# TARE NO. FOR LIEUTE

## **INSTITUTE OF AERONAUTICAL ENGINEERING**

(Autonomous)

Dundigal, Hyderabad - 500 043

### **CIVIL ENGINEERING**

### **DEFINITIONS AND TERMINOLOGY QUESTION BANK**

Course Name	:	MATHEMATICAL TRANSFORM TECHNIQUES
Course Code	:	AHSB11
Program	:	B.Tech
Semester	:	II
Branch	:	Civil Engineering
Section	:	A & B
Academic Year	:	2019 – 2020
Course Faculty	:	Dr. S. Jagadha, Associate Professor

#### **OBJECTIVES:**

I	Enrich the knowledge solving algebra and transcendental equations and understanding Laplace transforms.
II	Determine the unknown values of a function by interpolation and applying inverse Laplace transforms.
III	Fitting of a curve and determining the Fourier transform of a function.
IV	Solving the ordinary differential equations by numerical techniques.
V	Formulate to solve Partial differential equation

## DEFINITIONS AND TERMINOLOGY QUESTION BANK

S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code				
	MODULE-I									
1	What is the order of convergence in Bisection method?	The order of convergence in Bisection method is one or linear.	Remember	CO 1	CLO 1	AHSB11.01				
2	What is the order of convergence in Newton-Raphson method?	The order of convergence Newton-Raphson method is two.	Remember	CO 1	CLO 1	AHSB11.01				
3	State the other name of Bisection method in determining the real root of algebraic and transcendental equation.	Bisection method is also called as Bolzono method in solving the real root of algebraic and transcendental equation.	Remember	CO 1	CLO 1	AHSB11.01				
4	State the most powerful and elegant method in determining the real root of algebraic and transcendental equation.	Newton-Raphson method is the powerful and elegant method in solving the real root of algebraic and transcendental equation.	Remember	CO 1	CLO 1	AHSB11.01				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
5	Define the term Laplace transform	If $f(t)$ be a given function which is defined for all positive values of $t$ , if $F(s) = \int\limits_{0}^{\infty} e^{-st} f(t) \ dt \ exists, \ then \ F(s) \ is$ called Laplace transform of $f(t)$ and is denoted by $L\{f(t)\}$	Remember	CO 1	CLO 2	AHSB11.02
6	State linearity property of Laplace transform	If $L\{f(t)\} = f(s)$ then L[af(t) + bg(t)] = aL[f(t)] + bL[g(t)]	Understand	CO 1	CLO 2	AHSB11.02
7	State change of scale property of Laplace transform	If $L\{f(t)\} = f(s)$ then $L[f(at)] = \frac{1}{a}f(\frac{s}{a})$	Understand	CO 1	CLO 3	AHSB11.03
8	State Laplace transform of periodic functions	If L{f(t)} = f(s) and f(t) is a periodic function with period T then $L[f(t)] = \frac{1}{1 - e^{-sT}} \int_{0}^{T} f(t)e^{-st}dt$	Understand	CO 1	CLO 6	AHSB11.06
9	When does a Laplace transform exists?	Laplace Transform exists the function is piece-wise continuous and of exponential order	Understand	CO 1	CLO 2	AHSB11.02
10	State the Laplace transform of unit impulse function	The Laplace transform of unit impulse function is e <sup>-as</sup>	Understand	CO 1	CLO 2	AHSB11.02
11	Describe the use of studying the Laplace transforms?	Laplace Transformation is very much useful in obtaining solution of Linear D.E's( both Ordinary and Partial), Solution of system of simultaneous D.E's, Solutions of Integral equations, solutions of Linear Difference equations and in the evaluation of definite Integral.	Understand	CO 1	CLO 2	AHSB11.02
12	State Laplace transform of derivatives	If $f(t)$ , $f'(t)$ , $f''(t)$ ,, $f^{(n-1)}(t)$ are continuous, and $f^{(n)}(t)$ is piecewise continuous, and all of them are exponential order functions, then $L[f^{(n)}(t)] = s^n F(s) - \sum_{i=1}^n s^{n-i} f^{(i-1)}(0)$	Understand	CO 1	CLO 4	AHSB11.04
13	State Laplace transform of integrals	If $L\{f(t)\} = f(s)$ then $\Rightarrow \int_{s}^{\infty} \int_{s}^{\infty} \cdots \int_{s}^{\infty} F(s) ds ds \cdots ds = L \left[ \frac{1}{t^{n}} f(t) \right]$	Understand	CO 1	CLO 4	AHSB11.04
14	Why Laplace transforms are so useful for solving linear differential equations?	Laplace transforms are so useful for solving linear differential equations because the Laplace transform of the n <sup>th</sup> derivative f <sup>n</sup> (x) can be related to the transform of f(x) in a simple manner.	Understand	CO 1	CLO 2	AHSB11.02
15	In H(t-a) at what point unit step function is defined	At the point $t = a$	Understand	CO 1	CLO 2	AHSB11.02
1	What is the symbol $\mu$	MODULE-II The symbol $\mu$ is called as Average or	Remember	CO 2	CLO 7	AHSB11.07
2	called as? What is the symbol E called as?	Mean operator  The symbol E is called as Shift operator	Remember	CO 2	CLO 7	AHSB11.07
3 4	Express the relation between E in terms of $\Delta$ .	The relation between E in terms of $\Delta$ is $1+\Delta$	Remember	CO 2	CLO 7	AHSB11.07

