

MCA
(SEM. II) THEORY EXAMINATION 2018-19
COMPUTER BASED NUMERICAL & STATISTICAL TECHNIQUES

*Time: 3 Hours**Total Marks: 70***Note:** Attempt all Sections. If require any missing data; then choose suitably.**SECTION A**

- 1. Attempt all questions in brief. 2 x 7 = 14**
- Round off the number 865250 to four significant figures and find absolute, relative and percentage error.
 - Prove that $\delta = E^{1/2} - E^{-1/2}$
 - Differentiate false position method and secant method.
 - Write the formula of Bessel for the Interpolation.
 - What do you mean by the term numerical differentiation?
 - Discuss the basic concept used in the Gauss elimination approach.
 - What is the meaning of highly significant and probably significant?

SECTION B

- 2. Attempt any three of the following: 7 x 3 = 21**
- Find a real root of the equation $\cos x = 3x - 1$ correct to three places of decimal by using Iteration method.
 - Derive the Gauss-Forward Difference formula for equal intervals.
 - Solve the following system of equations by Gauss-Elimination method:

$$\begin{aligned} 2x + y + 4z &= 12 \\ 8x - 3y + 2z &= 23 \\ 4x + 11y - z &= 33 \end{aligned}$$
 - Given that $\frac{dy}{dx} = \log_x(x + y)$ 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.
 - How do you fit a curve of the following type:

(i) $y = ae^{bx}$	(ii) $y = ax^b$
(iii) $y = ax + bx^2$	(iv) $y = ax + \frac{b}{x}$

SECTION C

- 3. Attempt any one part of the following: 7 x 1 = 7**
- Find a real root of the equation $\log x - \cos x = 0$ correct to three places of decimal by Newton-Raphson's method.
 - Write an algorithm and explain Regula-Falsi method for finding simple roots of $f(x) = 0$.
- 4. Attempt any one part of the following: 7 x 1 = 7**
- Find the value of $\log_{10} 337.5$ from the following data:

x	310	320	330	340	350	360
$\log_{10}x$	2.4913	2.5051	2.5185	2.5314	2.5440	2.5563

- (b) Given $\log_{10}654 = 2.8156$, $\log_{10}658 = 2.8182$, $\log_{10}659 = 2.8189$, $\log_{10}661 = 2.8202$, find the value of $\log_{10}656$ by the divided difference formula.

5. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Find $f'(1)$ for $f(x) = \frac{1}{1+x^2}$ using the following table:

x	1.0	1.1	1.2	1.3	1.4
$f(x)$	0.5000	0.4524	0.4098	0.3717	0.3378

- (b) Use Simpson's 1/3 rule to prove that $\log_e 7$ is approximately 1.9587 using

$$\int_1^7 \frac{dx}{x}$$

6. Attempt any *one* part of the following:

7 x 1 = 7

- (a) Using the method of least square fit the non-linear of the form $y = ae^{bx}$ to the following data

x	0	2	4
y	5.012	10	31.62

- (b) The following results were obtained from records of age (x) and systolic blood pressure (y) of a group of 10 men:

	x	y
Mean	53	142
Variance	130	165

and $\sum(x - \bar{x})(y - \bar{y}) = 1220$. Find the approximate regression equation and use it to estimate the blood pressure of a man whose age is 45.

7. Attempt any *one* part of the following:

7 x 1 = 7

- (a) A manufacture 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 manufacture.
- (b) Define the following terms:
- Statistical Hypothesis
 - Null Hypothesis
 - Alternative Hypothesis