



Name :
Roll No. :
Invigilator's Signature :

CS/BSM(NEW)/SEM-2/BSM-202/2012

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 × 1 = 10

i) If \bar{A} be the component of an event A , then

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

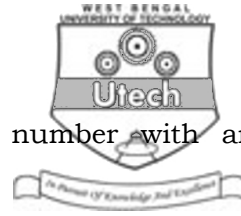
c) $P(\bar{A}) = P(A) - 1$ d) none of these.

ii) For a binomial distribution with parameters $n = 4$,

$p = \frac{1}{3}$, the variance is

a) $\frac{2}{9}$ b) $\frac{4}{3}$

c) $\frac{8}{9}$ d) $\frac{2}{3}$.



iii) The chance of throwing an even number with an ordinary six faced die is

- a) $\frac{1}{2}$
- b) $\frac{1}{6}$
- c) $\frac{1}{3}$
- d) none of these.

iv) The mean of a binomial distribution is

- a) npq
- b) npq^2
- c) np
- d) n^2p^2 .

v) 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.

vi) The regression lines are $2x + 3y - 4 = 0$ and $x + 2y + 6 = 0$. The correlation coefficient between x and y is

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



vii) Two samples of sizes 9 and 8 give the sum of squares of deviations from their respective means equal to 160 inches² and 91 inches² respectively. Then their *F*-distribution is

- | | |
|--------------------|---------------------|
| a) $\frac{20}{13}$ | b) $\frac{160}{91}$ |
| c) $\frac{13}{20}$ | d) $\frac{91}{160}$ |

viii) Sampling distribution is usually the distribution of

- | | |
|--------------|--------------|
| a) parameter | b) statistic |
| c) mean | d) variance. |

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

- | | |
|--|---|
| a) <i>N</i> is small & <i>p</i> is large | b) <i>N</i> is large & <i>p</i> is small |
| c) <i>N</i> is small & <i>p</i> is small | d) <i>N</i> is large & <i>p</i> is large. |

x) In chi-square test, the sample observation must be

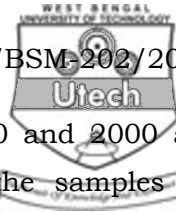
- | | |
|---------------------|-------------------|
| a) dependent | b) independent |
| c) both (a) and (b) | d) none of these. |

xi) Sampling errors occur due to

- | | |
|-----------------|-----------------|
| a) substitution | b) negligence |
| c) framing | d) compilation. |

xii) The percentage area under standard normal curve between -2 and 2 is

- | | |
|----------|-------------------|
| a) 68.27 | b) 95.45 |
| c) 99.73 | d) none of these. |



5. The means of simple samples of sizes 1000 and 2000 are 67.5 cm and 68.0 cm respectively. Can the samples be regarded as drawn from the same population of S.D. 2.5 cm ?
6. There are three bags : first containing 1 white, 2 red, 3 green balls; second containing 2 white, 3 red, 1 green balls and third containing 3 white, 1 red, 2 green balls. Two balls are drawn from a bag chosen at random. These are found to be one white and one red. Find the probability that the balls so drawn came from the second bag.

GROUP – C

(Long Answer Type Questions)

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

7. a) The probability density function of a variable x is given :

$X:$	0	1	2	3	4	5	6
$P(X):$	k	$3k$	$5k$	$7k$	$9k$	$11k$	$13k$

- i) Find $P(X < 4), P(X \geq 5), P(3 < X \leq 6)$
- ii) What will be the minimum value of k so that $P(X \leq 2) > 3$?
- b) A problem in mechanics is given to three students A, B and C whose chances of solving it are $\frac{1}{2}, \frac{1}{3},$ and $\frac{1}{4}$ respectively. What is the probability that the problem will be solved.
- c) If the probability of a bad reaction from a certain injection is 0.001, determine the chance that out of 2000 individuals more than two will get a bad reaction.



8. a) In a city *A*, 20% of a random sample of 900 school boys had a certain slight physical defect. In another city *B*, 18.5% of a random sample of 1600 school boys had the same defect. Is the difference between the proportions significant ?

b) The nine items of a sample have the following values :
 45, 47, 50, 52, 48, 47, 49, 53, 51. Does the mean of these differ significantly from the assumed mean of 47.5 ? 8 + 7

9. a) The average marks obtained by two groups in an examination were found to be 75 and 85 respectively. Determine the ratio of students in the two groups if the average marks for all students was 80.

b) 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 :

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

Given $\chi^2_{0.05,6} = 12.59$. 7 + 8

10. a) Fit a Poisson distribution to the following data and test for its goodness of fit at level of significance 0.05 :

<i>x</i> :	0	1	2	3	4
<i>f</i> :	419	352	154	56	19



- b) Let X [cm] and Y [cm] be the diameters of a pin and a hole respectively. Suppose that (X , Y) has the density

$$f(x,y) = \begin{cases} 625 & , \text{ if } 0.98 < x < 1.02, 1.00 < y < 1.04 \\ 0 & , \text{ otherwise} \end{cases}$$

- i) Find the marginal distributions.
- ii) What is the probability that a pin chosen at random will fit a hole whose diameter is 1.00 ?

7 + 8

11. a) In a referendum 60% of voters voted in favour. A random sample of 200 voters was selected. What is the probability that in the sample

- i) more than 130 voted in favour ?
- ii) between 105 and 130 inclusive voted in favour ?
- iii) 120 voted in favour ?

- b) A and B throw alternatively with a pair of dice. A wins if he throws 6 before B throws 7 and B wins if he throws 7 before A throws 6. If A begins, find his chance of winning.

8 + 7

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