5 Establish the relation between E and D is $E = e^{4D}$ Remember CO 2 CLO 8 AHSB11.07 for Express $\nabla y_5$ in terms of $y_2, y_2, y_4$ and $y_5$ ?  7 Define the term Interpolation.  8 Represent the range of p in Gauss-Forward interpolation formulae.  8 Represent the range of p in Gauss-Forward interpolation formulae is used for interpolation formulae is used for sucqual interpolation formulae for ocqual length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Causs's forward interpolation formulae for equal length of intervals.  15 State Causs's forward interpolation formulae in sucqual such for intervals.  16 State Lagrange interpolation formulae in the such formulae	S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
6 Express $V_{Y_{2}}$ in terms of $V_{Y_{2}}$ $V_{2}$ and $V_{3}$ ?  7 Define the term Interpolation promulae interpolation formulae interpolation formulae.  8 Represent the range of p in Gauss-Forward interpolation formulae interpolation formulae interpolation formulae interpolation formulae.  9 Represent the range of p in Gauss-Forward interpolation formulae interval of $V_{2}$ and $V_{2}$ and $V_{2}$ interpolation formulae is used for unequal interval of $V_{2}$ and $V_{2}$ interpolation formulae interpolation formulae interval of $V_{2}$ and $V_{2}$ interpolation formulae interval of $V_{2}$ interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal function of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae interpolation formulae for equal length of intervals.  17 Express the value of $V_{2}$ in $V_{2}$	5		The relation between E and D is $E = e^{hD}$	Remember	CO 2	CLO 7	AHSB11.07
The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$   State Newton's forward interpolation formulae for equal length of intervals.   State Newton's backward interpolation formulae for equal length of intervals.   State Gauss's forward interpolation formulae is $0 < P < 1$   Remember   CO 2   CLO 8   AHSB11.08		between E and D.					
Define the term Interpolation   Interpolation is an estimation of a value within two known values in a sequence of values.	6		$\nabla y_5 = y_5 - 3y_4 - 3y_3 - y_2$	Understand	CO 2	CLO 8	AHSB11.08
Interpolation.   within two known values in a sequence of yalues.	7		Total and the state of the stat	D 1	CO 2	CI O 7	AUCD 11 07
8 Represent the range of p in Gauss-Forward interpolation formulae.  9 Represent the range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Backward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is used for unequal interval of x values to obtain the desired value of y.  10 Mention the name of formulae is used for unequal interval of x values to obtain the desired value of y.  11 Define Average or Man operator.  12 State Newton's forward interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State State State State Newton's backward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for equal length of intervals.  17 Express the value of $(n+1)^{1/2} (n+1)^{1/2} (n+$	/			Remember	CO 2	CLO /	AHSB11.07
8 Represent the range of p in Gauss-Forward interpolation formulae.  9 Represent the range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Backward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is $0 < P < 1$ The range of p in Gauss-Forward interpolation formulae is used for unequal interval of x values to obtain the desired value of y.  10 Mention the name of formulae is used for unequal interval of x values to obtain the desired value of y is 1 agrange's interpolation formulae for equal length of intervals.  11 Define Average or Mean operator.  12 State Newton's forward interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for equal length of intervals.  17 Express the value of $(n + 1)^{1/6}$ order difference of a polynomial of $n^{1/6}$ degree.  18 Define the term Inverse Laplace transform inverse Laplace transform in Property of Inverse Laplace property of Inverse L		interpolation.	=				
Interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange's interpolation formulae   Interval of x values to obtain the desired value of y is Lagrange   Interval of x values to obtain the desired value of y is Lagrange   Interval of x values to obtain the desired value of y = y y + p \( \Delta y + p	8	Represent the range		Remember	CO 2	CLO 8	AHSB11 08
Forward interpolation formulae.  9 Represent the range of p in Gauss-Backward interpolation formulae is sue of formulae is used for unequal interval of x values to obtain the desired value of y.  110 Mention the name of formulae is used for unequal interval of x values to obtain the desired value of y.  111 Define Average or Mean operator.  112 State Newton's forward interpolation formulae for equal length of intervals.  113 State Newton's backward interpolation formulae for equal length of intervals.  114 State States States of the state of th					002	0200	1110211100
Formulae.   The range of p in Gauss-Forward interpolation formulae is used for unequal interval of x values to obtain the desired value of y; stagrange's interpolation formulae is used for unequal interval of x values to obtain the desired value of y; stagrange's interpolation formulae for equal length of intervals.   Y = Y_0 + P \Delta Y_0 + \frac{p(-1)}{21} \Delta^2 Y_0 + \dots + \dots + \frac{p(-1)}{21} \Delta^2 Y_0 + \dots + \d							
Interpolation   Interpolati							
Backward interpolation formulae is used for unequal formulae is used for unequal interval of x values to obtain the desired value of y is Lagrange's interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for equal length of intervals.  17 Express the value of polynomial of $n^{th}$ degree interpolation formulae for equal length of intervals.  18 Define Average on Mark 10 formulae for equal length of intervals.  19 Express the value of intervals.  10 State Gauss's forward interpolation formulae for equal length of intervals.  11 Express the value of intervals.  12 State Gauss's forward interpolation formulae for equal length of intervals.  13 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Causs's forward interpolation formulae for equal length of intervals.  17 Express the value of intervals.  18 Define the term Inverse Laplace transform the term Inverse Laplace transform is real or complex.  19 State linearity property of Inverse Laplace transform or inverse of L[f(t)] or F(s), is f(t) = L^1 [F(s)] where is real or complex.  19 State linearity property of Inverse Laplace transform is real or complex.  19 State linearity property of Inverse Laplace transform and the	9			Remember	CO 2	CLO 8	AHSB11.08
interpolation formulae.  10 Mention the name of formulae is used for unequal interval of x values to obtain the desired value of y, values value of value value of value of value value value of value va			interpolation formulae is $-1 < P < 0$				
formulae   forward   forwa					1		
Mention the name of formulae is used for unequal formulae is used for unequal interval of x values to obtain the desired value of y, alues to obtain the desired value of y is Lagrange's interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for unequal the polynomial of $y = y_0 + p \Delta y_0 + \frac{p(p+1)}{2!} \nabla^2 y_n + \cdots + \frac{p(p+1)(p+2)}{2!} \Delta^2 y_{-1} + \frac{p(p+1)(p+2)}{3!} \Delta^3 y_{-1} + \cdots$ 17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  20 State change of Scale property of Inverse Laplace transform  21 State change of Scale property of Inverse Laplace transform  22 State change of Scale property of Inverse Laplace transform  23 State change of Scale property of Inverse Laplace transform  24 CO 2 CLO 9 AHSB11.09  25 CLO 8 AHSB11.08  26 CO 2 CLO 8 AHSB11.08  27 CLO 8 AHSB11.08  28 CO 2 CLO 8 AHSB11.08  29 Py + p $\Delta y_0 + \frac{p(p+1)p}{2!} \Delta^2 y_0 + \cdots + p(p+$					J.		
formulae is used for unequal interval of x values to obtain the desired value of y. Lagrange's interpolation formulae desired value of y. Lagrange's interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Gauss's forward interpolation formulae for equal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  20 State change of Scale property of Inverse Laplace transform  20 State change of Scale property of Inverse Laplace transform  10 Lift [(8)] = 0 Lift ((8)) = 0 Lift ((8)) are $(n)$ to $(n)$	10			D 1	00.2	CT O O	ATTGD 11.00
