Complex Variables and Distributions
Subject Code: 18MA4GCCVD
Module – 1
Linear Algebra and Graph Theory

QNO	Question
1.	A non empty subset W of a vector space V over a Field F is called ___________ a) Column space b) Null space c) Linear transformation d) Subspace
2.	If V be the vector space over the field F the mapping T : U → V is said to be linear transformation and a, b ∈ U then a)T(a+b) = T(a)+ T(b) b)T(a+b) = T(a)* T(b) c) T(a*b) = T(a)* T(b) d) T(a+b) = T(a)-T(b)
3.	The dimension of the null space $\mathcal{N}(A)$ of a matrix A is called________. a)Nullity of A b) rank of A c) Both of these d) none
4.	If S and T are two subspace of vector space V, Then which one of the following is a subspace of V also a) SUT b) S∩T c) S – T d) T – S
5.	A subset B of a vector space V(F) is called a Basis of V, if B is **a**) Linearly Independent b) Linearly Dependent c) Both a) & b) d) None of these
6.	If no self loop & no parallel edges are present in a graph, the graph is known as ______ a) Simple graph b) Pseudograph c) Multigraph d)None of these
7.	A vertex with degree zero is known as __________ a) Pendant vertex b) Isolated vertex c) Node d) Junction
8.	The sum of the degrees of the vertices of a graph is _________ a) Equal to no. of edges b) Half the no. of edges c) Twice the no. of edges d) Thrice the no. of edges
9.	Degree of any vertex of a simple graph with n vertices is at the most____ a) n b) (n+1) c) (n-1) d) 2n
10.	A graph with all vertices having equal degree is known as a __________ a) Multi Graph b) Regular Graph c) Simple Graph d) Complete Graph

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Module – 2
Complex Variable

Q.NO	QUESTION
1	Limit of the function $f(z) = \frac{sinz}{z}$ as $z \to 0$ is a) 1 b) 0 c) ∞ d) not exist
2	Choose the function $f(z)$ which is not differentiable at $z = 0$ a) $f(z) = sinz$ b) $f(z) = z - 1$ c) $f(z) = e^z$ d) $f(z) = \frac{1}{z}$
3	If $f(z) = u(r,\theta) + i\,v(r,\theta)$ is analytic then which of the following is always true a) $\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta}$ and $\frac{\partial u}{\partial \theta} = -r\frac{\partial v}{\partial r}$ b) $\frac{\partial u}{\partial r} = \frac{1}{r}\frac{\partial v}{\partial \theta}$ and $\frac{\partial u}{\partial \theta} = \frac{1}{r}\frac{\partial v}{\partial r}$ c) $\frac{\partial u}{\partial r} = -\frac{1}{r}\frac{\partial v}{\partial \theta}$ and $\frac{\partial u}{\partial \theta} = r\frac{\partial v}{\partial r}$ d) $\frac{\partial u}{\partial \theta} = \frac{1}{r}\frac{\partial v}{\partial \theta}$ and $\frac{\partial u}{\partial r} = -r\frac{\partial v}{\partial r}$
4	If $f(z) = u(x,y) + i\,v(x,y)$ is analytic then which of the following is always true a) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial v}{\partial x} = -\frac{\partial v}{\partial y}$ b) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$ c) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y} = -\frac{\partial v}{\partial y}$ d) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}$ and $\frac{\partial u}{\partial y} = -\frac{\partial u}{\partial y}$
5	If $v = g(x,y)$ is harmonic then a) $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 0$ b) $\frac{\partial^2 v}{\partial x^2} - \frac{\partial^2 v}{\partial y^2} = 0$ c) $\frac{\partial^2 v}{\partial y^2} - \frac{\partial^2 v}{\partial x^2} = 0$ d) $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$
6	A function is harmonic if it is satisfy ________________ equation. a) Cauchy's Riemann b) Heat c) Laplace's d) Wave
7	A function is Analytic if it is satisfy ________________ equation. a) Cauchy's Riemann b) Heat c) Laplace's d) Wave
8	Construct the analytic function $f(z)$ by substituting $x = z\,; y = 0\;(or)\;r = z\,;\;\theta = 0$ is known as _______________ method. a) Milne Thompson b) Analytical c) Complex d) Laplace's
9	If $f(z) = u(x,y) + iv(x,y)$ is analytic then a) $f'(z) = \left(\frac{\partial u}{\partial y} + i\frac{\partial u}{\partial x}\right)$ b) $f'(z) = \left(\frac{\partial u}{\partial x} + i\frac{\partial u}{\partial y}\right)$ c) $f'(z) = \left(\frac{\partial u}{\partial y} - i\frac{\partial u}{\partial x}\right)$ d) $f'(z) = \left(\frac{\partial u}{\partial x} - i\frac{\partial u}{\partial y}\right)$
10	If $f(z) = u(r,\Theta) + iv(r,\Theta)$ is analytic then a) $f'(z) = e^{-i\Theta}\left(\frac{\partial u}{\partial r} + i\frac{\partial u}{\partial \theta}\right)$ b) $f'(z) = e^{i\Theta}\left(\frac{\partial u}{\partial r} + i\frac{\partial u}{\partial \theta}\right)$ c) $f'(z) = e^{-i\Theta}\left(\frac{\partial u}{\partial r} - i\frac{\partial u}{\partial \theta}\right)$ d) $f'(z) = e^{i\Theta}\left(\frac{\partial u}{\partial r} - i\frac{\partial u}{\partial \theta}\right)$

