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Question Paper Code: AHS010

INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
B.Tech III Semester End Examinations (Supplementary) - January, 2019
Regulation: IARE – R16
PROBABILITY AND STATISTICS
Time: 3 Hours   **(Common to ME | CE)**   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 binomial distribution. Determine the mean and the standard deviation of a binomial distribution. **[7M]**

   (b) A random variable X has the following probability function shown in Table 1: **[7M]**

Table 1

X	0	1	2	3	4
P(X)	k	3k	5k	7k	9k

   Find
   (i) The value of k
   (ii) $P(X < 3)$ and $P(0 < X < 4)$

2. (a) Explain probability mass function and probability density function of random variables. Determine the relation between the two functions for discrete and continuous random variables. **[7M]**

   (b) Six dice are thrown 729 times. How many times do you expect at least 3 dice to show a 5 or 6? **[7M]**

UNIT – II

3. (a) Write the difference between correlation and regression. Write the properties and normal equations of regression lines. **[7M]**

   (b) Find the correlation coefficient between industrial production and export for the following data shown in Table 2. **[7M]**

Table 2

Production (in crore tons):	55	56	58	59	60	60	62
Exports (in crore tons) :	35	38	38	39	44	43	45

4. (a) Define joint probability mass, density function. State the properties of joint distribution function of two random variables. **[7M]**

   (b) The marks secured by recruits in the selection test (X) and in the proficiency test (Y) are given below in Table 3: **[7M]**

Table 3

X:	12	17	14	19	15	18	26	16	24
Y:	28	40	43	44	31	32	38	33	37

   Calculate the rank correlation coefficient between X and Y.

UNIT – III

5. (a) Explain the method of systematic sampling. Give one real life situation where it can be used. **[7M]**

   (b) Construct sampling distribution of means for the population 3, 5, 8, 12 by drawing sample of size two with replacement. Determine (i) population mean (ii) population variance (iii) the mean of sampling distribution of means (iv) standard error. **[7M]**

6. (a) Explain about point and interval estimations. Define estimator and write the properties for estimator. **[7M]**

   (b) A random sample of size 100 has mean 15, the population variance being 25. Find the interval estimate of the population mean with a confidence level of (i) 99% (ii) 95% **[7M]**

UNIT – IV

7. (a) Define large sample. Write the test statistic for difference of means, proportions in large samples. **[7M]**

   (b) 20 people were attacked by a disease and only 18 are survived. Will you reject the hypothesis that the survival rate if attacked by this disease is 85% in favor of the hypothesis that is more at 5% level. **[7M]**

8. (a) A sample of 900 items has mean 3.4 and standard deviation 2.61. Can the sample be regarded as drawn from a population with mean 3.25 at 5% level of significance? **[7M]**

   (b) In the sample of 500 people in Telangana, 280 are Tea drinkers and the rest are Coffee drinkers. Can we assume that both Coffee and Tea drinkers are equally popular in the state at 5% level of significance? **[7M]**

UNIT – V

9. (a) Define small sample. Write about Student's t-distribution for single mean and difference of means. **[7M]**

   (b) Two sales men A and B shown in Table 4 are working in a certain district. From a sample survey conducted by head office, the following results were obtained. State whether there is any significant difference in the average sales between two sales men. **[7M]**

Table 4

No of sales	20	18
Average sales (in Rs.)	170	205
Standard deviation (in Rs)	20	25

10. (a) A trucking firm is suspicious of the claim that the average life time of certain tires is at least 28,000 miles. To check the claim, the firm puts 40 of these tires on its trucks and gets a mean life time of 27,462 miles with a S.D of 1,348 miles. What can it conclude if the probability of a type-I error is to be at most 0.01? **[7M]**

   (b) The internal bonding strength of 3 different resins ED, MD and PF shown in Table 5 need to be compared. Five specimens were prepared with each of the resins.Test at the level of significance of 0.01 whether the differences among the sample means can be attributed to chance. **[7M]**

Table 5

Resin	Strength				
ED	0.99	1.19	0.79	0.95	0.90
MD	1.11	1.53	1.37	1.24	1.42
PF	0.83	0.68	0.94	0.86	0.57

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