Printed Pages : 2 **Roll No.** | | | | | | | | | | | **RCA201**

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**

a) Explain Pitfalls of floating-point Representation in detail.

b) Prove that $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1+\frac{\delta^2}{4}}$

c) Suppose 1.414 is used as an approximation to $\sqrt{2}$. Find the absolute and relative errors.

d) Write down Gauss's forward interpolation formula.

e) Prove that $x^4 = \frac{1}{8}[3T_0(x) + 4T_2(x) + T_4(x)]$

f) What do you mean by Histograms?

g) Explain Null hypothesis.

SECTION-B

2. **Attempt any five of the following :** **7 x5 = 35**

a) Find a real root of the equation $3x + sinx - e^x = 0$ by the method of Regula falsi position correct to four decimal places.

b) 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

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

d) 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.

e) 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

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

$$20x + y - 2z = 17$$
$$3x + 20y - z = -18$$
$$2x - 3y + 20z = 25$$

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

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

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

$\sum x = 130, \quad \sum y = 220, \quad \sum x^2 = 2288, \quad \sum y^2 = 5506 \; and \sum xy = 3467$

Obtain the two lines of regression.

SECTION-C

Attempt any two of the following : 10.5 x2 = 21

3. Find $y(2)$ if $y(\mathrm{x})$ 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