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GAYATRI VIDYA PARISHAD COLLEGE OF ENGINEERING FOR WOMEN

(Autonomous)

(Affiliated to Andhra University, Visakhapatnam)

II B.Tech. - I Semester Regular Examinations, Nov – 2025

COMPLEX VARIABLES AND STATISTICAL METHODS

(EEE Branch)

1. All questions carry equal marks
2. Must answer all parts of the question at one place

Time: 3Hrs.

Max Marks: 70

UNIT-I

1. a. Construct the analytic function $f(z)$ whose real part is $e^x(x\cos y - y\sin y)$ (7M)
 b. Show that the function $f(z) = \sqrt{|xy|}$ is not analytic at the origin, although Cauchy-Riemann equations are satisfied at that point. (7M)
- OR
2. a. Evaluate $\oint_C \frac{z-1}{(z+1)^2(z-2)} dz$ where C is $|z-i|=2$ (7M)
 b. Evaluate using Cauchy Integral formula, $\int_C \frac{\cos \pi z^2}{(z-1)(z-2)} dz$ where $C: |z|=4$ (7M)

UNIT-II

3. a. Using Cauchy Residue Theorem, evaluate $\oint_C \frac{12z-7}{(2z+3)(z-1)^2} dz$ where $C: x^2 + y^2 = 4$ (7M)
 b. Evaluate $\int_0^\infty \frac{1}{(x^2+a^2)^2} dx$ (7M)
- OR
4. a. Expand $f(z) = \frac{z^2-1}{(z+2)(z+3)}$ in the region $2 < |z| < 3$ (7M)
 b. Find the sum of residues of $f(z) = \frac{z^3}{(z-2)^2(z-3)}$ at its poles. (7M)

UNIT-III

5. a. In a certain college, 25% of boys and 10% of girls are studying mathematics. The girls constitute 60% of the student body. What is the probability that mathematics is being studied? If a student is selected at random and is found to be studying mathematics then find the probability that the student is a girl. (7M)
 b. A random variable X is defined as sum of the numbers on the faces when two dice are thrown. Find the mean of X . (7M)
- OR
6. a. The probability of a man hitting a target is $1/3$. (i) If he fires 5 times, what is the probability of his hitting the target at least twice? (ii) How many times must he fire so that the probability of his hitting the target at least once is more than 90%? (7M)
 b. If the masses of 300 students are normally distributed with mean 68 kgs and standard deviation 3kgs, how many students have masses.
 i) Greater than 72 kg
 ii) Less than or equal to 64 kg
 iii) Between 65 and 71 kg inclusive. (7M)

UNIT-IV

7. a. A population consists of five numbers 2, 3, 6, 8 and 11. Consider all possible samples of size two which can be drawn without replacement from this population. Find.
- (i) The mean of the population.
 - (ii) The Standard deviation of the population.
 - (iii) The mean of the sampling distribution of means and
 - (iv) The standard deviation of the sampling distribution of means. **(7M)**
- b. Determine the probability that the sample mean area covered by sample of 40 one litre paint boxes will be between 510 to 520 square feet given that a one litre of such paint box covers on the average 513.3 square feet with s.d. of 31.5 s.ft. **(7M)**

OR

8. a. A random sample of size 100 is taken from a population with $\sigma = 5.1$. Given that the sample mean is $\bar{x} = 21.6$. Construct a 95 % confidence interval for the population mean μ . **(7M)**
- b. A random sample of size 100 has a standard deviation of 5. What can you say about the maximum error with 95 % confidence. **(7M)**

UNIT-V

9. a. A simple sample of heights of 6400 Englishmen has a mean of 67.85 inches and a mean of 67.85 inches and a S.D. of 2.56 inches while a simple sample of heights of 1600 Australian has a mean of 68.55 inches and a S.D. of 2.52 inches. Do the data indicate that the Australians are on the average taller than the Englishmen at 5% level of significance? **(7M)**
- b. The heights of 10 males of a given locality are found to be 70, 67, 62, 68, 61, 68, 70, 64, 64, 66 inches. Is it reasonable to believe that the average height is greater than 64 inches? **(7M)**

OR

10. a. In a big city 325 men out of 600 men were found to be smokers. Does this information support the conclusion that the majority of men in this city are smokers? **(7M)**
- b. The following random samples are measurements of the heat-producing capacity (in millions of calories per ton) of specimens of coal from two mines:

Mine 1	8260	8130	8350	8070	8340	-----
Mine2	7950	7890	7900	8140	7920	7840

Use 0.02 LOS to test whether it is reasonable to assume that the variances of the two population samples are equal. **(7M)**