Code No.: MA303BS

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

[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) If X is a random variable then Prove E[X+K] = E[X] + K , where 'K' constant. [2M]
b) Two coins are tossed simultaneously. Let X denotes the number of heads then find E(X) [2M]
c) If n=4, p=0.5 then find standard deviation of the binomial distribution. [2M]
d) If a Poisson distribution is such that $P(X=1)=\frac{3}{2}P(X=3)$ then find $P(X\geq 1)$ [2M]
e) Define TYPE-I and TYPE-II errors [2M]
f) Find the confidence interval for mean if mean of sample size of 144 is 150, standard deviation is 2. [2M]
g) If $w=f(z)=z^2+z$. Find its imaginary part. [2M]
h) Evaluate $e^{2+\pi i}$ [2M]
i) Obtain the Taylor series expansion of f(z) $= e^z$ about the point z = 1. [2M]
j) Discover the Bilinear transformation which maps the points (0,-i,-1) into the points (i,1, 0) [2M]

PART-B (50 Marks)

2. A continuous random variable has the probability density function [10M]

$$f(x)=\begin{cases} kxe^{-\lambda x}, for\ x\geq 0, \lambda>0 \\ 0, otherwise \end{cases}$$

Determine (i) k (ii) Mean (iii) Variance.

OR

3. A businessman goes to hotels X, Y, Z, 20%, 50% and 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faulty plumbing. What is the probability that business man's room having faulty pluming is (i) Assigned to hotel Z (ii) Assigned to hotel Y. [10M]

4. In a Normal distribution, 7% of the item are under 35 and 89% are under 63. Find the mean and standard deviation of the distribution. [10M]

OR

5. The average number of phone calls per minute coming into a switch board between 2 P.M. and 4 P.M. is 2.5. Determine the probability that during one particular minute (i) 4 or fewer calls (ii) more than 6 calls.(iii) between 5 to 7 calls [10M]

6.a) Two independent samples of items are given respectively had the following values. Find the standard error and 95% confidence interval [6M]

Sample I	11	11	13	11	15	9	12	14
Sample II	9	11	10	13	9	8	10	-

b) A sample of 400 items is taken from a population whose standard deviation is 10.The mean of sample is 40. calculate 95% confidence interval for the population [4M]

OR

7.a) If 48 out of 400 persons in rural area possessed 'cell' phones while 120 out of 500 in urban areas. Can it be accepted that the proportion of 'cell' phones in the rural area and Urban area is same or not. Use 5% of level of significance. [5M]

b) A sample of 100 electric bulbs produced by manufacturer 'A' showed a mean life time of 1190 hrs and s .d. of 90 hrs A sample of 75 bulbs produced by manufacturer 'B' Showed a mean life time of 1230 hrs with s.d. of 120 hrs. Is there difference between the mean life times of the two brands at a significance level of 0.05. [5M]

8. Determine the imaginary part of an analytic function f (z) whose real part of an analytic function is $e^x(x\cos y - y\sin y)$. [10M]

OR

9. Show that the function defined by [10M]

$$f(z)=\begin{cases} \frac{xy^2\,(x+iy)}{x^2+y^4} & ,z \neq 0 \\ 0 & ,z = 0 \end{cases}$$

is not analytic function even though Cauchy Riemann equations are satisfied at origin.

10. Estimate the value of line integral to $\int_c \frac{e^z}{(z^2+\pi^2)^2}dz$ where c is $|z|=4$ using Cauchy's integral formula. [10M]

OR

11. Estimate the Residues of the function $f(z) = \frac{z}{(z+1)(z+2)}$ as a Laurent's series about z = -2. [10M]

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