Reg.No._____

Karunya UNIVERSITY

(Karunya Institute of Technology & Sciences)
(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

End Semester Examination – Nov/Dec – 2016

Semester : 2016-17 ODD
Code : 14MA2005 **Duration : 3 hrs**
Sub. Name : Mathematical Foundation **Max. marks : 100**

Q. No.	Questions				Course outcome	Marks
	PART-A(40X1=40 MULTIPLE CHOICE QUESTIONS)					
1.	$\cos^4\theta - 4c_2\cos^2\theta\sin^2\theta + 4c_4\sin^4\theta =$				CO1	
	a. $\sin 4\theta$	b. $\cos 4\theta$	c. $\tan 4\theta$	d. $\cot 4\theta$		(1)
2.	$nc_1\cos^{n-1}\theta\sin\theta - nc_3\cos^{n-3}\theta\sin^3\theta + ... =$				CO1	
	a. $\cos n\theta$	b. $\sin n\theta$	c. $\cot n\theta$	d. $\tan n\theta$		(1)
3.	The product of the eigen values =				CO1	
	a. $\lambda_1\lambda_2\lambda_3$	b. $\lvert A\rvert$	c. $\lambda_1+\lambda_2+\lambda_3$	d. A		(1)
4.	Unit matrix I =				CO1	
	a. $\begin{bmatrix}1&1&1\\1&1&1\\1&1&1\end{bmatrix}$	b. $\begin{bmatrix}1&0&1\\0&1&0\\1&0&1\end{bmatrix}$	c. $\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$	d. $\begin{bmatrix}0&1&0\\1&0&1\\0&1&0\end{bmatrix}$		(1)
5.	Cayley –Hamilton theorem says that "Every square matrix _____ its own characteristic equation".				CO1	
	a. has	b. produces	c. satisfies	d. multiplies		(1)
6.	The value of $i^2 =$				CO1	
	a. 1	b. -1	c. i	d. -i		(1)
7.	$\sinh 0 =$				CO1	
	a. 1	b. 0	c. -1	d. i		(1)
8.	$\cosh 0 =$				CO1	
	a. 1	b. 0	c. -1	d. i		(1)
9.	$\sin ix =$				CO1	
	a. $\sinh x$	b. $i\sinh x$	c. $i\cosh x$	d. $-i\sinh x$		(1)
10.	$\cos ix =$				CO1	
	a. $\cosh x$	b. $i\cosh x$	c. $-i\cosh x$	d. $\cos x$		(1)
11.	In Z = x + iy, imaginary part is				CO1	
	a. i	b. x	c. y	d. iy		(1)
12.	$\tan\theta =$				CO1	
	a. $\sin\theta/\cos\theta$	b. $\cos\theta/\sin\theta$	c. $\sin\theta.\cos\theta$	d. $\sin\theta+\cos\theta$		(1)
13.	$\sin^2\theta+\cos^2\theta =$				CO1	
	a. -1	b. 0	c. 1	d. 2		(1)
14.	Cos 0 =				CO1	
	a. -1	b. 0	c. 1	d. 2		(1)
15.	Sin 0 =				CO1	
	a. 0	b. 1	c. -1	d. i		(1)

16.	$\frac{d}{dx}(\sqrt{x}) =$				CO1	
	a. $2\sqrt{x}$	b. $\frac{1}{2\sqrt{x}}$	c. $2\sqrt{x}+c$	d. 0		(1)
17.	$\frac{d}{dx}(uv) =$				CO1	
	a. $uv-vu$	b. $uv'-vu'$	c. $uv'+vu'$	d. uv_1-vu'		(1)
18.	$\frac{d}{dx}(\frac{u}{v}) =$				CO1	
	a. $\frac{vu'-uv'}{v}$	b. $\frac{vu'-uv'}{v^2}$	c. $\frac{vu'+uv'}{v^2}$	d. $\frac{v_1u'+u_1v'}{v^2}$		(1)
19.	If k is a constant then $\frac{d}{dx}(k) =$				CO1	
	a. k+1	b. k^{-1}	c. 0	d. 1		(1)
20.	$\frac{d}{dx}(e^{3x}) =$				CO1	
	a. e^{3x}	b. $3e^{.3x}$	c. xe^{3x}	d. $3xe^{3x}$		(1)
21.	$\log 5+\log 2 =$				CO1	
	a. $\log 10$	b. $\log\frac{5}{2}$	c. $\log 7$	d. $2\log 5$		(1)
22.	$\log 9-\log 3 =$				CO1	
	a. $\log 6$	b. $\log 3$	c. $\log 5$	d. $\log 27$		(1)
23.	$\log 2^3$				CO1	
	a. $2\log 3$	b. $\log 6$	c. $\log 5$	d. $3\log 2$		(1)
24.	The value of $e^{\infty} =$				CO1	
	a. 1	b. 0	c. -1	d. ∞		(1)
25.	The value of $e^{-\infty} =$				CO1	
	a. 1	b. 0	c. -1	d. ∞		(1)
26.	$\frac{d}{dx}\{\cos(ax+b)\} =$				CO1	
	a. $\sin(ax+b)$	b. $a\sin(ax+b)$	c. $\frac{\sin(ax+b)}{a}$	d. $\frac{\sin(ax+b)}{x}$		(1)
27.	$\frac{d}{dx}(\log x) =$				CO1	
	a. x	b. $\frac{1}{x}$	c. 1	d. e^x		(1)
28.	$\frac{d}{dx}(x^3) =$				CO1	
	a. $3x^4$	b. $\frac{x^4}{4}$	c. $3x^2$	d. $\frac{x^3}{3}$		(1)
29.	$\frac{d}{dx}(\cos 5x) =$				CO1	
	a. $\sin 5x$	b. $-5\sin 5x$	c. $\frac{\sin 5x}{5}$	d. $\frac{\sin 5x}{5}$		(1)

