INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

AERONAUTICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY

Course Name	:	**COMPLEX ANALYSIS AND PROBABILITY DISTRIBUTION**
Course Code	:	**AHS004**
Program	:	**B.Tech**
Semester	:	**IV**
Branch	:	**Aeronautical Engineering**
Section	:	**A,B**
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Course Faculty	:	**Ms. C Rachana , Assistant Professor, FE** **Ms. PRajani , Assistant Professor, FE**

OBJECTIVES

I	To help students to consider in depth the terminology and nomenclature used in the syllabus.
II	To focus on the meaning of new words / terminology/nomenclature

DEFINITIONS AND TERMINOLOGYQUESTION BANK

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		UNIT - I			
1	What is a function ?	Let S be a non empty subset of C then f maps S tends C is said to be a function if every element of S associates with an element of C	Understand	CLO1	CAHS004.01
2	What is a complex number?	The number which can be written as z = x + iy is called a complex number.	Understand	CLO1	CAHS004.01
3	Identify Modulus of a complex number	If z = a+ib ,then its modulus is $\|z\| = \sqrt{a^2 + b^2}$	Understand	CLO1	CAHS004.01
4	Describe Argument of complex number	argument of a complex number z = a + ib = r(cosθ + isinθ) is the value of θ satisfying rcosθ = a and rsinθ = b. Thus the argument of z =θ, **π** –θ , – **π** +θ , –θ ,θ = $\tan^{-1}$ |a/ b| , according as z = a + ib lies in I, II, III or IVth quadrant.	Understand	CLO1	CAHS004.01
4	Define Limit?	A function w=f(z) is said to have a limit at w_0 as z approchhes to z_o when ∈> 0 in domain then f(z) approaches to w_0 when $\delta > 0$ in codomain when ever modulus of z-z_o less than ∈then modulus of f(z)- $w_0$less than δ We shall use the notation $w_0 = \lim_{z \to z_0}$ f (z).	Understand	CLO1	CAHS004.01
5	Define the continuity of the function	A function is said to be continuity at a point if limit of the function exit and the limit value is equals to functional value	Remember	CLO1	CAHS004.01
6	Explain Differentation of complex function.	Let w = f(z) be a given function defined for all z in a neighbourhood of z_0.If $\lim_{\Delta z \to 0} \frac{f(z_0 + \Delta z) - f(z_0)}{\Delta z}$ exists,the function f(z) is said to be derivable at z_0 and the limit is denoted by $f'(z_0)$. $f'(z_0)$ if exists is called the derivative of f(z) at z_0.	Understand	CLO1	CAHS004.01
7	Explain the properties of limit.	If the limit of a function f(z) exists as z tends to then it is unique	Understand	CLO1	CAHS004.01
8	Define Analytic function.	A complex function is said to be analytic on a region R if it is complex differentiable at every point in R.	Remember	CLO1	CAHS004.01

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
9	Define Singularities.	A complex function may fail to be analytic at one or more points through the presence of singularities.	Remember	CLO2	CAHS004.02
10	Explain the term Entire function.	A complex function that is analytic at all finite points of the complex plane is said to be entire function.	Understand	CLO1	CAHS004.01
12	Define complex potential function.	Let $w = \emptyset(x, y) + i\varphi(x, y)$ if this function is analytic then it's called complex potential function.	Understand	CLO3	CAHS004.03
13	Define harmonic function.	Analytic functions are intimately related to harmonic functions. We say that a real-valued function h(x, y) on the plane is harmonic if it obeys Laplace's equation: $\frac{\partial^2 h}{\partial^2 x} + \frac{\partial^2 h}{\partial^2 y} = 0$	Remember	CLO3	CAHS004.03
14	State Milne Thomson method.	$f^{'}(z)$ express completely in terms of z by replacing x by z and y by zero.	Understand	CLO3	CAHS004.03
15	Define Harmonic Conjugate.	Given a function $u(x,y)$ harmonic in an open disk, then we can find another harmonic function $v(x,y)$ so that $u + iv$ is an analytic function of z in the disk. Such a function v is called a *harmonic conjugate* of u.	Remember	CLO3	CAHS004.03
16	What is real part of the complex number z = x + iy ?	The real part of the complex number z = x + iy is x.	Understand	CLO1	CAHS004.01
17	What is complex conjugate?	The complex number z = x − iy is called the complex conjugate of z.	Understand	CLO1	CAHS004.01
18	What is imaginary part of the complex number z = x + iy ?.	The imaginary part of the complex number z = x + iy is y	Remember	CLO1	CAHS004.01

