INSTITUTE OF AERONAUTICAL ENGINEERING
(Autonomous)
Four Year B.Tech II Semester End Examinations (Supplementary) - July, 2018
Regulation: IARE − R16
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) Calculate Expectation and variance of X , if the probability distribution of the random variable X is given by **[7M]**

Table 1

X	-1	0	1	2	3
P(X=x)	0.3	0.1	0.1	0.3	0.2

   (b) The mean and variance of a binomial Variable X is with parameters n,p are 16 and 8 respectively. Find $P(X \geq 1)$ *and* $P(X > 2)$. **[7M]**

2. (a) A Binomial distribution with parameter n=5 satisfies the property 8P(X=4)=P(X=2) find **[7M]**
   - i. P(X=0)
   - ii. P(X≥1)

   (b) The number of telephone calls an operator receives from 9a.m to 9.05am on a certain day follows a Poisson distribution with mean 3. Find the probability that: **[7M]**
   i. The operator will receive no calls in that time interval next day.
   ii. In the next three days a total of 1 call is received in that time interval.

UNIT − II

3. (a) Two variables X and Y have the joint probability density function

$$f(x,y) = \begin{cases} \frac{1}{3}(x+y) & 0 \leq x \leq 1, 0 \leq y \leq 2 \\ 0, & otherwise \end{cases}$$

   Find the regression line of Y on X. **[7M]**

(b) Obtain the rank correlation coefficient for the data shown in Table 2. **[7M]**

Table 2

X:	68	64	75	50	64	80	75	40	55	64
Y:	62	58	68	45	81	60	68	48	50	70

4. (a) The Table 3 shows the bivariate frequency distribution of marks of 25 students in Mathematics X and Computer Science Y. Determine the correlation coefficient r: **[7M]**

Table 3

$21 - 25$	$21 - 25$	$26 - 30$	$31 - 35$	$36 - 40$	$41 - 45$
	1				
$26 - 30$		3	1		
$31 - 35$		2	5	2	
$36 - 40$			1	4	1
$41 - 45$		1	3		
$46 - 50$					1

(b) Calculate the rank correlation coefficient from the data showing ranks of 10 students in two subjects as shown in Table 4: **[7M]**

Table 4

Maths:	3	8	9	2	7	10	4	6	1	5
Physics:	5	9	10	1	8	7	3	4	2	6

UNIT − III

5. (a) Certain tubes manufactured by a company have mean life time of 800 hours and S.D of 60 hrs. Find the Probability that a random sample of 16 tubes taken from the group will have a mean life time **[7M]**

   i. Between 790 hrs. and 810 hrs.

   ii. Less than 785 hrs.

   iii. Between 770hrs and 830 hrs.

(b) In a random sample of 200 industrial accidents, it was found that 116 were due to unsafe working conditions. Construct 99% confidence interval for the corresponding true proportion. **[7M]**

6. (a) Find the mean of sampling distribution of Variance for the population 2, 3, 4, 5 by drawing samples of size two with replacement. **[7M]**

   (b) A population consists of five numbers 2, 3, 6, 8, 11. Consider all possible samples of size 2 which can be drawn with replacement from this population. Find **[7M]**
   i. The mean and standard deviation of the population.
   ii. The mean and standard deviation of sampling distribution of means

UNIT – IV

7. (a) A manufacturer claimed that atleast 95% of the equipment which he supplied to a factory conformed to specifications. An examination of a sample of 200 pieces of equipment revealed that 18 of them were faulty. Test Los claim at 1% and 5% LOS. **[7M]**

   (b) In a sample of 400 voters of city A, 230 were favor of candidate K and in a sample of 500 voters of city B, 200 were in favor of candidate K. Test whether the proportion of voters favoring candidate K are the same in both cities test at 5% LOS. **[7M]**

8. (a) The means of two single large samples of 1000 and 2000 members are 67.5 and 68.0 respectively. Can the samples be regarded as drawn from the same population of standard deviation 2.5? **[7M]**

   (b) Random samples of 400 men and 600 women were asked whether they would like to flyover near their residence. 200 men and 325 women were in favour of the proposal. Test the hypothesis the proportion of men and women in favour the proposal are same at 5% level. **[7M]**

UNIT – V

9. (a) The data shown in Table 5 represent the biological value of protein from Cow's milk and buffalo's milk at certain level. Examine the average value of protein in two samples significantly. **[7M]**

Table 5

Cow's milk:	1.82	2.02	1.88	1.61	1.81	1.54
Buffalo's milk:	2.00	1.83	1.86	2.03	2.19	1.88

(b) The data shown in Table 6 defective articles produced by 4 machines. Do the figure indicate a significant difference in the performance of machine? **[7M]**

Table 6

Machines:	A	B	C	D
Production items:	1	1	2	3
No of defectives:	12	30	63	98

10. (a) Five dice were thrown 96 times and the numbers 1, 2 or 3 appearing on the face of the dice follows the frequency distribution as shown in Table 7 **[7M]**

Table 7

No. of dice showing 1, 2 or 3:	5	4	3	2	1	0
Frequency :	7	19	35	24	8	3

(b) An instructor has two classes A and B in a particular subject. Class A has 16 students which class B has 25 students on the same examination, although there was no significant difference in mean grades, class A had a standard deviation of 9 and class B had a standard deviation of 12. Can we conclude at 0.01 LOS that the Variability of class B is greater than that of A? **[7M]**

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