

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

M.Sc. DEGREE EXAMINATION – MEDICAL LAB. TECHNOLOGY

THIRD SEMESTER – APRIL 2010

ST 3901 - STATISTICAL APPLICATIONS IN BIOLOGICAL SCIENCES

Date & Time: 28/04/2010 / 9:00 - 12:00 Dept. No.

Max. : 100 Marks

PART-A

Answer ALL the following:

(10 x 2 = 20)

- 1) Write down the various measures of central tendency.
- 2) If there are two samples of size n_1 and n_2 respectively with means \bar{x}_1 and \bar{x}_2 , what is the combined mean of the two samples taken together?
- 3) Calculate Bowley's coefficient of Skewness using the given information $Q_1=26$, $Q_2 = 32$ and $Q_3 = 42$.
- 4) Define Correlation.
- 5) Write down the normal equations of the regression equation.
- 6) Define Null hypothesis.
- 7) What is Type-I error?
- 8) Give the test statistic for paired t-test.
- 9) State any two applications of Chi-square.
- 10) Write down the ANOVA table of one way classification.

PART – B

Answer any FIVE of the following:

(5 x 8 = 40)

11) The life (in days) of 100 insects are distributed as follows:

Life	0-50	50-100	100-150	150-200	200-250	250-300
Number of insects	10	20	15	20	15	10

Draw a histogram and a frequency polygon.

12) The lengths of 200 parasites in the human blood were measured to the nearest micron as given in the following table. Calculate the mean and standard deviation of this distribution.

Length	10-19	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	32	42	40	56	20	6	2	2

13) The following table shows the ages (X) and systolic blood pressure (Y) of 8 persons:

Age(X)	56	42	60	50	54	49	39	45
Blood pressure(Y)	160	130	125	135	145	115	140	120

Fit a linear regression equation of Y on X and estimate the blood pressure of a person of 70 years.

14) Obtain the rank correlation co-efficient for the following data:

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

- 15) Samples of one year old adult male Tilapia were collected one from each of two geographically isolated lakes and their body lengths were measured to the nearest millimeter. From the data below, determine whether there is statistically significant difference between the males of two populations in terms of body length.

Sample	I	II
Size	42	56
Mean	74	78
Variance	225	169

- 16) Medical examination of students of city colleges showed that 432 girls out of 1437 and 152 boys out of 441 had defective eye sight. Test whether there is any association between sex and defect in vision.

- 17) Twelve pre-school were given a supplement of multipurpose food for a period of four months. Their skin fold thickness (in mm) was measured before the commencement of the programme and also at the end. The values obtained are given in table below. Test if there is any change in their skin fold thickness.

S.No.	1	2	3	4	5	6	7	8	9	10	11	12
At the beginning	6	8	8	6	5	9	6	7	6	6	4	8
At the end	8	8	10	7	6	10	9	8	5	7	4	6

- 18) Apply one way analysis of variance to the following data on plankton density in ponds A,B,C and D and find out whether the variance in the density of planktons in different ponds is significant.

Density (mg/litre)			
Pond A	Pond B	Pond C	Pond D
16	23	29	33
18	22	24	29
20	26	32	36
30	32	35	41
32	36	36	44

PART – C

Answer any TWO of the following:

(2 x 20 = 40)

- 19)(a) Weight (g) of 50 fishes of a species and their frequency are given below:

Weight(in gm)	6-10	11-15	16-20	21-25	26-30	31-35
Frequency	7	5	15	9	8	6

Calculate Quartile deviation and also co-efficient of Q.D. (10)

- (b) Find the moments, coefficient of Skewness and Kurtosis based on moments,

X	3	4	5	7	8	11
f	1	2	2	5	4	2

(10)

20) Find the multiple regression equation of Symbol-Digit Modalities Test (SDMT) on Scores of Vocabulary (V) and Abstraction Components (A.C).

SDMT	60	70	90	90	70	80	60	120
V	45	80	70	85	60	55	75	90
A.C	0.9	0.3	1.2	0.5	0.4	1.6	0.1	2.0

Estimate the SDMT score when scores in Vocabulary and Abstraction Components are 88 and 0.7 respectively. (20)

21 (a) The following table gives the detail about 96 HIV patients with Human Papilloma Virus (HPV). Test for the independence of HIV infection and HPV status at 5% level.

HIV

HPV	Seropositive Symptomatic	Seropositive Asymptomatic	Seronegative
Positive	23	4	10
Negative	10	14	35

(10)

(b) Body length of 10 goats of a species of goat was obtained from two different locations of a country. They were measured as:

Location A	20	24	20	28	22	20	24	32	24	26
B	12	10	8	10	6	4	14	20	10	6

Calculate and show the mean difference in total body length between goats in the two locations is significant or not. (10)

22) Given the table of time required to learn the use of a certain Prosthetic Device.

Teaching method

Age group	A	B	C
Under 20	7	9	10
20-29	8	9	10
30-39	9	9	12
40-49	10	9	12
50 and above	11	12	14

Test whether there is any significant difference among teaching methods and test whether there is any significant difference among age group in the use of Prosthetic device. (20)
