| 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.

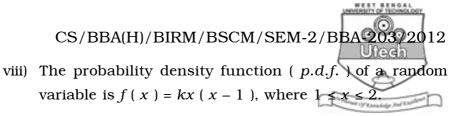
vi) In a binomial distribution the mean and standard deviation are 12 and 2 respectively. Then n is

- 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.

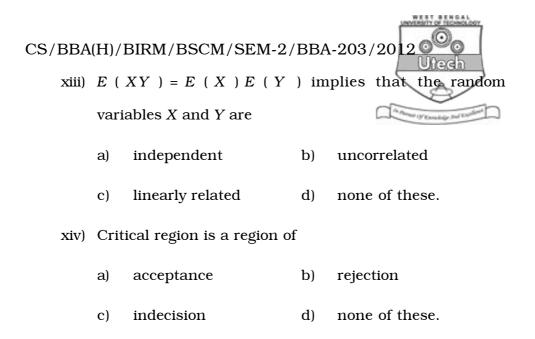
- ix) A binomial distribution may be approximated by a Poisson distribution provided
  - a) *n* is small and *p* is large
  - b) n is large and p is small
  - c) *n* is large and *p* is large
  - d) n is small and p is small.
- x) The expectation of a random variable cannot be negative.
  - a) True b)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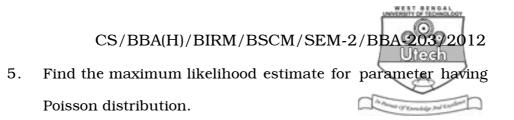
### GROUP – B

#### ( 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<sup>c</sup>/B) and P (A<sup>c</sup> 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<br>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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