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
19	Explain Limit of the complex Function.	A function w=f(z) is said to tend to limit l as z approaches a point z_0 ,if for every real ε ,we can find a positive δ such that $\lvert f(z)-l \rvert < \varepsilon$ for $0<\lvert z-z_0 \rvert<\delta$ .we write $\underset{z \to z_0}{Lt} f(z)=l$	Understand	CLO1	CAHS004.01
20	Explain Differentiability of complex function .	Let w = f(z) be a given function defined for all z in a neighbourhood of z_0.If $\lim_{\Delta z \to 0} \frac{f(z_0+\Delta z)-f(z_0)}{\Delta z}$ exists, the function f(z) is said to be derivable at z_0 and the limit is denoted by $f'(z_0)$. $f'(z_0)$ if exists is called the derivative of f(z) at z_0.	Understand	CLO1	CAHS004.01
21	List polar form of the Cauchy-Riemann equation.	If $f(z)=f(re^{i\theta})=u(r,\theta)+iv(r,\theta)$ and f(z) is derivable at $z_0=r_0e^{i\theta_0}$ then $\frac{\partial u}{\partial r}=\frac{1}{r}\frac{\partial v}{\partial \theta},\frac{\partial v}{\partial r}=-\frac{1}{r}\frac{\partial u}{\partial \theta}$	Understand	CLO3	CAHS004.03
22	Define Regular function.	A complex function is said to be analytic on a region R if it is complex differentiable at every point in R.	Remember	CLO1	CAHS004.01
23	Define Singularities.	A complex function may fail to be analytic at one or more points through the presence of singularities.	Remember	CLO2	CAHS004.02
24	Explain the term Entire function.	A complex function that is analytic at all finite points of the complex plane is said to be entire function.	Understand	CLO1	CAHS004.01
25	State Cauchy–Riemann equations.	The Cauchy–Riemann equations on a pair of real-valued functions of two real variables *u*(*x*,*y*) and *v*(*x*,*y*) are the two equations: 1. $\frac{\partial u}{\partial x}=\frac{\partial v}{\partial y}$ 2. $\frac{\partial u}{\partial y}=-\frac{\partial v}{\partial x}$ Typically *u* and *v* are taken to be the real and imaginary parts respectively of a complex-valued function of a single complex variable z = x + iy, f(x + iy) = u(x,y) + iv(x,y)	Understand	CLO3	CAHS004.03
26	Define harmonic function.	Solutions of laplace equations having second order partial derivatives are called harmonic functios.	Remember	CLO3	CAHS004.03

