

**CARMEL COLLEGE OF ARTS, SCIENCE AND COMMERCE FOR WOMEN,
NUVEM-GOA**

B.SC. CBCS Semester II Examination, July, 2021

Semester: II OF B.SC

Course name & Code: Numerical Computations (GE-02)

Total marks: 30

Date: 09-07-2021

Duration: 2 Hrs

Total No. of pages: 2

Instructions:

1. All questions are compulsory, however internal choice is available.
2. Figures to the right indicate maximum marks allotted to the question.
3. Student shall write down the answers and should **sign each and every page with date** and then upload the scanned copy/photograph of the answer sheet in PDF format. A student must upload their answer scripts by 1.00 pm.
4. PDF should be titled as : **Name of the student_Seat Number_paper code.**

Q.1. Attempt **any five** of the following:

[10]

- a) Use the Newton-Raphson to obtain a root, correct to three decimal places, of each of the following equation $x^3 - 5x + 3 = 0$
- b) Evaluate the sum $S = \sqrt{2} + \sqrt{3} + \sqrt{5}$ to 4 significant digits and find its absolute and relative errors.
- c) Explain the term 'round-off error' and round-off the following numbers to three decimal places
(i) 0.0022218 (ii) 0.7029 (iii) 2.36425 (iv) 68.46267
- d) Find the second-degree polynomial which satisfy the set of values (0,1), (1,2), and (2,1).
- e) For the following distributed data construct the difference table and find the value of $\nabla^3 y_3$
 $x:$ 1.60 1.65 1.70 1.75
 $y:$ 26.98 28.75 30.47 32.21
- f) A function $f(x)$ takes the values as given in the following table:
 x : 1 3 4
 $f(x)$: 4 12 19
Find $f(x)$ when $x = 5$
- g) Find from the table the area bounded by the curve and the x -axis from $x = 6.47$ to $x = 6.52$
 x : 6.46 6.47 6.48 6.49 6.50 6.51 6.52
 $f(x):$ 1.93 1.95 1.98 2.01 2.03 2.06 2.11
- h) From the following table of values of x and y , obtain $\frac{dy}{dx}$ for $x = 3.1$
 $x:$ 3.1 3.2 3.3 3.4 3.5 3.6
 $y:$ 3.320 4.055 4.953 6.046 7.389 9.025

Q.2. Attempt **any four** of the following:

[20]

- a) Obtain a root, correct to three decimal places, of the equation: $x^3 - x - 4 = 0$ using the bisection method
- b) Give the sequence of steps in the regula-falsi method for determining a real root of the equation $f(x) = 0$. Hence, find the real root, which lies between 2 and 3, of the equation $x \log x - 1.2 = 0$ to an accuracy of two decimal places
- c) State Newton's backward interpolation formula with assumptions.
Estimate by Newton's method of interpolation, the expectation of life at age 36 from the following data.

Age(years)	:	10	15	20	25	30	35
Expectation of life (years)	:	35.3	32.4	29.2	26.1	23.2	20.5

- d) Using Simpson's $\frac{1}{3}$ -rule with $h = 1$, evaluate the integral

$$I = \int_3^7 (x^2 \cdot \log x) dx$$

- e) Evaluate the following integral by Weddle's rule correct to three decimal places taking 13 equidistant ordinates

$$I = \int_0^6 \frac{x^2 + 2}{1 + x^2} dx$$

- f) Find the missing terms in the following:

x :	0	5	10	15	20	25	30
y :	1	3	-	73	225	-	1153
