

INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous) Dundigal, Hyderabad - 500 043

MECHANICAL ENGINEERING

DEFINITIONS AND TERMINOLOGY QUESTION BANK

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

OBJECTIVES:

Ι	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	Blooms Level	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	СО	CLO	CLO Code
5	Define the term	If f(t) be a given function which is defined	Remember	CO 1	CLO 2	AHSB11.02
	Laplace transform	for all positive values of t, if				
		∞				
		$F(s) = \int e^{-st} f(t) dt exists, then F(s) is$				
		called Laplace transform of $f(t)$ and is				
	0	denoted by $L{f(t)}$		CO 1		AUGD 11 02
6	State linearity	If $L{f(t)} = f(s)$ then	Understand	COT	CLO 2	AHSB11.02
	property of Laplace	L [a f(t) + b g(t)] = a L [f(t)] + b L [g(t)]				
	transform		TT 1 1	CO 1	CI O 2	AUGD 11 02
/	State change of scale	If $L{f(t)} = f(s)$ then	Understand	COT	CLO 3	AHSB11.03
	property of Laplace	$L[f(at)] = \frac{1}{a}f(\frac{3}{a})$				
	transform			CO 1	CT O C	
8	State Laplace	If $L{f(t)} = f(s)$ and $f(t)$ is a periodic	Understand	COT	CLO 6	AHSB11.06
	transform of periodic	function with period 1 then				
	functions	$\int [f(t)] = \frac{1}{\sqrt{T}} \int_{0}^{T} f(t) e^{-st} dt$				
		$L[f(t)] = \frac{1}{1 - e^{-sT}} \int_0^{t} f(t) e^{-sT} dt$				
9	When does a Laplace	Laplace Transform exists the function is	Understand	CO 1	CLO 2	AHSB11.02
-	transform exists?	piece-wise continuous and of exponential				
		order				
10	State the Laplace	The Laplace transform of unit impulse	Understand	CO 1	CLO 2	AHSB11.02
	transform of unit	function is e ^{-as}				
	impulse function					
11	Describe the use of	Laplace Transformation is very much	Understand	CO 1	CLO 2	AHSB11.02
	studying the Laplace	useful in obtaining solution of Linear				
	transforms?	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.				
12	State Laplace	If $f(t)$, $f'(t)$, $f''(t)$, $f''(t)$ are	Understand	CO 1	CLO 4	AHSB11.04
	transform of	continuous, and $f^{(n)}(t)$ is piecewise			_	
	derivatives	continuous, and all of them are				
		exponential order functions then				
		n	· · · · · · · · · · · · · · · · · · ·			
	0	$L[f^{(n)}(t)] = s^n F(s) - \sum s^{n-i} f^{(i-1)}(0)$		1.1		
	0			-		
13	State Laplace	If $L{f(t)} = f(s)$ then	Understand	CO 1	CLO 4	AHSB11.04
	transform of integrals			1.0		
	Ū.	\Rightarrow $F(s)dsds\cdots ds = L \left[\frac{1}{n}f(t)\right]$		C		
		$J_s J_s J_s J_s t^{\prime\prime}$	· · · · · · · · · · · · · · · · · · ·			
			~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
14	Why Laplace	Laplace transforms are so useful for	Understand	CO 1	CLO 2	AHSB11.02
	transforms are so	solving linear differential equations				
	useful for solving	because the Laplace transform of the n th				
	linear differential	derivative $f''(x)$ can be related to the				
	equations?	transform of f(x) in a simple manner.				
15	In H(t-a) at what	At the point $t = a$	Understand	CO 1	CLO 2	AHSB11.02
	point unit step					
	tunction is defined					
1	XX71 / 1 1 1	MODULE-II	D 1	00.2	CLO 7	ALIOD 11 07
1	what is the symbol $\mu$	I ne symbol $\mu$ is called as Average or Maan amountar	Kemember	002	CLU7	AHSB11.07
	called as?	Mean operator	D 1	00.0	01.0.7	AUGD 11 07
2	what is the symbol E	I ne symbol E is called as Shift operator	Remember	002	CL07	AHSB11.07
	called as?			00.0	<b>a</b> r a <b>a</b>	
3	Express the relation	The relation between E in terms of $\Delta$	Remember	CO 2	CLO 7	AHSB11.07
4	between E in terms of	is1+Δ				
	Δ.					
1						1

