BACHELOROFCOMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

ASSIGNMENTS

(July-2025 & January-2026 sessions)

(BCS-051,BCS-052,BCS-053,BCS-054,BCS-055

BCSL-056, BCSL-057, BCSL-058)

SCHOOLOFCOMPUTERANDINFORMATIONSCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068

CONTENTS

Important Notes

1. Submit your assignments to the Coordinator of your Study Centre on or before the due date.

2. Assignment submission before due dates is compulsory to become eligible for appearing in corresponding Term End Examinations. For further details, please refer to BCA Programme Guide.

3. To become eligible for appearing the Term End Practical Examination for the lab courses, it is essential to fulfill the minimum attendance requirements as well as submission of assignments (on or before the due date). For further details, please refer to the BCA Programme Guide.

Course Code	:	BCS-054
Course Title	:	**Computer Oriented Numerical Techniques**
Assignment Number	:	**BCA(V)/054/Assignment/2025-26**
Maximum Marks	:	**100**
Weightage	:	**25%**
Last Dates for Submission	:	**31stOctober,2025(For July, Session)**
		30thApril, 2026(For January, Session)

This assignment has seven questions of total 80 marks. Answer all the questions. 20 marks are for viva voce. You may use illustrations and diagrams to enhance explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation. Illustrations/ examples, where-ever required, should be different from those given in the course material. You must use only simple calculator to perform the calculations.

Q1. (a) Find floating point representation, if possible normalized, in the 4-digit mantissa, two digit exponent, if necessary use approximation for each of the following numbers: **(8 Marks)**
(i) 27.94 (ii) -0.00943 (iii) -6781014 (iv) 0.0644321

Also, find absolute error, if any, in each ca

(b) Convert the decimal integer -465 to binary using both the methods (as shown in Pg No:16 of Block-1) . Show all the steps. **(4 Marks)**

(c) Convert the number given as binary fraction $-(0.101110101)_2$ to decimal. **(3 Marks)**

(d) Find the sum of the two floating numbers x1=0.1364X101 and x2=0.7342X10-1. Further express the result in normal form, using (i) Chopping (ii) Rounding. Also, find the absolute error.

(5 Marks)

Q2. (a) Solve the system of equations **(5 Marks)**
$$2 x + y + z = 3$$
$$x + 3y + 3z = 4$$
$$x - 4y + 2z = 9$$

using Gauss elimination method with **partial pivoting**. Show all thesteps.

(b) Perform four iterations (rounded to four decimal places) using **(5 Marks)**
(i) Jacobi Method and
(ii) Gauss-Seidel method ,
for the following system of equations.

$$\begin{bmatrix} 5 & 4 & -3 \\ 4 & -4 & 3 \\ -1 & 2 & -1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 4 \\ 5 \\ -4 \end{bmatrix}$$

With $\mathbf{x}^{(0)} = (0, 0, 0)^{T}$. The exact solution is $(1, -4, -5)^{T}$.

Which method gives better approximation to the exact solution?

Q3. Determine the smallest positive root of the following equation: **(10 Marks)**

$$f(x) \equiv x^3 - 9x^2 - x + 9 = 0$$

to three significant digits using

(a) Regula-falsi method (b) Newton-Raphson method

(c) Bisectionmethod   (d) Secant method

Q4. (a) Find Lagrange's interpolating polynomial for the following data. Hence obtain the value of f(4).

(5 Marks)

x	0	2	3	5
f(x)	2	11	21	121

(b) Using the inverse Lagrange's interpolation, find the value of x when y=3 for the following data:

(5 Marks)

x	25	35	55	75
y=f(x)	-2	-1	1	5

Q5. (a) The population of a country for the last 25 years is given in the following table:. **(3+2+3=8 Marks)**
Year (x)   : 1995 2000 2005 2010   2015
Population in lakhs (y)   : 678   1205 1855 2745   3403

(i) Using Stirling's central difference formula, estimate the populationfor the year 2007
(ii) Using Newton's forward formula, estimate the population for theyear 1998.
(iii) Using Newton's backward formula, estimate the population for theyear 2013.

(b) Derive the relationship for the operators δ in terms of E. **(2 Marks)**

Q6. (a) Find the values of the first and second derivatives of y = f(x) for x=2.1 using the **(5 Marks)**
following table. Use forward difference method. Also, find Truncation Error (TE) and actual errors.

x	:	2	2.5	3	3.5
y	:	8.7	12.7	16.8	20.9

(b)   Find the values of the first and second derivatives of y = f(x) for x=2.1 from the following table using Lagrange's interpolation formula. Compare the results with (a)   part above.

(5 Marks)

x	:	2	2.5	3	3.5
y	:	8.7	12.7	16.8	20.9

Q7.   Compute the value of the integral   **(10 Marks)**

$$\int_0^8 (4x^4 + 5x^3 + 6x + 5)\, dx$$

By taking 8 equal subintervals using (a) Trapezoidal Rule and then
(b) Simpson's 1/3 Rule. Compare the result with the actual value.