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27	Define Conjugate harmonic function.	If two harmonic functions u and v satisfy the Cauchy-Reimann equations in a domain D and they are real and imaginary parts of an analytic function f in D then v is said to be a conjugate harmonic function of u in D.If f(z)=u+iv is an analytic function and if u and v satisfy Laplace's equation ,then u and v are called conjugate harmonic functions.	Remember	CLO3	CAHS004.03
28	State Milne Thomson method.	To express $f'(z)$ completely in terms of z by replacing x by z and y by zero.	Understand	CLO3	CAHS004.03
29	Define Harmonic Conjugate.	Given a function *u*(*x*,*y*) harmonic in an open disk, then we can find another harmonic function *v*(*x*,*y*) so that *u* + *iv* is an analytic function of *z* in the disk, Such a function *v* is called a harmonic conjugate of u.	Remember	CLO3	CAHS004.03
30	What is the value of $f'(z)$.	The value of $f'(z)$ is $f'(z) = \frac{\partial u}{\partial x} + i\frac{\partial v}{\partial x}$	Understand	CLO1	CAHS004.01
		UNIT – II			
1	Write the properties of continuous	All polynomials, exponential, logarithmic and trigonometric functions are continuous.	Remember	CLO1	CAHS004.01
2	Write the properties of derivative	Every differentiable functions is a continuous but converse need not be true	Remember	CLO1	CAHS004.01
3	Define a Complex function?	Let D be a nonempty set in C. A single-valued complex function or, simply, a complex function f : D → C is a map that assigns to each complex argument z = x + iy in D a unique complex number w = u + iv. We write w = f(z).	Remember	CLO1	CAHS004.01
4	What is the reciprocal of complex number?	The reciprocal of complex number is $x-iy/x^2+y^2$	Understand	CLO1	CAHS004.01
5	What is a line integral?	A line integral is just an integral of a function along a path or curve. In this case, the curve is a straight line – a segment of the x-axis that starts at x = a and ends at x = b.	Remember	CLO5	CAHS004.05
6	State Cauchy goursat Theorem.	let F(z)=u(x,y)+iv(x,y) be analytic on and within a simple closed contour (or curve) 'c' and let f ' (z) be continuous there,then and if integral f(z)dz is equal to zero	Understand	CLO5	CAHS004.05

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
7	Write nth order Cauchy integral formula.	Let f(z) be an regular function everywhere on and within a closed contour c. If z=a is any point within c then $f^{n}(a)=\frac{n!}{2\pi i}\int_{c}\frac{f(z)}{(z-a)^{n+1}}dz$	Remember	CLO6	CAHS004.06
8	Define pole	A point at which a function f(z) is not analytic is called a pole.	Remember	CLO5	CAHS004.05
9	Define the contour integrals	Contour integration is the process of calculating the values of a contour_integrals around a given contour in the complex plane	Remember	CLO5	CAHS004.05
10	Define the continuous function.	A function f(z) is said to be continuous at $z=z_0$,if $f(z_0)$ is defined and $\underset{z\to z_0}{Lt}\ f(z)=f(z_0)$	Remember	CLO5	CAHS004.05
11	Define the orthogonality curves	Two curves intersecting at a point p are said to intersect orthogonally.	Remember	CLO5	CAHS004.05
12	Define the simple closed curve.	A curve which does not intersect is called a simple closed curve.	Remember	CLO5	CAHS004.05
13	State the moreras theorem.	If a function f is continuous throughout a simple connected domain d and if integral f(z)dz is equal to zero for every closed contour c in D then f(z)is analytic in D.	Understand	CLO6	CAHS004.06
14	What is Path independence	We say the integral f(z) dz is path independent if it has the same value for any two paths with the same endpoints.	Remember	CLO5	CAHS004.05
15	Explain Extensions of Cauchy's theorem?	Cauchy's theorem requires that the function f(z) be analytic on a simply connected region. In cases where it is not, we can extend it in a useful way. Suppose R is the region between the two simple closed curves C1 and C2. Note, both C1 and C2 are oriented in a counterclockwise direction.	Understand	CLO5	CAHS004.05
16	What is a domain?	An open and connected subset $G\subseteq C$ is called a domain.	Understand	CLO5	CAHS004.05
17	Define line integral.	A line integral is an integral where the function to be integrated is evaluated along a curve. we define $\int_a^b F(t)\ dt=\int_a^b u(t)\ dt+i\int_a^b v(t)\ dt$	Remember	CLO5	CAHS004.05
18	What is real part of	The real part of $\int_a^b F(t)dt$ is $\int_a^b u(t)dt$	Understand	CLO5	CAHS004.05