unequal interval of x values to obtain the desired value of y. Define Average or Mean operator.  12 State Newton's forward interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for equal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform Inverse of Laplace transform  19 State linearity property of Inverse Laplace transform  20 State change of scale property of Inverse Laplace transform  10 Laplace transform Laplace transform and the desired value of $(n+1)^{th}$ order diff(s) = $(n+1)^{th}$ order transform and the control of the control o	10			Remember	CO 2	CLO 8	AHSB11.08
values to obtain the desired value of y.  Define Average or Mean operator. $\mu y_r = \frac{1}{2} \left[ y_{r+1/2} + y_{r-1/2} \right]$ Remember CO 2 CLO 7 AHSB11.07  Remember CO 2 CLO 8 AHSB11.08  Py = y_0 + p \( \Delta y_0 + \frac{p(p-1)}{2} \) \( \Delta y_0 + \cdots + \cdots + \frac{p(p-1)}{2} \) \( \Delta y_0 + \cdots + \cdots + \frac{p(p-1)}{2} \) \( \Delta y_0 + \cdots + \cdots + \frac{p(p-1)}{2} \) \( \Delta y_0 + \cdots + \frac							
desired value of y.  Define Average or Mean operator.  12 State Newton's forward interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Gauss's forward interpolation formulae for equal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  10 Express the value of $(n+1)^{th}$ order diff(s) $+$ Lift(s)							
11   Define Average or Mean operator.   $\mu y_r = \frac{1}{2} \left[ y_{r+1/2} + y_{r-1/2} \right]$   Remember   CO 2   CLO 7   AHSB11.07			Tormurae				
Mean operator.   $\mu y_r = \frac{1}{2} \left[ y_{r+1/2} + y_{r-1/2} \right]$   State Newton's forward interpolation formulae for equal length of intervals.   $y = y_0 + p \Delta y_0 + \frac{p(p-1)}{2!} \Delta^2 y_0 + \cdots + \frac{p(p-1)(p-2)(p-(n-1))}{n!} \Delta^n y_0$   Remember   CO 2   CLO 8   AHSB11.08   State Newton's backward interpolation formulae for equal length of intervals.   $y = y_0 + p \nabla y_n + \frac{p(p+1)}{2!} \nabla^2 y_n + \cdots + \frac{p(p+1)(p+2)(p+(n-1))}{n!} \nabla^n y_n$   Remember   CO 2   CLO 8   AHSB11.08   CC 2   CLO 8   AHSB11.08   CC 3   CLO 8   AHSB11.08   CC 3   CLO 8   AHSB11.08   CC 4   CLO 8   AHSB11.08   CC 5   CLO 8   CC 5   CC 5   CLO 8   CC 5   CC 5   CLO 8   CC 5   CC 5   CLO 8   CC 5   CC 5   CLO 8   CC 5	11		1	Remember	CO 2	CLO 7	AHSB11.07
State Newton's forward interpolation formulae for equal length of intervals.   State State Newton's backward interpolation formulae for equal length of intervals.   $y = y_0 + p \ \nabla y_n + \frac{p(p-1)}{2!} \ \nabla^2 y_n + \cdots + \frac{p(p-1)(p-2)(p-(n-1))}{n!} \ \nabla^2 y_n + \cdots + \frac{p(p+1)(p+2)(p+(n-1))}{n!} \ \nabla^2 y_n + \cdots + \frac{p(p+1)(p+1)}{n!} \ \Delta^2 y_{-1} + \cdots + \frac{p(p+1)(p+1)}{n!} \ \Delta^2 $			$\mu y_r = \frac{1}{2} \left[ y_{r+1/2} + y_{r-1/2} \right]$			020 /	1110211107
forward interpolation formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for equal length of intervals.  17 State Gauss's forward interpolation formulae for equal length of intervals.  18 State Lagrange interpolation formulae for equal length of intervals.  19 State Lagrange interpolation formulae for equal length of intervals.  10 State Lagrange interpolation formulae for equal length of intervals.  11 State Gauss's forward interpolation formulae for equal length of intervals.  12 State Lagrange interpolation formulae for unequal length of intervals.  13 State Gauss's forward interpolation formulae for equal length of intervals.  14 State Lagrange interpolation formulae for unequal length of intervals.  15 State Lagrange interpolation formulae for unequal length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is always zero inverse of Lagrange interpolation formulae for unequal length of intervals.  18 Define the term Inverse Laplace transform in the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is always zero inverse of Lagrange is real or complex.  19 State linearity property of Inverse Laplace transform in the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is real or complex.  19 State change of scale property of Inverse $(n+1)^{th}$ order difference of $(n+1)^{th}$		_					
formulae for equal length of intervals.  13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform is real or complex.  19 State linearity property of Inverse Laplace transform is real or complex.  19 State Lagrange interpolation for the degree is ransform in the complex of the strength of the term Laplace transform is real or complex.  19 State Linearity property of Inverse Laplace transform is real or complex.  20 State change of scale property of Inverse Laplace transform are interpolated in the complex in the complex in the complex in the complex interpolation for the degree is always zero in the complex in the complex in the complex interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of	12		$y = y_0 + p \Delta y_0 + \frac{p(p-1)}{2!} \Delta^2 y_0 + \dots +$	Remember	CO 2	CLO 8	AHSB11.08
length of intervals.   State Newton's backward interpolation formulae for equal length of intervals.   $y = y_0 + p \nabla y_n + \frac{p(p+1)}{2!} \nabla^2 y_n + \cdots + \frac{p(p+1)(p+2) \dots (p+(n-1))}{n!} \nabla^n y_n$   Remember   CO 2   CLO 8   AHSB11.08   AHSB11.08   CO 2   CLO 8   AHSB11.08   CO 2   CLO 9   AHSB11.09   CO 2   CLO 9   AH			$\frac{p(p-1)(p-2)(p-(n-1))}{\Lambda^n v_0}$				
13 State Newton's backward interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  20 State change of scale property of Inverse Laplace transform  20 State change of scale property of Inverse Laplace Lapl			n! \(\sigma \text{ y}_0\)				
Dackward interpolation formulae for equal length of intervals.   14   State Gauss's forward interpolation formulae for equal length of intervals.   15   State Gauss's forward interpolation formulae for equal length of intervals.   15   State Gauss's forward interpolation formulae for equal length of intervals.   16   State Lagrange interpolation formulae for unequal length of intervals.   17   Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.   18   Define the term Inverse Laplace transform   19   State linearity property of Inverse Laplace transform   15   Co 2   Co 3   Co 4   Co 5   Co 6   AHSB11.08	12		_ p(p+1) _2	Pamambar	CO 2	CLOS	<b>ЛИСВ11 0</b> 0
interpolation formulae for equal length of intervals.  14 State Gauss's forward interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform intersion of the state transform interpolation are larged approperty of Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  20 State change of scale property of Inverse Laplace transform  21 Express the value of $(1 - 1)^{th}$ or $(1 - 1)^{th}$ is $(1 - 1)^{th}$ in $(1 - $	13		$y = y_0 + p  \forall y_n + \frac{1}{2!}  \forall^2 y_n + \dots +$	Kemember	COZ	CLO	Alisbii.00
formulae for equal length of intervals.   14   State Gauss's forward interpolation formulae for equal length of intervals.   $y = y_0 + p \Delta y_0 + \frac{p(p-1)}{2!} \Delta^2 y_{-1} + \frac{p+1p(p-1)}{3!} \Delta^3 y_{-1} + \cdots$   Remember   CO 2   CLO 8   AHSB11.08     15   State Gauss's forward interpolation formulae for equal length of intervals.   $y = y_0 + p \Delta y_{-1} + \frac{(p+1)p(p-1)}{2!} \Delta^2 y_{-1} + \frac{(p+1)p(p-1)}{3!} \Delta^3 y_{-1} + \cdots$   Remember   CO 2   CLO 8   AHSB11.08     16   State Lagrange interpolation formulae for unequal length of intervals.   $y = f(x) = \frac{(x-x_1)(x-x_2)(x-x_n)}{(x-x_1)(x-x_2)(x-x_n)} \cdot y_0 + + \frac{(x-x_1)(x-x_1)}{(x-x_1)(x-x_1)(x-x_1)} \cdot y_0 + + ($			$\frac{p(p+1)(p+2)(p+(n-1))}{} \nabla^n y_n$				
length of intervals.   State Gauss's forward interpolation formulae for equal length of intervals.   $y = y_0 + p \Delta y_0 + \frac{p(p-1)}{2!} \Delta^2 y_{-1} + \frac{p(p+1)p(p-1)}{3!} \Delta^3 y_{-1} + \cdots$   Remember   CO 2   CLO 8   AHSB11.08   CO 2   CLO 9   AHSB11.09   CO 2   CLO 9   CLO			n!				
interpolation formulae for equal length of intervals.  15 State Gauss's forward interpolation formulae for equal length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse Laplace transform  10 State Lapca formulae for unequal length of intervals.  11 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  12 Define the term Inverse Laplace transform  13 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  14 Define the term Inverse Laplace $(n+1)^{th}$ or $(n+1)^$		length of intervals.				1	
