a) The probability that Asok can solve a problem is $\frac{4}{5}$, that Amal can solve is $\frac{2}{3}$ and that Abdul can solve is $\frac{3}{7}$. If all of them try independently, find the probability that the problem will be solved.

b) If A and B are independent events and $P(A) = \frac{2}{3}$, $P(B) = \frac{3}{5}$, find $P(A + B)$, $P(A^c/B)$ and $P(A^c B)$.

c) If A and B are independent events, then prove that

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

ii) A^c and B are also independent. 5 + 4 + 6

8. a) State Baye's theorem.

b) Urn-1 contains 5 red and 5 black balls, urn-2 contains 4 red and 8 black balls and urn-3 contains 3 red and 6 black balls. One urn is chosen at random and a ball is drawn. The colour of the ball is black. What is the probability that it has been drawn from urn-3 ?

c) If A and B are two events not necessarily mutually exclusive, prove that

$P (A + B) = P (A) + P (B) – P (AB)$. 3 + 7 + 5

9. a) The following table gives the number of aircraft accidents that occurred during various days of a week. Find whether the accidents are uniformly distributed over the week. 8

Days	SUN	MON	TUE	WED	THU	FRI	SAT
Nos. of accidents	6	8	8	20	11	9	14

Given : $\Psi^{2}_{6,\ 0{\cdot}05} = 12{\cdot}59$.

b) X is a continuous random variable with probability density function given by

$f (x) = kx \ (0 \le x < 2)$

$= 2k \ (2 \le x < 4)$

$= – kx + 6k \ (4 \le x < 6)$

Find k and mean value of X. 7

10. a) Show that the sample mean is consistent and unbiased estimate of the population mean but sample variance is consistent but biased estimate of population variance. 8

b) If a random variable X follows normal distribution such that $P\ (\ 9{\cdot}6 < X < 13{\cdot}8\ ) = 0{\cdot}7008$ and $P\ (\ X > 9{\cdot}6\ ) = 0{\cdot}8159$ where the standard normal variable Z satisfies $P\ (\ Z < 0{\cdot}9\ ) = 0{\cdot}8159$ and $P\ (\ Z < 1{\cdot}2\ ) = 0{\cdot}8849$, find the mean and variance of X. 7

11. a) In a survey of buying habits, 400 women shoppers are chosen at random in supermarket A located in a certain section of the city. Their average weekly food expenditure is Rs. 250 with a standard deviation of Rs. 40. For 400 women shoppers chosen at random in supermarket B in another section of the city, the average weekly food expenditure is Rs. 220 with a standard deviation of Rs. 55. Test at 1% level of significance whether the average weekly food expenditure of the two populations of shoppers are equal. 8

b) The joint probability distribution of the random variables X and Y is shown below :

Y / X	0	1	2
2	0·05	0·10	0·25
4	0·15	0·05	0·15
6	0·10	0·10	0·05

Find,

i) the conditional distribution of X, given $Y = 1$

ii) the conditional distribution of X, given $Y = 2$

iii) the probability $P\ (\ X + Y > 6\ )$. 7