

Sample B:

70, 73, 77, 81, 84, 88, 90, 95, 98,

Test whether the two populations have the same variance at a 5% level of significance using an F-test for equality of variances.

(c) In the general population, the average blood pressure level is 130 mmHg, with a standard deviation of 20 mmHg. A group of researchers aims to test whether a new hypertension drug lowers blood pressure.

A sample of 100 participants who have taken the medication shows an average blood pressure level of 122 mmHg.

Perform an appropriate hypothesis test at a 5% level of significance to determine whether the medication significantly decreases blood pressure levels in the population. (6,6,6)

(100)

[This question paper contains 8 printed pages.]

Your Roll No.....

Sr. No. of Question Paper : 4625

J

Unique Paper Code : 3184002006

Name of the Paper : GE-Statistical Concepts in Biology (NEP-UGCF)

Name of the Course : **B.Sc. (Hons.) Biomedical Science**

Semester : IV/VI

Duration : 3 Hours

Maximum Marks : 90

Instructions for Candidates.

1. Write your Roll. No. on the top immediately on receipt of this question paper.
2. Attempt **any five** questions.
3. Subparts of the questions should be attempted together.
4. Use of simple/non-programmable scientific calculators is allowed
5. Statistical tables will be provided (if needed).

P.T.O.

1. (a) Differentiate between the following (any 2)

(i) Sensitivity and Specificity

(ii) Unpaired T test and Paired T Test

(iii) Sample and Population

(b) Explain the following (any 4)

(i) Discrete variable

(ii) Parameter

(iii) Coefficient of Determination

(iv) Type-I error

(v) Alternate hypothesis

(c) Find the mean, median, and mode of the following

data set: 12, 25, 17, 22, 19, 30, 25, 17, 25, 21, 20

(6,8,4)

There are 14 people in a room, consisting of:

• 8 females (3 diabetic, 5 non-diabetic)

• 6 males (2 diabetic, 4 non-diabetic)

If a person is picked at random:

(i) What is the probability that the person is diabetic, given that they are male?

(ii) What is the probability that the person is female, given that they are non-diabetic?

(b) Two random samples were drawn from two normal populations. The data is as follows:

Sample A:

72, 74, 78, 80, 85, 89, 91, 94, 97

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- (b) In a health screening camp, there are 120 participants, consisting of 80 females and 40 males. It is observed that 32 females and 18 males have high blood glucose levels.

If a participant is picked at random:

- (i) What is the probability that the selected participant has high blood glucose, given that the participant is a female?
- (ii) What is the probability of the event of having high blood glucose and being a female?
- (c) Give a brief account of Scales of Measurement.

(6, 6, 6)

6. (a) State the Conditional Probability Rule and explain its application.

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2. (a) State True or False and justify your answer (any three):

- (i) The mode is the most frequently occurring value in a dataset.
- (ii) A histogram represents continuous data.
- (iii) The median is affected by extreme values in a dataset.
- (iv) The sum of probabilities of all possible outcomes of an event is always greater than 1.

- (b) For the given tabulated data, find out the two linear regression equations:

X	2	4	5	7	9
Y	3	6	8	10	12

(6,12)

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3. (a) In a clinical study, a pain relief drug is tested on 30 patients. The following data represents the time (in minutes) for each patient to experience noticeable relief from symptoms:

Data (in minutes):

18, 20, 22, 19, 21, 23, 20, 24, 26, 22, 25, 21, 23,
27, 19, 22, 21, 24, 20, 25, 27, 22, 23, 21, 22, 26,
23, 24, 25, 20

Determine the interquartile range of this dataset,
D8 and P50

- (b) Differentiate between a Line Graph and a Histogram. (12,6)

4. Write short notes emphasising the importance/applications of the following (Any 3):

- (i) Kurtosis

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- (ii) Bayes theorem

- (iii) Partition value

- (iv) Regression Analysis (6,6,6)

5. (a) A pharmaceutical company claims that a 600mg dosage of a new antiviral drug cures infection within an average of 40 hours with a standard deviation of 6 hours.

To test this claim, a study is conducted on 7 randomly selected patients, and the observed recovery times (in hours) are:

35, 42, 38, 45, 39, 41, 36

Using an appropriate hypothesis test, determine whether the manufacturer's claim is valid at a 5% level of significance.

P.T.O.