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	$\int_a^b F(t)dt$?				
19	What is imaginary part of $\int_a^b F(t)dt$	The imaginary part of $\int_a^b F(t)dt$ is $\int_a^b v(t)dt$	Understand	CLO5	CAHS004.05
20	State Cauchy integral Theorem.	let F(z)=u(x,y)+iv(x,y) be an analytic on and within a simple closed contour (or curve) 'c' and let f '(z) be continuous there, then $\int_c f(z)dz = 0$	Understand	CLO5	CAHS004.05
21	State Cauchy integral formula.	Let f(z) be an analytic function everywhere on and within a closed contour c. If z=a is any point within c then $f(a) = \frac{1}{2\pi i}\int_c \frac{f(z)}{(z-a)}dz$ where the integral is taken in the positive sense around c.	Understand	CLO6	CAHS004.06
22	State generalization of Cauchy integral formula.	Let f(z) be an analytic function everywhere on and within a closed contour c. If z=a is any point within c then $f^n(a) = \frac{n!}{2\pi i}\int_c \frac{f(z)}{(z-a)^{n+1}}dz$	Understand	CLO6	CAHS004.06
23	Define indefinite integral.	The integral $\int f(z)dz$ is called indefinite integral.	Remember	CLO6	CAHS004.06
24	State morera's theorem.	If a function f is continuous through out a simple connected domain D and if $\int_c f(z)dz = 0$ for every closed contour c in D then f(z) is analytic in D.	Understand	CLO6	CAHS004.06
25	Define singular point.	A point at which a function f(z) is not analytic is called a singular point	Remember	CLO5	CAHS004.05
26	Define contour.	A continuous arc without multiple point is called contour.	Remember	CLO5	CAHS004.05
27	Define continuous function.	A function f(z) is said to be continuous at $z=z_0$,if $f(z_0)$ is defined and $\underset{z\to z_0}{Lt} f(z) = f(z_0)$	Remember	CLO5	CAHS004.05
28	Define laplace equation.	If f(z) is analytic function in a domain D,thenU and v satisfies the equation $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}$ =0	Remember	CLO5	CAHS004.05

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
29	Define orthogonality.	Two curves intersecting at a point p are said to intersect orthogonally.	Remember	CLO5	CAHS004.05
30	Define laplacian operator.	The operator $\nabla = \frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}$ is called laplacian operator.	Remember	CLO5	CAHS004.05
31	Define simple closed curve.	A curve which does not intersect is called a simple closed curve.	Remember	CLO5	CAHS004.05
UNIT – III					
1	Define singularity of analytic function.	A zero of an analytic function f(z) is a value of z such that f(z)=0 .Particularly a point a is called a singularity of an analytic function f (z) if f(a) = 0	Remember	CLO10	CAHS004.10
2	Define singularity of m^{th} order.	If an analytic function f(z) can be expressed in the form $f(z) = (z-a)^m \Phi(z)$ where $\Phi(z)$ is analytic function and $\Phi(a) \neq 0$ then z=a is called singularity of m^{th} order. of the function f(z).	Remember	CLO10	CAHS004.10
3	Define Singular point of an analytic function.	A point at which an analytic function f(z) is not analytic, i.e. at which f '(z) fails to exist, is called a singular point or singularity of the function.	Remember	CLO10	CAHS004.10\
4	Define Isolated singularity?	A singular point z_0 is called an isolated singular point of an analytic function f(z) if there exists a deleted ε-spherical neighborhood of z_0 that contains no singularity. If no such neighborhood can be found, z_0 is called a non-isolated singular point.	Remember	CLO10	CAHS004.10
5	Define non-isolated singularity?	A singular point z_0 is called an isolated singular point of an analytic function f(z) if there exists a deleted ε-spherical neighborhood of z_0 that contains no singularity. If no such neighborhood can be found, z_0 is called a non-isolated singular point.	Remember	CLO10	CAHS004.10
6	Define double pole.	A pole of order two is called a simple pole.	Remember	CLO11	CAHS004.11
7	Define Removable singularity?	An isolated singular point z_0 such that f can be defined, or redefined, at z_0 in such a way as to be analytic at z_0. A singular point z_0 is removable if $\lim_{z \to z_0} f(z) exist$.	Remember	CLO10	CAHS004.10

