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 : 14MA3008	Semester :	2016-17 ODD
	Duration :	3hrs
Sub. Name : COMPUTATIONAL MATHEMATICS	Max. marks :	100

ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)

Q. No.	Sub Div.	Questions	Course Outcome	Marks
1.	a.	Find the curve passing through (x_1, y_1) and (x_2, y_2) which when rotated about x – axis gives minimum surface area.	CO1	10
	b.	Find the extremal of $I = \int_0^4 [xy' - (y')^2]\, dx$ given $y(0) = 0, y(4) = 3$	CO1	10
		(OR)		
2.	a.	Show that the functional $I = \int_0^{\pi/2} \left[2xy + \left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2\right] dx$ given $y(0) = 0, y(\pi/2) = 1$ and $x(0) = 0, x(\pi/2) = -1$ is stationary for $x = -sint$ and $y = sint$.	CO1	12
	b.	Find the general solution of the curve for which the functional $I = \int_a^b [16y^2 + x^2 - (y'')^2]\, dx$ is extremum.	CO1	8
3.	a.	Solve the Poisson's equation $\nabla^2 u = -10\,(x^2 + y^2 + 10)$ over the square mesh with sides x = 0 , y = 0, x = 3 , y = 3 with u = 0 on the boundary with mesh length 1.	CO2	10
	b.	Solve by Bender - Schimit Method $u_{xx} = u_t$ subject to u(x,0) = $x^2(25 - x^2)$, u(0,t) = 0, u(5,t) = 0 taking $h = 1$ and upto 5 seconds.	CO2	10
		(OR)		
4.	a.	Solve by Crank Nicklson Method $u_{xx} = u_t$ subject to u(x,0) = 0, u(0,t) = 0, u(1,t) = t for two time steps taking $h = 0.25$.	CO2	10
	b.	Solve the hyperbolic equation $16u_{xx} = u_{tt}$ up to $t = 2.5$ given $u(0, t) = u(5, t) = 0, u(x, 0) = x^2 (5 - x), u_t(x, 0) = 0$	CO2	10
5.	a.	Solve $\frac{dy}{dx} = e^x - y$ given y(0) = 0. Obtain the values of y(0.1), y(0.2) using Picard's Method.	CO3	10
	b.	Using Jacobi method find all the eigen values of the matrix $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$	CO3	10
		(OR)		
6.	a.	Solve $y' = -y$ and y(0) = 0. Determine the value of y(0.2) and y(0.4) using Improved Euler Method.	CO3	10
	b.	Solve $y'' + y = e^x$, y(0) = $y\left(\frac{\pi}{2}\right)$ = 0 using Rayleigh Ritz Method.	CO3	10

7.	a.	Find the positive root of $x^3 - 4x + 5x + 1 = 0$ by Chebyshev's Method.	CO3	10
	b.	Solve the equations 3x + 4y + 5z = 18 ; 2x – y + 8z = 13 ; 5x – 2y + 7z = 20 by Gauss Elimination Method	CO3	10
		(OR)		
8.	a.	Find all the roots of the equation $x^3 - 4x^2 + 5x - 2 = 0$ by Graeffe's method squaring upto three times.	CO3	10
	b.	Solve the equations $x^2 + y^2 = 16,\ x^2 - y^2 = 4,\quad x_0 = 2\sqrt{2},\ y_0 = 2\sqrt{2}$ by Newton-Raphson method (2 iterations).	CO3	10
		Compulsory:		
9.	a.	Evaluate $\int_1^{1.4}\int_2^{2.4} \frac{1}{xy}\, dx\, dy$ using (i) Trapezoidal rule, (ii) Simpson's Rule and verify with exact integration.	CO3	10
	b.	Find the cubic spline approximation for the function given below *x*: 0, 1, 2, 3 *y = f(x)*: 1, 2, 33, 244 Assume M(0) = M(3) = 0. Also find *y*(2.5)	CO3	10

Inner table for 9(b):

x	0	1	2	3
$y = f(x)$	1	2	33	244

ALL THE BEST