INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)

B.Tech II Semester End Examinations (Regular) - May, 2019

Regulation: IARE – R18

PROBABILITY AND STATISTICS

Time: 3 Hours   (Common to CSE | IT)   Max Marks: 70

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT – I

1. (a) What is probability density function and probability distribution function? Elaborate with suitable examples. List the important properties of probability density function.   **[7M]**

   (b) The probability that an integrated chip will have defective etching is 0.12, the probability that it will have a crack defect is 0.29, and the probability that it has both defects is 0.07. What is the probability that a newly manufactured chip will have (i) Either an etching or a crack defect (ii) Neither defects.   **[7M]**

2. (a) Define random variable and different types of random variables with examples. What is the Mean and Variance of a probability density function.   **[7M]**

   (b) The chance that doctor A will diagnose a disease x correctly is 60%. The chance that a patient will die by his treatment after correct diagnosis is 40% and the chance of death by wrong diagnosis is 70%. A patient of doctor A, who had disease x, died. What is the chance that his disease was diagnosed correctly?   **[7M]**

UNIT – II

3. (a) Derive Poisson distribution as a limiting case of Binomial distribution   **[7M]**

   (b) A die is thrown 8 times and it is required to find the probability that 3 will show i) Exactly 2 times; ii) At least 2 times and iii) At most once.   **[7M]**

4. (a) Show that mean and variance of the normal distribution is μ and σ^2.   **[7M]**

   (b) From a large group of men, 5% are under 30 inches in height and 40% are under 60. Assuming a normal distribution, find the mean height and standard deviation.   **[7M]**

UNIT – III

5. (a) Explain types of correlation. What are normal equations for regression lines? Explain about multiple correlation and multiple regressions.   **[7M]**

   (b) Calculate the regression equation of X on Y from the data given in Table: **[7M]**

6. (a) Define regression and write its properties. Write the difference between correlation and regression.   **[7M]**

Table 1

X	10	12	13	12	16	15
Y	40	38	43	45	37	43

    (b) If y = 2x − 3 and y = 5x + 7 are the two regression lines, find the i) Mean value of x and ii) Correlation coefficient between x and y iii) Estimate the value of x when y = 1. **[7M]**

UNIT − IV

7. (a) Define sample with an example. Explain different types of sampling. How many different samples of size n=2 can be chosen from a finite population of size 25. **[7M]**

    (b) The mean breaking strength of cables supplied by a manufacturer is 1800 with a standard deviation 100. By a new technique in the manufacturing process, it is claimed that the breaking strength of cables have increased. In order to test this claim, a sample of 50 cables is tested. It is found that the mean breaking strength is 1850. Can we support the claim at 1% level of significance? **[7M]**

8. (a) Define population with an example. Write a short note on parameter, statistic and standard error of a statistic. Construct the confidence interval for single mean if mean of sample size of 400 is 40, standard deviation is 10. **[7M]**

    (b) A sample of 400 items is taken from the population whose standard deviation is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 38. Also calculate 95% confidence interval for the population. **[7M]**

UNIT − V

9. (a) Distinguish between t test for difference of means and F test. What is the test statistic for t test for single mean? What is the test statistic for t test for difference of means? **[7M]**

    (b) The mean of two random sample of sizes 9 and 7 are 196.42 and 198.82 respectively. The sum of squares of deviations taken from the mean are 26.94 and 18.73 respectively. Can the sample be considered to have been drawn from the same normal population? **[7M]**

10. (a) i. What is the degree of freedom for t test for difference of means? **[7M]**
       ii.Write the formulae for sample variance and sample standard deviation.
       iii.What is the test statistic for chi square test?

    (b) Two random samples gave the following results shown in Table 2. Test whether the samples came from the same normal population. **[7M]**

Table 2

Sample	Sample size	Sample mean	Sum of squares of deviations from the mean
1	10	15	90
2	12	14	108

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