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8	Define Essential singularity	A singular point that is not a pole or removable singularity is called an essential singular point.	Remember	CLO10	CAHS004.10
9	Define Residues at Poles.	If f(z) has a simple pole at z_0, then $\text{Res}[f, z_0] = \lim_{Z \to Z_0} (z - z_0) f(z)$	Remember	CLO11	CAHS004.11
10	Stat Cauchy's Residue Theorem.	$\int_c f(z)dz = 2\pi i \sum_{a \in A} \text{Res}_{z=a_i} f(z)$ Where A is the set of poles contained inside the contour	Understand	CLO11	CAHS004.11
12	Define Residue at infinity.	The residue at infinity is given by: $\text{Res}[f(z)]_{Z=\infty} = -\frac{1}{2\pi i}\int_C f(z)dz$ Where f is an analytic function except at finite number of singular points and C is a closed countour so all singular points lie inside it.	Remember	CLO11	CAHS004.11
13	Define the Power series.	A series of the form $\sum a_n z^n$ is called as power series. That is $\sum a_n z^n = a_1 z + a_2 z^2 + ...+ a_n z^n + ...$	Remember	CLO7	CAHS004.07
14	State Taylor's series.	The Taylor series is an infinite series, whereas a Taylor polynomial is a polynomial of degree n and has a finite number of terms. The form of a Taylor polynomial of degree n for a function f (z) at x = a is $f(z) = f(a) + f'(a)(z-a) + f''(0)\frac{(z)^2}{2!} + ... \|z-a\| < r$	Remember	CLO9	CAHS004.09
15	Write Taylor series at x=0	Taylor series expansion of a function about x=0, $f(z) = f(0) + f'(0)(z) + f''(0)\frac{(z)^2}{2!} + f'''(0)\frac{(z)^3}{3!} + ...+ f^n(0)\frac{(z)^n}{n!} + ...$ This series is called astaylor series expansion of z=0.	Remember	CLO9	CAHS004.09
16	State Laurent series.	The Laurent series for a complex function *f*(z) about a point *c* is given by: $f(z) = \sum_{n=-\infty}^{\infty} a_n (z-a)^n$ $f(z) = \sum_{n=0}^{\infty} a_n (z-a)^n + \sum_{n=1}^{\infty} b_n \frac{1}{(z-a)^n}$	Remember	CLO9	CAHS004.09

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		where the a_n *and* a are constants.			
17	Define the Power series.	A series of the form $\sum a_n z^n$ is called as power series. That is $\sum a_n z^n = a_1 z + a_2 z^2 + ...+ a_n z^n + ...$	Remember	CLO7	CAHS004.07
18	State Power series.	A series of the form $\sum a_n z^n$ is called as power series. That is $\sum a_n z^n = a_1 z + a_2 z^2 + ...+ a_n z^n + ...$	Remember	CLO7	CAHS004.07
19	State Taylor's series.	The Taylor series is an infinite series, whereas a Taylor polynomial is a polynomial of degree n and has a finite number of terms. The form of a Taylor polynomial of degree n for a function f (z) at x = a is $f(z) = f(a) + f'(a)(z-a) + f''(0)\frac{(z)^2}{2!} + ...\ \lvert z-a \rvert < r$	Remember	CLO9	CAHS004.09
20	State Maclaurin series.	A Maclaurin series is a Taylor series expansion of a function about x=0, is called as macurins series.	Remember	CLO9	CAHS004.09
21	State Laurent series.	The Laurent series for a complex function *f*(*z*) about a point *c* is given by: $$f(z) = \sum_{n=-\infty}^{\infty} a_n (z-a)^n$$ $$f(z) = \sum_{n=0}^{\infty} a_n (z-a)^n + \sum_{n=1}^{\infty} b_n \frac{1}{(z-a)^n}$$ where the a_n *and* b_n are constants.	Remember	CLO9	CAHS004.09
22	Define Zero of an analytic function.	A zero of an analytic function f(z) is a value of z such that f(z)=0 .Particularly a point a is called a zero of an analytic function f (z) if f(a) = 0.	Remember	CLO10	CAHS004.10
23	Define Zero of m^{th} order.	If an analytic function f(z) can be expressed in the form $f(z) = (z-a)^m \phi(z)$ where $\phi(z)$ is analytic function and $\phi(a) \neq 0$ then z=a is called zero of m^{th} order of the function f(z).	Remember	CLO10	CAHS004.10
24	Define Singular point of an analytic function.	A point at which an analytic function f(z) is not analytic, i.e. at which f '(z) fails to exist, is called a singular point or singularity of the function.	Remember	CLO10	CAHS004.10

