

II B. Tech I Semester Supplementary Examinations, July - 2022

MATHEMATICS-IV

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions each Question from each unitAll Questions carry **Equal** Marks

- 1 a) Evaluate $\int_0^{1+2i} (x^2 - iy) dx$ along the path $y = 2x$. [7M]
 b) Evaluate $\int_C \frac{e^{2z}}{(z-1)(z-2)} dz$ where $C: |z| = 3$ using Cauchy's Integral formula. [7M]

Or

- 2 a) Prove that $f(z) = z^3$ is analytic. [7M]
 b) Find 'k' such that $u(x, y) = x^3 + 3kxy^2$ is harmonic and find its conjugate. [7M]
- 3 a) Find Taylor's expansion of $f(z) = \frac{z}{(z-1)(z-2)}$ about the point $z = 1$. [7M]
 b) Find the Laurent series of $f(z) = \frac{z}{(z-1)(z-4)}$ for $|z| > 4$. [7M]

Or

- 4 a) Evaluate by Contour integration $\int_0^\infty \frac{x dx}{4+x^2}$. [7M]
 b) Find the singularity of the function $f(z) = \frac{z-2}{z^2} \sin\left(\frac{1}{z-1}\right)$. [7M]
- 5 a) A business man goes to hotels X, Y, Z, 20%, 50%, 30% of the time respectively. It is known that 5%, 4%, 8% of the rooms in X, Y, Z hotels have faculty plumbing. What is the probability that business man's room have faculty plumbing is assigned to hotel X. [7M]
 b) Let X denote the number of heads in single toss of 3 fair coins. [7M]
 Determine (i) $P(X > 2)$ (ii) Mean of the distribution.

Or

- 6 a) The average no of accidents in national highway 216 per week are 2. Then find probability for (i) at most 3 accident (ii) none of accidents [7M]
 b) If the masses of 1000 students are normally distributed with mean 14 kg and standard deviation 2.5 kg, how many students have masses: [7M]
 (i) greater than 18 kg (ii) between 12 and 15 kg.

- 7 Samples of size 2 are taken from the population $\{2, 3, 4, 5\}$ without replacement. Find [14M]
 (i) The mean of the population
 (ii) The standard deviation of the population
 (iii) Mean of the sampling distribution of means
 (iv) The standard deviation of the sampling distribution of means

Or



- 8 a) The mean height of students in a college is 155 cm and S.D is 15. What is the probability that the mean height of 36 students is less than 157 cms. [7M]
 b) A random sample of 100 items is found to have mean 20 and S.D of 5. Find the maximum error of estimation at 95% confidence interval. [7M]
- 9 a) A sample of 200 students have a mean weight of 70kgs. Can this be regarded as a sample from population with mean weight 65 kgs with standard deviation 15 kgs. Test at 5 % level of significance. [7M]
 b) A coffee company claims that brand A outsells its brand b by 5% . If 40 out of 100 prefer brand A and 20 out of 50 prefer brand B . Test the claim at 5% level. [7M]

Or

- 10 a) Two random samples with following results. Test whether the differences of means is significant at 1% level. [7M]

| Sample | Size | Mean | S.D |
|--------|------|------|-----|
| 1 | 10 | 12 | 3 |
| 2 | 15 | 13 | 4 |

- b) A die is thrown 264 times with the following results. Show that the die is unbiased at 5% level. [7M]

| No appeared on die | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------|----|----|----|----|----|----|
| Frequency | 40 | 32 | 28 | 58 | 54 | 52 |

