

BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-II

ASSIGNMENTS

(July - 2026 & January - 2027)

ECO-02, MCS-011, MCS-012, MCS-015, MCS-013, BCSL-021, BCSL-022,



**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 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	:	MCS-013
Course Title	:	Discrete Mathematics
Assignment Number	:	BCA (II)/013/Assignment/2026-27
Maximum Marks	:	100
Last Date of Submission	:	31st October, 2026 (for July 2026 Session)
	:	30th April, 2027 (for January 2027 Session)

There are eight questions in this assignment, which carries 80 marks. Rest 20 marks are for viva-voce. Answer all the questions. You may use illustrations and diagrams to enhance the explanations. Please go through the guidelines regarding assignments given in the Programme Guide for the format of presentation.

Q1:

- (a) What is concept of sets? Explain use of set with examples. (3 Marks)
- (b) Make truth table for followings. (4 Marks)
- i) $p \rightarrow (r \wedge q) \wedge (\sim p \vee r)$
- ii) $p \rightarrow (r \vee \sim q) \vee (\sim p \wedge r)$
- (c) Give geometric representation for followings: (3 Marks)
- i) $\{3, -2\} \times (-1, 4)$
- ii) $\{-2, 2\} \times (-3, 1)$

Q2:

- (a) Draw a Venn diagram to represent followings: (3 Marks)
- i) $(A \cap B \cup C) \cap (B \cap C)$
- ii) $(A \cup B \cap C) \cap (B \cup C)$
- iii) $A \Delta B$
- (b) Write down suitable mathematical statement that can be represented by the following symbolic forms. (4 Marks)
- i) $(\forall x) (\exists y) (\exists z) P(x, y, z)$
- ii) $\exists (x) (\forall y) (\forall z) Q(x, y, z)$
- (c) Show whether $\sqrt{13}$ is rational or irrational. (3 Marks)

Q3:

- (a) What is inclusion-exclusion principle? Explain its use with example. (2 Marks)
- (b) Draw logic circuit for the following boolean expressions: (4 Marks)
- i) $(xy'z) + (xyz)' + (x'yz)$

ii) $(xyz)(xyz')(xy'z)$

- (c) What is a tautology? If P and Q are statements, show that: (4 Marks)
 $P \leftrightarrow Q \equiv (P \rightarrow Q) \wedge (Q \rightarrow P)$

Q4:

- (a) How many words can be formed using letter of “SUCCESS” using each letter at most once? (2 Marks)
- i) If each letter must be used,
 ii) If some or all the letters may be omitted.
- (b) What is a relation? What are different types of relation? Explain equivalence relation with the help of example. (5 Marks)
- (c) Prove that $1^2 + 2^2 + 3^2 + \dots + n^2 = n(n+1)(2n+1)/6$; $\forall n \in \mathbb{N}$ (3 Marks)

Q5:

- (a) A committee of 9 members is to be formed from 8 Engineers, 7 Accountants, and 5 Data Scientists. In how many ways can this committee be chosen if it must contain at least 3 Engineers, at least 2 Accountants, and at least 1 Data Scientists? (4 Marks)
- (b) A and B are mutually exclusive events such that $P(A) = 1/2$ and $P(B) = 1/4$. Find the probability of $P(A \cup B)$? (2 Marks)
- (c) Find how many 3-digit numbers are odd? (2 Marks)
- (d) Explain whether the function $f(x) = x^2 + 1$ is one-one or not. (2 Marks)

Q6:

- (a) How many ways are there to distribute 27 distinct items into 5 distinct boxes with: (2 Marks)
- i) At least two empty boxes.
 ii) No empty box.
- (b) How many 4-digit number divisible by 5. (3 Marks)
- (c) Three Sets A, B and C are: $A = \{1, 2, 3, 4, 5, 8, 9, 12\}$, $B = \{1, 2, 3, 4, 8, 9, 11\}$ and $C = \{1, 2, 7, 9, 10, 11, 13, 15, 17\}$. Find $(A \cup B \cap C)$; $A \cap B \cup C$, and $(A \Delta B \cap C)$. (3 Marks)
- (d) What is function? Explain difference between relation and function with example. (2 Marks)

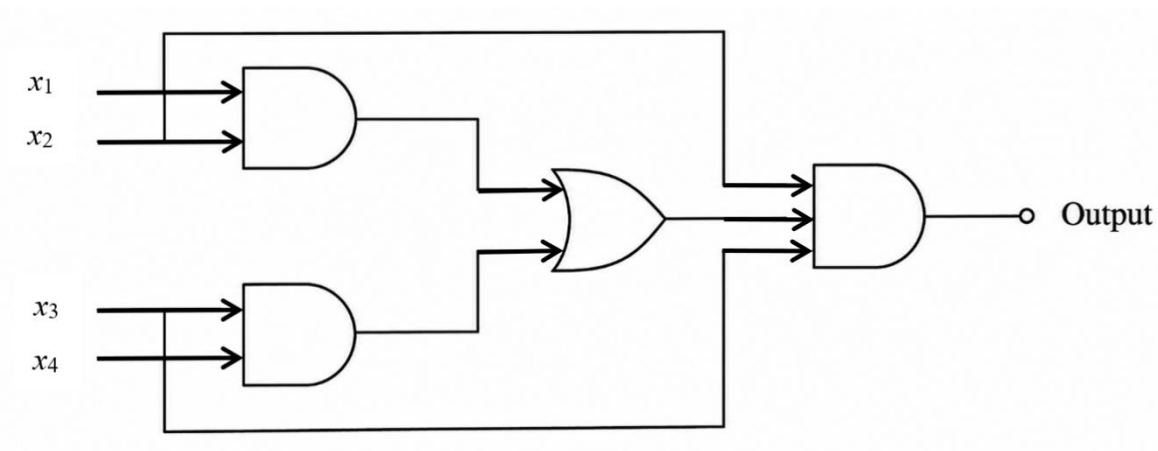
Q7:

- (a) Explain addition theorem in probability with example. (2 Marks)
- (b) Make Pascal's triangle up to $n = 7$. (3 Marks)
- (c) State and explain principal of duality for boolean algebra. (2 Marks)
- (d) Find inverse of the following functions (3 Marks)

$$f(x) = \frac{x^3 + 2}{x - 3} \quad x \neq 3$$

Q8:

- (a) Find dual of Boolean Expression for the output of the following logic circuit. (3 Marks)



- (b) What is a proper subset? Write all the proper subsets of the set $A = \{a, b, c, d, e, f, g\}$. (2 Marks)
- (c) Given the condition statement: "If the system updates, then the software will run smoothly." Write its: (3 Marks)
 - i. Inverse
 - ii. Contrapositive
- (d) In how many ways can a student choose 5 questions out of 8 questions in an exam? (2 Marks)