Register Number: ……………………..

MCA DEGREE EXAMINATIONS: APRIL/MAY 2014

(Regulation 2009)

Fifth Semester

MASTER OF COMPUTER APPLICATIONS

MAT511: Numerical Methods

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 2 = 10 Marks)

1. Find an iterative formula to find $\sqrt{N}$(where N is positive number).
2. Solve the system of equation by Gauss-Elimination method: 2x+y = 3; 7x-3y = 4
3. State the error in Newton's forward interpolation formula.
4. Find the missing value of the table given below:

Year	1917	1918	1919	1920	1921
Export (in tons)	443	384	-	397	467

5. Find the divided differences of $f(x) = x^3 + x + 2$ for the arguments 1, 3, 6, 11.
6. State the Lagrange's inverse interpolation formula.
7. Write the Newton's backward difference formulae to compute the derivative up to 2nd order.
8. Evaluate $\int_{-3}^{3} x^4 dx$ by using Trapezoidal rule.
9. Solve $\frac{dy}{dx} = x + y$, given y (1) =0 and find y (1.1) by Taylor series method.
10. State the Adam's predictor and corrector formulae.

PART B (5 x 16 = 80 Marks)

11. a) (i) Find the positive root of $x^3 = 2x + 5$ by false position method (8)

(ii) Solve the system of equations by Gauss-Jordan method: (8)

$$x + y + z + w = 2;\ 2x - y + 2z - w = -5;\ 3x + 2y + 3z + 4w = 7;$$
$$x - 2y - 3z + 2w = 5$$

(OR)

b) (i) Using Gauss-Jordan method, find the inverse of $\begin{pmatrix} 2 & 0 & 1 \\ 3 & 2 & 5 \\ 1 & -1 & 0 \end{pmatrix}$. (8)

(ii) Find the dominant Eigen value of A = $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ by power method and hence find the other Eigen value also. (8)

12. a) (i) The hourly declination of the moon on a day is given below. Find the declination at $3^h35^m15^s$ and 5^h. (8)

Hour	0	1	2	3	4
Declination	8°29'53.7"	8°18'19.4"	8°6'43.5"	7°55'6.1"	7°43'27.2"

(ii) From the data given below, find the number of students whose weight is between 60 and 70. (8)

Weight in lbs	0-40	40-60	60-80	80-100	100-120
No., of students	250	120	100	70	50

(OR)

b) (i) Apply Gauss's forward formula to obtain *f(x)* at *x*=3.5 from the table below: (8)

x	2	3	4	5
f(x)	2.626	3.454	4.784	6.986

(ii) Find the value of *cos* 51°42' by using Gauss's backward interpolation formula from the table given below: (8)

x	50°	51°	52°	53°	54°
y = cos x	0.6428	0.6293	0.6157	0.6018	0.5878

13. a) Using Newton's divided difference formula, find the value of *f*(2), *f*(8),and *f*(15) given the following table:

x	4	5	7	10	11	13
f(*x*)	48	100	294	900	1210	2028

(OR)

b) (i) Find the parabola of the form $y = ax^2 + bx + c$ passing through the points (0, 0), (1, 1) and (2, 20). (8)

(ii) Find the value of θ given *f*(θ) = 0.3887 where $f(\theta) = \int_0^{\theta} \frac{d\theta}{\sqrt{1-\frac{1}{2}\sin^2\theta}}$ using the table (8)

θ	21°	23°	25°
f(θ)	0.3706	0.4068	0.4433

14. a) The population of a certain town is given below. Find the rate of growth of population in 1931, 1941, 1961, and 1971.

Year *x*	1931	1941	1951	1961	1971
Population in thousands *y*	40.62	60.80	79.95	103.56	132.65

(OR)

b) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by (i) Trapezoidal rule (ii) Simpson's one-third and three-eight rules (iii) Weddle's rule. Also check up the results by actual integration.

15. a) (i) Solve numerically $y' = y + e^x$, $y(0) = 0$ for $x = 0.2, 0.4$ by Improved Euler method. (8)

(ii) Obtain the values of y at x =0.1, 0.2 using R-K method of fourth order for the differential equation $y' = -y$, given $y(0)$ =1. (8)

(OR)

b) Given $\frac{dy}{dx} = \frac{1}{2}(1 + x^2)y^2$ and $y(0) = 1$, $y(0.1) = 1.06$, $y(0.2) = 1.12$, $y(0.3) = 1.21$, evaluate $y(0.4)$ by Milne's predictor corrector method.

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