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Roll No.

Total No. of Pages : 02

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M.Tech.(Bio Tech.) (Sem.-1) BIOSTATISTICS Subject Code : MTBT-107 Paper ID : [E0874]

Time: 3 Hrs.

Max. Marks : 100

INSTRUCTION TO CANDIDATES :

- 1. Attempt any FIVE questions out of EIGHT questions.
- 2. Each question carries TWENTY marks.
- 1. a) Briefly describe the probability laws. (10)
 - b) What is conditional probability? Describe the importance of Bayes' theorem. (10)
- 2. a) What is normal curve? Briefly describe its importance and distributions of variables in a normal distribution curve.
 - b) What is binomial distribution? Describe its importance. (5)
 - c) What are the chances of getting any combination, i.e., 2 boys, 1 girl or 1 boy, 2 girls or three boys or three girls when the number of pregnancies is 3? Probability of getting a boy or a girl is found to be 0.5.
- 3. a) What is skewness and kurtosis? Mention their importance. (10)
 - b) The mean birth weight and the standard deviation of high socioeconomic group is 2.91 ± 0.27 (n=15) and low socioeconomic group is 2.26 ± 0.22 (n=10). Test whether the mean difference in birth weight is significant between the socioeconomic groups. (5)
 - c) Briefly describe different sampling procedures (5)
- 4. a) Briefly describe type I and type II error and their importance. (8)
 - b) A random sample of 395 people were surveyed and each person was asked to report the highest education level they obtained. The data that resulted from the survey is summarized in the following table. Are gender and education level dependent at 5% level of significance? (use χ^2 test).

(12)

	High School	Bachelors	Masters	Ph.Ds	Total
Females	60	54	46	41	201
Males	40	44	53	57	194
Total	100	98	99	98	395

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- 5. a) What do you understand by linear regression? Explain the method of fitting the line y = a + bx using the method of least squares. (5)
 - b) A biologist assumes that there is a linear relationship between the amount of fertilizer supplied to tomato plants and the subsequent yield of tomatoes obtained. Eight tomato plants, of the same variety, were selected at random and treated, weekly, with a solution in which x grams of fertilizer was dissolved in a fixed quantity of water. The yield y kilograms, of tomatoes was recorded,
 - i) Calculate the equation of the least squares regression line of y on x.
 - ii) Estimate the yield of a plant treated, weekly, with 3.2 grams of fertilizer. (15)

Plants	1	2	3	4	5	6	7	8
X	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5
У	3.9	4.4	5.8	6.6	7.0	7.1	7.3	7.7

- 6. a) What is analysis of variance? Mention its importance in biological sciences. (5)
 - b) Students were given different drug treatments before revising for their exams. Some were given a memory drug, some a placebo drug and some no treatment. The exam scores (%) are shown below for the three different groups : Carry out a one-way ANOVA to test the hypothesis that the treatments will have different effects. (15)

Memory Drug	Placebo	No treatment			
70	37	3			
77	43	10			
83	50	17			
90	57	23			
97	63	30			

- a) What are the basic principles of experimental design? Briefly describe its importance.(8)
 - b) Discuss about the factorial design and its importance in agriculture. (12)
- 8. a) What is the test of significance? Write its importance.
 - b) What is hypothesis testing? Briefly describe the importance of statistical hypotheses.

(10)

(10)