Interpolation formulae for equal length of intervals.  15  State Gauss's forward interpolation formulae for equal length of intervals.  16  State Lagrange interpolation formulae for unequal length of intervals.  17  Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18  Define the term Inverse Laplace transform is real or complex.  19  State linearity property of Inverse Laplace transform  19  State linearity property of Inverse Laplace transform  20  State change of scale property of Inverse Laplace transform  20  State change of scale property of Inverse Laplace transform  10  State Gauss's forward interpolation formulae for unequal length of intervals.  21  State Lagrange interpolation formulae for unequal length of intervals.  22  State change of scale property of Inverse Laplace transform  33 $y_{-1} + \cdots$ 24  Remember CO 2 CLO 8 AHSB11.08  25  CLO 8 AHSB11.08  26  CLO 8 AHSB11.08  27  CLO 8 AHSB11.08  28  AHSB11.08  29  CLO 9 AHSB11.09  20  State change of scale property of Inverse Laplace transform  20  State change of scale property of Inverse Laplace transform  20  State change of scale property of Inverse Laplace transform  20  State change of scale property of Inverse Laplace transform  20  State change of scale property of Inverse Laplace transform  21  State change of scale property of Inverse Laplace transform  22  State change of scale property of Inverse Laplace transform  23  State change of scale property of Inverse Laplace transform  24  State change of scale property of Inverse Laplace transform  25  State change of scale property of Inverse Laplace transform  26  State change of scale property of Inverse Laplace transform  27  State change of scale property of Inverse Laplace transform  28  State change of scale property of Inverse changes and the scale property of Inverse changes and th	14		$v = v_0 + p \Delta v_0 + \frac{p(p-1)}{2} \Delta^2 v_{-1} + \frac{p(p-1)}{2} \Delta^2 v_{-1$	Remember	CO 2	CLO 8	AHSB11.08
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formulae for equal length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse Laplace Laplace transform  19 State linearity property of Inverse Laplace Laplace transform  10 State change of scale property of Inverse  11 Laplace transform  12 State change of scale property of Inverse  13 Laplace transform  14 State change of scale property of Inverse  15 Laplace transform  16 State Lagrange interpolation $(x-x_1)(x-x_2)(x-x_n)$ $(x_0-x_1)(x_0-x_2)(x_0-x_n)$ $y_0++(x_0-x_1)(x_0-x_2)(x_0-x_n)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_2)(x_0-x_n)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)$ $y_0++(x_0-x_1)(x_0-x_1)(x_0-x_1)$	15		$y = y_0 + p \Delta y_{-1} + \frac{(p+1)p}{2!} \Delta^2 y_{-1} +$	Remember	CO 2	CLO 8	AHSB11.08
length of intervals.  16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree.  18 Define the term Inverse Laplace transform  19 State linearity property of Inverse  Laplace transform  19 State linearity property of Inverse  Laplace transform  10 State change of scale property of Inverse  Laplace transform  11 Laplace transform  12 State change of scale property of Inverse  Laplace transform  15 Laplace transform  16 Laplace transform  17 Laplace transform  18 Laplace transform  19 State linearity property of Inverse  Laplace transform  19 State change of scale property of Inverse  Laplace transform  19 State change of scale property of Inverse  Laplace transform  10 State change of scale property of Inverse  Laplace transform  10 State change of scale property of Inverse  Laplace transform  11 Laplace transform  12 State change of scale property of Inverse  Laplace transform  13 State change of scale property of Inverse  Laplace transform  14 Laplace transform  Laplace transform  15 Laplace transform  16 Laplace transform  27 State change of scale property of Inverse  Laplace transform  28 State change of scale property of Inverse  Laplace transform  29 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  20 State change of scale property of Inverse  Laplace transform  21 State Inverse transform property of Inverse  Laplace transform  22 State Change of Scale property of Inverse  23 S			$\frac{(p+1)p(p-1)}{\Lambda^3 v_1 + \cdots}$		100		
16 State Lagrange interpolation formulae for unequal length of intervals.  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is always zero  18 Define the term Inverse Laplace transform is real or complex.  19 State linearity property of Inverse Laplace transform  10 State change of scale property of Inverse Part Laplace transform  11 Inverse Laplace Laplace Laplace Laplace Laplace transform  12 State change of scale property of Inverse Laplace transform  13 State change of scale property of Inverse Laplace transform  14 Laplace transform  15 State change of scale property of Inverse Laplace transform  16 State Laplace transform  17 Express the value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is always zero  18 Define the term Inverse transform, or inverse of Laplace transform  19 State linearity property of Inverse Laplace transform  10 State change of scale property of Inverse Laplace transform  11 Inverse Laplace Laplace Laplace Laplace transform  12 Inverse Laplace Laplace Laplace Laplace transform  13 Inverse Laplace Laplace Laplace Laplace Laplace transform  14 Inverse Laplace L			3! 2 7-1		1.		
interpolation formulae for unequal length of intervals. $ \frac{(x-x_1)(x-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x_0-x_n)}.y_0 + + \\ \frac{(x-x_1)(x-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x_0-x_n)}.y_n $ The value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is always zero $ \frac{(x-x_1)(x-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x_0-x_n)}.y_n $ Understand CO 2 CLO 8 AHSB11.08 $ \frac{(x-x_1)(x-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x_0-x_n)}.y_n $ The value of $(n+1)^{th}$ order difference of a polynomial of $n^{th}$ degree is always zero $ \frac{(x-x_1)(x-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x_0-x_n)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x-x_n)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_2)(x-x_n)}{(x_0-x_1)(x-x_n)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_1)(x-x_n)}{(x_0-x_1)(x-x_n)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_1)(x_0-x_1)}{(x_0-x_1)(x_0-x_1)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_1)(x_0-x_1)}{(x_0-x_1)(x_0-x_1)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_1)(x_0-x_1)}{(x_0-x_1)(x_0-x_1)}.y_0 + + \\ \frac{(x-x_1)(x_0-x_1)(x_0-x_1)}{(x_0-x_1)(x_0-x_1)}.y_0 +$	16		y = f(x) =	Remember	CO 2	CLO 8	AHSB11.08
			$(x-x_1)(x-x_2)(x-x_n)$				.== = 1.00
			$(x_0-x_1)(x_0-x_2)(\overline{x_0-x_n}) \cdot y_0 + \dots +$	100			
		length of intervals.	$\frac{(x-x_1)(x-x_2)(x-x_n)}{(x_2-x_1)(x_2-x_2)(x_2-x_n)} \cdot y_n$	1 -			
	17	Express the value of	The value of $(n+1)^{th}$ order difference of	Understand	CO 2	CLO 8	AHSB11.08
difference of a polynomial of $n^{th}$ degree.  The inverse transform, or inverse of Inverse Laplace transform  Inverse Laplace transform  If $L^{-1}\{f(s)\} = f(t)$ then the term is real or complex.  The inverse transform, or inverse of Laplace transform  Inverse Laplace transform  If $L^{-1}\{f(s)\} = f(t)$ then the Laplace transform $L^{-1}[a f(s)] + b L^{-1}[g(s)]$ The inverse transform, or inverse of Laplace transform  If $L^{-1}\{f(s)\} = f(t)$ then the Laplace transform the control of the con			a polynomial of $n^{th}$ degree is always zero				
degree.  18 Define the term Inverse Laplace Inverse Laplace Inverse Inverse Inverse Laplace Inverse Laplace Inverse Inverse Inverse Inverse Inverse CO 2 Inverse CD 9 Inverse Inverse CD 9 Inve			1 ,				
Define the term Inverse Laplace Inverse Inver		polynomial of $n^{th}$					
Inverse Laplace transform $L\{f(t)\}$ or $F(s)$ , is $f(t) = L^{-1}\{F(s)\}$ where $s$ is real or complex.  19 State linearity property of Inverse Laplace transform $L^{-1}\{f(s)\} = f(t)$ then $L^{-1}\{f(s)\} = f(t)$		degree.					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	18			Remember	CO 2	CLO 9	AHSB11.09
19 State linearity property of Inverse Laplace transform $L^{-1}\{f(s)\} = f(t)$ then $L^{-1}\{f(s)\} = f$							
property of Inverse Laplace transform $ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	10			** 1	GO 2	GT C C	ATIODALOG
Laplace transform $= a L^{-1} [f(s)] + b L^{-1} [g(s)]$ 20 State change of scale property of Inverse $L^{-1} \{ F(s-a) \} = e^{at} L^{-1} \{ F(s) \}$ Understand CO 2 CLO 9 AHSB11.09	19			Understand	CO 2	CLO 9	AHSB11.09
State change of scale property of Inverse $L^{-1}\{f(s)\}=f(t)$ then $L^{-1}\{F(s-a)\}=e^{at}$ $L^{-1}\{F(s)\}$ Understand CO 2 CLO 9 AHSB11.09							
property of Inverse $L^{-1}{F(s-a)} = e^{at} f(t) = e^{at} L^{-1}{F(s)}$	20		$-aL[1(5)] + UL[g(5)]$ If $I^{-1}\{f(s)\} - f(t)$ then	Understand	CO 2	CLOO	ΔHSR11 00
	20		$L^{-1}\{F(s-a)\} = e^{at} f(t) = e^{at} L^{-1}\{F(s)\}$	Onderstand	202	CLU	A113D11.07