S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code
5	Establish the relation	The relation between E and D is $E = e^{hD}$	Remember	CO 2	CLO 7	AHSB11.07
	between E and D.					
6	Express $\nabla y_5$ in terms	$\nabla y_5 = y_5 - 3y_4 - 3y_3 - y_2$	Understand	CO 2	CLO 8	AHSB11.08
	of $y_2$ , $y_3$ , $y_4$ and $y_5$ ?					
7	Define the term	Interpolation is an estimation of a value	Remember	CO 2	CLO 7	AHSB11.07
	Interpolation.	within two known values in a sequence of				
0	Domescent the series	Values.	Damamhar	COD	CLOS	
0	of p in Gauss-	interpolation formulae is $0 < P < 1$	Kelhenhbei	02	CLU 8	Ansb11.06
	Forward interpolation	interpolation formulae is $0 < 1 < 1$				
	formulae.					
9	Represent the range	The range of p in Gauss-Forward	Remember	CO 2	CLO 8	AHSB11.08
	of p in Gauss-	interpolation formulae is $-1 < P < 0$				
	Backward					
	interpolation					
10	formulae.		D 1	00.0	CT O O	
10	Mention the name of	The name of formulae is used for unequal interval of y values to obtain the desired	Remember	CO 2	CLO 8	AHSB11.08
	unequal interval of x	value of v is Lagrange's interpolation				
	values to obtain the	formulae				
	desired value of y.					
11	Define Average or	1	Remember	<b>CO</b> 2	CLO 7	AHSB11.07
	Mean operator.	$\mu y_r = \frac{1}{2} \left[ y_{r+1/2} + y_{r-1/2} \right]$				
12	State Newton's	$\sum_{n(n-1) \rightarrow 2}$	Damamhar	COD	CLOS	
12	forward interpolation	$y = y_0 + p \Delta y_0 + \frac{p(p-1)}{2!} \Delta^2 y_0 + \dots +$	Remember		CLU 8	АПЗВ11.08
	formulae for equal	$\frac{p(p-1)(p-2)(p-(n-1))}{2}\Delta^n y_0$				
	length of intervals.	n!				
13	State Newton's	$y = y_0 + n \nabla y_1 + \frac{p(p+1)}{2} \nabla^2 y_1 + \dots +$	Remember	<b>CO</b> 2	CLO 8	AHSB11.08
	backward	$y = y_0 + p + y_n + 2!$ p(p+1)(p+2)(p+(n-1)) = n				
	interpolation	$\frac{p(p+1)(p+2)\dots(p+(n-2))}{n!} \nabla^n y_n$				
	formulae for equal					
1.4	length of intervals.	n(n 1)	D 1	00.0	CT O O	
14	State Gauss's forward	$y = y_0 + p \Delta y_0 + \frac{p(p-1)}{2!} \Delta^2 y_{-1} +$	Remember	02	CLU 8	AHSB11.08
	formulae for equal	$\frac{(p+1)p(p-1)}{\Delta^3 v_{-1}} + \cdots$			0	
	length of intervals.	3! 2-1 -				
15	State Gauss's forward	$y = y_{0} + p \wedge y_{0} + \frac{(p+1)p}{p} \wedge^{2} y_{0} + \frac{p}{p}$	Remember	CO 2	CLO 8	AHSB11.08
	interpolation	$y - y_0 + p \Delta y_{-1} + \frac{1}{2!} \Delta y_{-1} + \frac{1}{2!}$				
	formulae for equal	$\frac{(p+1)p(p-1)}{3!} \Delta^3 y_{-1} + \cdots$				
	length of intervals.					
16	State Lagrange	y = f(x) =	Remember	CO 2	CLO 8	AHSB11.08
	interpolation	$\frac{(x-x_1)(x-x_2)(x-x_n)}{(x_0-x_1)(x_0-x_2)(x_0-x_n)}.y_0++$	. 0. 7			
	length of intervals	$\frac{(x-x_1)(x-x_2)(x-x_n)}{(x-x_1)}$				
17		$(x_0 - x_1)(x_0 - x_2)(x_0 - x_n) \cdot y_n$	TT 1 / 1	00.0		
17	Express the value of $(n+1)^{th}$ order	The value of $(n + 1)^{th}$ order difference of	Understand	02	CLO 8	AHSB11.08
	(n + 1) order difference of a	a polynomial of $n^{2n}$ degree is always zero				
	polynomial of $n^{th}$					
	degree.					
18	Define the term	The inverse transform, or inverse of	Remember	CO 2	CLO 9	AHSB11.09
	Inverse Laplace	$L{f(t)}$ or $F(s)$ , is $f(t) = L^{-1}{F(s)}$ where s				
	transform	is real or complex.				
19	State linearity	If $L^{-1}{f(s)} = f(t)$ then	Understand	CO 2	CLO 9	AHSB11.09
	property of Inverse	$L^{-}[a f(s) + b g(s)]$				
20	Laplace transform	$ - a L [I(S)] + D L [g(S)] $ If $I^{-1} \{f(s)\} - f(t)$ then	Understand	$CO^{2}$	CLOO	AHSB11.00
20	property of Inverse	$L^{-1}{F(s-a)} = e^{at} f(t) = e^{at} L^{-1}{F(s)}$	Understallu			AU3D11.09
	Laplace transform					

