

**MASTER OF SCIENCE
DATA SCIENCE AND ANALYTICS
(MSCDSA)**

MSCDSA/ASSIGN/SEMESTER-I

ASSIGNMENTS

(January – 2026 & July – 2026)

**MCS-061, MCS-062, MCS-063, MCS-207, MCSL-064,
MCSL-065**



**SCHOOL OF COMPUTER AND INFORMATION SCIENCES
INDIRA GANDHI NATIONAL OPEN UNIVERSITY
MAIDAN GARHI, NEW DELHI – 110 068**

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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 MSCDSA 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 MSCDSA Programme Guide.
4. The viva voce is compulsory for the assignments. For any course, if a student submitted the assignment and not attended the viva-voce, then the assignment is treated as not successfully completed and would be marked as ZERO.

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|--------------------------------|---|---|
| Course Code | : | MCS-061 |
| Course Title | : | Mathematical Foundations-I |
| Assignment Number | : | MSCDSA (I)/061/Assign/2026 |
| Maximum Marks | : | 100 |
| Weightage | : | 30% |
| Last Date of Submission | : | 30th April, 2026 (for January session) 31st October, 2026 (for July session) |

Note: There are four questions in this assignment, carrying a total of 80 marks. The remaining 20 marks are for viva-voce. Answer all the questions.

Q1 a) What is set? Explain the Finite set and the Infinite set with example. **(3 Marks)**

b) What is Power Set? Find $P(A)$ for $A = \{ a,b,c,e,f,g\}$ **(2 Marks)**

c) What is a function? Explain the following types of functions with examples. **(3 Marks)**

i) Surjective

ii) Injective

iii) Bijective

d) Explain how to draw a graph of a linear function. Draw graph of $(x) = 5x + 2$ **(3 Marks)**

e) Find the inverse of the following function: **(3 Marks)**

$$f(x) = \frac{x^2 + 9}{x - 5}, x \neq 5$$

f) What is a relation? Explain an equivalence relation with the help of an example. **(3 Marks)**

g) Draw Venn diagram to represent the followings: **(3 Marks)**

i) $A \subseteq B$

ii) $(A \subset B$

iii) $(A \cap B \cap C) \cap (A \cup B \cap C)$

h) Explain whether the function $f(x) = x^2 + 2$ is one-one or not. **(2 Marks)**

i) Let f and g be the two functions such that $f(x) = x^2 + 5$ and $g(x) = 2x + 5$. Define $f \circ f$, $f \circ g$, $g \circ f$ and $g \circ g$. **(3 Marks)**

Q2 a) Show 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 Marks)**

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

c) What is a matrix? Explain Upper Triangular Matrix and Lower Triangular Matrix with examples. **(2 Marks)**

d) Find the inverse of the matrix $A = \begin{pmatrix} 1 & 6 & 4 \\ 2 & 4 & -1 \\ -1 & 2 & 5 \end{pmatrix}$ if it exists. (3 Marks)

e) Solve the following system of equations by using the Matrix Method. (3 Marks)

$$\begin{aligned} 3x + 4y + 7z &= 14 \\ 2x - y + 3z &= 4 \\ 2x + 2y - 3z &= 0 \end{aligned}$$

f) Explain how to find sum of n terms of a G.P. (2 Marks)

g) If m times the mth term of an A.P. is n times its nth term, show that (m + n)th term of the A.P. is zero. (3 Marks)

h) Explain what minors and cofactors are in a determinant? Find minor of each element of the following matrix. (3 Marks)

$$\begin{pmatrix} 1 & 6 & 4 \\ 2 & 4 & -1 \\ -1 & 2 & 5 \end{pmatrix}$$

Q3 a) What is vector? Explain how to find the inner product of vectors with an example. (3 Marks)

b) What is Eigen Vector? What is Eigen Value? Explain the characteristic equation. (3 Marks)

c) Explain the fundamental principle of multiplication. (3 Marks)

d) Prove ${}^{n+1}C_r = {}^nC_r + {}^nC_{r-1}$ (3 Marks)

e) Expand $\left(x + \frac{1}{x}\right)^4$ by binomial theorem. (3 Marks)

Q4 a) Explain the concept of limit. (2 Marks)

b) Show that if $y = ae^{mx} + be^{-mx}$, prove that $d^2y/dx^2 = m^2 y$ (2 Marks)

c) Evaluate the integrals: (3 Marks)

i) $\int e^x(e^x + 7)^5 dx$.

ii) $\int \frac{1}{x \log x} dx$

d) Evaluate $\int (x + 1)e^x(xe^x + 5)^4 dx$. (2 Marks)

e) Evaluate the followings: (3 Marks)

i) $\int (x + 1)e^x(xe^x + 5)^4 dx$. ii) $\int \frac{x^6 - x^3 + 1}{x^2} dx$

f) Evaluate the followings: (3 Marks)

i) $\lim_{n \rightarrow 0} \frac{|x|}{x}$ does not exist

ii) $f(x) = |x|$ is continuous at $x = 0$.

iii) $\lim_{x \rightarrow 0} f(x)$, where $f(x) = \begin{cases} 2 - x^2, & x \neq 0 \\ 2, & x = 0 \end{cases}$

g) What is a derivative? Explain its meaning and geometrical interpretation with an example. (3 Marks)

h) What is definite integration? Give a geometrical interpretation of it with the help of an example. (2 Marks)