

Code No.: MA302HS

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS
II-B.TECH-I-Semester End Examinations (Regular) - February- 2023
PROBABILITY AND STATISTICS
(AI&DS)

[Time: 3 Hours]

[Max. Marks: 70]

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 20 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(20 Marks)

1. a) Define dependent and independent event with an example for each. [2M]
- b) Define conditional probability. [2M]
- c) A fair coin is tossed six times .Find the probability of getting four heads. [2M]
- d) Give the recurrence relation of poisson distribution. [2M]
- e) If X is a normal variate , find the area to the right of $z = -1.45$. [2M]
- f) Define the properties of exponential distribution. [2M]
- g) Define positive and negative correlation with an example for each. [2M]
- h) Differentiate between correlation and regression. [2M]
- i) Define null hypothesis and alternative hypothesis. [2M]
- j) Define degrees of freedom with an example. [2M]

PART-B

(50 Marks)

- 2.a) State Baye's theorem. [2M]
- b) Of the three men, the chances that a politician, a business man or an academician will be appointed as a vice – chancellor (V.C) of a university are 0.5, 0.3 and 0.2 respectively. Probability that research is promoted by these persons if they are appointed as V.C are 0.3, 0.7 and 0.8 respectively. [8M]
 - i. Determine the probability that research is promoted
 - ii. If research is promoted, what is the probability that V.C is an academician?

OR

3. A continuous r.v has the p.d.f $f(x) = \begin{cases} kxe^{-\alpha x}, & \text{if } x \geq 0 \text{ and } \alpha \geq 0 \\ 0, & \text{else where} \end{cases}$ [10M]
Determine i)k ii) mean iii) variance

- 4.a) If 3 of 20 tyres are defective and 4 of them are randomly chosen for inspection , what is the probability that [5M]
 - i. only one of the defective tyre will be included
 - ii. atleast one defective tyre will be included
 - iii. atmost one defective tyre will be included
- b) A manufacturer of pins knows that 5% of his product is defective. Pins are sold in boxes of 100. He gurantees that not more than 10 pins will be defective. What is the approximate probability that a box will fail to meet the guaranteed quality? [5M]

OR

5. Derive poisson distribution as a limiting case of binomial distribution [10M]
6. A sales tax officer has reported that the average sales of the 500 business that he has to deal with during a year is Rs.36,000 with a standard deviation of Rs.10,000. Assuming that the sales in these business are normally distributed, find : i. The number of business as the sales of which are greater than Rs.40,000
ii. The percentage of business the sales of which are likely to range between Rs.30,000 and Rs.40,000 [10M]

OR

7. Derive mean and variance of exponential distribution. [10M]
8. From the following data, calculate the rank correlation coefficient [10M]

X	48	33	40	16	16	65	24	16	57
Y	13	13	24	15	4	20	9	6	19

OR

9. A panel of two judges P and Q graded seven dramatic performances by independently awarding marks as follows: [10M]

Performance	1	2	3	4	5	6	7
Marks by P	46	42	44	40	43	41	45
Marks by Q	40	38	36	35	39	37	41

The eight performances, which judge Q would not attend, was awarded 37 marks by judge P. If judge Q had also been present, how many marks would be expected to have been awarded by him to the eighth performance

- 10.a) Write the procedure for testing of hypothesis [5M]
- b) In an investigation on the machine performance the following results are obtained:

	No. of units inspected	No. of defectives
Machine 1	375	17
Machine 2	450	22

Test whether there is any significant performance of two machines at 5%LOS [5M]

OR

11. Memory capacity of 9 students were tested before and after training . State whether the training was effective or not from the following scores. [10M]

Before training	12	14	11	8	7	10	3	0	5
After training	15	16	10	7	5	12	10	2	3
