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**Paper Code - 0327005/0397904**  
**B.C.A./B.VOC 3<sup>rd</sup> Sem. (Main/Back/**  
**Ex) Examination, Dec.-2024**  
**Bachelor of Computer Application/**  
**Information Technology**  
**(Numerical Methods)**

*Time : Three Hours / [Maximum Marks : 75*

**Note :** Attempt all the sections as per instructions.

**Section-A**

**Note :** Attempt all questions. Each question carries 3 marks.

1. Find the value of  $E^2 x^2$  when the values of  $x$  vary by a constant increment of 1.
2. Find the square root of given number  $b$  by Newton-Raphson's method.

**P.T.O.**

3. State Trapezoidal rule and Simpson's one third rule of integration.
4. Find  $\Delta^2 x$  if  $h=1$ , where  $\Delta$  is forward difference operator.
5. Given  
$$\frac{dy}{dx} = f(x, y)$$
$$y = y_0 \text{ at } x = x_0$$
Write the formula for  $K_1, K_2, K_3$  &  $K_4$

(Runge Kutta Fourth order formula)

**Section-B**

**Note :** Attempt any **two** questions out of the **three** questions. Each question carries **7½** marks.

6. Evaluate  $\int_0^6 \frac{dx}{1+x^2}$  using Simpson's  $\frac{3}{8}$  rule.

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7. Prove that the role of convergence of Newton-Rapnson method is quadratic.

8. The value of y and x are given as below

x: 5 6 9 11

y: 12 13 14 16

Find the value of y when x=10

### Section-C

**Note :** Attempt any **three** questions out of the following **five** questions. Each question carries **15** marks.

9. (a) Find a real root of equation  $x^3+29x-97=0$  by Bisection method, correct to three places of decimal.

(b) Obtain  $(12)^{1/3}$ , to five place of decimal by Newton's Raphson method.

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P.T.O.

10. Use Stirling formula to find  $y_{35}$  given

$$y_{20} = 512, y_{30} = 439, y_{40} = 346, y_{50} = 243$$

11. From the table given below for what value of x; y is minimum

x	3	4	5	6	7	8
y	0.205	0.240	0.259	0.262	0.250	0.224

12. Apply Gauss-Seidal iteration method to solve the equations

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

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

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

13. Use Picard's method to approximate y when  $x=0.2$  given that  $y=1$  when  $x=0$  and  $\frac{dy}{dx} = x-y$

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