



Name : .....  
Roll No. : .....  
Invigilator's Signature : .....

**CS/BBA(H)/BIRM/BSCM/SEM-2/BBA-203/2013**

**2013  
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) If 5 coins are tossed simultaneously, the total number of possible outcomes is
    - a) 10
    - b) 32
    - c) 5
    - d) 16.
  - ii) Events are mutually exclusive when
    - a) they can appear simultaneously
    - b) they cannot appear simultaneously
    - c) they disappear one after another
    - d) they are non-existing.



iii)  $E ( X )$  of the Probability Distribution

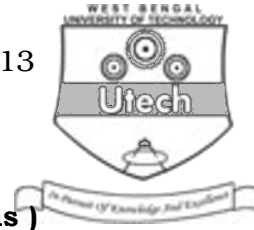
$X :$	1	2	3	4	5	6
$f(x) :$	0.05	0.43	0.27	0.12	0.09	0.04

is given by

- |        |         |
|--------|---------|
| a) 2.8 | b) 1.6  |
| c) 5   | d) 7.9. |
- iv) If two cards are drawn from a well shuffled pack of 52 cards, the probability that both the cards are of same colour is
- |                  |                   |
|------------------|-------------------|
| a) $\frac{1}{4}$ | b) $\frac{3}{4}$  |
| c) 1             | d) none of these. |
- v) The condition for Binomial Distribution is
- |                         |                           |
|-------------------------|---------------------------|
| a) Trials are dependent | b) Trials are independent |
| c) Trials are equal     | d) None of these.         |
- vi) If population size is 100, sample size is 4, S. D. = 2. The standard error of sample mean in SRSWR is
- |      |       |
|------|-------|
| a) 4 | b) 6  |
| c) 1 | d) 0. |
- vii) For Binomial distribution, if  $n = 4$ ,  $p = \frac{1}{3}$ , then variance is
- |                  |                    |
|------------------|--------------------|
| a) $\frac{2}{9}$ | b) $\frac{4}{3}$   |
| c) $\frac{8}{9}$ | d) $\frac{2}{3}$ . |



- viii) The mean of uniform distribution  $f(x) = k, a < x < b$  is
- a)  $a/(a + b)$                       b)  $(a + b)/2$   
 c)  $(a - b)/2$                       d) None of these.
- ix) When two perfect coins are tossed simultaneously, the probability of getting at least one head is
- a)  $\frac{1}{2}$                                       b) 0  
 c)  $\frac{3}{4}$                                       d) none of these.
- x) If a random variable  $X$  follows Poisson distribution, with parameter  $m$ , then mean and variance are respectively
- a)  $m$  and  $1/m$                       b)  $1/m$  and  $m$   
 c)  $1/m$  and  $1/m$                       d)  $m$  and  $m$ .
- xi) 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)  $\frac{2}{3}$ .
- xii) Type-II error of statistical decision reflects
- a) rejecting a true null hypothesis  
 b) accepting a false alternative hypothesis  
 c) accepting a false null hypothesis  
 d) all of these.



**GROUP – B**

**( Short Answer Type Questions )**

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

2. Two bags contain respectively 3 white, 7 red, 5 green balls and 5 white, 3 red, 10 green balls. One ball is drawn at random from the first bag and is put into the second, then a ball is drawn from the second bag. What is the probability that the ball drawn from the second bag is green ?
3. The following table is the joint probability distribution of two random variables,  $X$  and  $Y$  :

$X \searrow$ Y	0	1	2	3	Total
2	$1/8$	$1/8$	$1/8$	$1/8$	$1/2$
3	$1/16$	$1/8$	0	$1/16$	$1/4$
4	$1/16$	0	$1/8$	$1/16$	$1/4$
Total	$1/4$	$1/4$	$1/4$	$1/4$	1

- i) Find conditional distribution of  $X$  given  $Y = 3$
  - ii) Find covariance between  $X$  and  $Y$  and comment.
4. Intelligence test on two groups of boys and girls gave the following results :

	Mean	S.D.	$N$
Girls	75	15	150
Boys	70	20	250

Is there a significant difference in the mean scores obtained by boys and girls ? Test at 1% level of significance.



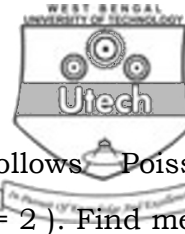
5. A die was thrown 9000 times and a throw of 3 and 4 observed 3240 times. Show that the die cannot be regarded as unbiased.
6. In a sample of 900 stockholders of companies 400 stated that their major aim in holding stock is capital appreciation. Find –
- i) 90%
  - ii) 95%
- confidence range within which lies the population proportion of stockholders who hold stocks for capital appreciation.  
(  $z$  at 90% = 1.645 and 95% = 1.96 )

**GROUP – C**

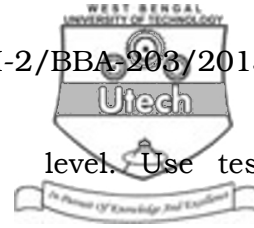
**( Long Answer Type Questions )**

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

7. a) Suppose that the probability is 0.55 for a birth of a male child and two successive births are independent. If a woman is to have 5 children, what is the probability that she will have three sons and two daughters ?
- b) The letters of the word PROBABILITY are arranged at random. What is the probability that the arrangement begins as well as ends with the letter 'I'.
- c) What are the properties of probability model of the Binomial distribution ?  $5 + 5 + 5$



8. a) A discrete random variable  $X$  follows Poisson distribution such that  $P(X = 1) = P(X = 2)$ . Find mean and variance of the distribution.
- b) The mean of a normal distribution is 50 and 5% of the values are greater than 60. Find the standard deviation of the distribution. ( Given  $P(0 < Z < 1.64) = 0.45$ ,  $Z$  being a standard normal variate).
- c) For the following *p.d.f.*, find the value of  $k$  :
- $$f(x) = k e^x, \text{ for } -\infty < x < 0$$
- $$= k e^{-x}, \text{ for } 0 < x < \infty$$
- 5 + 5 + 5
9. A population consists of the numbers 1, 3, 5, 7 and 9.
- a) Enumerate all possible samples of size two which can be drawn from the population without replacement.
- b) Show that the mean of the sampling distribution of the sample means is equal to the population mean.
- c) Calculate the variance of the sampling distribution of the sample mean and show that it is less than the variance of the sample drawn with replacement.
- 2 + 5 + 8
10. a) Random samples of 400 men and 600 women were asked whether they would like to have a flyover near residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis that the proportions of men and women in favour of the proposal are same



against that they are not, at 5% level. Use test statistic  $Z$ , where  $Z$  follows  $N(0,1)$ .

- b) The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64 and 66 inches. Is it reasonable to believe that the average height is greater than 64 inches ? Test at 5 % level of significance. Use  $t$ -distribution (Tabulated  $t$  at 9 d.f. at 5% level of significance is 1.833). 7 + 8

11. a) Define null and alternative hypothesis, Type I and Type II error.

- b) What is Analysis of Variance ? Test the hypothesis that there is difference between the mean outputs of the following 4 processes :

Process	Process outputs						
1	11	15	14	12	10		
2	9	11	16	25	17	8	15
3	9	14	21	10	12	16	
4	17	19	13	21			

{ Given :  $F_{0.05}(3, 18) = 3.16$ ;  $F_{0.01}(3,18) = 5.09$  } 6 + 9