

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

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**SARDAR PATEL UNIVERSITY**

**M.Sc. Examination - April 2018**

**M. Sc. Genetics- 2<sup>nd</sup> Semester**

**Saturday, 21<sup>th</sup> April 2018**

**Session: Evening**

**Time: 02:00 pm to 05:00 pm**

**Subject / Course Code: - PS02EGEN21**

**Subject / Course Title: - Biostatistics**

**Maximum Marks: 70**

**Note:** (1) All the Questions are compulsory. (2) Figures on the right indicate marks.

(3) Use of Simple/Scientific calculator is allowed. (4) Statistical table will be provided on request.

**Q.1** Choose the correct option

**1 x 8 = 8**

- (i) Which of the following is a measure of not the measure of dispersion?  
[A] Range [B] Variance  
[C] Standard deviation [D] Mean
- (ii) The standard deviation is:  
[A] The square root of the variance  
[B] A measure of variability  
[C] An Approximate indicator of how numbers vary from the mean  
[D] All of the above
- (iii) Approximately what percentage of scores fall within one standard deviation of the mean in a normal distribution.  
[A] 34% [B] 99%  
[C] 95% [D] 68%
- (iv) Two events are mutually exclusive if \_\_\_\_\_.  
[A] they are exclusively connected [B] they exclusively include mutuality  
[C] they cannot occur together [D] None of these
- (v) Ogive is a graphic method of determining \_\_\_\_\_ as a measure of central tendency in a frequency distribution.  
[A] Mean [B] Mode  
[C] Median [D] Standard deviation
- (vi) A procedure used to select a sample of n objects from a population in such a way that each member of the population is chosen strictly by chance, each member of the population is equally likely to be chosen, and every possible sample of a given size, n, has the same chance of selection is known as \_\_\_\_\_.  
[A] Statistical thinking [B] Inferential statistics  
[C] Descriptive statistics [D] Simple random sampling
- (vii) If the null hypothesis was rejected and there was 1 chance out of 100 that the decision was wrong, what was the alpha level in the study?  
[A] 0.001 [B] 0.01  
[C] 0.10 [D] 1.00
- (viii) Which of the following values could not represent a correlation coefficient?  
[A]  $r = 0.99$  [B]  $r = 1.99$   
[C]  $r = 0.73$  [D]  $r = -1.00$

C.P.T.O.)

Q.2. Attempt any seven of the following

2 x 7 = 14

1. Define the term arithmetic mean and write the formula to calculate arithmetic mean for ungrouped data and grouped data.
2. Write merits and demerits of median.
3. Write the formula to compute Pearson's coefficient of skewness.
4. Explain the terms Quantitative data and Qualitative data.
5. Define Standard deviation. Calculate standard deviation to given data 25, 30, 35, 40, 45.
6. Write a short note on Histogram.
7. Give Statement of multiplicative theorem or theorem on compound probability
8. Following is an incomplete ANOVA table of Completely Randomized design

Complete the table:

| Source of Variation | Degrees of freedom | Sum of squares | Mean Sum of Squares | F-ratio |
|---------------------|--------------------|----------------|---------------------|---------|
| Between treatments  | 2                  | 86050          |                     |         |
| Error               | 6                  | 10260          |                     |         |
| Total               | 8                  | 96310          |                     |         |

9. What is coefficient of variation?

Q. 3. (A). Explain Measure of central tendency and write a note on characteristics of an ideal measure of central tendency. [6]

(B). Calculate the Arithmetic mean and standard deviation for the following data. [6]

|                 |    |    |    |    |    |    |    |    |
|-----------------|----|----|----|----|----|----|----|----|
| Marks           | 35 | 40 | 45 | 50 | 55 | 60 | 65 | 70 |
| No. of students | 1  | 2  | 9  | 12 | 25 | 15 | 5  | 1  |

OR

Q. 3. (B). For the following data calculate the value of Median and mode. [6]

|           |       |       |       |       |       |       |       |
|-----------|-------|-------|-------|-------|-------|-------|-------|
| Class     | 20-30 | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 | 80-90 |
| Frequency | 2     | 23    | 48    | 98    | 65    | 39    | 5     |