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Module – 3
Probability Distribution

Q.No	Question
1.	If a random variable takes finite or countably infinite number of values then it is called __________ random variable. (a) Discrete (b) Continuous (c) Stochastic (d) None of these
2..	The mean of the Geometric distribution is _________. (a) pq (b) $\frac{1}{q}$ (c) $\sqrt{qp}$ (d) $\frac{1}{p}$
3.	The S D of the Geometric distribution is __________. (a) $\sqrt{\left(\frac{q}{p}\right)}$ (b) $\sqrt{\left(\frac{p}{q}\right)}$ (c) $\frac{\sqrt{q}}{p}$ (d) $\frac{\sqrt{p}}{q}$
4.	The S.D of Poisson distribution is (a) m^2 (b) $\sqrt{m}$ (c) m (d) None of these
5.	The mean and variance of a Poisson distributions are (a) same (b) 0 (c)different (d) None of these
6.	The p.d .f of a continuous random variable is $f(x) = \begin{Bmatrix} kx^2 & ; & 1 < x < 3 \\ 0 & ; & otherwise \end{Bmatrix}$, then the value of k is (a)3 (b) 26/3 (c) 3/26 (d) 26
7.	The mean of the exponential distribution is (a) $\frac{1}{\propto}$ (b) $\frac{1}{\propto^2}$ (c) $\frac{1}{\sqrt{\propto}}$ (d) $\propto$
8.	The mean and S D of an exponential distributions are (a) equal (b) 0 (c)different (d) None of these
9.	Mean, Variance and S D of the normal distribution are __________ to the mean, variance and SD of the given distribution. (a) equal (b) 0 (c)different (d) None of these
10.	The area under the whole normal curve is (a) 1 (b) 0.5 (c) -0.5 (d) 0

Complex Variables and Distributions
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Module – 4
Sampling Distribution

Q.No	Question
1.	Sample error of sample mean with μ as the population mean , σ as the standard deviation and sample size n is given by (a) σ (b) σ/n (c) σ/√n (d) none of these
2.	A hypothesis is true, but is rejected. Then this is an error of type (a) II (b) I (c) both I & II (d) none of these
3.	A hypothesis is false but accepted, then there is an error of type (a) II (b) I (c) both I & II (d) none of these
4.	The finite population correction factor is (a) n-N/N-1 (b) N-n/N-1 (c) N-1/N-n (d) none of these
5.	The probability distribution of a statistic is called _____ distribution. (a)Normal (b)Binomial (c) Sampling (d) none of these
6.	Sample is a subset of (a)Data (b) group (c) population (d) distribution
7.	Any numerical value computed from population is called (a)Statistic (b) bias (c) sampling error (d) parameter
8.	In a random sampling, the probability of selecting an item from the population is (a) Unknown (b) undecided (c) known (d) zero
9.	In sampling with replacement ,a sampling unit can be selected (a)Only once (b) more than once (c) less than once (d) none of above
10.	Sampling in which a sampling unit cannot be repeated more than once is called (a) Sampling without replacement (b) simple sampling (c) Sampling with replacement (d) none of above