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	$\mathbf{L} \begin{bmatrix} \mathbf{f}^{t} \\ \mathbf{f}(z) \end{bmatrix} = (t - z) \mathbf{f}(z) = \mathbf{F}(z) \mathbf{F}(z)$				
	transform	$L[\int_0 f(\tau)g(\tau-\tau)d\tau] = F(s).G(s)$				
22	State Inverse shifting	If I {ua(t) $f(t-a)$ } = $e^{-as}$ I {f(t)} =	Understand	$CO_2$	CL O 9	AHSB11.09
22	property of Inverse	$e^{-as} F(s)$ , then $L^{-1} \{ e^{-as} F(s) \} = u_0(t) f(t-a)$	Onderstand	002	CLO )	/115011.09
	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					
		MODULE-III				
1	Define the term curve	It is the process of finding the best fit	Remember	CO 3	CLO 13	AHSB11.13
	fitting.	curve for the set of given data values				
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					
2	Montion the principle	The principle involved in determining the	Domomhor	$CO^2$	CL 0 12	AUSD11 12
3	involved in	best fit curve for the set of given date	Remember	05	CL0 15	АПЗД11.13
	determining the best	values is the Method of least squares				
	fit curve for the set of	values is the Method of least squares				
	given data values.					
4	Describe the term	The principle of least squares is described	Remember	<b>CO</b> 3	CLO 13	AHSB11.13
	principle of least	as "Sum of the squares of the errors or				
	squares in obtaining	residuals is minimum"				
	the best fit of the					
	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.				
	points does fitting of					
	the best straight line				_	
	must pass through?			00.2	CI 0 12	AUGD 11 12
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				
	straight line $v = a \pm bv$	$\sum y = na + b \sum x$				
	y = a + bx	$\sum r y = a \sum r + b \sum r^2$		1.00		
		$\sum xy - u \sum x + b \sum x$	/ / /			
7	State the Normal	The normal equations of the second degree $\frac{2}{2}$	Remember	CO 3	CLO 13	AHSB11.13
	equations of the	parabola $y = a + bx + cx^2$ are	~~~			
	second degree	$\varepsilon y = na + b\varepsilon x + c\varepsilon x^2$	100			
	parabola $y = a \pm by \pm ay^2$	$cm = acr + bcr^2 + acr^3$				
	y = a + UX + CX	$c_{\Lambda Y} - uc_{\Lambda} + vc_{\Lambda} + vc_{\Lambda}$	1			
		$\varepsilon x^2 y = a\varepsilon x^2 + b\varepsilon x^3 + c\varepsilon x^4$				
8	Define Fourier	Fourier integral is a pair of integralsa	Remember	CO 3	CLO 14	AHSB11.14
Ŭ	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	<b>Blooms Level</b>	CO	CLO	CLO Code
9	State Fourier integral	If $f(x)$ is a given function defined in	Understand	CO 3	CLO 14	AHSB11.14
	theorem.	(-l,l) and satisfies the Dirichlet				
		conditions then				
		1 ~ ~				
		$f(x) = \frac{1}{2} \int \int f(t) \cos \lambda (t-x) dt d\lambda$	,			
		$\pi \begin{bmatrix} \mathbf{J} & \mathbf{J} \\ 0 & -\infty \end{bmatrix}$				
10	State Fourier Sine		Remember	CO 3	CLO 14	AHSB11.14
	integral formulae.	$f(x) = \frac{2}{2} \int \sin \lambda x \int f(t) \sin \lambda t dt d\lambda$				
