BRAINWARE UNIVERSITY

Term End Examination 2023
Programme – BCA-2020
Course Name – Numerical Method
Course Code - GEBS301
(Semester III)

Full Marks : 60 **Time : 2:30 Hours**

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

Group-A
(Multiple Choice Type Question) 1 x 15=15

1. *Choose the correct alternative from the following :*

(i) The iterative method is determined as
a) direct method b) indirect method
c) derivative method d) none of these.

(ii) In Gauss Jordan method to solve AX=B, A is transferred in
a) singular matrix b) non-singular matrix
c) diagonal matrix d) orthogonal matrix

(iii) Identify the number of significant figures in 0.03409.
a) 5 b) 6
c) 7 d) 4

(iv) Omit the following digit which is not significant of the number 0.025.
a) 0 b) 2
c) 5 d) none of these.

(v) Define the number of significant digits in the number 3.0056.
a) 3 b) 4
c) 5 d) 2

(vi) Identify the number of significant digit in the number 0.0001234.
a) 7 b) 4
c) 8 d) 6

(vii) If 'a' be the actual value and 'e' be its estimated value, then define formula for relative error.
a) $\frac{|a-e|}{a}$ b) $\frac{a}{e}$
c) $\frac{|a-e|}{e}$ d) $\frac{(a-e)}{e}$

(viii) Locate the relative error, when 0.1 is approximated to 0.09
a) <p style="text-align: left;"> 1/9 b) 0.11111
c) 0.11 d) <p style="text-align: left;"> None of these

(ix) Infer the kind of error when 3.14 is approximate values of π.
a) inherent error b) truncation error
c) round-off error d) percentage error

(x) Transform the number if 1.005723 is rounded-off the number up to three significant digits is
a) 1.00 b) 1.005
c) 1.01 d) none of these.

(xi) Interpret answer, if the number 0.0456 is rounded-off up to five significant figures is
a) 0.0456 b) 0.04560
c) 0.045600 d) none of these

(xii) Represent the answer if the number 3.45672 is rounded-off up to five significant figures is
a) 3.456 b) 3.457
c) 3.458 d) 3.4567

(xiii) Calculate the result, if the number 5.4555 is rounded-off up to four significant figures.
a) 5.455 b) 5.456
c) 5.457 d) none of these.

(xiv) Apply the concept of round-off to the number 5.45852 correct up to four significant figures.
a) 5.457 b) 5.459
c) 5.458 d) none of these.

(xv) Determine an ordinary differential equation of first order and first degree $\frac{dy}{dx} = f(x,y)$ with $y(x_0) = y_0$
a) An IVP b) A BVP
c) Integro differential equation d) none of these.

Group-B

(Short Answer Type Questions) 3 x 5=15

2. Convert the following numbers into the round off number correct up to 4-decimal places: (3)
   a) 56.243827
   b) 0.235082
   c) 0.560012
   d) 40.35856

3. List the round-off numbers of the following numbers correct up to 4-significant digits: (3)
   a) 5.2056
   b) 0.24062
   c) 0.0055672
   d) 87.268466

4. Estimate the root lying between 2.1 and 2.2 correct up to two decimal places of the equation $x^2 + x - 7 = 0$ using Bisection method. (3)

5. Evaluate $\int_0^1 \frac{dx}{1+x^2}$ using Trapezoidal rule taking $n = 4$. (3)

6. Evaluate the value of y at $x = 0.1$ by solving the following equation $\frac{dy}{dx} = \frac{y-x}{y+x}, y(0) = 1$ using Picard's method. (3)

OR

Compare Euler's method and 4th order Runge-Kutta method to solve an IVP. (3)

Group-C

(Long Answer Type Questions) 5 x 6=30

7. Round off the numbers 865240 and 37.46235 to four significant digits and identify the absolute and relative errors in each case. (5)

8. Define exact number and approximate number with an example. (5)

9. Compute the value of 2nd iteration of the positive root for the equation $tan\, x + x = 0$ by secant method. (5)

10. Deduce the equation of the cubic curve $f(x)$ which passes through the points $(4, -43), (7, 83), (9, 327)$ and $(12, 1053)$. (5)

11. Evaluate the value of $y(0.4)$ correct to two decimal places by Euler's method of the differential equation: (5)
    $\frac{dy}{dx} = x - y, y(0) = 1$ taking $h = 0.2$.

12. Evaluate the value of $y(0.1)$ *and* $y(0.2)$ correct to two decimal places by Euler's method of the differential equation: (5)
    $\frac{dy}{dx} = 1 - y, y(0) = 0$ taking $h = 0.1$.

OR

Evaluate the value of $y(0.1)$ by Runge-Kutta method of order 2 of the differential equation: (5)
$\frac{dy}{dx} = x + y^2, y(0) = 1.$

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