Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/HM/SEM-3/BHM-302/2010-11

2010-11

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 × 1 = 10

i) Simultaneous classification of units on the basis of two or more characteristics is called

a) mani-fold classification

b) simple classification

c) submani-fold classification

d) none of these.

ii) Empirical relation between mean, median and mode is

a) Mean – Mode = (Mean – Median)

b) Mean – Mode = 2 (Mean – Median)

c) Mean + Mode = 3 (Mean + Median)

d) Mean – Mode = 3 (Mean – Median).

iii) The median of 4, 12, 7, 9, 14, 17, 16 and 21 is

a) 15 b) 14

c) 13 d) 8.

iv) The range of the values 40, 51, 47, 39, 60, 64, 57 are

a) 25 b) 35

c) 45 d) none of these.

v) If the relation between variables X and Y is given by $Y = 2X$ and SD of X is 8, then SD of Y is given by

a) 4 b) 8

c) 16 d) none of these.

vi) If the first and third quartiles are 22·16 and 56·36 respectively, then quartile deviation is

a) 17·1 b) 34·2

c) 51·3 d) none of these.

vii) If a digit is chosen at random from the digits 1, 2, 3, 4, 5, 6, 7, 8, 9 then the probability that it is odd, is

a) $\frac{4}{9}$ b) $\frac{5}{9}$

c) $\frac{1}{9}$ d) $\frac{2}{3}$.

viii) If $P(E) = 0{\cdot}5$ then $P(\text{not } E) =$

a) – 0·05 b) 0·5

c) 0·9 d) 0·95 .

ix) The Chi-square and t distribution are both

a) always symmetrical distribution

b) dependent on the number of degree of freedom

c) used for hypothesis testing

d) both (a) and (b).

x) 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.

xi) An unbiased coin is tossed once, the probability of head is

a) 0·25 b) 0·50

c) 0·75 d) 1.

xii) The probability that a leap year has 53 Sundays is

a) $\frac{1}{7}$ b) $\frac{2}{7}$

c) $\frac{5}{7}$ d) none of these.

GROUP – B

(Short Answer Type Questions)

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

2. The age distribution of the patients admitted to a hospital in a particular day is as follows :

Age groups (in years)	30 - 35	35 - 40	40 - 45	45 - 50	50 - 55
Frequency	4	2	8	7	2

Draw both the ogives (less than and more than types) for this distribution.

3. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, $P(AB) = \frac{1}{4}$ then obtain the values of $P(A + B)$, $P(AB^C)$ and $P(A^C + B^C)$.

4. Find the standard deviation of the following :

Marks	0 - 10	10 - 20	20 - 30	30 - 40	40 - 50	50 - 60
No. of students	10	20	30	40	50	30

5. The probability that a student of BHM passes in Bio-statistics test is $\frac{2}{3}$ and probability that he passes both a Bio-statistics and Health-economics test is $\frac{14}{45}$. The probability that he passes at least one test is $\frac{4}{5}$. What is the probability that he passes the Health-economics test ?

6. A drug is given to 10 patients and the increments in their blood pressure were recorded to be 3, 6, – 2, 4, – 3, 4, 6, 0, 0, 2. Is it reasonable to believe that the drug has no effect on change of blood pressure ?

{ tabulated value of $| t |$ = 2·26 at 5% level, d.f. = 9 }.

GROUP – C
(Long Answer Type Questions)

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

7. a) The mean weight of 500 male students at a certain college is 151 kg and the s.d. is 15 kg. Assuming that the weights are normally distributed, find how many students weigh.

   i) between 120 and 155 kg

   ii) more than 155 kg

   [Given that Φ (0·27) = 0·6064 and Φ (2·07) = 0·9808 where Φ (z) denotes the area under standard normal curve to the left of the ordinate at z]

   b) In an experiment on pea breeding, Mendell observed the following frequencies of seed. Round and Yellow — 315, Wrinkled and Yellow — 101, Round and Green — 108, Wrinkled and Green — 32. Total — 556. Theory predicts that the frequency should be in a proportion 9 : 3 : 3 : 1. Examine the correspondence between theory and the observation.

   [Given that 5% value of χ^2 for 3 d.f. is 7·815] 8 + 7

8. a) Find the coefficient of variation from the following data :

Weight	***Frequency***
110 — 119	5
120 — 129	7
130 — 139	12
140 — 149	20
150 — 159	16
160 — 169	10
170 — 179	7
180 — 189	3

b) The probability of *X*, *Y* and *Z* becoming the principal of a certain college are respectively 0·3, 0·5 and 0·2. The probabilities that "students aid fund" will be introduced in the college if *X*, *Y*, *Z* becomes the principal are 0·4, 0·6 and 0·1 respectively. Given that "student aid fund" has been introduced, find the probability that *Y* has been appointed as the principal. 8 + 7

9. a) From the following frequency distribution find the values of f_1 and f_2. Given that median is 57·5 and total frequency, *N* = 90.

Values	20 - 29	30 - 39	40 - 49	50 - 59	60 - 69	70 - 79	80 - 89	90 - 99	Total
Frequency	2	12	15	f_1	18	f_2	9	4	90

b) Draw a pie chart from the following data :

Principal exporting countries of cotton

Countries	***USA***	***India***	***Egypt***	***Brasil***	***Argentina***
'**000 *bales***	300	600	350	250	500

8 + 7

10. a) The equations of two regression lines in a correlation analysis are as follows :

$3x + 2y = 26$ and $6x + y = 31$.

A student obtained the mean value of $x = 7$, mean value of $y = 4$ and correlation coefficient (r) = + 0·5. Do you agree with him ? If not, suggest your results.

b) In order to find correlation coefficient between two variables x and y from 7 pairs of observations the following calculations were made :

$\sum x = 68$, $\sum y = 64$, $\sum x^2 = 704$, $\sum y^2 = 658$, $\sum xy = 675$.

It was found later on the pair ($x = 5$, $y = 4$) was copied wrongly.

Instead of the correct value ($x = 7$, $y = 3$). Find the correct value of correlation coefficient. 8 + 7

11. a) In the contingency table given below, obtained from a sample of 60 persons, test the independence of hair colour and eye colour of persons.

Eye colour	***Hair colour***	
	Light	***Dark***
Blue	24	6
Brown	8	22

(Given that the tabulated value of chi square distribution with 1 d.f. is 3·84 at 5% level)

b) The diastolic blood pressure of 40 patients admitted to a hospital are as follows :

68, 84, 75, 82, 68, 90, 62, 88, 76, 93, 73, 79, 88, 73, 60, 93, 71, 59, 85, 75, 61, 65, 75, 87, 74, 62, 95, 78, 63, 72, 66, 78, 82, 75, 94, 77, 69, 74, 68, 60.

Analyse the data in 8 bp groups to construct a frequency distribution table. Find mean blood pressure.8 + 7