

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**

**Code : 14MA2005**  
**Sub. Name : Mathematical Foundation**

**Duration : 3hrs**  
**Max. marks : 100**

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Prove that $\frac{\sin 7\theta}{\sin \theta} = 7 - 56\sin^2 \theta + 112\sin^4 \theta - 64\sin^6 \theta$	CO1	12
	b.	Find the real and imaginary part of $\sin(x + iy)$		8
(OR)				
2.		If $x + iy = \sin(A + iB)$ then prove that (i) $\frac{x^2}{\cosh^2 B} + \frac{y^2}{\sinh^2 B} = 1$ (ii) $\frac{x^2}{\cos^2 B} - \frac{y^2}{\sin^2 B} = 1$	CO1	20
3.	a.	Find the eigen values and eigen vectors of the matrix $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$	CO1	15
	b.	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 $ A $ .	CO1	5
(OR)				
4.		Verify Cayley-Hamilton theorem for the matrix $A = \begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 3 & 2 \end{bmatrix}$	CO1	20
5.	a.	If $y = \frac{x^7 - 4^7}{x - 4}$ then find $\frac{dy}{dx}$ .	CO2	7
	b.	If $y = x^3 + 5x^2 + 4$ then find $\frac{dy}{dx}$ .	CO2	6
	c.	If $y = \cos(\sqrt{x})$ then find $\frac{dy}{dx}$	CO2	7
(OR)				
6.	a.	If $y = \frac{x^3}{3x - 2}$ then find $\frac{dy}{dx}$ .	CO2	10

	b.	If $y = (4x^2 - 1)(2x + 3)$ then find $\frac{dy}{dx}$ .	CO2	10
7.	a.	Evaluate $\int \frac{dx}{(x+4)(x+6)}$	CO2	10
	b.	Evaluate $\int \frac{(2ax+b)dx}{(ax^2+bx+c)}$	CO2	10
<b>(OR)</b>				
8.	a.	Evaluate $\int_0^{2\pi} (x^2 + 2x) \sin x dx$ using Bernoullis formula	CO2	12
	b.	Evaluate $\int x^5 (1+x^6)^7 dx$		8
<b><u>Compulsory:</u></b>				
9.		Solve $(D^2 + 2D + 3)y = e^{2x} + 2x$	CO2	20

ALL THE BEST

CO1: Developing the skills to solve problems using trigonometry.

CO1: Developing the skills to solve problems using calculus.