Q. 4. (A). A man and his wife appear for an interview for two posts. The probability of the husband's selection is  $\frac{1}{7}$  and that of the wife's selection is  $\frac{1}{5}$ . What is the probability that only one of them will be selected? [6]

(B). (i) If two parents, both heterozygous carriers of autosomal recessive gene causing cystic fibrosis have five children. What is the probability that three will be normal? [3]

(ii) Assume the mean height of children to be 68.22 cm with a variance of 10.8 cm. How many children in a school of 1000 would you expect to be over 72 cm tall? [3]

OR

Q. 4. (B) Define normal distribution and write the properties of normal curve. [6]

- Q. 5. (A). Compute the coefficient of correlation between x and y for the following data and identify the type of correlation. [6]

|                               |       |       |       |       |       |
|-------------------------------|-------|-------|-------|-------|-------|
| X = Protein ( $\mu\text{g}$ ) | 20    | 40    | 60    | 80    | 100   |
| Y = Absorbance at 600nm       | 0.100 | 0.122 | 0.299 | 0.410 | 0.511 |

- (B). The ranks of same 10 students in Biology and biostatistics are as follows [6]

|                        |   |    |   |   |   |   |   |   |   |    |
|------------------------|---|----|---|---|---|---|---|---|---|----|
| Ranks in Biology       | 1 | 2  | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| Ranks in biostatistics | 1 | 10 | 3 | 4 | 5 | 7 | 2 | 6 | 8 | 9  |

Calculate the rank correlation coefficient for proficiencies of this group in biology and Biostatistics.

OR

- Q. 5. (B). A certain drug was administered to 500 people out of a total of 800 included in the sample to test its efficacy against malaria. The results are given below : [6]

|         |         |            |
|---------|---------|------------|
|         | Malaria | No Malaria |
| Drug    | 200     | 300        |
| No Drug | 280     | 20         |

On the basis of these data can it be concluded that the new drug is effective in preventing the malaria [Given for 1 d.f., the value of chi square  $(\chi^2)_{0.005} = 3.84$ ]

- Q. 6. (A). Memory capacity of students was tested before and after giving the nourishing food (CHAVANPRASH). State whether CHAVANPRASH was effective or not from the following scores. [6]

|          |    |    |     |    |   |    |     |      |    |   |
|----------|----|----|-----|----|---|----|-----|------|----|---|
| Roll No. | I  | II | III | IV | V | VI | VII | VIII | IX | X |
| Before   | 12 | 14 | 11  | 8  | 7 | 10 | 3   | 0    | 5  | 6 |
| After    | 15 | 16 | 10  | 7  | 5 | 12 | 10  | 2    | 3  | 8 |

(For  $\nu = 9$ ,  $t_{0.05}$  is 2.26)

- (B). Three samples of barley were sown in 3 plots each and following yield in quintals per acre were obtained. Perform one way ANOVA and find out whether there is significant difference between mean yield of three samples. [6]

|       |          |          |          |
|-------|----------|----------|----------|
| Plots | Sample A | Sample B | Sample C |
| 1     | 8        | 5        | 11       |
| 2     | 9        | 7        | 9        |
| 3     | 7        | 6        | 10       |

$F_{\text{crit}}$  value [ $\alpha$ ; c-1, c(r-1)] at  $\alpha = 0.05$  is 5.14

OR

- Q. 6. (B). For a random sample of 10 boys fed on diet A, the increase in weight in pounds in certain period were: 16, 6, 16, 17, 13, 12, 8, 14, 15, and 9. [6]  
For another random sample of 12 boys fed on diet B, the increase in weight in the same period were: 7, 13, 22, 15, 12, 14, 18, 8, 21, 23, 10 and 17.  
Test whether the samples come from populations having same variance.  
(The  $F_{0.05}$  for  $V_2 = 11$ ,  $V_1 = 9$  is 3.10)

