Printed Pages : 3 MCA212

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

PAPER ID : 9615 **Roll No.** | | | | | | | | | | |

M.C.A.

(SEMESTER-II) THEORY EXAMINATION, 2011-12

COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

Time : 3 Hours] *[Total Marks : 100*

Note : Attempt questions from each Section as indicated. The symbols have their usual meaning.

Section – A

1. Attempt **all** parts of this question. Each part carries 2 marks. **10 × 2 = 20**

(a) Prove that the absolute error in the common logarithm of a number is less than half the relative error of the given number.

(b) Multiply the following floating point numbers :

(i) .1111 E 51 and .4444 E 50

(ii) .1234 E – 49 and .1111 E – 54

(c) Show that $E \equiv 1 + \Delta$ and $\Delta \equiv \nabla (1 - \nabla)^{-1}$.

(d) Prove the Taylor's series for a function of one variable.

(e) Explain two types of errors in numerical differentiation.

(f) Evaluate $\int_0^6 \frac{dx}{1+x^2}$ by using Simpson's one third rule.

(g) Prove the formula for fitting a straight line.

(h) What do you know about Histograms ?

(i) Write any four advantages of statistical quality control.

(j) Explain the types of test of significance.

Section – B

2. Attempt any **three** parts of this question. **3 × 10 = 30**

(a) Prove that Bisection method always converges.

(b) Given log x for x= 40, 45, 50, 55, 60 and 65 according to the following table :

x :	40	45	50	55	60	65
log x :	1.60206	1.65321	1.69897	1.74036	1.77815	1.81291

Find the value of log 5875.

(c) Use Euler – Maclaurin's formula to prove that $\sum_1^n \chi^2 = \frac{n(n+1)(2n+1)}{6}$

(d) Obtain the cubic spline for the following data :

x :	0	1	2	3
y :	2	–6	–8	2

(e) Explain the following control charts :

(i) P chart (ii) np chart

Section – C

All questions of this Section are compulsory.

3. Attempt any **two** parts : **2 × 5 = 10**

(a) Find a real root of $2x - \log_{10} x = 7$ correct to four decimal places using iteration method.

(b) Find a root of the equation tan x + tan hx = 0 which lies in the interval (1, 6, 3, 0) correct to four significant digits using method of false position.

(c) Write the procedure of secant method to find a root of a polynomial equation to implement it in 'C'.

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4. Attempt any **two** parts : **$2 \times 5 = 10$**

(a) 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

(b) Value of f(x) for values of x are given as :

$$f(1) = 4,\ f(2) = 5,\ f(7) = 5,\ f(8) = 4$$

Find f(6) and also the value of x for which f(x) is maximum or minimum using Lagrange's formula.

(c) Show that : $f\left(\frac{a+b}{2}\right) = \frac{f(a) + f(b)}{2} + \frac{(b-a)\,[f'(a) - f'(b)]}{8}$

by Hermite's interpolation.

5. Attempt any **one** part : **$1 \times 10 = 10$**

(a) Using Runge-Kutta method of Fourth order, solve for y(0.1), y(0.2) and y(0.3) given that $y' = xy + y^2$, y(0) = 1.

(b) Write the algorithm and flow chart for Milne's Predictor – Corrector method.

6. Attempt any **one** part : **$1 \times 10 = 10$**

(a) Write down the principle of least squares method for curve fitting.

(b) Prove that the regression coefficients are independent of the origin but not to scale.

7. Attempt any **two** parts. **$2 \times 5 = 10$**

(a) A manufacturer claims that only 4% of his products supplied by him are defective. A random sample of 600 products contained 36 defectives. Test the claim of the manufacturer.

(b) Write the t-Test for difference of means of two small samples.

(c) Explain CHI-SQUARE test and write the Yates's correction for test of independence.
