

MCA

THEORY EXAMINATION (SEM-II) 2016-17

COMPUTER BASED NUMERICAL AND STATISTICAL TECHNIQUES

Time : 3 Hours

Max. Marks : 70

Note : Be precise in your answer. In case of numerical problem assume data wherever not provided.

SECTION-A

1. Attempt all questions :

7 x2 = 14

- Explain Pitfalls of floating-point Representation in detail.
- Prove that $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$
- Suppose 1.414 is used as an approximation to $\sqrt{2}$. Find the absolute and relative errors.
- Write down Gauss's forward interpolation formula.
- Prove that $x^4 = \frac{1}{8}[3T_0(x) + 4T_2(x) + T_4(x)]$
- What do you mean by Histograms?
- Explain Null hypothesis.

SECTION-B

2. Attempt any five of the following :

7 x5 = 35

- Find a real root of the equation $3x + \sin x - e^x = 0$ by the method of Regula falsi position correct to four decimal places.
- Find the missing term in the following table:

x	2	2.1	2.2	2.3	2.4	2.5	2.6
y	0.135	---	0.111	0.100	----	0.082	0.074

- Given $y_{20} = 24$, $y_{24} = 32$, $y_{28} = 35$ and $y_{32} = 40$ find y_{25} by Bessel's interpolation formula.
- Given $\frac{dy}{dx} = y - x$, $y(0) = 2$. Find $y(0.1)$ and $y(0.2)$ correct to four decimal places using Runge-Kutta method.
- By the method of least squares, find the curve $y = ax + bx^2$ that best fits the following data :

x	1	2	3	4	5
y	1.8	5.1	8.9	14.1	19.8

- Apply Gauss-Seidel iteration method to solve the following equation (three iteration only)

$$20x + y - 2z = 17$$

$$3x + 20y - z = -18$$

$$2x - 3y + 20z = 25$$

- Find the cubic Lagrange's interpolating polynomial from the following data :

x	0	1	2	5
f(x)	2	3	12	147

- For 10 observations on price(x) and supply(y), the following data were obtained (in appropriate units) :

Obtain the two lines of regression.

SECTION-C

Attempt any two of the following :

10.5 x2 = 21

3. Find $y(2)$ if $y(x)$ is the solution of $\frac{dy}{dx} = \frac{1}{2}(x + y)$ where $y(0) = 2, y(0.5) = 2.636, y(1) = 3.595, y(1.5) = 4.968$ using Milne's method.
4. Given that $\frac{dy}{dx} = \log_{10}(x + y)$ with the initial condition that $y = 1$ when $x = 0$, find y for $x = 0.2$ and $x = 0.5$ using Euler's modified formula.
5. Derive the Newton-divided difference formula, calculate the value of $f(6)$ from the following data

x	1	2	7	8
$f(x)$	1	5	5	4

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