Code No: 56066 **R09**

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech III Year II Semester Examinations, June - 2022
PROBABILITY AND STATISTICS
(Aeronautical Engineering)

Time: 3 hours **Max. Marks: 75**

Answer any five questions
All questions carry equal marks
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1.a) A couple has 2 children. What is the probability that both are girls if the older of the two is a girl?

b) A sample of 3 items is selected at random from a box containing 12 items of which 4 are defective. Find the expected number of defective items in the sample. [7+8]

2.a) Prove that if A, B, C are mutually independent events of a sample space S, then $A \cup B$ and C are also independent events.

b) Prove that if $A_1, A_2, \ldots A_n$ are n events then $P(\cap_{i=1}^{n} A_i) \geq \sum_{i=1}^{n} P(A_i) - (n-1)$. [7+8]

3.a) If six coins are tossed. Find the probability of number of heads
i) P(x=0) ii) P(1<x≤4) iii) P(x=3)

b) If for a Poisson variate P(x=2)=P(x=3). Find i) μ (the mean) ii) P(x≥1) iii) P(2<x<5). [7+8]

4.a) Mean and standard deviation of sample of size 100 is 58 and 5. Test the hypothesis at 0.05 level that the mean of the population is 57.5.

b) The mean and standard deviation of a sample is 100 and 5, and of the second sample is 110 and 6. If the sizes of the two samples are 100 and 80, find whether there is a significance difference between the samples. [7+8]

5.a) The mean breaking strength of a certain type of fiber is required to be at least 200 psi. Past experience indicates that the standard deviation of breaking strength is 5 psi. If a sample of 8 pieces of fiber yielded breakage at the following pressures,

210	198
195	202
197.4	196
199	195.5

would you conclude, at the 5 percent level of significance, that the fiber is unacceptable? What about at the 10 percent level of significance?

b) Test the hypothesis that the average content of containers of a particular lubricant is 10 liters if the contents of a random sample of 10 containers are
10.2, 9.7, 10.1, 10.3, 10.1, 9.8, 9.9, 10.4, 10.3, and 9.8 liters.
Use a 0.01 level of significance and assume that the distribution of contents is normal. [7+8]

6. A public health official claims that the mean home water use is 350 gallons a day. To verify this claim, a study of 20 randomly selected homes was instigated with the result that the average daily water uses of these 20 homes were as follows:

340	344	362	375
356	386	354	364
332	402	340	355
362	322	372	324
318	360	338	370

Do the data contradict the official's claim?
(use a t-test to test the hypothesis). [15]

7. Suppose we have ranks of 5 students in three subjects Computer, Physics and Statistics. test which two subjects have the same trend. [15]

Rank in Computer	2	4	5	1	3
Rank in Physics	5	1	2	3	4
Rank in Statistics	2	3	5	4	1

8. A student's study habits are as follows. If he studies one night, he is 70% sure not to study the next night. On the other hand, if he does not study one night, he is 60% sure not to study the next night as well. In the long run, how often does he study? [15]

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