Name :	
Roll No. :	Consider and Excellent
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 \overline{A} is the complement of the event *A*, then

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

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CS/BBA(H)/BIRM/BSCM/SEM-2/BBA-203/201 If a die is rolled thrice, the total number of possible iii) outcomes is e infa 216 a) 6 b) 36 none of these. c) d) A box contains 6 white and 4 black balls. One ball is iv) drawn at random, the probability that it is white is $\frac{2}{5}$ $\frac{3}{5}$ b) a) $\frac{4}{5}$ d) none of these. c) 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.

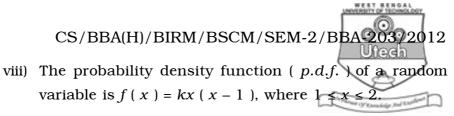
vi) In a binomial distribution the mean and standard deviation are 12 and 2 respectively. Then n is

- 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)
$$m \text{ and } \frac{1}{m}$$
 b) $\frac{1}{m}$ and m

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

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Then the value of k is

a)
$$\frac{6}{5}$$
 b) $\frac{1}{2}$
c) $\frac{8}{9}$ d) 1.

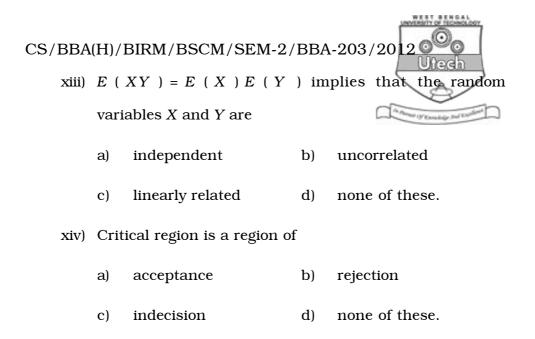
- ix) A binomial distribution may be approximated by a Poisson distribution provided
 - a) *n* is small and *p* is large
 - b) n is large and p is small
 - c) *n* is large and *p* is large
 - d) n is small and p is small.
- x) The expectation of a random variable cannot be negative.
 - a) True b) False
 - 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.

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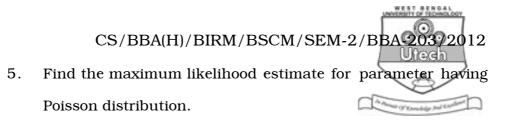
GROUP – B

(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 variables X and YE(X + Y) = E(X) + E(Y).

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

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

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
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- 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.

Days	SUN	MON	TUE	WED	THU	FRI	SAT
Nos. of accidents	6	8	8	20	11	9	14
Given : $\Psi^{2}_{6, 0.05} = 12.59$.							

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

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

= 2k (2 \le x < 4)
= -kx + 6k (4 \le x < 6)

Find k and mean value of X.

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- 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* (9.6 < X < 13.8) = 0.7008 and *P* (X > 9.6) = 0.8159 where the standard normal variable *Z* satisfies *P* (Z < 0.9) = 0.8159 and *P* (Z < 1.2) = 0.8849, 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.
 - 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

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- ii) the conditional distribution of *X*, given Y = 2
- iii) the probability P(X + Y > 6).

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