	8	$\int I(x) = -\frac{1}{\pi} \int \sin \lambda x \int I(t) \sin \lambda dt d\lambda$				
					_	
11	State Fourier Cosine	$2^{\circ}$	Remember	CO 3	CLO 14	AHSB11.14
	integral formulae.	$f(x) = \frac{2}{3}  \cos \lambda x  f(t) \cos \lambda t dt d\lambda$				
		$\pi_0$				
		0 0				
12	Define the term	The integral transform of a function $f(x)$ is	Remember	CO 3	CLO 15	AHSB1115
12	Integral transform	given by $I[f(x)]$ or $F(s)$	remember	005		1110011.10
	integral transform					
		$-\int f(x)k(s, x)dx$				
		$-\int \int f(x)\kappa(s,x)dx$				
		Where Ir(a, y) is a known function called				
		kernel of the transform a is called the				
		kernel of the transform, s is called the				
		parameter of the transform of $F(a)$				
12	Define Ferrier	The Equation transforms (ET) decomposed of	Damaruhan	<u>CO 2</u>	CL 0 15	AUCD1115
13	Define Fourier	The Fourier transform (FT) decomposes a	Remember	CO 3	CL0 15	AHSBI1.15
	transforms	function of time (a signal) into the				
		incluencies that make it up, in a way				
		similar to now a musical chord can be				
		expressed as the frequencies (or pitches)				
14	Why to we need	A complicated signal can be broken down	Lindonston d	$CO_2$	CL O 10	
14	Why to we need Equipient transforms	A complicated signal can be broken down	Understand	05	CLO 19	AHSB11.19
	Fourier transforms	have much of each many is needed in				
		the Equation Transforms Equation to a former			0	
		(ET) take a signal and approach it in tampo	· · · · · · · · · · · · · · · · · · ·			
		(F1) take a signal and express it in terms	and the second s		· · · ·	
		of the frequencies of the waves that make				
15	What is difference	The Equation series is used to represent a	Understand	$CO_2$	CL O 10	
15	what is difference	The Fourier series is used to represent a	Understand	03	CLO 19	AHSB11.19
	between Fourier	periodic function by a discrete suff of		2		
	transform?	transform is then used to represent a	· · · · · · · · · · · · · · · · · · ·			
	transform?	transform is then used to represent a	~~~~			
		general, non periodic function by a	1.0			
		complex exponentials				
16	How to represent	Fourier transforms of function E(s) is	Understand	$CO^{2}$	CL O 15	AUSD11 15
10	Fourier transforms of	defined by	Understand	05	CLO IJ	Alisbii.is
	function $F(s)$	r∞				
	runcuon 1(8)	$F(s) \equiv \int f(x) e^{-2\pi i s x} dx$				
		$J_{-\infty}$				
17	How to represent	Inverse Fourier transforms of function f(x)	Understand	CO 3	CLO 15	AHSB11.15
	Inverse Fourier	is defined by				
	transforms of	$\int_{-\infty}^{\infty}$				
	function f(x)	$f(x) \equiv \int F(s) e^{2\pi i s x} ds$				
19	State linearity	$\frac{J-\infty}{1-1}$	Understand	CO 3	CL 0 15	AUSB11 15
10	property of Fourier	$r_{1}a_{1}(x) + b_{2}(x) = a_{1}(s) + b_{2}(s)$	Understand	005		Alisb11.15
	transforms					
	aunsionno					
1		1	1		1	1