S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code
21	State convolution	If $L\{f(t)\} = f(s)$ then	Understand	CO 2	CLO 10	AHSB11.10
	theorem of Laplace transform	$L\left[\int_{0}^{t} f(\tau)g(t-\tau)d\tau\right] = F(s).G(s)$				
	transform					
22	C( . ( . T 1. 'C'	TCT ((1) C(1) -85 T (C(1))	TT. 1	GO 2	CLOO	AUGD11 00
22	State Inverse shifting property of Inverse	If $L\{ua(t) f(t-a)\}=e^{-as} L\{f(t)\}=$ $e^{-as} F(s), then L^{-1} \{e^{-as} F(s)\}=ua(t) f(t-a)$	Understand	CO 2	CLO 9	AHSB11.09
	Laplace transform					
23	State convolution	If $L\{f *g\} = L\{f(t)\}.L\{g(t)\} = F(s).G(s)$	Understand	CO 2	CLO 10	AHSB11.10
	theorem of Inverse	then $L^{-1} \{F(s).G(s)\} = f(t) * g(t)$				
	Laplace transform					
1	D. C. at the same	MODULE-III	D	CO 2	CI O 12	ALICD 11 12
1	Define the term curve fitting.	It is the process of finding the best fit curve for the set of given data values	Remember	CO 3	CLO 13	AHSB11.13
2	State through how	Through the three paired data points the	Understand	CO 3	CLO 13	AHSB11.13
	many paired data	fitting of the best straight line is obtained.				
	points does fitting of					
	the best straight line					
3	must pass through?  Mention the principle	The principle involved in determining the	Remember	CO 3	CLO 13	AHSB11.13
	involved in	best fit curve for the set of given data	Remember	203	CLO 13	A113D11.13
	determining the best	values is the Method of least squares				
	fit curve for the set of	-				
	given data values.					
4	Describe the term	The principle of least squares is described	Remember	CO 3	CLO 13	AHSB11.13
	principle of least squares in obtaining	as "Sum of the squares of the errors or residuals is minimum"				
	the best fit of the	Testadas is illililida				
	curve.					
5	State through how	Through the two paired data points the	Understand	CO 3	CLO 13	AHSB11.13
	many paired data	fitting of the best straight line is obtained.		7		
	points does fitting of the best straight line				-	
	must pass through?					
6	State the Normal	The normal equations of the straight line	Remember	CO 3	CLO 13	AHSB11.13
	equations of the	y = a + bx are		7	-	
	straight line	$\sum y = na + b \sum x$				
	y = a + bx			500		
		$\sum xy = a\sum x + b\sum x^2$				
7	State the Normal	The normal equations of the second degree	Remember	CO 3	CLO 13	AHSB11.13
	equations of the second degree	parabola $y = a + bx + cx^2$ are	~~			
	parabola	$\varepsilon y = na + b\varepsilon x + c\varepsilon x^2$	10			
	$y = a + bx + cx^2$	$\varepsilon xy = a\varepsilon x + b\varepsilon x^2 + c\varepsilon x^3$	1			
		/- L/ //				
		$\varepsilon x^2 y = a\varepsilon x^2 + b\varepsilon x^3 + c\varepsilon x^4$				
8	Define Fourier	Fourier integral is a pair of integralsa	Remember	CO 3	CLO 14	AHSB11.14
	integral transforms	"lower Fourier integral" and an "upper Fourier integral"which allow				
		certain complex-valued functions $f$ to				
		be decomposed as the sum of integral-				
		defined functions, each of which				
		resembles the usual Fourier				
		integral associated to $f$ .				

