

$$3x_1 + 2x_2 - 5x_3 = 0$$

$$2x_1 - 3x_2 + x_3 = 0$$

$$x_1 + 4x_2 - x_3 = 4$$

(c) Use Picard's method to solve the equations:

$$\frac{dx}{dt} = -y, \frac{dy}{dt} = x$$

given $x=1, y=0$, when $t=0$

5. Attempt any two of the following: 10×2=20

(a) Explain various methods of test of significance.

(b) For the following data, fit a regression line of (i) x on y , and (ii) y on x --

x	1	2	3	4	5	6	7	8
y	2	5	3	7	8	1	4	3

(c) Write short notes on any two of the following:

(i) Ill conditioned system of equations

(ii) Hermite's interpolation

(iii) Boole's rule

—x—

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NBC-401

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 294401

Roll No.

M.C.A. Dual Degree (Sem. IV)

SPL. CARRY OVER EXAMINATION, 2015

**COMPUTER BASED NUMERICAL AND
STATISTICAL TECHNIQUES**

Time : 3 Hours]

[Total Marks : 100

Note: Attempt all questions. All question carry equal marks.

1. Attempt any four of the following: 5×5=20

(a) Define absolute, percentage and related error, An approximate value of π is given by 3.1428571 and its true value is 3.1415926. Find absolute and relative errors.

(b) Write algorithm of Bisection method to find roots of an equation.

(c) Find roots of the equation $2x = \cos x + 3$ correct to three decimal places by the iteration method.

- (d) Find the real root of the equation $x^2 - 5x + 2 = 0$ by Newton-Raphson method.
- (e) Define normalized floating point representation of numbers and round off errors in representation.
- (f) Perform:
 - (i) Addition of .6434 E3 and .4845 E3
 - (ii) Multiplication of .1111 E 51 and .4444 E 50

2. Attempt any four of the following: 5×4=20

- (a) Use Newton-Gregory formula to compute y at x=24 from the following data:

x	21	25	29	33	37
y	18.4	17.8	17.1	16.3	15.5

- (b) From the following data, form the table of divided difference and use it to find f (2)–

x	4	5	7	10	11	13
y	48	100	294	900	1210	2028

- (c) Apply Gauss backward formula to find $\sin 45^\circ$ from the following table–

\square 0	20	30	40	50	60	70	80
$\sin \square$	0.342	0.502	0.643	0.766	0.866	0.93969	0.98481

- (d) Given $y_{20}=24, y_{24}=32, y_{28}=35$ and $y_{32}=40$, find y_{25} Bessel's interpolation formula.
- (e) State and derive Stirling's formula.
- (f) Prove -- $\Delta - \nabla = -\Delta \nabla$

3. Attempt any two of the following: 10×2=20

- (a) Derive the formula for Simpson's 1/3 and 3/8 rule.
- (b) Evaluate using Trapezoidal rule–
 - (i) $\int_0^{\pi} t \sin t dt$
 - (ii) $\int_0^1 \frac{1}{1+x^2} dx$
- (c) Use Euler-Maclaurin's formula to prove that

$$\sum_1^n x^2 = \frac{n(n+1)(2n+1)}{6}$$

4. Attempt any two of the following: 10×2=20

- (a) Apply Runge-Kutta Fourth order method of find y (0.1), y (0.2) and y(0.3) for the initial value problem

$$\frac{dy}{dx} = xy + y^2$$
- (b) Solve the following equations by Gauss elimination method correct to three significant digits.