30.	$\frac{d}{dx}(\sin 7x) =$				CO1	
	a. $\cos 7x$	b. $7\cos 7x$	c. $\frac{\cos 7x}{7}$	d. $\frac{\cos 7x}{7}$		(1)
31.	If $m = 5$ is the root of auxiliary equation then C F = _____.				CO1	
	a. Ae^{5x}	b. e^{5x}	c. Ae^{mx}	d. Ae^{2i}		(1)
32.	The particular integral of $(D+2)^2 y = 0$ is _____				CO1	
	a. 1	b. $\cos\theta / \sin\theta$	c. 0	d. $\sin\theta + \cos\theta$		(1)
33.	The roots of the equation $m^2 + 5m + 6 = 0$ are _____.				CO1	
	a. 2, 3	b. 5, 1	c. -2, -3	d. -5, -1		(1)
34.	If $m_1 = m_2 = 4$ then the complementary function is				CO1	
	a. $(Ax+B)e^{4x}$	b. $(Ax+B)e^{-4x}$	c. $Ae^{4x} + Be^{4x}$	d. $Axe^{4x} + Bxe^{4x}$		(1)
35.	If $m = \pm i$ then the complementary function is _____				CO1	
	a. $e^x(A\cos x + B\sin x)$	b. $e^x(A\cos x + B\sin x)$	c. $e^{-x}(A\cos x + B\sin x)$	d. $A\cos x + B\sin x$		(1)
36.	The Bernoulli's formula $\int uvdx =$				CO1	
	a. $uv_1 + u'v_2 + u''v_3 + \ldots$	b. $uv_1 - u'v_2 + u''v_3 - \ldots$	c. $uv_1 - uv_2 + uv_3 - \ldots$	d. $uv - u'v + u''v - \ldots$		(1)
37.	$\int \frac{dx}{x} =$_____				CO1	
	a. e^x	b. $\sqrt{x}$	c. $\log x$	d. x^{-1}		(1)
38.	If f(x) is an even function then $\int_{-a}^{a} f(x)dx =$				CO1	
	a. 0	b. $\int_0^a f(x)dx$	c. $2\int_0^a f(x)dx$	d. 1		(1)
39.	If f(x) is an odd function then $\int_{-a}^{a} f(x)dx =$				CO1	
	a. 1	b. 0	c. -1	d. 2		(1)
40.	$\int x^5 dx$				CO1	
	a. $5x^4$	b. $5x^6$	c. $\frac{x^6}{6}$	d. $\frac{x^6}{5}$		(1)

PART B(8 X 5 = 40 MARKS) (ANSWER ANY EIGHT)			
41	Prove that $\sin 6\theta = 6\cos^5\theta\sin\theta - 20\cos^3\theta\sin^3\theta + 6\cos\theta\sin^5\theta$.	CO2	(5)
42	Find the real and imaginary part of $\cos(\alpha + i\beta)$.	CO2	(5)
43	Two eigen values of the matrix $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$ are 1 and 2. Find the third eigen value and	CO2	(5)

	$\lvert A \rvert$.		
44	If the characteristic equation of a matrix $A=\begin{bmatrix}1 & 2 & -2\\ 2 & 5 & -4\\ 3 & 7 & -5\end{bmatrix}$ is $\lambda^3-\lambda^2+5\lambda-1=0$ then verify Cayley-Hamilton theorem.	CO2	(5)
45	If $y=(x^2+2x+3)\log x$ then find $\frac{dy}{dx}$.	CO2	(5)
46	If $y=\frac{x^3}{3x-2}$ then find $\frac{dy}{dx}$.	CO2	(5)
47	Evaluate $\int \frac{dx}{(x+a)(x+b)}$	CO2	(5)
48	Evaluate $\int (x^2+2x+5)dx$	CO2	(5)
49	Find the particular integral of the equation $(D^3-D^2-6D)y=1+x^2$	CO2	(5)
50	Solve $(D^3+D^2-D-1)y=0$.	CO2	(5)

PART C(2 X 10 = 20 MARKS) (ANSWER ANY TWO)			
51	Find the eigen values and eigen vectors of the matrix A= $\begin{bmatrix}2 & 0 & 1\\ 0 & 2 & 0\\ 1 & 0 & 2\end{bmatrix}$	CO2	(10)
52	Evaluate $\int_0^{\pi} x^3 \cos 2x dx$.	CO2	(10)
53	Solve $(D^2-4D-5)y=e^{5x}$	CO2	(10)

ALL THE BEST

CO1: Students to know and understand the basics of calculus.

CO2: Students are able to solve the problems in calculus.