

Total No. of Questions : 10] [Total No. of Printed Pages : 5

MCA-204

M. C. A. (Second Semester)

EXAMINATION, June, 2012

(Grading/Non-Grading)

COMPUTER ORIENTED NUMERICAL AND
STATISTICAL METHODS

(MCA – 204)

Time : Three Hours

Maximum Marks : $\begin{cases} GS : 70 \\ NGS : 100 \end{cases}$

Note : Attempt *one* question from each Unit. Each Unit carries an internal choice. All questions carry equal marks.

Unit – I

1. (a) If the number $x = 57.46235$ is rounded off to four significant figures, find the absolute error, relative error and the percentage relative error.
- (b) Solve $x^4 - 5x^3 + 20x^2 - 40x + 60 = 0$ by Newton-Raphson method given that all the roots of the given equation are complex.

Or

2. (a) Find a real root of $2x - \log_{10} x = 7$ correct to three places of decimal using iterative method.
- (b) Using Regula-Falsi method, compute the real root of the equation correct to four decimal places :

$$\cos x = 3x - 1$$

P. T. O.

Unit – II

- (a) Using Gauss Forward formula, find $f(30)$ from the following data :

x	$f(x)$
21	18.4708
25	17.8144
29	17.1070
33	16.3432
37	15.5154

- (b) Find the equation of the cubic curve which passes through the points (4, -43), (7, 83), (9, 327) and (12, 1053). Hence find $f(10)$.

Or

- (a) A curve is drawn to pass through the points given by the following data :

x	y
1.0	2
1.5	2.4
2.0	2.7
2.5	2.8
3.0	3
3.5	2.6
4.0	2.1

Using Simpson's rule find the area bounded by the curve, the x -axis and the lines $x = 1, x = 4$.

- (b) Find $\int_0^{\pi/2} \sin x \, dx$ by three point Gaussian quadrature

formula. Given :

$Z_1 = -0.77459667$	$W_1 = 0.55555555$
$Z_2 = 0$	$W_2 = 0.88888888$
$Z_3 = 0.77459667$	$W_3 = 0.55555555$

Unit – III

5. (a) Solve the following system of equations by Gauss-Jordan method :

$$2x + y + 4z = 12$$

$$8x - 3y + 2z = 1$$

$$4x + 11y - z = 33$$

- (b) Solve the systems of linear equations by Gauss-Seidel iterative method :

$$10x + 2y + z = 9$$

$$x + 10y - z = -22$$

$$-2x + 3y + 10z = 22$$

Or

6. (a) Solve $\frac{dy}{dx} = 1 - y, y(0) = 0$ using Euler's method. Find y at $x = 0.5$. Compare the result with results of the exact solution.

- (b) Compute $y(0.1)$ and $y(0.2)$ by Runge-Kutta fourth order method for the differential equation :

$$\frac{dy}{dx} = xy + y^2, y(0) = 1$$

Unit – IV

7. (a) Fit a binomial distribution for the following data and compare the theoretical frequencies with the actual ones :

x	f
0	2
1	14
2	20
3	34
4	22
5	8

- (b) In a certain factory turning razor blades, there is a small chance of 0.002 for any blade to be defective. The blades are supplied in packets of 10. Use Poisson distribution to calculate the approximate number of packets containing no defective, one defective and two defective blades respectively in a consignment of 10000 packets.

Or

8. (a) From the following table regarding the colour of eyes of fathers and sons test if the color of son's eye is associated with that of the father :

Eye color of father	Eye color of son	
	Light	Not Light
Light	471	51
Not Light	148	230

(at 5% level for d. f. is 3.841)

- (b) In a normal distribution, 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation of the distribution.

Unit – V

9. (a) Random sample of 400 men and 600 women were asked whether they would to have a school near their residence. 200 men and 325 women were in favour of proposal. Test the hypothesis that the proportion of men and women in favour of the proposal are same at 5% level of significance.

- (b) The following values give the lengths of 12 samples of Egyptian cotton taken from a consignment :

48, 46, 49, 46, 52, 45, 43, 47, 47, 46, 45, 50.

Test if the mean length of the consignment can be taken as 46.

Or

10. (a) Write short notes on the following :

- Hypothesis testing for sampling
- Student *t*-test
- Chi-square test
- Large sampling

- (b) Two random samples drawn from 2 normal populations are as the follows :

A	B
17	16
27	16
18	20
25	27
27	26
29	25
13	21
17	—

Test whether the samples are drawn from the same normal population.