

Code No.: MA303BS

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CMR ENGINEERING COLLEGE: : HYDERABAD
UGC AUTONOMOUS

II-B.TECH-I-Semester End Examinations (Supply)- June- 2022
PROBABILITY AND STATISTICS & COMPLEX VARIABLES
(MECH)

[Time: 3 Hours]

[Max. Marks: 70]

- Note: 1. Answer any FIVE questions. Each question carries 14 marks.
2. All questions carry equal marks.
3. Illustrate your answers with NEAT sketches wherever necessary.

5X14=70

1. a) State Baye's theorem. Three urns A, B, C contains white, red and green balls as given below [7M]

	Urn A	Urn B	Urn C
White	1	2	4
Red	2	1	5
Green	3	1	3

Two balls are drawn from an urn chosen at random. These are found to be one white and one green. Find the probability that the balls drawn are from (i) Urn B, (ii) Urn C.

- b) A fair coin is tossed three times. Let X be the number of tails appearing. Find the probability distribution of X . Calculate the expected value of X . [7M]
2. a) In a sample of 1000 cases, the mean of certain test is 14 and S.D is 2.5. Assuming the distribution to be normal, find [7M]
(i) How many students score between 12 and 15?
(ii) How many students score above 18?
(iii) How many students score below 18?
- b) It has been found that 20% of the tools produced by a certain machine are defective. What is the probability that in a shipment of 400 such tools (i) 3% or more (ii) 2% or less will prove defective. [7M]
3. a) Write the procedure for the testing of hypothesis. [7M]
b) A sample of 400 items is taken from a population whose S.D is 10. The mean of the sample is 40. Test whether the sample has come from a population with mean 30. Also construct 95% confidence interval for the population. [7M]
4. a) Find $f(z) = u + iv$ given that $u + v = \frac{\sin 2x}{\cosh 2y - \cos 2x}$ [7M]
- b) Prove that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$. [7M]

5. a) Find the Laurent series expansion of the function $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z+2)(z-3)}$ [7M]
in the region $3 < |z+2| < 5$.

b) Determine the poles and residues of [7M]

$$f(z) = \frac{z^2}{z(z+2)(z-1)^2}.$$

6. a) Probability density function of random variable x is [7M]

$$f(x) = \begin{cases} \frac{1}{2} \sin x & \text{for } 0 \leq x \leq \pi \\ 0 & \text{otherwise} \end{cases}$$

Find the mean, mode and median of the distribution.

b) Calculate the first four moments about the mean from the following data [7M]

x	1	2	3	4	5
f	2	3	5	4	1

7. Four coins are tossed 160 times. The number of times x heads occurs at each toss is recorded and the result are given below: [14M]

x	0	1	2	3	4	5	6	7
f	7	6	19	35	30	23	7	1

Fit a binomial distribution to the data assuming that the coins are unbiased?

8. Time taken by the workers in performing a job by method I and method II is given [14M]
below:

Method-I	20	16	26	27	23	22	-
Method-II	27	33	42	35	32	34	38

Do the data show that the variances of time distribution from population from which these samples are drawn do not differ significantly?