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
25	Define Isolated singular points.	A singular point z_0 is called an isolated singular point of an analytic function f(z) if there exists a deleted ε-spherical neighborhood of z_0 that contains no singularity. If no such neighborhood can be found, z_0 is called a non-isolated singular point.	Remember	CLO10	CAHS004.10
26	Define non-isolated singular points.	A singular point z_0 is called an isolated singular point of an analytic function f(z) if there exists a deleted ε-spherical neighborhood of z_0 that contains no singularity. If no such neighborhood can be found, z_0 is called a non-isolated singular point.	Remember	CLO10	CAHS004.10
27	Define Simple pole.	A pole of order 1 is called a simple pole.	Remember	CLO11	CAHS004.11
28	Define Removable singular point.	An isolated singular point z_0 such that f can be defined, or redefined, at z_0 in such a way as to be analytic at z_0. A singular point z_0 is removable if exist $\lim_{z \to z_0} f(z)$ exist.	Remember	CLO10	CAHS004.10
29	Define Essential singular point.	A singular point that is not a pole or removable singularity is called an essential singular point.	Remember	CLO10	CAHS004.10
30	Define Residues at Poles	If f(z) has a simple pole at z_0, then $\operatorname{Res}[f, z_0] = \lim_{Z \to Z_0} (z - z_0) f(z)$	Remember	CLO11	CAHS004.11
31	Stat Cauch's Residue Theorem.	$\int_c f(z)dz = 2\pi i \sum_{a \in A} \operatorname{Res}_{z=a_i} f(z)$ Where A is the set of poles contained inside the contour.	Understand	CLO11	CAHS004.11
32	Define Residue at infinity.	The residue at infinity is given by: $\operatorname{Res}[f(z)]_{Z=\infty} = -\frac{1}{2\pi i} \int_C f(z)dz$ Where f is an analytic function except at finite number of singular points and C is a closed countour so all singular points lie inside it.	Remember	CLO11	CAHS004.11
UNIT - IV					
1	Define expectation?	The sum of products of different values of x and the corresponding probabilities	Remember	CLO15	CAHS004.15

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
2	What is predictable experiment?	An experiment is said to be predictable if the result can be predicted	Remember	CLO15	CAHS004.15
3	What is conditional event?	Two events are said to be conditional events if they happen simultaneously. If A and B are any two events happening simultaneously then A/B, B/A are called conditional events.	Remember	CLO15	CAHS004.15
4	Define mean	The mean value μ of the discrete distributions functions is given by $\mu = E(x)$	Remember	CLO15	CAHS004.15
5	explain sample space?	The collection of all possible outcomes in any random experiment.	Remember	CLO15	CAHS004.15
6	What is an event?	A non empty subset of the sample space	Remember	CLO15	CAHS004.15
7	Define Probability.	Consider any random experiment the total number of events are n out of them m events are favorable to a particular event E then P(E)=Favorable events/ total number of events	Understand	CLO15	CAHS004.15
8	Define random variable.	In any random experiment the sample space associated with a real number	Remember	CLO15	CAHS004.15
9	What is discrete random variable?	A random variable is said to be discrete if the range of the random variable is finite	Remember	CLO15	CAHS004.15
10	What is continuous random variable?	A random variable is said to be continuous if the range of the random variable is interval of two real numbers	Remember	CLO15	CAHS004.15

