Printed Page:- **Subject Code:- BBT0202**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA

(An Autonomous Institute Affiliated to AKTU, Lucknow)

B.Tech

SEM: II - THEORY EXAMINATION (20..... - 20.....)

Subject: Bio Statistics

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. A bar diagram is generally used for presenting: (CO1, K1) 1

(a) Continuous data

(b) Time series data

(c) Categorical data

(d) Interval scale data

1-b. A frequency polygon is drawn by: (CO1, K1) 1

(a) Using bar heights

(b) Joining midpoints of histogram tops

(c) Joining class intervals

(d) Using vertical lines

1-c. The weighted mean of 10, 20, 30 with weights 1, 2, and 3 respectively is: (CO2, K1) 1

(a) 25

(b) 23.33

(c) 30

(d) 20

1-d. A distribution with kurtosis > 3 is: (CO2, K1) 1

(a) Platykurtic

(b) Mesokurtic

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(c) Leptokurtic

(d) Symmetric

1-e. If a coin is tossed 3 times, the number of heads obtained is a: (CO3, K1) 1

(a) Continuous variable

(b) Discrete random variable

(c) Not a random variable

(d) Probability function

1-f. The mean of a binomial distribution with parameters n and p is: (CO3, K1) 1

(a) np

(b) n + p

(c) np(1-p)

(d) $\sqrt{np}$

1-g. The alternative hypothesis (H_1) represents: (CO4, K1) 1

(a) No difference

(b) A statement we want to test

(c) A known truth

(d) Random error

1-h. A Type II error occurs when: (CO4, K1) 1

(a) We accept a false null hypothesis

(b) We reject a true null hypothesis

(c) We accept a true null hypothesis

(d) None of the above

1-i. If a: b=4:5, b:c= 3:4, c: d = 7:11, then a: d is (CO5, K2) 1

(a) 3:4

(b) 21:55

(c) 21:44

(d) 7:5

1-j. ₹ 3960 are divided among A, B and C so that half of A's part, one-third of B's part and one-sixth of C's part are equal. Then C's part is (CO5, K2) 1

(a) 720

(b) 2160

(c) 1080

(d) 810

2. Attempt all parts:-

2.a. What are the two main types of data? Mention them with examples. (CO1, K1) 2

2.b. Define the term central tendency in the context of statistical data. (CO2, K1) 2

2.c. What is the total area under the standard normal curve? (CO3, K1) 2

2.d. Explain the concept of level of significance. What is the common value used? (CO4, K2) 2

2.e. A, B and C enter a partnership with a capital in which A's contribution is Rs. 15,000. If out of a total profit of Rs. 1000, A gets Rs. 500 and B gets Rs. 300, then what is the C's capital? (CO5, K2) 2

SECTION-B 30

3. Answer any five of the following:-

3-a. Define bar diagram and draw a bar diagram for: A – 12, B – 18, C – 10, D – 20. (CO1, K2) 6

3-b. Draw histogram, and polygon for: (CO1, K2) 6

Class Interval	0-5	5-10	10-15	15-20
Frequency	3	7	10	5

3-c. Compute rank correlation coefficient for the ranks: (CO2, K3) 6

X	1	2	3	4	5
Y	2	1	4	3	5

3-d. Find the linear regression line of y on x for following data: (CO2, K3) 6

Y	10	12	14	16	18
X	1	2	3	4	5

3.e. For a binomial distribution with n = 7, p = 0.6, compute the full probability distribution table. (CO3, K2) 6

3.f. Provide an example where a Type II error would have serious consequences and explain why? (CO4, K2) 6

3.g. Seats for mathematics, physics and biology in a school are in the ratio 5:7:8. There is a proposal to increase these seats by 40%,50% and 75% respectively. What will be the ratio of increased seats? (CO5, K2) 6

SECTION-C 50

4. Answer any one of the following:-

4-a. What do you mean by Sampling? Describe any three probability sampling techniques and any three non-probability sampling techniques with the help suitable examples. (CO1, K1) 10

4-b. Create a comprehensive graphical representation of a frequency distribution consisting of five class intervals. 10

Class Interval	0-10	10-20	20-30	30-40	40-50
Frequency	2	5	4	3	2

Include appropriate diagrams such as a histogram, frequency polygon, and frequency curve, ensuring each graph is accurately constructed with proper titles, labels, and scales. (CO1, K2)

5. Answer any one of the following:-

5-a. The following data shows the average heights (in cm) of teachers and their 10

students:

Teachers Height (X)	160	165	170	175	180
Students Height (Y)	155	162	168	172	177

Calculate Karl Pearson's correlation coefficient (r) to determine the strength and direction of the relationship between teacher's and student's average heights. (CO2, K3)

5-b. Fit and interpret the regression lines Y on X and X on Y for data: (CO2, K3) 10

X	2	4	6	8
Y	3	6	9	12

6. Answer any <u>one</u> of the following:-

6-a. Suppose a fair coin is tossed 6 times. Let X be a random variable representing the number of heads. Write the probability mass function (PMF) of X. Calculate the mean and variance of X. (CO3, K2) 10

6-b. The probability of a player of winning a round is 0.7. If he plays 15 rounds: (i) Find the probability of winning exactly 5 rounds. (ii)Calculate the mean and variance of the number of wins. (CO3, K3) 10

7. Answer any <u>one</u> of the following:-

7-a. A dietitian measures the hemoglobin levels (g/dL) of 10 women before and after they undergo a 6-week iron-rich vitamin supplement regimen. 10

Subject	1	2	3	4	5	6	7	8	9	10
Before	10.5	10.8	11.0	10.2	10.6	11.1	10.4	10.9	10.3	10.7
After	12.1	12.4	12.5	11.8	12.2	12.6	12.0	12.4	12.0	12.3

Using a paired t-test, determine whether the vitamin supplement causes a significant increase in hemoglobin levels at the 5% significance level. Critical value:t{0.025,9} = 2.262 (CO4, K3)

7-b. A researcher wants to compare the effectiveness of three different types of fertilizers (A, B, and C) on crop yield. To test this, 5 plots of land are treated with each type of fertilizer, and the yield (in kg per plot) is recorded as follows: 10

Plot No.	1	2	3	4	5
Fertilizer A	20	22	19	23	21
Fertilizer B	25	28	24	26	27
Fertilizer C	27	29	28	30	31

F (2,12,0.05)=3.89 (CO4, K3)

8. Answer any <u>one</u> of the following:-

8-a. Solve both Questions a and b. 10

a) The difference between simple interest and compound interest on a sum for 2 years at 8%, when the interest is compounded annually ₹ 16. If the interest was compounded half-yearly, find the difference in two interests would be nearly.

b) The simple interest on a sum of money will be ₹600 after 10 years. If the principal is tripled after 5 years, what will be the total interest at

.

the end of the tenth year? (CO5, K2)

8-b. Solve both Questions a and b. 10

a) A person walks 5 km in East direction after that he turns towards left and moves 6 km. Finally, he turns towards left and moves 4 km. At what distance and in which direction he finally stands from his starting point?

b) Kashyap starts towards South direction. Which of the following order of direction will lead him to East direction? (CO5, K2)

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