Code No: R2022011 **R20** SET - 1

II B. Tech II Semester Supplementary Examinations, December - 2022
COMPLEX VARIABLES AND STATISTICAL METHODS
(Common to CE, ME, AME & MM)

Time: 3 hours **Max. Marks: 70**

Answer any **FIVE** Questions each Question from each unit
All Questions carry **Equal** Marks

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UNIT-I

1 a) Show that $f(z) = Re\ z = x$ is not differentiable [7M]

b) Evaluate $\int_{(1,1)}^{(2,4)}(x^2 + ixy)dz$ along the curve x = t, y = t^2 [7M]

Or

2 a) Find the analytic function $f(z) = u + iv$ where $v(x, y) = e^{-x}(xcosy + ysiny)$ [7M]

b) Evaluate $\int_c \frac{e^{2z}}{(z-1)(z-2)}$ dz where C: $|z| = 3$ using Cauchy's integral formula. [7M]

UNIT-II

3 a) Obtain Laurent's expansion for f(z) = $\frac{1}{(z+2)(1+z)^2}$ in $|1 + z| > 1$ [7M]

b) Evaluate $\oint_C \frac{dz}{Cosh\ z}$ where C: |z| = 2 using Residue theorem [7M]

Or

4 a) Obtain the Taylor's series expansion $f(z) = \frac{z^2-1}{(z+2)(z+3)}$ in $|z| < 2$ [7M]

b) Evaluate $\int_0^\infty \frac{dx}{1+x^2}$ using Residue theorem [7M]

UNIT-III

5 a) Let X denote the number of heads in a single toss of 4 fair coins. Determine the probability distribution and find P(1< X< 3) [7M]

b) If the mean of the Poisson variant is 1.8 then find (i) $P(x > 1)$ (ii) $P(x = 5)$ [7M]

Or

6 a) If F[X] = $\begin{cases} 0, if\ x < 1 \\ k(x-1)^4, if\ 1 \le x \le 3 \\ 1, if\ x > 3 \end{cases}$ then determine (i) f(x) (ii) find k [7M]

b) If X is a normal variate, find the area A
(i) to the left of z = -1.78 (ii) to the right of z = 1.45 [7M]

UNIT-IV

7 A population consists of six numbers {1, 2, 3, 4, 5, 6}. Consider all possible samples of size two with can be drawn without replacement from the population. Find [14M]
(i) The mean of the population
(ii) Standard deviation of the population
(iii) The mean of sampling distribution of means
(iv) The standard deviation of the sampling distributions of means

Or

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8 a) Verify whether $\frac{x+2}{n+1}$ is an unbiased estimate of the binomial parameter 'p'. [7M]

b) A random sample of size 81 was taken whose variance is 20.25 and means is 32, construct 98% confidence interval. [7M]

UNIT-V

9 a) 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. [7M]

b) A manufacturer claimed that at least 98% of the equipment he supplied is conformed to specifications. A sample of 500 pieces 30 were defective. Test the claim at 1% level. [7M]

Or

10 a) A random of 10 boys had the following I.Q's 70,120,110,101,88,83,95,98,107,100. Do the data support the assumption of population means I.Q of 100.Test at 1% level of significance. [7M]

b) Two independent samples of 8 items respectively had the following values. Test whether two samples has same variance at 5% level. [7M]

Sample I	11	11	13	11	12	9	12	14
Sample II	9	11	10	13	9	8	10	7