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
11	What is predictable experiment?	An experiment is said to be predictable if the result can be predicted	Remember	CLO15	CAHS004.15
12	What is exhaustive event?	The total number of events in any random experiment	Remember	CLO15	CAHS004.15
13	What is mutually exclusive event?	It two or more events cannot obtain simultaneously in the same random experiment	Remember	CLO15	CAHS004.15
14	What is equally likely event?	Two events are said to be equally likely events if they have equal chance of happening.	Remember	CLO15	CAHS004.15
15	Define dependent event.	If one event is effected by the another event the n the two events are called dependent events	Remember	CLO15	CAHS004.15
16	What is random experiment?	An experiment is said to be predictable if the result cannot be predicted.	Remember	CLO15	CAHS004.15
17	Define outcome.	The result of the experiment.	Remember	CLO15	CAHS004.15
18	Define sample space?	The collection of all possible outcomes in any random experiment.	Remember	CLO15	CAHS004.15
19	What is an event?	A non empty subset of the sample space.	Remember	CLO15	CAHS004.15
20	What is exhaustive event?	The total number of events in any random experiment.	Remember	CLO15	CAHS004.15
21	What is mutually exclusive event?	It two or more events cannot obtain simultaneously in the same random experiment.	Remember	CLO15	CAHS004.15

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
22	What is equally likely event?	Two events are said to be equally likely events if they have equal chance of happening.	Remember	CLO15	CAHS004.15
23	Define dependent event.	If one event is effected by the another event the n the two events are called dependent events.	Remember	CLO15	CAHS004.15
24	Define independent event.	If one event is not effected by the another event the n the two events are called independent events.	Remember	CLO15	CAHS004.15
25	What is favorable event?	The events which are favorable to one particular event in any random experiment.	Remember	CLO15	CAHS004.15
26	Define Probability.	Consider any random experiment the total number of events are n out of them m events are favorable to a particular event E then P(E)=Favorable events/ total number of events	Understand	CLO15	CAHS004.15
27	Define random variable.	In any random experiment the sample space associated with a real number.	Remember	CLO15	CAHS004.15
28	What is discrete random variable?	A random variable is said to be discrete if the range of the random variable is finite.	Remember	CLO15	CAHS004.15
29	What is continuous random variable?	A random variable is said to be continuous if the range of the random variable is interval of two real numbers.	Remember	CLO15	CAHS004.15
30	What is predictable experiment?	An experiment is said to be predictable if the result can be predicted.	Remember	CLO15	CAHS004.15

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
UNIT - V					
1	Define Normal distribution.	If X is a continuous random variable μ, σ^2 are any two parameters then the normal distribution is denoted by $N(\mu,\sigma^2) = P(X_1 \le X \le X_2) = \frac{1}{\sigma\sqrt{2\pi}} e^{-\frac{1}{2}\left(\frac{x-m}{\sigma}\right)^2}, -\infty < X < \infty$	Understand	CLO20	CAHS004.20
2	What is Normal curve?	Normal curve is bell shape. It is symmetric about $x = \mu$ and z = 0. The total area in a normal distribution is unity.	Remember	CLO20	CAHS004.20
3	What is the maximum probability	The maximum probability is one.	Understand	CLO21	CAHS004.21
4	What is variance of binomial distribution?	The variance of binomial distribution is $\sigma = npq$	Understand	CLO21	CAHS004.21
5	What is standard deviation of binomial distribution?	The standard deviation of binomial distribution is $\sigma = \sqrt{npq}$	Understand	CLO21	CAHS004.21
6	What is mode of Poisson the distribution?	The mode of the Poisson distribution lies bet ween $\lambda - 1$ and λ	Understand	CLO23	CAHS004.23
7	What is variance of Poisson distribution?	The variance of Poisson distribution is λ	Understand	CLO23	CAHS004.23
8	***What is the recurrence relation of Poisson distribution?***	The recurrence relation of Poisson distribution is $p(x) = \frac{\lambda}{x} p(x-1)$	Understand	CLO23	CAHS004.23
9	Define binomial distribution.	Consider a random experiment having n trials. Let it succeed x times then the probability of getting x success is p^x , and the probability of n-x failures are q^{n-x} Therefore the probability of getting x success out of n trials are	Understand	CLO21	CAHS004.21