S.No	QUESTION	ANSWER	Blooms Level	CO	CLO	CLO Code
9	State Fourier integral theorem.	If $f(x)$ is a given function defined in (-l,l) and satisfies the Dirichlet conditions then $f(x) = \frac{1}{\pi} \int_{0}^{\infty} \int_{-\infty}^{\infty} f(t) \cos \lambda (t-x) dt d\lambda$	Understand	CO 3	CLO 14	AHSB11.14
10	State Fourier Sine integral formulae.	$f(x) = \frac{2}{\pi} \int_{0}^{\infty} \sin \lambda x \int_{0}^{\infty} f(t) \sin \lambda t dt d\lambda$	Remember	CO 3	CLO 14	AHSB11.14
11	State Fourier Cosine integral formulae.	$f(x) = \frac{2}{\pi} \int_{0}^{\infty} \cos \lambda x \int_{0}^{\infty} f(t) \cos \lambda t dt d\lambda$	Remember	CO 3	CLO 14	AHSB11.14
12	Define the term Integral transform	The integral transform of a function $f(x)$ is given by $I[f(x)]$ or $F(s)$ $= \int_{a}^{b} f(x)k(s,x)dx$ Where $k(s, x)$ is a known function called kernel of the transform, $s$ is called the parameter of the transform of $F(s)$	Remember	CO 3	CLO 15	AHSB11.15
13	Define Fourier transforms	The Fourier transform (FT) decomposes a function of time (a signal) into the frequencies that make it up, in a way similar to how a musical chord can be expressed as the frequencies (or pitches) of its constituent notes.	Remember	CO 3	CLO 15	AHSB11.15
14	Why to we need Fourier transforms	A complicated signal can be broken down into simple waves. This break down, and how much of each wave is needed, is the Fourier Transform. Fourier transforms (FT) take a signal and express it in terms of the frequencies of the waves that make up that signal.	Understand	CO 3	CLO 19	AHSB11.19
15	What is difference between Fourier series and Fourier transform?	The Fourier series is used to represent a periodic function by a discrete sum of complex exponentials, while the Fourier transform is then used to represent a general, non periodic function by a continuous superposition or integral of complex exponentials.	Understand	CO 3	CLO 19	AHSB11.19
16	How to represent Fourier transforms of function F(s)	Fourier transforms of function F(s) is defined by $F(s) \equiv \int_{-\infty}^{\infty} f(x) e^{-2\pi i s x} dx$	Understand	CO 3	CLO 15	AHSB11.15
17	How to represent Inverse Fourier transforms of function f(x)	Inverse Fourier transforms of function f(x) is defined by $f(x) \equiv \int_{-\infty}^{\infty} F(s) e^{2\pi i s x} ds$ $F[af_1(x) + bf_2(x)] = aF_1(s) + bF_2(s)$	Understand	CO 3	CLO 15	AHSB11.15
18	State linearity property of Fourier transforms	$F[af_1(x) + bf_2(x)] = aF_1(s) + bF_2(s)$	Understand	CO 3	CLO 15	AHSB11.15