S.No	QUESTION	ANSWER	<b>Blooms Level</b>	CO	CLO	CLO Code
19	State change of scale	1 8	Understand	CO 3	CLO 15	AHSB11.15
	property of Fourier	F[f(ax)] = -F(-)(a > 0)				
	transforms	a a				
20	State Modulation		Understand	CO 3	CLO 15	AHSB11.15
	property of Fourier	$F[t(x)\cos ax] = -[F(s+a) + F(s-a)], F[s] = F[t(x)]$				
	transforms	Z				
21	Define Fourier sine	The Fourier sine transform is he imaginary	Remember	CO 3	CLO 16	AHSB1116
21	transforms	part of the full complex Fourier transform	Kemember	005		Alisbii.io
	u ansiornis	part of the full complex fourier transform				
22	Define Fourier cosine	The Fourier cosine transform is the a real	Remember	CO 3	CLO 16	AHSB1116
	transforms	part of the full complex Fourier transform.	Remember	005	02010	1110011110
23	Define inverse	A mathematical operation	Remember	CO 3	CLO 17	AHSB11.17
	Fourier transforms	that transforms a function for a discrete or				
		continuous spectrum into a function for				
		the amplitude with the given spectrum;		A		
		an inverse transform of the Fourier				
		transform				
		MODULE-IV		-		
1	What is single step	Taylor's series method is single step	Remember	CO 4	CLO 20	AHSB11.20
	method in	method in determining the numerical				
	determining the	solution to ordinary differential equation				
	numerical solution to					
	ordinary differential					
2	What are multi step	Fuler's method Modified Fuler's	Remember	<u>CO</u> 4	CL O 20	AHSB11 20
2	methods in	method and Runge-Kutta method, are	Kemember	CO 4	CLO 20	AIISD11.20
	determining the	multi step method in determining the				
	numerical solution to	numerical solution to ordinary differential				
	ordinary differential	equation				
	equation?					
3	Define Taylor's	$r^2$ $r^n$	Remember	CO 4	CLO 20	AHSB11.20
	series formulae.	$y(x) = y(0) + x \cdot y'(0) + \frac{x}{2} \cdot y''(0) + \dots + \frac{x}{2} \cdot y^{n}(0) + \dots$			100	
		2! n!				
4	State the Euler	$y_{n+1} = y_n + hf(x_n, y_n)$	Understand	CO 4	CLO 20	AHSB11.20
	formula to determine					
	solution of ordinary					
	differential equation					
5	State the second	Second order R-K Formula	Understand	CO 4	CLO 21	AHSB11 21
5	order Runge- Kutta	$v_{i+1} = v_i + 1/2 (K_1 + K_2).$	Chaeistana	001	010 21	1110011121
	method to determine	Where $K_1 = h(x_i, y_i)$	2.3	C		
	the numerical	$K_2 = h (x_i + h, y_i + k_1)$	~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~			
	solution of ordinary	For i= 0,1,2	101			
	differential equation.	-N DOON	1			
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	$K_2 = h (x_1 + h/2, y_0 + k_1/2)$				
	ordinary differential	$K_3 = n (x_i+n, y_i+2K_2-K_1)$				
7	equation.	FOI I= U,1,2	Understand	CO 4	CLO 21	AUSD11 21
	Runge- Kutta method	$\frac{1}{2} \sum_{k=1}^{\infty} \frac{1}{2} \frac{1}{6} \left( \frac{1}{2} \frac{1}{$	Understand	004	CLO 21	AD3011.21
	to determine the	$y_{1+1} - y_1 + 1/0$ ( $K_1 + 2K_2 + 2K_3 + K_4$ ), Where $K_1 = h(x, y_1)$				
	numerical solution of	$K_1 = h(x_1, y_1)$ $K_2 = h(x_1+h/2, y_1+k_2/2)$				
	ordinary differential	$K_2 = h (x_1+h/2, y_1+K_1/2)$ $K_3 = h (x_1+h/2, y_1+K_1/2)$				
	equation	$K_4 = h (x_i+h, y_i+k_3)$				
	*	For i= 0,1,2				
8	State the modified	$y^{(i)} = y + h/2f[(y - y) + f(y - 1)^{(i-1)}]$	Understand	CO 4	CLO 20	AHSB11.20
	Euler formula to	$y_{k+1} - y_k + n/2J \left[ (x_k, y_k) + J (x_{k+1}, 1)_{k+1} \right]$	, <i>i</i>			

