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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**

a. Round off the number 865250 to four significant figures and final absolute, relative and percentage error.
b. Prove that $\delta = E^{1/2} - E^{-1/2}$
c. Differentiate false position method and secant method.
d. Write the formula of Bessel for the Interpolation.
e. What do you mean by the term numerical differentiation?
f. Discuss the basic concept used in the Gauss elimination approach.
g. What is the meaning of highly significant and probably significant?

SECTION B

2. Attempt any *three* of the following: **7 x 3 = 21**

a. Find a real root of the equation $cosx = 3x - 1$ correct to three places of decimal by using Iteration method.
b. Derive the Gauss-Forward Difference formula for equal intervals.
c. Solve the following system of equations by Gauss-Elimination method:

$$2x + y + 4z = 12$$
$$8x - 3y + 2z = 23$$
$$4x + 11y - z = 33$$

d. 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.
e. 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**

(a) Find a real root of the equation $logx - cosx = 0$ correct to three places of decimal by Newton-Raphson's method.
(b) Write a 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**

(a) 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:

(i) Statistical Hypothesis
(ii) Null Hypothesis
(iii) Alternative Hypothesis