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
		b(x,n,p) = P(X=X) = $n_{c_x} p^x q^{n-x}$, x=0,1,2…….n			
10	What is the variance of K.	Variance of x	Understand	CLO21	CAHS004.21
11	Define probability function.	If X is a random variable then P(X=x) is called probability distribution or probability function.	Understand	CLO17	CAHS004.17
12	What is Bernuolli trial?	It is a random experiment having only two possible outcomes. Which are denoted by success and failure.	Remember	CLO21	CAHS004.21
13	Define binomial distribution.	Consider a random experiment having n trials. Let it succeed x times then the probability of getting x success is p^x , and the probability of n-x failures are q^{n-x} Therefore the probability of getting x success out of n trials are b(x,n,p) = P(X=X) = $n_{c_x} p^x q^{n-x}$, x=0,1,2…….n	Understand	CLO21	CAHS004.21
14	Define Poisson distribution.	A random variable X is said to follow a Poisson distribution if it assumes only non-negative values and its probability mass function is given by $f(x,\lambda) = P(X=x) = \frac{e^{-\lambda}.\lambda^x}{x!}, x = 0,1....\infty$	Understand	CLO23	CAHS004.23
15	Define Normal distribution.	If X is a continuous random variable μ, σ^2 are any two parameters then the normal distribution is denoted by $N(\mu,\sigma^2) = P(X_1 \le X \le X_2) = \frac{1}{\sigma\sqrt{2\pi}} e^{\frac{-1}{2}(\frac{x-\mu}{\sigma})^2}, -\infty < X < \infty$	Understand	CLO20	CAHS004.20
16	What is Normal curve?	Normal curve is bell shape. It is symmetric about $x = \mu$ and z = 0. The total area in a normal distribution is unity.	Remember	CLO20	CAHS004.20
17	What is mean of binomial distribution?	The mean of binomial distribution is $\mu = np$	Understand	CLO21	CAHS004.21
18	What is variance of binomial distribution?	The variance of binomial distribution is $\sigma = npq$	Understand	CLO21	CAHS004.21
19	What is standard deviation of	The standard deviation of binomial distribution is $\sigma = \sqrt{npq}$	Understand	CLO21	CAHS004.21

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
	binomial distribution?				
20	What is mean of Poisson distribution?	The mean of Poisson distribution is $\mu = np$	Understand	CLO23	CAHS004.23
21	What is variance of Poisson distribution?	The variance of Poisson distribution is λ	Understand	CLO23	CAHS004.23
22	What is standard deviation of Poisson distribution?	The standard deviation of Poisson distribution is $\sigma = \sqrt{\lambda}$	Understand	CLO23	CAHS004.23
23	What is mean of Normal distribution?	The mean of Normal distribution is $\mu = b$	Understand	CLO20	CAHS004.20
24	What is variance of Normal distribution?	The variance of Normal distribution is σ^2	Understand	CLO20	CAHS004.20
25	What is median of Normal distribution?	The median of Normal distribution is $\mu = M$	Understand	CLO20	CAHS004.20

Signature of the Faculty **Signature of the HOD**