INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad - 500 043

CIVIL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

Course Name	:	**MATHEMATICAL TRANSFORM TECHNIQUES**
Course Code	:	**AHSB03**
Program	:	**B.Tech**
Semester	:	**IV**
Branch	:	**CIVIL ENGINEERING**
Section	:	**A & B**
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Course Faculty	:	**Dr. S Jagadha , Professor** **Mrs V Subbha Laxmi, Assistant Professor**

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	Define Polynomial function	A function f(x) is said to be a polynomial function if it is a polynomial in x.	Remember	CLO 1	AHSB11.01
2	Define Algebraic function	A function which is a sum or difference or product of two polynomials.	Remember	CLO 1	AHSB11.01
3	Define transcendental function	A function which is a combination of trigonometry, exponential and logarithm function.	Remember	CLO 1	AHSB11.01
4	Define root of an equation	A real or complex number is the solution of an equation resulting zero.	Remember	CLO 1	AHSB11.01
4	Define root graphically	The roots of an equation are the abscissa of the points where the graph of function of independent variable cuts the axis of function framed by dependent variable.	Remember	CLO 1	AHSB11.01
5	Define iteration method	The process to obtain better approximation from initial condition.	Remember	CLO 2	AHSB11.02
6	Describe direct method	The solution which is obtained by solving linear and quadratic equations.	Understand	CLO 2	AHSB11.02
7	Describe analytical method	The solution which is obtained by solving cubic and biquadratic equations.	Understand	CLO 2	AHSB11.02
8	State disadvantage of analytical method	Polynomial equation of degree greater than 4 and transcendental equation are not solvable.	Understand	CLO 2	AHSB11.02
9	Describe bisection method	Better approximation of the root is obtained by taking average of points at each iteration.	Understand	CLO 1	AHSB11.01
10	Explain the term convergent in numerical methods regarding root	The iterative value tends to move towards origin.	Understand	CLO 1	AHSB11.01
12	State approximate root	The iterative value lies between opposite signs of values obtained from the function framed by dependent variables.	Remember	CLO 1	AHSB11.01
13	State exact root	The real or complex number statisfies the function framed by dependent variables.	Remember	CLO 1	AHSB11.01
14	Explain Newton Raphson method	The initial approximate value is chosen close to the root and converges very fast	Understand	CLO 2	AHSB11.02
15	State differences of a polynomial	If n is the degree of the polynomial and the values of x are equally spaced then n times of forward difference is a constant.	Understand	CLO 3	AHSB11.03
UNIT – II					

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
1	Describe curve fitting	To fit a unique curve through the given data points	Remember	CLO 6	AHSB11.06
2	Describe normal equations	The normal equations are obtained by the method of least squares consists of summation of squares of error of approximations	Remember	CLO 6	AHSB11.06
3	List numerical methods to solve ordinary differential equation	Taylor's series method, Euler's method, Modified Euler method and Rugne-Kutta method	Understand	CLO 7	AHSB11.07
4	Describe single step method	The information about the curve at one point is obtained and the solution is not iterated.	Understand	CLO 7	AHSB11.07
5	Describe step-by-step method	The information about the curve at one point is computed by short steps ahead for equal intervals h of the independent variable.	Understand	CLO 7	AHSB11.07
6	Explain boundary-value problem	The solution is obtained by applying conditions on the dependent variable which is prescribed at n distinct points.	Understand	CLO 7	AHSB11.07
7	Explain merit of Taylor series method	It is a single step method and the solution is not iterated.	Understand	CLO 7	AHSB11.07
8	Explain demerit of Taylor series method	Difficult to evaluate higher order derivatives of function	Understand	CLO 7	AHSB11.07
9	Explain merit of Euler's method	This method does not involve any derivatives and the solution is obtained by using initial condition	Understand	CLO 7	AHSB11.07
10	Explain disadvantage of R-K method	To calculate the derivatives is very difficult	Understand	CLO 7	AHSB11.07
11	State advantage of R-K method	To compute programming code is easier than comparing with other methods.	Remember	CLO 7	AHSB11.07
12	Explain relation between Euler and R-K method	Euler's method is the R-K method of the first order.	Remember	CLO 7	AHSB11.07
13	Explain reasons for existence of numerical methods becoming familiar	The solution of differential equations is obtained by using analytical methods are applicable only to a selected class of differential equations.	Remember	CLO 7	AHSB11.07
14	List number of R-K method	First order R-K method, second order R-K method, third order R-K method and fourth order R-K method.	Remember	CLO 7	AHSB11.07
15	Name the numerical methods to get approximate roots	Bisection method, Regular-false position method and Newton-Raphson method	Remember	CLO 7	AHSB11.07
UNIT – III					
1	Define Laplace transform	Laplace transform of a function f(t) is f(t) is multiplied by e^{-st} and integrating from 0 to ∞	Remember	CLO 9	AHSB11.09

