Name : .....

Roll No. : .....

Invigilator's Signature : .....

CS/HM/SEM-3/BHM-302/2009-10

2009

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) What is the probability that the sum of the two numbers appeared in throwing two perfect dice is 5 ?

a) 1/9 b) 1/6

c) 2/3 d) 2/9.

ii) Coefficient of variation is a/an

a) relative measure of dispersion

b) absolute measure of dispersion

c) relative measure of central tendency

d) absolute measure of central tendency.

iii) The intersection of two ogives represents

a) mean b) median

c) mode d) frequency density.

iv) If $y = 2x + 5$ and s.d. of x is 12, then s.d. of y is

a) 12 b) 6

c) 24 d) 29.

v) The number of children per family is a

a) discrete data

b) continuous data

c) raw data

d) secondary data.

vi) Each observation of a data set is doubled. The median will be

a) the same

b) doubled

c) half of the previous median

d) cannot be said.

vii) The range of the data 10, 12, 24, 20, 9, 8 is

a) 24 b) 11

c) 16 d) 8.

viii) Frequency density is

a) class frequency / class width

b) class frequency / upper limit of the class

c) class frequency / total number of observations

d) class frequency / lower liit of the class.

ix) Correlation coefficient lies between

a) – 1 to 1 b) 0 to 1

c) 1 to 10 d) 0 to 10.

x) Chi-square test is a

a) parametric test b) non-parametric test

c) both d) none of these.

xi) If four events P, Q, R, S are exhaustive, mutually exclusive and equally likely, the probability of occurrence of each of them will be

a) 0·2 b) 0·25

c) 0·75 d) 0·55.

xii) Two events A and B are independent and $P(A) = \frac{1}{4}$ and $P(B) = \frac{3}{10}$. Then $P(AB)$ is

a) $\frac{13}{40}$ b) $\frac{11}{20}$

c) $\frac{3}{40}$ d) 0.

xiii) To test the difference between the means of two samples of small sizes, which of the following tests is used ?

a) Z-test b) t-test

c) χ^2-test d) F-test.

GROUP – B

(Short Answer Type Questions)

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

2. Given $P(AB) = \frac{1}{3}$, $P(A + B) = \frac{2}{3}$, find $P(B)$. What is $P(A)$, if $P(AB) = \frac{1}{6}$?

3. Find the number of families belonging to expenditure group 20 – 40 and 60 – 80, given the median to be 50.

Expenditure	0-20	20-40	40-60	60-80	80-100
No. of families	14	?	27	?	15

4. State Bayes' theorem on conditional probability. How does it help in medical sciences ?

5. Distinguish between statistic and parameter. Give examples.

6. For two events A and B, let $P(A) = 0{\cdot}4$, $P(A + B) = 0{\cdot}7$ and $P(B) = p$. For what value of p are A and B (i) mutually exclusive, (ii) independent ?

GROUP – C

(Long Answer Type Questions)

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

7. a) A random sample of size 20 from a normal population gives the sample mean of 42 and the sample standard deviation of 6. Test the hypothesis that the population mean is 44. Value of t with 19 degrees of freedom at 5% level is 2·09.

   b) Find the correlation coefficient between the ages of husband and wife :

Age of Husband	23	27	28	29	30	31	33	35	36	39
Age of Wife	18	22	23	24	25	26	28	29	30	32

7 + 8

8. a) Three students *A*, *B* and *C* are given a problem in statistics. The probabilities of their solving the poblem are $\frac{3}{4}$, $\frac{2}{4}$ and $\frac{1}{4}$ respectively. What is the probability that if all of them try the problem, it would be solved ?

b) The incidence of occupational disease is such that on the average 20% of workers suffer from it. If 10 workers are selected at random, find the probability that (i) exactly 2 workers suffer from the disease, (ii) not more than 2 workers suffer from the disease.

7 + 8

9. a) 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.

b) Prove that the coefficient of correlation is the geometric mean of the coefficients of regression. 12 + 3

10. a) 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 of the observations were incorrect, which were recorded as 29 and 31. Find the mean and S.D., if the incorrect observations are excluded.

b) Draw a Pie-chart from the following data :

Principal Exporting Countries of Cotton

Countries	USA	India	Egypt	Brazil	Argentina
'000 Bales	300	600	350	250	500

10 + 5

11. a) 5 identical coins are tossed 320 times and the number of heads appearing each time is recorded. The results are

Number of heads	0	1	2	3	4	5	Total
Frequency	14	45	80	112	61	8	320

Would you conclude that the coins are biased ?

(Given $\chi^2_{0\cdot05} = 11\cdot07$ and $\chi^2_{0\cdot01} = 15\cdot09$ with

5 degrees of freedom).

b) A manufacturer claimed that at least 90% of the components which he supplied conformed to specifications. A random sample of 200 components showed that only 164 were up to the standard. Test the claim at 5% level of significance. (Area under standard normal curve for $z \leq -1\cdot645$ is 5%). 8 + 7

12. Marks obtained by 10 students in Economics and Statistics are given below :

Marks in Economics	25	28	35	32	31	36	29	38	34	32
Marks in Statistics	43	46	49	41	36	32	31	30	33	39

Find

i) the two regression equations.

ii) the coefficients of correlation between marks in Economics and Statistics.

iii) the most likely marks in Statistics when the marks in Economics is 30.