BACHELOR OF COMPUTER APPLICATIONS (BCA_NEW)

BCA_NEW /ASSIGN/SEMESTER-I

ASSIGNMENTS

(July-2025 & January 2026 Sessions)

BEVAE-181, BEGLA-136, BCS-111, BCSL-013, BCS-012

**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-012**
Course Title	:	**Basic Mathematics**
Assignment Number	:	**BCA_NEW(I)-012/Assignment/2025-26**
Maximum Marks	:	**100**
Weightage	:	**30%**
Last Date of Submission	:	**31st October,2025(For July 2025 Session)**
		30th April, 2026 (For January 2026 Session)

Note: There are 5 questions in the following assignment carrying a total of 80 marks, Rest 20 marks are for viva-voce. Answer all the questions.

Q1: (a) Snow that $\begin{vmatrix} b+c & c+a & a+b \\ c+a & a+b & b+c \\ a+b & b+c & c+a \end{vmatrix} = 2\begin{vmatrix} a & b & c \\ b & c & a \\ c & a & b \end{vmatrix}$ **(2.5 Marks)**

(b) If A = [2 -1 3] and B= $\begin{bmatrix} 1 \\ 3 \\ -1 \end{bmatrix}$ check **(2.5 Marks)**

Whether AB = BA.

(c) Use the principle of mathematical induction to show that $1+3+5+ \text{--------} + (2n-1) = n^2$ **(2.5 Marks)** for each n $\in$ **N**.

(d) If α and β are roots of $x^2 - 3ax + a^2 = 0$ and **(2.5 Marks)** $\alpha^2 + \beta^2 = \frac{7}{9}$, find the value of a.

(e) If $y = ax + \frac{b}{x}$, show that $x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} - y = 0$ **(2.5 Marks)**

(f) Evaluate the integral $\int e^x(e^x + 7)^5\, dx$. **(2.5 Marks)**

(g) If $\vec{a} = 5\hat{\imath} - \hat{\jmath} - 3\hat{k}$ and $\vec{b} = \hat{\imath} - 3\hat{\jmath} - 5\hat{k}$, show **(2.5 Marks)** that $\vec{a} + \vec{b}$ and $\vec{a} - \vec{b}$ are perpendicular to each other.

(h) Find the angle between the lines **(2.5 Marks)** $\frac{x-5}{2} = \frac{y-5}{1} = \frac{z+1}{-1}$ and $\frac{x}{3} = \frac{y-1}{2} = \frac{z+5}{3}$

Q2: (a) If A= $\begin{bmatrix} -1 & 2 & 0 \\ -1 & 1 & 1 \\ 0 & 1 & 0 \end{bmatrix}$, show that $A^2 = A^{-1}$ **(2.5 Marks)**

(b) Show that A= $\begin{bmatrix} 3 & 4 & -5 \\ 1 & 1 & 0 \\ 1 & 1 & 5 \end{bmatrix}$ is row equivalent **(2.5 Marks)** to I$_3$, where I$_3$ is identity matrix of order 3.

(c) If A= $\begin{bmatrix} 2 & 3 \\ -1 & 2 \end{bmatrix}$, show that **(2.5 Marks)** $A^2 - 4A + 7I_2 = 0_{2x2}$. Use this result to find

A^5. Where 0_{2x2} is null matrix of order 2x2.

Q3: (a) Solve the inequality $\left|\frac{3x-1}{2}\right| \le 5$. **(2.5 Marks)**

(b) Solve the equation $6x^3 - 11x^2 - 3x + 2 = 0$, **(5 Marks)**
given that the roots are in H.P.

(c) If $x + iy = \sqrt{\frac{a+ib}{c+id}}$, show that **(5 Marks)**
$(x^2 + y^2)^2 = \frac{a^2+b^2}{c^2+d^2}$.

(d) If α and β be the roots of the equation **(5 Marks)**
$3x^2 - 4x + 1 = 0$, find the equation whose roots are α^2/β and β^2/α

Q4: (a) Determine the intervals in which the **(5 Marks)**

function $f(x) = \frac{1+x+x^2}{1-x+x^2}$ $x \in \mathbf{R}$ is increasing or decreasing.

(b) Show that $f(x) = x^2 \, In\left(\frac{1}{x}\right), x > 0$ has a local **(5 Marks)**

maximum at $x = \frac{1}{\sqrt{e}}$

(c) Evaluate $\int (x+1)e^x(xe^x + 5)^4 \, dx$. **(5 Marks)**

(d) Find the area bounded by $y = \sqrt{x}$ and $y = x$. **(5 Marks)**

Q5: (a) Find the vector and Cartesian equation of the line through the points (3, 0, -1) **(5 Marks)**
and (5, 2, 3).

(b) Show that $\left[\vec{a} \times \vec{b} \quad \vec{b} \times \vec{c} \quad \vec{c} \times \vec{a}\right] = \left[\vec{a} \quad \vec{b} \quad \vec{c}\right]^2$ **(5 Marks)**

(c) Two tailors A and B, earn ₹ 150 and ₹ 200 per day respectively. **(5 Marks)**
A can stich 6 shirts and 4 paints while B can stich 10 shirts and 4 pants per day.
How many days should each word to stich (at least) 60 shirts and 32 pants at least
labour cost ? Also calculate the least cost.