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
2	State sufficient conditions for the existence of Laplace transform of a function	The function f(t) must be piece-wise continuous in any limited interval and the function is of exponential order	Understand	CLO 9	AHSB11.09
3	State piece-wise continuous function	A function f(t) is said to be piece-wise continuous over the closed interval [a,b] if it is divided into a finite number of subintervals where f(t) is continuous and has right and left hand limits at every end point of the subinterval	Understand	CLO 9	AHSB11.09
4	State Linearity property	Laplace transform of the sum of two or more functions of t is the sum of the Laplace transforms of the separate functions	Understand	CLO 9	AHSB11.09
5	State first shifting theorem	Laplace transform of a function f(t) is multiplied by e^{at} then changes to be made from s to s-a in resulting L[f(t)]	Understand	CLO 9	AHSB11.09
6	Define Unit step function	The unit step function is defined as u(t-a) if t<a the value is 0 and t>a the value is 1	Remember	CLO 9	AHSB11.09
7	State change of scale property	L[f(at)] is finding Laplace transform of function f(t) where changes to be made s to s/a , the whole is multiplied by 1/a	Understand	CLO 9	AHSB11.09
8	Define Laplace transform of derivatives	If f(t) is continuous and of exponential order, and f'(t) is sectionally continuous then the L[f'(t)] = sL[f(t)]-f(0)	Remember	CLO 9	AHSB11.09
9	Define Laplace transform of t^n f(t)	Laplace transform of t^n f(t) is $(-1)^n$ is multiplied by n^{th} derivative of L[f(t)]	Remember	CLO 9	AHSB11.09
10	Define Laplace transform of integrals	The whole L[f(t)] is divided by s	Remember	CLO 9	AHSB11.09
12	State Laplace transform of Dirac delta function	Laplace transform of Dirac delta function is e^{-as}	Understand	CLO 9	AHSB11.09
13	Define periodic function	A function f(t) is said to be periodic iff f(t+T) = f(t)	Remember	CLO 9	AHSB11.09
14	Define inverse Laplace transform	If f(s) is the Laplace transform of a function f(t) then f(t) is called the inverse Laplace transform of f(s)	Remember	CLO 11	AHSB11.11
15	State use of partial fractions in finding inverse Laplace transform	If f(s) is g(s)/h(s) where g and h are polynomials in s then f(t) is obtained by resolving f(s) into partial fractions and manipulating term by term	Understand	CLO 15	AHSB11.15
16	Define convolution theorem	f(t)*g(t) is equal to integrating with respect to u from 0 to t of f(u)g(t-u)	Remember	CLO 15	AHSB11.15
UNIT – IV					
1	Define transformation	A transformation is a mathematical device which changes one function into another function.	Remember	CLO 18	AHSB11.18
2	Name the transformations	Differentiation and integration	Remember	CLO 18	AHSB11.18