Complex Variables and Distributions
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Module – 5 (Joint Probability Distribution & Markov Chains)

<table>
<tr><th>SI.NO</th><th>QUESTIONS</th></tr>
<tr><td>1</td><td>Find the value of c, given the joint probability distribution of two random variables X and Y is
<table>
<tr><td>X \ Y</td><td>0</td><td>1</td><td>2</td><td>3</td></tr>
<tr><td>0</td><td>0</td><td>c</td><td>2c</td><td>3c</td></tr>
<tr><td>1</td><td>2c</td><td>3c</td><td>4c</td><td>5c</td></tr>
<tr><td>2</td><td>4c</td><td>5c</td><td>6c</td><td>7c</td></tr>
</table>
(a) 42 (b) $\frac{1}{42}$ (c) $\frac{1}{24}$ (d) 24</td></tr>
<tr><td>2</td><td>The correlation coefficient of discrete random variables X and y is
(a) $\rho(X,Y) = \frac{COV(X,Y)}{\sigma_X}$ (b) $\rho(X,Y) = \frac{COV(X,Y)}{\sigma_X \sigma_Y}$ (c) $\rho(X,Y) = \frac{\sigma_{X+Y}}{\sigma_X \sigma_y}$ d) None of these</td></tr>
<tr><td>3</td><td>When the random variable X and Y are independent, its co-variance is:
(a) One (b) Negative (c) Zero (d) Positive</td></tr>
<tr><td>4</td><td>When the random variable X and Y are independent, then $E(XY) = ---$
(a) E(X)E(Y) (b) $\frac{E(X)}{E(Y)}$ (c) Zero (d) E(X+Y)</td></tr>
<tr><td>5</td><td>If the joint density function of two continuous random variables X and Y is
$f(x,y) = \begin{cases} kxy : 0 \le x \le 4, 1 < y < 5 \\ 0 \quad otherwise \end{cases}$ then the value of k is
(a) 1 (b) 96 (c) $\frac{1}{96}$ (d) 0</td></tr>
<tr><td>6</td><td>A certain farm produces two kinds of eggs on any given day; organic and non-organic. Let these two kinds of eggs be represented by the random variables X and Y respectively. Given that the joint probability density function of these variables is given by $f(x,y) = \begin{cases} \frac{2}{3}(x+2y), & 0 \le x \le 1, 0 \le y \le 1 \\ 0 & otherwise \end{cases}$,The marginal PDF of X is -----------
(a) $g(x) = \frac{3}{2}(x+1)$ (b) $g(x) = \frac{2}{3}(x+1)$ (c) $(x+1)$ (d) None of these</td></tr>
<tr><td>7</td><td>An Identity matrix is an example of
(a) Stochastic Matrix (b) Regular Stochastic Matrix (c) Probability vector (d) All of these</td></tr>
<tr><td>8</td><td>In an absorbing state of a Markov chain the transition probabilities p_{ij} are such that
$(a) \begin{cases} p_{ij=1 \; for \; i=j} \\ p_{ij=0 \; otherwise} \end{cases}$ (b) $\begin{cases} p_{ij=-1 \; for \; i=j} \\ p_{ij=0 \; otherwise} \end{cases}$ (c) $Both \; (a) and \; (b)$ (d) None of these</td></tr>
<tr><td>9</td><td>A Markov chain is said to be irreducible if the associated transition probability matrix is
(a) Regular (b) Stochastic (c) Regular Stochastic (d) None of these</td></tr>
<tr><td>10</td><td>The fixed probability vectors for the regular stochastic matrix $\begin{bmatrix} 0.7 & 0.3 \\ 0.8 & 0.2 \end{bmatrix}$ are
(a) $\begin{bmatrix} \frac{8}{11}, & \frac{3}{11} \end{bmatrix}$ (b) $\begin{bmatrix} \frac{1}{11}, & \frac{3}{11} \end{bmatrix}$ (c) $\begin{bmatrix} \frac{8}{11}, & \frac{1}{11} \end{bmatrix}$ (d) $\begin{bmatrix} \frac{1}{11}, & \frac{2}{11} \end{bmatrix}$</td></tr>
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