



Name : .....

Roll No. : .....

Invigilator's Signature : .....

**CS/BSM/SEM-2/BSM-202/2013  
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 × 1 = 10

i) If  $\bar{A}$  be the complement of an 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.



- ii) For a Binomial Distribution with parameters  $n = 4$  and  $P = \frac{1}{3}$ , the variance is

- a)  $\frac{2}{9}$                                       b)  $\frac{4}{3}$   
c)  $\frac{8}{9}$                                       d)  $\frac{2}{3}$ .

- iii) For a Poisson Distribution given  $P(x = 3) = \frac{e^{-6} (6)^3}{3!}$ , the mean is

- a) 2    b) 6  
c) 12    d) none of these.

- iv) A card is drawn from a full pack of playing cards. What is the probability that it is either a King or Queen ?

- a)  $\frac{1}{13}$     b)  $\frac{2}{13}$   
c)  $\frac{4}{13}$     d) None of these.

- v) Area under standard normal curve between  $Z = +2$  and  $Z = -2$  is

- a) 95.45%                                      b) 68.27%  
c) 99.75%                                      d) none of these.



vi) If  $A, B, C, D$  are equally likely, mutually exclusive and exhaustive events, then  $P(A)$  equals

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

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

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

d)  $\frac{2}{3}$ .

vii) In which of the following distributions are the mean and the variance same ?

a) Binomial

b) Poisson

c) Uniform

d) Normal.

viii) The normal distributions is

a) continuous probability distribution

b) discrete probability distribution

c) both (a) and (b)

d) none of these.

ix) The mean of a uniform distribution  $f(x) = K, a < x < b$  is

a)  $\frac{a}{a+b}$

b)  $\frac{a+b}{2}$

c)  $\frac{a-b}{2}$

d) none of these.

- a)  $-\frac{3}{4}$                       b)  $\frac{3}{4}$
- c)  $\frac{4}{3}$                          d)  $-\frac{4}{3}$ .

- a)  $\frac{72}{7}$                       b) 12
- c) 14                         d) none of these.

- a)**     $\alpha$

**c)**     $1 - \alpha$

**b)**     $\beta$

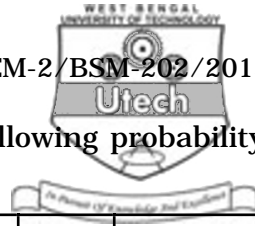
**d)**     $1 - \beta .$

**( Short Answer Type Questions )**

$$3 \times 5 = 15$$

2. Given  $P(A) = \frac{1}{2}$ ,  $P(B) = \frac{1}{3}$ ,  $P(AB) = \frac{1}{4}$

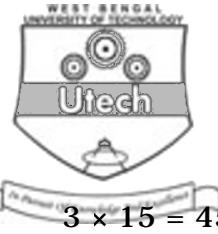
Find  $P(\bar{A})$ ,  $P(A \cup B)$ ,  $P(A / B)$ ,  $P(\bar{A} B)$ ,  $P(\bar{A} \bar{B})$ .



3.  $X$  is discrete random variate having the following probability mass function :

$X:$	0	1	2	3	4	5	6	7
$P(X = x):$	0	$K$	$2K$	$2K$	$3K$	$K^2$	$2K^2$	$7K^2 + K$

- i) Determine the constant  $K$ .
  - ii) Find  $P(x < 6)$ .
4. The diameter of an electric cable  $X$  is assumed to be continuous random variable with p.d.f.  $= 6x(1 - x)$ ,  $0 \leq x \leq 1$ . Check that  $f(x)$  is a p.d.f. Determine a number  $b$  such that  $P(x < b) = P(x > b)$ .
5. If  $X$  is normally distributed and the mean of  $X$  is 12 and s.d. is 4, find
- i)  $P(X < 20)$
  - ii)  $P(X \geq 20)$
- Given  $\phi(2) = 0.9772$
6. The means of two sample of size 50 and 100 are 54.4 and 50.3 respectively and the s.d. are 8 and 7 respectively. Obtain the mean and s.d. of the combined groups.

**GROUP – C****( Long Answer Type Questions )**Answer any *three* of the following.

$3 \times 15 = 45$

7. a) An IQ test was administered to 5 persons before and after they are trained. The results is given below :

	<b>I</b>	<b>II</b>	<b>III</b>	<b>IV</b>	<b>V</b>
IQ Before Training	110	120	123	132	125
IQ After Training	120	118	125	136	121

Test whether there was any change in IQ after training programme ( Given  $t_{0.01(4)} = 4.6$  ).

- b) Given mode = 155.75, find the missing frequencies.

Total frequency is 1000 :

<b>Class</b>	130 - 139	140 - 149	150 - 159	160 - 169	170 - 179
<b>Frequency</b>	105	?	325	?	120

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

<b>Days</b>	Sun	Mon	Tue	Wed	Thur	Fri	Sat
<b>No. of accidents</b>	18	20	9	12	11	7	15

Given  $\chi^2_{0.05,6} = 12.59$



- b) The average marks obtained by two groups in an examination were found to be 75 and 85 respectively. Determine the ratio of students in two groups if the average marks for all students was 80.
9. The following data give the yields on 12 plots of the land in three samples, each of four plots under three varieties of fertilizers *A*, *B*, *C*.

<i>A</i>	<i>B</i>	<i>C</i>
25	20	24
22	17	26
24	16	30
21	19	20

Is there any significant difference in the average yields of the land under the three varieties of fertilizers ? ( Given the value of  $F(2, 9)$  at 5% level of significance is 4.26 ).

10. a) The number of automobile accidents per week in a certain community were as follows :

12, 8, 20, 2, 14, 10, 15, 6, 9, 4

Are these frequencies in agreement with the belief that accident conditions were the same during this 10 week period ?

- b) Ten cartons are taken at random from an automatic filing machine. The mean net weight of the 10 cartons is 11.8 oz and s.d. is 0.15 oz. Does the sample mean differ significantly from the intended weight of 10 oz ?

You are given that for  $\gamma = 9$ ,  $t_{0.05} = 2.25$



11. a) There are 3 children in a family. What is the probability that they include
- i) exactly 2 girls ?
  - ii) not more than one girl ?
- b) Probability that a man will be alive 25 years hence is 0.3 and the probability that his wife will be alive 25 years hence is 0.4. Find the probability that 25 years hence (i) both will be alive (ii) only the man will be alive.
- c) In a normal distribution, 31% of items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.
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