

LOYOLA COLLEGE (AUTONOMOUS), CHENNAI – 600 034

B.Sc. DEGREE EXAMINATION – PL. BIO.&BIOTE.& ADV. ZOO.

THIRD SEMESTER – NOVEMBER 2007

ST 3203 / 3201 - BIOSTATISTICS

BB 29

Date : 05/11/2007
Time : 9:00 - 12:00

Dept. No.

Max. : 100 Marks

SECTION – A

Answer all questions.

$10 \times 2 = 20$

1. Give any two properties of arithmetic mean
2. What is a frequency polygon?
3. In a certain high school class consisting of 60 girls and 40 boys it is observed that 24 girls and 16 boys wear eye glasses. If a student is picked at random from this class, what is the probability that the student wears eyeglasses given that the student is a boy.
4. Let X be a random variable having the following probability distribution.
X : -1 -2 0 1 2
P(X=x): 0.3 0.1 0.1 0.2 0.3
Find the distribution of $Y=2X+3$.
5. Define Skewness of a distribution. Give an example for the same.
6. Define Unbiased Estimator.
7. What is meant by contingency table?
8. Give the structure of one-way ANOVA table.
9. What are non-parametric tests?
10. If the mean number of serious accidents for a year in a large factory is five, find the probability that in the current year, there will be exactly seven accidents.

SECTION – B

Answer any FIVE questions

$5 \times 8 = 40$

11. The following table shows the age distribution of cases of a certain disease reported during a year in a particular state

Age	Number of cases
5-14	5
15-24	10
25-34	20
35-44	22
45-54	13
55-64	5

Compute the mean , median and mode.

12. In a large population, 16 percent of the members are left-handed. If a random sample of size 10 is taken from this population, find the probability that the number of left-handed members will be
 - (i) Exactly two
 - (ii) Less than two
 - (iii) Between one and four
13. Explain the concepts of correlation and regression with an example each.
14. Compute the sampling distribution of 'range' based on all possible samples of size '2' from the population consisting of values 10,15,17,19,12,14 and verify whether the sample range is an unbiased estimator for the population range.
15. a) What is meant by Confidence Interval?
b) A sample of 10 twelve-year old girls and a sample of 10 twelve-year old boys yielded mean heights , respectively 59.8 inches and 58.5 inches. Assuming normal distributions of height with $\sigma_1 = 2$ inches and $\sigma_2 = 3$ inches, find the 90 percent confidence interval for $\mu_1 - \mu_2$. Interpret the above Confidence interval.

16. Researchers wish to know if the urban and rural adult residents of a developing country differ with respect to the prevalence of blindness. A survey revealed the following information:

Group	Number in sample	Number blind
Rural	300	24
Urban	500	15.

Do these data provide sufficient evidence to indicate a difference in the prevalence of blindness in these two populations? Let $\alpha = 0.05$.

17. An experiment was conducted to compare three methods of packaging certain frozen food. The criterion was the ascorbic acid content (mg/100 gm) after a specified period of time. The following data were obtained.

Packaging Method

A	B	C
14.29	20.06	20.04
19.10	20.64	26.23
19.09	18.00	22.74
16.25	19.56	24.04
15.09	19.47	23.37
16.61	19.07	25.02
19.63	18.38	23.27

Do these data provide sufficient evidence at the 1% level of significance to indicate a difference in packaging methods?

18. Explain the various scales of measurement with examples.

SECTION – C

Answer any TWO questions

2 x 20 = 40

19. The following are the scores made on an Intelligence test by a group of children who participated in an experiment.

Scores	Frequency
10-19	5
20-29	19
30-39	10
40-49	13
50-59	4
60-69	4
70-79	2

a) Draw a box plot and interpret it

b) Compute mean deviation about mean and its coefficient (10+10)

20. a) Two methods of measuring cardiac output were compared in 10 experimental animals with the following results

Cardiac output

Method I (X)	Method II (Y)
0.8	0.5
1.0	1.2
1.3	1.1
1.4	1.3
1.5	1.1
1.4	1.8
2.0	1.6
2.4	2.0
2.7	2.4
3.0	2.8

Compute the Karl Pearson's correlation coefficient.

b) The following are the numbers of a particular organism found in 100 samples of water from a pond.

Number of organisms Per sample	Frequency
0	15
1	30
2	25
3	20
4	5
5	4
6	1
7	0

Fit a Poisson distribution for the above data and test the goodness of fit at 5% level.

(10+10)

21. Subjects in different age groups participated in an experiment to compare three methods of relieving stress. Each subject was placed in a stressful situation on three different occasions. Each time a different method for reducing stress was used with the subject. The response variable is the amount of decrease in stress level as measured before and after treatment application. The results were as follows:

Subject	A	B	C
1	16	26	22
2	16	20	23
3	17	21	22
4	28	29	36

Test the hypothesis that there is no difference between the three methods and no difference between the age groups. Let $\alpha = 0.05$.

(20)

22. a) Independent simple random samples from two strains of mice used in experiment yielded the following measurements on plasma glucose levels following a traumatic experience :

Strain A: 54, 99, 105, 46, 70, 87, 55, 58, 139, 91

Strain B: 93, 91, 93, 150, 80, 104, 128, 83, 88, 95, 94, 97

Assuming the population variances are equal, test the hypothesis that the mean plasma – glucose levels are equal for both strains of mice. Take $\alpha = 0.05$.

b) Explain the procedure for Mann-Whitney test.

(12 +8)