S No	QUESTION	ANSWER	Blooms Level	CLO	CLO Code
3	Explain Fourier integral	Extension from periodic function to non-periodic functions defined in the infinite intervals.	Remember	CLO 18	AHSB11.18
4	State Dirichlet's condition	The function is a single valued function at a finite number of points defined in the interval and piece-wise continuous.	Remember	CLO 18	AHSB11.18
5	State Linearity property	Fourier transform of two or more functions is seperated as sum of the Fourier transform of each function multiplied by constants.	Understand	CLO 19	AHSB11.19
6	State shifting property	The resulting Fourier transform of function is multiplied by e^{isa}	Understand	CLO 19	AHSB11.19
7	List the Fourier transformations	Finite and infinite Fourier transformations	Understand	CLO 20	AHSB11.20
8	List Finite Fourier transformations	Fourier sine transformation and Fourier cosine transformation	Remember	CLO 20	AHSB11.20
9	List infinite Fourier transforms	Infinite Fourier sine transformation and infinite Fourier cosine transformation	Understand	CLO 20	AHSB11.20
10	Define Fourier cosine transform	Integrating from zero to infinity to the function multiplied by cospx.	Understand	CLO 20	AHSB11.20
11	Define Fourier sine transform	Integrating from zero to infinity to the function multiplied by sinpx.	Understand	CLO 20	AHSB11.20
12	Explain modulus of x is less than a	X lies between the value from –a to a	Remember	CLO 20	AHSB11.20
13	Explain modulus of x is greater than a	X lies between the value from a to infinity	Remember	CLO 9	AHSB11.09
14	Explain existence of infinite Fourier sine transform interval	Interval from zero to infinity	Understand	CLO 20	AHSB11.20
15	Explain existence of infinite Fourier cosine transform interval	Interval from zero to infinity	Understand	CLO 20	AHSB11.20
UNIT - V					
1	Define partial differential equation	A differential equation which involves partial derivatives is called a partial differential equation	Remember	CLO 24	AHSB11.24
2	Define order of PDE	The order of PDE is the highest partial derivative appearing in the equation	Remember	CLO 24	AHSB11.24
3	Define degree of PDE	Degree of PDE is the highest order derivative	Remember	CLO 24	AHSB11.24
4	State the formation of PDE	PDE is formed either by the elimination of arbitrary constants or by the elimination of arbitrary functions from a relation involving three or more variables	Understand	CLO 25	AHSB11.25

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5	State the rule of PDE to be of first order	If the number of constants to be eliminated is equal to the number of independent variables the derived PDE is of first order	Understand	CLO 26	AHSB11.26
6	State the rule of PDE to be of second or higher order	If the number of constants to be eliminated is greater than the number of independent variables then the elimination of the constants will give rise to a PDE is of second or higher order	Understand	CLO 26	AHSB11.26
7	Define Lagrange's linear equation	A linear PDE of order one, involving a dependent variable z and two independent variables x and y of the form Pp+Qq =R where P,Q,R are functions of x,y,z is called Lagrange's linear equation	Remember	CLO 27	AHSB11.27
8	Define non-linear partial differential equation	A PDE which involves first order partial derivatives p and q with degree higher than one and the products of p and q is called a non-linear partial differential equation	Remember	CLO 27	AHSB11.27
9	Define complete integral	A solution in which the number of arbitrary constants is equal to the number of independent variables is called complete integral	Remember	CLO 27	AHSB11.27
10	Define particular integral	A solution obtained by giving particular values to the arbitrary constants in the complete integral is called a particular integral	Remember	CLO 27	AHSB11.27
11	Define singular integral	f(x,y,z,p,q)=0 is a PDE whose complete integral is g(x,y,z,a,b)=0	Remember	CLO 27	AHSB11.27
12	Define singular integral	f(x,y,z,p,q)=0 is a PDE whose complete integral is g(x,y,z,a,b)=0	Remember	CLO 27	AHSB11.27
13	Define standard form I	f(p,q)=0	Remember	CLO 27	AHSB11.27
14	Define standard form II	f(z,p,q)=0	Remember	CLO 27	AHSB11.27
15	Define standard form III	f1(x,p) = f2(y,q)	Remember	CLO 27	AHSB11.27

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