

Seat No. : \_\_\_\_\_

# AP-123

April-2022

M.Sc. (CA & IT), Sem.-IV

## Computer Oriented Numerical Methods

Time : 2 Hours]

[Max. Marks : 50

- Instructions :** (1) Use of non-programmable scientific calculator is allowed.  
(2) In Section-I attempt any **three** questions out of given **five**.  
(3) In Section-II attempt any **eight** MCQs out of given **ten**.

### Section – I

1. **Attempt all :**

- (A) Solve the following system of linear equations using Gauss Elimination method : 7

$$x + 4y - z = -5$$

$$x + y - 6z = -12$$

$$3x - y - z = 4$$

- (B) Solve the following system of linear equations using Gauss Seidel method : 7

$$3x - 0.1y - 0.2z = 7.85$$

$$0.1x + 7y - 0.3z = -19.3$$

$$0.3x - 0.2y + 10z = 71.4$$

2. **Attempt all :**

- (A) Derive normal equations for quadratic fit using least square method. 7

- (B) Using least square method fit an exponential curve  $y = ax^b$  to the following data : 7

$x$	2	3	4	5
$y$	27.8	62.1	110	161

3. **Attempt all :**

- (A) Use Newton's backward interpolation formula to find out the value of  $f(0.15)$  using the following data : 7

$x$	0.1	0.2	0.3	0.4	0.5
$f(x)$	0.09983	0.19867	0.29552	0.38942	0.47943

- (B) Find out the value of  $y$  for  $x = 38$  and  $y = \log_{10}(x)$  and with the help of following information :

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$x$	$\log_{10}(2)$	$\log_{10}(3)$	$\log_{10}(5)$	$\log_{10}(7)$
$y$	0.3010	0.4771	0.6989	0.8450

4. **Attempt all :**

- (A) Find the root of the equation  $\cos x - xe^x = 0$  correct upto three decimal places using false position method.

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- (B) Find  $3\sqrt[4]{48}$  correct up to four decimal places using Newton Raphson method.

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5. **Attempt all :**

- (A) Evaluate  $\int_0^{\pi/2} \sin t \, dt$  by the two point Gaussian quadrature formula.

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- (B) Solve the ODE  $y' = 2y + \frac{e^{x^2}}{1+y^2}$ ,  $y(1) = 7$ . Find the value of  $y$  at  $x = 1.2$  by taking  $h = 0.1$  using Runge-Kutta fourth order method.

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**Section – II**

6. **Attempt any eight :**

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(1)  $(98)_{10} = (\text{_____})_2$

- (a) 01100010    (b) 01100011    (c) 01110010    (d) 11100010

(2)  $(560)_{10} = (\text{_____})_8$

- (a) 490    (b) 420    (c) 1060    (d) none

(3) The real roots of the equation  $x^2 + 4 = 0$  are \_\_\_\_\_.

- (a) 0    (b) 1    (c) 2    (d) infinitely many

(4)  $\int_{-1}^1 x^3 \, dx = \text{_____}$ .

- (a) 0    (b) 1    (c) 2    (d) 2/3

- (5)  $\nabla =$  \_\_\_\_\_.
- (a)  $1 - E$       (b)  $1 - E^{-1}$       (c)  $1 - E^2$       (d) None
- (6)  $\delta =$  \_\_\_\_\_.
- (a)  $E^{1/2} + E^{-1/2}$       (b)  $E^{1/2} - E^{-1/2}$       (c)  $-E^{1/2} + E^{-1/2}$       (d) None
- (7) 2's complement of  $(106)_{10}$  is
- (a) 1010110      (b) 0110110      (c) 0010110      (d) 111101111
- (8) If  $x = 0.00458529$  then the absolute error when  $x$  is truncated to three decimal places is \_\_\_\_\_.
- (a) 0.000000529      (b) 0.0000529      (c) 0.00529      (d) 0.00000529
- (9) The solution set of  $x + y = 1$  contains \_\_\_\_\_.
- (a) No element      (b) infinitely many elements  
(c) two elements      (d) three elements
- (10) Newton Raphson method fails if \_\_\_\_\_.
- (a) slope of the tangent is parallel to  $x$  axis.  
(b) slope of the tangent is perpendicular to  $x$  axis  
(c) slope of the tangent is 1.  
(d) slope of the tangent is 2.
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