S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code
19	State change of scale	1 <sub>E</sub> (s) 1	Understand	CO 3	CLO 15	AHSB11.15
	property of Fourier	$F[f(ax)] = \frac{1}{a}F(\frac{s}{a})(a>0)$				
20	transforms State Modulation		Understand	CO 3	CLO 15	AHSB11.15
20	property of Fourier	$F[f(x)\cos ax] = \frac{1}{2}[F(s+a) + F(s-a)], F[s] = F[f(x)]$	Understand	CO 3	CLO 13	Alisb11.15
	transforms	21 7 7 17 17 17 17 17 17 17 17 17 17 17 1				
2.1	D C		D 1	00.2	GI 0 16	AHGD1116
21	Define Fourier sine transforms	The Fourier sine transform is he imaginary part of the full complex Fourier transform	Remember	CO 3	CLO 16	AHSB11.16
	transforms	part of the full complex Fourier transform				
22	Define Fourier cosine	The Fourier cosine transform is the a real	Remember	CO 3	CLO 16	AHSB11.16
	transforms	part of the full complex Fourier transform.				
23	Define inverse	A mathematical operation	Remember	CO 3	CLO 17	AHSB11.17
	Fourier transforms	that transforms a function for a discrete or		1		
		continuous spectrum into a function for the amplitude with the given spectrum;		J.		
		an inverse transform of the Fourier				
		transform				
	***	MODULE-IV		ac i	l or o s	A VYCEN 1 1 5 5
1	What is single step method in	Taylor's series method is single step method in determining the numerical	Remember	CO 4	CLO 20	AHSB11.20
	determining the	solution to ordinary differential equation				
	numerical solution to	solution to ordinary unrecentiar equation				
	ordinary differential					
	equation?					
2	What are multi step	Euler's method, Modified Euler's	Remember	CO 4	CLO 20	AHSB11.20
	methods in determining the	method and Runge-Kutta method are multi step method in determining the				
	numerical solution to	numerical solution to ordinary differential				
	ordinary differential	equation				
	equation?					
3	Define Taylor's	(x) $(x)$ $(x)$ $(x)$ $(x)$ $(x)$ $(x)$ $(x)$ $(x)$ $(x)$	Remember	CO 4	CLO 20	AHSB11.20
	series formulae.	$y(x) = y(0) + x \cdot y'(0) + \frac{x^2}{2!} y''(0) + \dots + \frac{x^n}{n!} y^n(0) + \dots$			-	
4	State the Euler	$y_{n+1} = y_n + hf(x_n, y_n)$	Understand	CO 4	CLO 20	AHSB11.20
	formula to determine		7			
	the numerical			- 4	-	
	solution of ordinary differential equation.					
5	State the second	Second order R-K Formula	Understand	CO 4	CLO 21	AHSB11.21
	order Runge- Kutta	$y_{i+1} = y_i + 1/2 (K_1 + K_2),$		D-, "		
	method to determine	Where $K_1 = h(x_i, y_i)$	- 6			
	the numerical	$K_2 = h (x_i + h, y_i + k_1)$	0.7			
	solution of ordinary differential equation.	For i= 0,1,2	10			
6	State the third order	Third order R-K Formula	Understand	CO 4	CLO 21	AHSB11.21
	Runge- Kutta method	$y_{i+1} = y_i + 1/6 (K_1 + 4K_2 + K_3),$				
	to determine the	Where $K_1 = h(x_i, y_i)$				
	numerical solution of ordinary differential	$K_2 = h (x_i+h/2, y_0+k_1/2)$ $K_3 = h (x_i+h, y_i+2k_2-k_1)$				
	equation.	For i= $0,1,2$				
7	State the fourth order	Fourth order R-K Formula	Understand	CO 4	CLO 21	AHSB11.21
	Runge- Kutta method	$y_{i+1} = y_i + 1/6 (K_1 + 2K_2 + 2K_3 + K_4),$				
	to determine the	Where $K_1 = h(x_i, y_i)$				
	numerical solution of	$K_2 = h(x_i + h/2, y_i + k_1/2)$ $K_1 = h(x_i + h/2, y_i + k_1/2)$				
	ordinary differential equation	$K_3 = h (x_i+h/2, y_i+k_2/2)$ $K_4 = h (x_i+h, y_i+k_3)$				
		For $i = 0, 1, 2 - \cdots$				
8	State the modified	$y_{k+1}^{(i)} = y_k + h/2f[(x_k, y_k) + f(x_{k+1}, 1)_{k+1}^{(i-1)}]$	Understand	CO 4	CLO 20	AHSB11.20
	Euler formula to	$\begin{bmatrix} y_{k+1} - y_k & n/2J & (\lambda_k, y_k) \top J & (\lambda_{k+1}, 1)_{k+1} \end{bmatrix}$	, ,			

