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 – April/May – 2017

Code : 14MA1001 **Duration : 3hrs**
Sub. Name : BASIC MATHEMATICS FOR ENGINEERING **Max. marks : 100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Find $\sin(\alpha+\beta)$, $\cos(\alpha+\beta)$, $\sin(\alpha-\beta)$ and $\cos(\alpha-\beta)$ if $\sin\alpha = \frac{4}{5}$ and $\cos\beta = \frac{5}{13}$.	CO1	5
	b.	Resolve $\frac{x^2-3}{(x+2)(x^2+1)}$ into partial fractions	CO1	7
	c.	When A+B+C=180^o, show that tanA+tanB+tanC=tanAtanBtanC	CO1	8
		(OR)		
2.	a.	Find the angle between the pair of lines 3x-7y+5=0 and 7x+3y-11=0	CO1	5
	b.	Prove that $\sqrt{\frac{1-\cos\theta}{1+\cos\theta}} = \operatorname{cosec}\theta - \cot\theta$.	CO1	5
	c.	Expand $(2x-3y)^6$ using binomial theorem.	CO1	5
	d.	Resolve $\frac{5x+1}{(x+2)(x-1)}$ into partial fractions	CO1	5
3.	a.	Evaluate $\lim_{x\to\infty} \frac{(3x+1)(2x+4)}{(x+3)(x-7)}$	CO2	5
	b.	If $x\sqrt{1+y} + y\sqrt{1+x} = 0$ prove that $\frac{dy}{dx} = \frac{-1}{(1+x)^2}$	CO2	8
	c.	Find $\frac{dy}{dx}$ for $\frac{(1-x)\sqrt{x^2+2}}{(x+3)\sqrt{x-1}}$	CO2	7
		(OR)		
4.	a.	Evaluate $\int x\,tan^{-1}(x)\,dx$	CO2	8
	b.	Evaluate $\int \frac{9}{(x-1)(x+2)^2}dx$	CO2	7
	c.	Evaluate $\int \frac{\cos x}{\sqrt{\sin x}}$ dx	CO2	5
5.	a.	Expand $x^2y^2 + 2x^2y + 3xy^2$ about $(-2, 1)$ upto the third term using Taylor Series.	CO2	15
	b.	If $u = \frac{x}{y} + \frac{y}{z} + \frac{z}{x}$ prove that $x\frac{\partial u}{\partial x} + y\frac{\partial u}{\partial y} + z\frac{\partial u}{\partial z} = 0$	CO2	5
		(OR)		
6.	a.	If $x = r\,cos\theta$ and $y = r\,sin\theta$. Verify that $\frac{\partial(x,y)}{\partial(r,\theta)} \times \frac{\partial(r,\theta)}{\partial(x,y)} = 1$.	CO2	10
	b.	Find Taylor's series to represent the function f(x)= sinx about the	CO2	5

		point x=0.		
	c.	If f(x,y) = $x^3 + y^3 - 3ax^2y$, find $\frac{dy}{dx}$	CO2	5
7.	a.	Find the projection of $\vec{PQ}$ on $\vec{AB}$ where P,Q,A,B are the points (-2,1,3),(3,2,5),(4,-3,5), (7,-5,-1) respectively	CO2	5
	b.	If $\vec{a} = \vec{i} + 2\vec{j} - \vec{k}$, $\vec{b} = 2\vec{i} - \vec{j} + \vec{k}$, $\vec{c} = \vec{i} + \vec{j} + \vec{k}$, then find $\vec{a} \times (\vec{b} \times \vec{c})$	. CO2	5
	c.	Find the angle between the lines $\frac{x-1}{2} = \frac{y-2}{1} = \frac{z-3}{3}$ and $\frac{x+1}{12} = \frac{y-2}{1} = \frac{z-1}{-2}$	CO2	10
		(OR)		
8.	a.	Show that the lines $\frac{x-1}{3} = \frac{y-1}{-1} = \frac{z+1}{0}$ and $\frac{x-4}{2} = \frac{y}{0} = \frac{z+1}{3}$ intersect and hence find the point of intersection.	CO2	10
	b.	Find the vector and Cartesian equation of the plane passing through the points (2,2,-1), (3,4,2) and (7,0,6).	CO2	10
		Compulsory:		
9.	a.	Find the eigen values and the eigenvectors of the matrix $A = \begin{vmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{vmatrix}$	CO3	12
	b.	Solve using Cramer's Method 3x + y + 2z = 3; 2x – 3y – z = – 3; x + 2y + z = 4.	CO3	8

ALL THE BEST