Name : …………………………………………………………

Roll No. : …………………………………………………………

Invigilator's Signature : …………………………………………

CS/HM/SEM-3/BHM-302/2011-12

2011

BIO-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)   Two events are said to be mutually exclusive if

   a)   the sum of their probabilities is less than 1·00

   b)   the sum of their probabilities is more than 1·00

   c)   they contain in every possible outcome of an experiment

   d)   they cannot occur at the same time.

   ii) If $A^{\prime}$ is the complement of event A and $P(A) = 0.50$, then $P(A \text{ and } A^{\prime}) =$

   a)   0·00   b)   0·25

   c)   0·50   d)   0·75.

3079   [Turn over

iii) Which of the following is not a measure of central tendency ?

a) Mean

b) Median

c) Mode

d) Standard deviation.

iv) The normal curve is perfectly symmetrical about the

a) mean

b) median

c) mode

d) none of these.

v) If the S.D. of x is 6, then S.D. of $3x + 10$ is

a) 6

b) 12

c) 18

d) 24.

vi) The median of the following data :

4, 7, 10, 7, 9, 15, 12, 7, 9, 6

is

a) 7

b) 8

c) 9

d) 10.

vii) In a single throw of a die, the probability of getting a multiple of 3 is

a) $\dfrac{1}{2}$

b) $\dfrac{1}{3}$

c) $\dfrac{1}{6}$

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

viii) The mode of a frequency distribution can be determined graphically from

a)   Histogram   b)   Frequency curve

c)   Ogive   d)   Frequency polygon.

ix)   The first and third quartiles Q1 and Q3 of a variable x are 5 and 17 respectively. Then the Quartile deviation is

a)   6   b)   8

c)   10   d)   none of these.

x)   When one regression coefficient is negative, the other would be

a)   negative   b)   positive

c)   zero   d)   none of these.

xi)   The area under standard normal curve between

$Z = + 1$ and $Z = - 1$ is

a)   95·45%   b)   68·27%

c)   99·75%   d)   74·52%.

xii) Chi-square test is a

a)   parametric test   b)   non-parametric test

c)   both (a) and (b)   d)   none of these.

GROUP – B

(Short Answer Type Questions)

Answer any *three* of the following.   3 × 5 = 15

2. Ages at death (years) of 50 persons of a town are given below :

   36, 48, 50, 45, 49, 31, 50, 48, 43, 42, 37, 32, 40, 39, 41, 47, 45, 39, 43, 47, 38, 39, 37, 40, 32, 52, 56, 31, 54, 36, 51, 46, 41, 55, 58, 31, 42, 53, 32, 44, 53, 36, 60, 59, 41, 53, 58, 36, 38, 60

   Arrange the data in a frequency distribution in 12 class-intervals and find out A.M.

3. The mean of 5 observations is 4·4 and the variance is 8·24. If three observations are 4, 6 and 9, find the other two.

4. *A, B* and *C* are three mutually exclusive and exhaustive events. Find $P (B)$, if $1/3P (C) = 1/2P (A) = P (C)$.

5. You are given that the variance of x is 9. The regression equations are $8x – 10y + 66 = 0$ and $40x – 18y = 214$. Find (i) average values of x and y, (ii) correlation coefficient between the two variables and (iii) Standard deviation of y.

6. Write short notes on the following :

   a) Type I and Type II errors

   b) Test of significance.
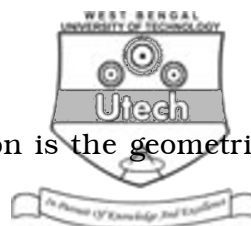
GROUP – C

(Long Answer Type Questions)

Answer any *three* of the following.   3 × 15 = 45

7. In a cardiological unit, there are three cardiologists namely, *A, B* and *C* who perform 20%, 30% and 50% of the total number of surgical operations. It has been observed that 5% of the cases are undertaken by *A*, 4% of the cases undertaken by *B* and 2% of the cases undertaken by *C* need external guidance from some specialist doctors. One patient has been chosen at random from the operated patients and is found to have been operated with external guidance. Find out the probability that patient was operated by cardiologist *A*, cardiologist *B* and cardiologist *C*.

8. a) Construct Grouped Frequency Distribution and Cumulative Frequency Distribution from the following :

Marks	No. of Students
Below 10	15
Below 20	35
Below 30	60
Below 40	84
Below 50	106
Below 60	120
Below 70	125

  b) An urn contains 8 white and 3 red balls. If two balls are drawn at random, find the probability that

  i) both are white

  ii) both are red.   7 + 8

9. a) Prove that the coefficient of correlation is the geometric mean of the coefficients of regression.

   b) The mean and S.D. of a group of 25 observations were found to be 30 and 3 respectively. After the calculations were made, it was found that two observations were incorrect, which were recorded as 29 and 31. Find the mean and S.D. if the incorrect observations are excluded. 7 + 8

10 a) Distinguish between Discrete Variable and Continuous Variable. Give examples.

   b) The following data are given for marks in Mathematics and Statistics at a certain examination :

 | | *Mathematics* | *Statistics* |
   |---|---|---|
   | Mean Marks | 5 | 25 |
   | S.D. of Marks | 5 | 4 |

   Coefficient of correlation between them is 0·6. Find two regression equations. 7 + 8

11. a) The following results were obtained from records of age (x) and Systolic Blood Pressure (y) of a group of 10 women :

	x	y
Mean :	53	142
Variance :	130	165

   $\sum \left(x - \bar{x} \right)\left(y - \bar{y} \right) = 1220.$

   Find the approximate regression equation and use it to estimate the blood pressure of a women whose age is 45.
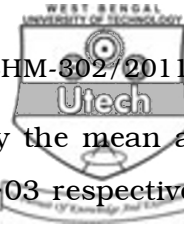
b) In a sample of 120 workers in a factory the mean and S.D. of wages were Rs. 11·35 and Rs. 3·03 respectively. Find the percentage of workers getting the wages between Rs. 9 and Rs. 17 in the whole factory, assuming that the wages are normally distributed.

(Area between $z = 0$ and $z = 0·78$ is $0·2823$ and between $z = 0$ and $z = 1·86$ is $0·4686$).   7 + 8