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NMCA212

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

PAPER ID : 214219

Roll No.

MCA

(SEM. II) THEORY EXAM. 2014-15

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

Time : 3 Hours] [Total Marks : 100

Note : Attempt the questions as indicated.

Q1. Attempt any ***four*** parts of the following : 5x4=20

(a) Define absolute, relative and percentage error. If 0.333 is the approximate value of 1/3, find absolute, relative and percentage errors.

(b) Perform the following operations–

i) .4546 E 3 + .5454 E 8

ii) .9432 E – 4 - .6353 E – 6

(c) Write a C program to implement Bisection method.

(d) Find the real root of the equation $x^2 - 5x + 2 = 0$ by Newton-Raphson method.

(e) Apply false position method to find smallest positive root of the equation $x - e^{-x} = 0$ correct to two decimal places.

(f) Explain underflow and overflow conditions of error in floating point's addition and subtraction.

Q2. Attempt any ***four*** parts of the following : 5x4=20

(a) Solve the following systems of equations by Gauss elimination method–

$x - y + z = 1$

$-3x + 2y - 3z = -6$

$2x - 5y + 4z = 5$

(b) Apply Gauss's forward formula to find the value of f(x) at x=3.75 from the table –

x	2.5	3.0	3.5	4.0	4.5	5.0
f(x)	24.145	22.043	20.225	18.644	17.262	16.047

(c) Given y_{20}=24, y_{24}=32, y_{28}=35 and y_{32}=40, find y_{25} by Bessel's interpolation formula.

(d) Write algorithm for Newton's forward and Newton's backward formula.

(e) Use Stirling's formula to find y_{28}, given y_{20}=49225, y_{25}=48316, y_{30}=47236, y_{35}=45926 and y_{40}=44306.

(f) What do you understand by rate of convergence of a method to find out the root of an equation? Explain.

Q3. Attempt any ***two*** parts of the following : 10x2=20

(a) (i) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by Simpson's 1/3 rule.

(ii) Evaluate $\int_0^1 \frac{dx}{1+x^2}$ by using Simpson's 3/8 rule.

(b) Derive Euler-Maclurin formula and use it to prove that –

$$\Sigma_1^n \chi^2 = \frac{n(n+1)(2n+1)}{6}$$

(c) Apply Hermite's formula to find a polymonial from the following data –

x	0	1	2
f(x)	0	1	0
$f'(x)$	0	0	0

Q4. Attempt any ***two*** parts of the following : 10x2=20

(a) (i) Use the method of least squares to fit the curve–

$$y = \frac{c_0}{x} + c_1\sqrt{x}$$

(ii) Find the least square line for the data points–

(-1,10), (0,9), (1,7), (2,5), (3,4), (4,3), (5,0) and (6,-1)

(b) Obtain y(1.5) from the following data using cubic spline–

x : 1 2 3

y : -8 -1 18

(c) Given the following data–

x	1	5	3	2	1	1	7	3
y	6	1	0	0	1	2	1	5

(i) Fit a regression line of y on x.

(ii) Fit a regression line of x on y.

Q5. Attempt any ***two*** parts of the following : 10x2=20

(a) What is Chi-square test?

A die is thrown 90 times with the following results–

Face	:	1	2	3	4	5	6	Total
Frequency	:	10	12	16	14	18	20	90

(b) Find the trend of annual sales of trading organization moving average method

Year	1964	1965	1966	1967	1968	1969	1970	1971	1972	1973
Annual sales Rs. In 1000	80	84	80	88	98	92	84	88	80	100
Year	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Annual sales Rs. In 1000	84	96	92	104	116	112	102	114	108	126

(c) Write short notes on the following–

(i) Multiple regression

(ii) Histogram