



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

B.Tech III Semester End Examinations (Regular), February – 2021

Regulation: IARE–R18

PROBABILITY AND STATISTICS

Time: 3 Hours

(AE | ME)

Max Marks: 70

Answer any Four Questions from Part A

Answer any Five Questions from Part B

PART – A

1. Out of 24 mangoes, 6 mangoes are rotten. If we draw two mangoes. Obtain probability distribution of number of rotten mangoes that can be drawn. also find the expectation. [5M]
2. The probability of a component's failure is 0.05. Out of 14 components what is the probability that
 - i) Atmost 3 will fail
 - ii) Atleast 3 will fail[5M]
3. State the definition of the regression equation of X_1 on X_2 and X_3 . [5M]
4. List out the differences between large and small samples with example. [5M]
5. Find $F_{0.95}$ with (19, 24) degrees of freedom. [5M]
6. A continuous RV X has the density function $f(x)$ given by $f(x) = c(x^2+1)$, $1 < x < 3$. Find the value of C. [5M]
7. A car hire firm has two cars which it hires out daily. The number of demands for a car on each day is distributed as Poisson variate with mean $\lambda=1.5$. Obtain the proportion of days on which
 - i) There was no demand
 - ii) Demand is refused.[5M]
8. Outline the classical definition of probability. A coin is tossed 9 times. calculate the probability of getting 5 heads. [5M]

PART – B

9. If the CDF of a RV X is given by $f(x) = \begin{cases} 0, & x < 0 \\ \frac{x^2}{16} & 0 \leq x \leq 4 \\ 1 & x \geq 4 \end{cases}$. Find $P(1 < X < 5)$. [10M]
10. If the density function of a continuous RV 'X' is given by $f(x) = \begin{cases} ax, & 0 \leq x \leq 1 \\ a, & 1 \leq x \leq 2 \\ 3a - ax, & 2 \leq x \leq 3 \\ 0, & \text{otherwise} \end{cases}$
 - i) Find the value of a
 - ii) Find expectation of X[10M]
11. Out of 800 families with 4 children each, how many families would be expected to have i) 2 boys and 2 girls
 - ii) Atleast 1 boy iii) At most 2 girls and iv) Children of both sexes[10M]
12. It is known that the probability of an item produced by a certain machine will be defective is 0.05. If the produced items are sent to the market in packets of 20, find the number of packets containing atleast, exactly and at most 2 defective items in a consignment of 1000 packets using binomial distribution. [10M]

13. Obtain the line of regression for the following data in Table 1

[10M]

Table 1

X	1	2	3	4	5	6	7	8	9
Y	9	10	11	12	13	14	15	16	17

14. Determine the coefficient of correlation for the following data in Table 2:

[10M]

Table 2

Number of tourists X	200	350	300	400	350	420	480
Profit Y	90	130	130	170	140	160	180

15. A sample of 900 members has mean of 3.4 and S.D of 2.61. is This sample has been taken from a large population mean 3.25 and S.D 2.61? Also calculate 95% confidence interval. [10M]

16. The average marks scored by 32 boys is 72 with an SD of 8, while that for 36 girls is 70 with an SD of 6. Test at 1% level of significance whether the boys perform better than girls. [10M]

17. A group of 10 rats fed on a diet A and another group 8 rats fed on diets recorded the following increases on weight in Table 3. Find the variances are significantly different. [10M]

Table 3

Diet A	5	6	8	1	12	4	3	9	6	10
Diet B	2	3	6	8	10	1	2	8		

18. The following Table 4 are the average weekly losses of working hours due to accidents in ten industrial plants before and after an introduction of a safety program was put into operation

Table 4

Before	45	73	46	124	33	57	83	34	26	17
After	36	60	44	119	35	51	77	29	24	11

i) Use to 5% to test whether the safety program is effective. ii) Find if the variance are significantly at 1%

[10M]

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