

SEAT No. \_\_\_\_\_

No. of Printed Pages: 03

**(62 & A-34) Sardar Patel University****M. Sc. (Integrated) Biotechnology (IGBT) - 2<sup>nd</sup> Semester****Theory examination, November, 2017****Wednesday, 22<sup>nd</sup> November, 2017; Time: 02:00 p.m. to 05:00 p.m.****Subject: PS02CIGB06: Biostatistics****Total Marks: 70**

Notes: - 1) Figures to the right indicate marks.

2) Draw neat and labeled diagram, wherever necessary.

**Q.1 Choose the Correct Answers of the Following.****[08]**

- The average of absolute deviations from the central value of a data set is called  
(a) Mean (b) Mean deviation (c) Standard deviation (d) None of these
- Which of the following can be described as a variable?  
(a) Blood glucose level (b) Heart rate (c) Body weight (d) All of these
- What is the probability of getting a sum 9 from two throws of a dice?  
(a) 1/9 (b) 1/6 (c) 1/12 (d) 1/8
- Which of the following is a continuous probability distribution?  
(a) Binomial (b) Poisson (c) Normal (d) None of these
- A statement that is accepted if the sample data provide sufficient evidence that the null hypothesis is false is called:  
(a) Simple hypothesis (b) Composite hypothesis  
(c) Alternative hypothesis (d) Statistical hypothesis
- If the critical region is located equally in both sides of the sampling distribution of test-statistic, the test is called:  
(a) One tailed (b) Two tailed (c) Right tailed (d) Left tailed
- When the ratio of variations in the related variables is constant, it is called:  
(a) Linear correlation (b) Nonlinear correlation (c) Positive correlation (d) Negative correlation
- In the regression equation  $Y = a + bX$ , b is called:  
(a) Slope (b) Regression coefficient (c) Intercept (d) Both (a) and (b)

**Q.2 Answer the following in short. (Attempt Any Seven)****[14]**

- Give merits and demerits of median.
- Write merits and demerits of Geometric Mean.
- Define the terms: 1. Population 2. Sample
- Write properties of Binomial distribution.
- Define the terms: 1. Null event 2. Exhaustive events
- What is Chi-square test? Enlist the application of Chi-square test.
- What is a level of significant?
- Write properties of regression coefficient.
- Narrate the significance of correlation coefficient test.

- Q.3 (A) The marks obtained by 35 students of IGBT class are: [06]  
628, 665, 560, 328, 421, 525, 326, 480, 470, 405, 421, 664, 668, 620, 300, 305, 520, 420, 370, 326, 440, 328, 480, 565, 650, 480, 360, 325, 450, 360, 426, 440, 306, 488, 370.

Form a cumulative frequency table with class interval of 50. Calculate Mean, Median and Mode.

- Q.3 (B) What is Central tendency? Name some of them which you have studied. Mention need of Measure of Central tendency for Biotechnology experiments. [06]

OR

- Q.3 (B) Given below is the data on the height of plants grown under normal light. Calculate the Arithmetic mean and Standard deviation. [06]

Height	0 – 10	10 – 20	20 – 30	30 – 40	40 – 50	50 – 60
No. of plants	42	44	58	35	26	15

- Q.4 (A) (i) In a class there are 3 boys and 2 girls. 3 students are selected at random from the class. Find the probability that 2 boys and 1 girl or 1 boy and 2 girls are selected. [03]  
(ii) A card is drawn at random from a well shuffled pack of cards. Find the probability of getting a two of heart or a diamond. [03]

- Q.4 (B) Write in detail the conditions under which Poisson distribution is used and characteristics of Poisson distribution. [06]

OR

- Q.4 (B) There are two bags. One bag contains 4 white and 2 black balls. Second bag contains 5 white and 4 black balls. Two balls are transferred from first bag to second bag. Then one ball is taken from the second bag. Find the probability that it is a white ball. [06]

- Q.5 (A) A random blood sample for the test of fasting sugar of 10 boys give the following data in mg/dl : [06]

70, 120, 110, 101, 88, 83, 95, 107, 100, 98

Do these data support the assumption of population mean of 100 mg/dl?

[value of 't' for 9 degrees of freedom is 2.262]

- Q.5 (B) A tobacco company claims that there is no relationship between smoking and lung ailments. To investigate the claims random sample of 300 males in the age group of 40 to 50 is given medical test. The observed sample results are tabulated below: [06]

	Lung ailment	No lung ailment	total
Smokers	75	105	150
Non-smokers	25	95	120
Total	100	200	300

On the basis of chi-square test for goodness of fit, can it be concluded that smoking and lung ailments are independent?

[At 5% level of significance the value of ' $\chi^2$ ' value 3.841 for one degree of freedom]

OR

- Q.5 (B) The average number of articles produced by two machines per day is 200 and 250 with standard deviations 20 and 25 respectively on the basis of records of 25 days production. Can you regard both the machines equally efficient at 1% of significance? [06]  
[Tabulated  $t_{0.01, 48} = 2.58$ ]

- Q.6 (A) Explain the different types of correlation. Discuss different methods of studying correlation. [06]

- Q.6 (B) The following data relate to the pod length and the number of seeds per pod are given below. Calculate the correlation coefficient (r), and test their level of significance. [06]  
[Tabulated 't' value at 1% (3.36) levels of probability with d.f.=8]

Pods length (cms)	4.5	04	5.2	4.6	5.2	5.2	4.3	04	4.5	5.5
No. of seeds/pod	05	05	06	06	06	07	04	04	05	06

OR

- Q.6 (B) From the data given below, find out whether the means of the three samples differ significantly or not with applying ANOVA. [06]

Sample 1	Sample 2	Sample 3
20	19	13
10	13	12
17	17	10
17	12	15
16	09	05

[Tabulated F value = 3.9 at 5% level of significance]

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