C 61275 (Pages : 3) Name..................................

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FOURTH SEMESTER B.Sc. DEGREE EXAMINATION, APRIL 2019

(CUCBCSS—UG)

Microbiology

MBY 4C 16 (P)—BIOSTATISTICS

Time : Three Hours Maximum : 32 Marks

Use of Calculator and Statistical table is permitted.

Part A

Answer **all** *questions.*
Each question carries ½ mark.

Fill in the blanks (Questions 1 - 3) :

1. How many cases need to appear in one category for chi-square ?
2. The error degrees of freedom in one way ANOVA with 5 treatments and total of 20 observations is ————.
3. If $r_{xy} = -0.84$ then $r_{yx} =$ ————, where r is the co-efficient of correlation.

State True *or* False (Questions 4 - 6) :

4. In Regression Analysis two regression lines intersect at the point (0, 0)
5. The null hypothesis for the Chi-Square test of independence should specify that the two categorical variables are independent.
6. Multiple correlation co-efficient takes value between – 1 and + 1.

(6 × ½ = 3 marks)

Part B (Short Answer Type Questions)

Answer **all** *questions.*
Each question carries 2 marks.

7. Given the two regression lines $3x + 12y = 10$ and $3y + 9x = 46$ find means of x and y.
8. Find the correlation between x and y in a bivariate distribution for 8 pairs of observations with $\sum x = 544, \sum y = 552, \sum x^2 = 37028, \sum y^2 = 38132$ and $\sum xy = 37560$.
9. In a trivariate population $r_{12} = 0.53, r_{13} = 0.45, r_{23} = 0.62$. Find multiple correlation co-efficient

10. Compute the chi-square statistic for testing independence of attributes for the following contingency table :

	Knowledge of Diseases		
Major Field	Good	Poor	Total
Premedical	31	91	122
Other	19	359	378
Total	50	450	500

11. Develop Two Way ANOVA table from the following information

Number of treatments = 3 ; Number of Blocks = 4 ; Total Sum of Squares = 485 ; Treatment Sum of Squares = 137 and Block sum of squares = 142.

(5 × 2 = 10 marks)

Part C (Short Essays)

Answer any **three** *questions.*
Each question carries 3 *marks.*

12. Two researchers classified some people into different income categories on the basis of sampling studies and their results are given below. Test whether the sampling techniques adopted by the researchers are similar or not :

	Poor	Middle	Rich
Researcher A	220	80	20
Researcher B	180	170	30

13. The correlation between yield and number of panicle based on a sample of 7 plants of paddy was found to be 0.86. Test whether the correlation of the population can be equal to 0.9.

14. In a study of a disease, reported the following severity scores of patients with none, mild, and high. On the basis of One way ANOVA may we conclude that the mean severity scores differ among the three populations represented in the study ?

Non severe : 18 18 20 21 23 23 24 26 26 27 28 29 29 30 30 30 32

Mild severe : 10 16 22 22 23 26 28 28 29 29 29 30 31 32 32 33

High Severe : 17 24 26 27 29 30 30 33 34 35 35 36 39

15. The following table shows the distribution of Inpatient occupancy ratio on a sample 250 hospitals. Test the goodness of fit of these data to a normal distribution with $\mu = 69.91$ and $\sigma = 19.02$.

Inpatient occupancy ratio	Observed Frequency
0 to 39.9	16
40 to 49.9	18
50 to 59.9	22
60 to 69.9	51
70 to 79.9	62
80 to 89.9	55
90 to 99.9	22
100 to 109.9	4

(3 × 3 = 9 marks)

Part D (Essays)

Answer any **one** *question.*
The question carries 10 *marks*

16.

X	:	10	12	13	16	17	20	25
Y	:	19	22	26	27	29	33	37
Z	:	16	21	25	27	19	18	34

(i) Find the multiple correlation co-efficient $R_{2.13}\left(R_{y.xz}\right)$.

(ii) Find the partial correlation co-efficient $r_{12.3}\left(r_{xy.z}\right)$.

17. A nursing supervisor in a local health department wished to study the influence of time of day on length of home visits by the nursing staff. It was thought that individual differences among nurses might be large, so the nurse was used as a blocking factor. The nursing supervisor collected the following data :

	Length of home visit by time of day			
Nurse	Early Morning	Late Morning	Early Afternoon	Late Afternoon
A	27	28	30	23
B	31	30	27	20
C	35	38	34	30
D	20	18	20	14

Test whether there is any difference in length of home visit among the different times of day using two way ANOVA. Also test whether there are any individual differences among the nurses.

(1 × 10 = 10 marks)