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	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-					
	step					
10	List numerical	Euler and Runge-Kutta methods are step	Remember	CO 4	CLO 21	AHSB11.21
	method of step by	by step methods				
	step					
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	form of datas				
	given in tabular form					
14	Which numerical	Runge-Kutta method is very powerful	Understand	<b>CO</b> 4	CLO 21	AHSB11.21
	method is powerful					
15	Define initial value	The values of y are specified at the same	Understand	<b>CO</b> 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				
	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	curve can be formed in two ways				
	differential equation	1. By eliminating arbitrary constants				
	1	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.				
	non linear partial					
	differential equation					
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	$\frac{dx}{dx} = \frac{dy}{dx} = \frac{dz}{dx}$		1.4		
	partial differential	P Q R				
	equation			1.00		
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		0		
		order derivatives is called a first order	· · · · · · · · · · · · · · · · · · ·			
		equation.	. O. Y			
6	Write one example of	The example of linear p.d.e is	Understand	CO 5	CLO 23	AHSB11.23
	linear p.d.e	$px + qy^2 = z$				
7	Write general	$\frac{1}{2} = \frac{1}{2} = \frac{1}{2}$	Understand	CO 5	CL O 24	AUSB11 24
/	solution of	$\varphi(u,v) = 0$	Understand	05	CLO 24	АПЭВ11.24
	$P_p + Q_q = R$					
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	the vibrating string over time, is called the				
	equation of partial	one-dimensional wave equation. It is a				
	differential equation	second order PDE, and it's linear and				
	-	homogeneous.				

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	$\partial^2 u \rightarrow \partial^2 u$	Understand	CO 5	CLO 26	AHSB11.26
	dimensional wave	$\frac{1}{2t^2} = c^2 \frac{1}{2t^2}$				
	equation of partial	OI = OX				
10			TTo 1 and and 1	CO 5		
12	Express one	$\partial u = \partial^2 \partial^2 u$	Understand	05	CLU 20	AHSB11.20
	aduation of partial	$\frac{\partial t}{\partial t} = c \frac{\partial r^2}{\partial r^2}$				
	differential equation					
13	Express two	$2^{2} - 2^{2}$	Understand	CO 5	CL O 26	AHSB11.26
15	dimensional laplace	$\frac{\partial^2 u}{\partial u} + \frac{\partial^2 u}{\partial u} = 0$	Onderstand	05	CLO 20	7115011.20
	equation of partial	$\partial x^2  \partial y^2$				
	differential equation			A		
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
	conditions of one					
	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	$u(t,t) = f(x) \text{ for } 0 \leq x \leq t$				
	equation					

# Signature of the faculty

OCCATION F

### HOD, ME

LIBER