S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code
	determine the	For i=0,1,2,3				
	numerical solution of ordinary differential					
	equation.					
9	List numerical	Taylor's method is a single-step method	Remember	CO 4	CLO 20	AHSB11.20
	method of single-					
10	step List numerical	Euler and Runge-Kutta methods are step	Remember	CO 4	CLO 21	AHSB11.21
10	method of step by	by step methods	Kemember	CO 4	CLO 21	AliSD11.21
	step	3 1				
11	Define boundary-	If the conditions on y are prescribed at n	Remember	CO 4	CLO 20	AHSB11.20
	value problem	distinct points, then the problems are called boundary-value problems				
12	Drawback of Taylor	To evaluate higher order derivatives is	Remember	CO 4	CLO 20	AHSB11.20
	method	difficult				
13	Which method is	Taylor's form is unsuitable for tabular	Remember	CO 4	CLO 20	AHSB11.20
	unsuitable if f(x,y) is given in tabular form	form of datas				
14	Which numerical	Runge-Kutta method is very powerful	Understand	CO 4	CLO 21	AHSB11.21
	method is powerful					
15	Define initial value	The values of y are specified at the same	Understand	CO 4	CLO 20	AHSB11.20
	problems	value of x is called initial value problem.  MODULE-V				
1	Define the term	An equation involving partial derivatives	Remember	CO 5	CLO 22	AHSB11.22
	partial differential	of one dependent variable with respective	Remember		CEO 22	11110211.22
	equation	more than one independent variables.				
2	Describe the	A partial differential equation of given	Understand	CO 5	CLO 23	AHSB11.23
	formation of partial differential equation	curve can be formed in two ways  1. By eliminating arbitrary constants				
	differential equation	2. By eliminating arbitrary functions				
3	Write Lagrange's	An equation of the form $Pp + Qq = R$ is	Remember	CO 5	CLO 24	AHSB11.24
	linear equation of a	called Lagrange's linear equation.		7	-	
	non linear partial differential equation	W . W - )	_		-	
4	Write auxillary	Lagrange's linear equation consider	Remember	CO 5	CLO 24	AHSB11.24
	equation of	auxiliary equation is given by				
	Lagrange's linear	$\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$		1		
	partial differential equation	1 Q K		-		
5	Define first order	A differential equation involving partial	Understand	CO 5	CLO 23	AHSB11.23
	equation	derivatives p and q only and no higher	- 5			
		order derivatives is called a first order	~ ~			
6	Write one example of	equation.  The example of linear p.d.e is	Understand	CO 5	CLO 23	AHSB11.23
	linear p.d.e	$px + qy^2 = z$	Understand	203	CLU 23	AH5D11.23
7	Write general	$ \begin{aligned} px + qy &= z \\ \phi(u, v) &= 0 \end{aligned} $	Understand	CO 5	CLO 24	AHSB11.24
'	solution of	$\psi(u,v)=0$	Chacistana		CLO 24	11110011.24
	$P_p + Q_q = R$					
8	Define order of p.d.e	Highest partial derivative appearing in the	Understand	CO 5	CLO 23	AHSB11.23
	•	equation				
9	Describe one	The equation which governs the motion of	Understand	CO 5	CLO 26	AHSB11.26
	dimensional wave equation of partial	the vibrating string over time, is called the one-dimensional wave equation. It is a				
	differential equation	second order PDE, and it's linear and				
	1	homogeneous.				
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S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code
10	Describe one	The equation which governs the	Understand	CO 5	CLO 27	AHSB11.27
	dimensional heat	mathematical model of how heat spreads				
	equation of partial	or diffuses through an object such as a				
	differential equation	metal rod or a body of water.				
11	Express one	$\frac{\partial^2 u}{\partial t^2} = c^2 \frac{\partial^2 u}{\partial x^2}$	Understand	CO 5	CLO 26	AHSB11.26
	dimensional wave	$\frac{1}{24^2} = c^2 \frac{1}{2x^2}$				
	equation of partial	$CI \qquad CX$				
10	differential equation	_	XX 1 . 1	00.5	CT 0.26	A TIGD 11 0 C
12	Express one	$\frac{\partial u}{\partial t} = c^2 \frac{\partial^2 u}{\partial x^2}$	Understand	CO 5	CLO 26	AHSB11.26
	dimensional heat	$\frac{1}{\partial t} = c \frac{1}{\partial x^2}$				
	equation of partial differential equation					
13		2 2	Understand	CO 5	CLO 26	AHSB11.26
13	Express two dimensional laplace	$\int \partial^2 u \int \partial^2 u = 0$	Understand	CO 3	CLO 20	Ansb11.20
	equation of partial	$\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$				
	differential equation			3		
14	Define the boundary	y(0,t) = 0 for all t and $y(1,t) = 0$ for all t	Remember	CO 5	CLO 26	AHSB11.26
1.	conditions of one	y(o,t) o for all t alla y(i,t) o for all t	remember		CEO 20	1115511.20
	dimensional wave					
	equation					
15	Define the boundary	u(0,t) = 0 for all values of t and	Remember	CO 5	CLO 26	AHSB11.26
	conditions of one	$u(l,t) = f(x) \text{ for } 0 \le x \le l$				
	dimensional heat	$u(\iota,\iota) = f(x) \text{ for } 0 \le x \le \iota$				
	equation					

**Signature of the faculty** 

HOD, CE