

(26) SARDAR PATEL UNIVERSITY

M.Sc. IGBT, Second Semester
 Wednesday, 12th December, 2012
 Time: 2:30 p.m. to 5:30 p.m.
 Course Code: PS02CIGB06
 Course Title: Biostatistics

Total marks: 70

Note: Figures to right indicate marks.

Q.1 Choose the most appropriate alternative for the following:

[8]

1. The measure of central tendency associated with observation having maximum frequency is called
 (a) Mean (b) Median (c) Mode (d) None of these
2. Which of the following is a unit-less measure of dispersion?
 (a) Mean (b) Median (c) Coefficient of variation (d) None of these.
3. Probability of selecting white ball from a box containing 5 white & 6 black balls is
 (a) 1/2 (b) 5/11 (c) 1/11 (d) 1/6
4. If for two variables, value of correlation coefficient is 1, then the correlation is
 (a) Perfectly positive (b) Perfectly negative
 (c) Partially correlated (d) Not correlated
5. In testing of hypothesis, if calculated value of statistic is not less than tabular value, H_0 is
 (a) Not rejected (b) Rejected (c) Both (a) and (b) (d) None of these.
6. For testing equality of two population means, which of the following test is most suitable?
 (a) χ^2 test (b) ANOVA (c) t test (d) None of these.
7. In testing of hypothesis, probability of committing type – I error is denoted by,
 (a) α (b) β (c) μ (d) Both (a) and (b).
8. In Poisson distribution, λ refers to
 (a) No. of success (b) No. of failures (c) Average (d) Probability of success

Q.2 Attempt any seven of the following:

[14]

1. Give merits and demerits of *median*.
2. Give formula of range and coefficient of variation for ungrouped data.
3. Define Binomial distribution.
4. State Addition law for probability.
5. Give null and alternative hypothesis for two sample t – test (i.e. t – test for significance of a difference between two means).
6. Explain: Correlation.
7. Give equation of regression line for two variables X and Y.
8. Define: Sample space, Mutually exclusive events
9. Define any two statistical measures you have studied.

Q.3 A. Following is the data giving frequency distribution of ages of 189 subjects:

[6]

class	10-20	20-30	30-40	40-50	50-60	60-70
Frequency	18	26	17	5	16	10

Find mean, mode and median for the data.

B. For the data mentioned in Q.3 A above, evaluate standard deviation, mean deviation and coefficient of variation. [6]

OR

B. Define Measure of Central tendency. Name some of them which you have studied. Mention need of Measure of Central tendency for the statistical investigation. [6]

Q.4 A. Let A represent the event that a particular individual is exposed to high levels of *carbon monoxide* and B the event that he or she is exposed to high levels of *nitrogen dioxide*. (i) What is the event $A \cap B$? (ii) What is the event $A \cup B$? (iii) What is the complement of A? (iv) Are the events A and B *mutually exclusive*? Why? (v) If probability of A and B are 0.25 and 0.55 respectively, evaluate $P(A \cap B)$. [6]

B. A pharma company manufactures vaccines using two machines equally. Machine A and machine B manufacture 1% and 2% *defective vaccines* resp. A vaccine, randomly selected from production house found to be *defective*. What is the probability that, it was manufactured by *machine A*? [6]

OR

B. (i) The no. of cases of tetanus reported in the United States during a single month in 1989 has a *Poisson distribution* with parameter $\lambda = 4.5$. What is the probability that *exactly one case* of tetanus will be reported during a given month? What is the probability that *four or more cases* of tetanus will be reported during a given month? [6]

(ii) The time T required for digestion of one unit of a certain food is normally distributed with the mean 35 minutes and standard deviation 4 minutes. What is the probability that a unit of food is digested in more than 40 minutes?

Q.5 A. (i) The following data show the blood pressure reduction (in mm Hg) caused in 10 animals [6]
20, 18, 15, 12, 8, 16, 18, 17, 14, 21.

Test the hypothesis that the blood pressure reduction for the population is 15 mm Hg.

(ii) Give testing procedure of two sample t – test.

B. Data on the hair color and the eye color are given in the table. Calculate the χ^2 -value. Determine the association between the hair color and the eye color. [6]

		Hair color		
		Fair	Brown	black
Eye color	Blue	15	20	5
	Gray	20	20	10
	Brown	25	20	15

OR

B. The table below shows the data obtained during the epidemic of cholera.

[6]

	<i>Attacked</i>	<i>Not attacked</i>
<i>Inoculated</i>	24	32
<i>Not inoculated</i>	50	14

Using χ^2 - test, examine the effectiveness of inoculation in preventing the susceptibility or attack of cholera.

Q.6 A. National Heart Research Institute conducted a study to check association between diastolic blood pressure and Cholesterol level and collected the following data. Calculate correlation coefficient for the data and obtain equation of regression line for the data.

[6]

<i>Diastolic blood pressure (mmHg)</i>	80	75	90	74	75	110	70	85	88	78
<i>Cholesterol level</i>	307	259	347	317	274	416	267	320	274	336

B. Three groups of six guinea pigs each were injected, respectively with 0.5 mg, 1.0 mg and 1.5 mg of a new tranquilizer and the following are the number of minutes it took to fall asleep:

[6]

<i>0.5 mg</i>	21	23	19	24	25	23
<i>1.0 mg</i>	19	21	20	18	22	20
<i>1.5 mg</i>	15	10	13	14	11	15

Using One way ANOVA, test the null hypothesis that, differences in dosage have no effect.

OR

B. Write testing procedure of Randomized Block Design (Two way ANOVA).

[6]
