

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 : **14MA2012**
 Sub. Name : **Numerical Methods**

Semester : **2016-17 ODD**
 Duration : **3hrs**
 Max. marks : **100**

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks													
1.	a.	Fit a straight line to the following data and estimate the value of y at x=2.5.	CO3	10													
		<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>y</td><td>1</td><td>1.8</td><td>3.3</td><td>4.5</td><td>6.3</td></tr></table>			x	0	1	2	3	4	y	1	1.8	3.3	4.5	6.3	
		x			0	1	2	3	4								
y	1	1.8	3.3	4.5	6.3												
	b.	Fit a parabola to the following data, also estimate y at x=6.	CO3	10													
		<table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>y</td><td>5</td><td>12</td><td>26</td><td>60</td><td>97</td></tr></table>			x	1	2	3	4	5	y	5	12	26	60	97	
		x			1	2	3	4	5								
y	5	12	26	60	97												
(OR)																	
2.	a.	Fit a curve of the form $y = ax^b$ from the following data:	CO3	10													
		<table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>y</td><td>7.1</td><td>27.8</td><td>62.1</td><td>110</td><td>161</td></tr></table>			x	1	2	3	4	5	y	7.1	27.8	62.1	110	161	
		x			1	2	3	4	5								
	y	7.1	27.8	62.1	110	161											
b.	Fit a curve of the form $y = ab^x$ to the following data :	CO3	10														
	<table><tr><td>x</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td></tr><tr><td>Y</td><td>151</td><td>100</td><td>61</td><td>50</td><td>20</td><td>8</td></tr></table>			x	1	2	3	4	5	6	Y	151	100	61	50	20	8
	x			1	2	3	4	5	6								
Y	151	100	61	50	20	8											
3.	a.	Find the positive root of $2x^3 - 3x - 6 = 0$ using Newton Raphson Method.	CO3	10													
	b.	Using Gauss Jordan Method, Solve the following systems. $x + y + 5z = 7$ $2x + 10y + z = 13$ $10x + y + z = 12$	CO3	10													
(OR)																	
4.	a.	Solve the following system of equations using Gauss Seidal Method. $8x - 3y + 2z = 20$ $4x + 11y - z = 33$ $6x + 3y + 12z = 35$	CO3	20													
5.	a.	From the following table of half yearly premium for policies maturing at different ages, estimate the premium at ages 46 and 63 using Newton's forward and Backward Interpolation Formula.	CO2	20													
		<table><tr><td>Age(x)</td><td>45</td><td>50</td><td>55</td><td>60</td><td>65</td></tr><tr><td>Premium(y)</td><td>114.84</td><td>96.16</td><td>83.32</td><td>74.48</td><td>68.48</td></tr></table>	Age(x)	45	50	55	60	65	Premium(y)	114.84	96.16	83.32	74.48	68.48			
Age(x)	45	50	55	60	65												
Premium(y)	114.84	96.16	83.32	74.48	68.48												
(OR)																	
6.	a.	Using Gaus Forward Interpolation Formula , obtain f(3.5) from the following data.	CO2	10													
		<table><tr><td>x</td><td>2</td><td>3</td><td>4</td><td>5</td></tr><tr><td>f(x)</td><td>2.626</td><td>3.454</td><td>4.784</td><td>6.986</td></tr></table>	x	2	3	4	5	f(x)	2.626	3.454	4.784	6.986					
x	2	3	4	5													
f(x)	2.626	3.454	4.784	6.986													
	b.	Using Lagranges Formula of Interpolation , find y(9.5)	CO2	10													

		<table border="1"> <tr> <td>x</td><td>7</td><td>8</td><td>9</td><td>10</td></tr> <tr> <td>y</td><td>3</td><td>1</td><td>1</td><td>9</td></tr> </table>	x	7	8	9	10	y	3	1	1	9		
x	7	8	9	10										
y	3	1	1	9										
7.	a.	Evaluate $\int_0^6 \frac{dx}{1+x^2}$ using (i) Trapezoidal rule (ii) Simpson's 1/3 rd rule (iii) Simpson's 3/8 th rule.	CO3	10										
	b.	By means of Taylor's Series expansion, find y at x=0.1 given $\frac{dy}{dx} = 2y + 3e^x, y(0) = 0$.	C03	10										
(OR)														
8.	a.	Solve the equation $\frac{dy}{dx} = 1 - y$ given $y(0) = 0$ using (i) Improved Euler Method (ii) Modified Euler Method and find y at $x = 0.1$ and 0.2	CO3	20										
		<u>Compulsory:</u>												
9.	a.	Solve $y' = x + y, y(0) = 1$ using (i) Third Order Runge Kutta method (ii) Fourth Order Runge Kutta method and find y at $x = 0.1, 0.2$.	CO3	20										

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