BACHELOR OF COMPUTER APPLICATIONS (BCA)

(Revised Syllabus)

BCA(Revised Syllabus)/ASSIGN/SEMESTER-II

ASSIGNMENTS

(July - 2025 & January – 2026 sessions)

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
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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/2025-26**
Maximum Marks	**:**	**100**
Weightage	**:**	**25%**
Last Date of Submission	**:**	**31st October, 2025 (for July Session)** **30th April, 2026 (for January 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 Set? Explain use of Sets in problem solving. **(3 Marks)**

(b) What is a proper subset ? Write the number of proper subsets of the Set {2, 3, 4, 5, 6, 7, 8, 9} **(2 Marks)**

(c) Make the truth table for the following. **(3 Marks)**

i) $p \rightarrow \sim (r \wedge q) \wedge (\sim p \vee r)$

ii) $p \rightarrow (r \vee q) \vee (\sim p \wedge \sim r)$

iii) $p \rightarrow (r \vee \sim q)$

(d) Give geometric representation for the following. **(2 Marks)**

i) {5, -3) x (-1, 2)

ii) {-1, -3) x (-2, -4)

Q2.

(a) Draw Venn diagram to represent the following. **(3 Marks)**

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

ii) $(A \cap B \cap C)$

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

(b) Write down a suitable mathematical statement that the following symbolic properties can represent. **(2 Marks)**

i) $(\forall x)(\exists y)(\exists z)P$

ii) $\forall (x) \forall (y) Q$

(c) Show whether $\sqrt{2}$ is rational or irrational. **(2 Marks)**

(d) Explain proof by contradiction with the help of an example. **(3 Marks)**

Q3.

(a) Explain use of the inclusion-exclusion principle with an example. **(2 Marks)**

(b) Construct logic circuites for the following Boolean expressions: **(3 Marks)**

i) (x+yz) + (yz)' + (z'y)

ii) (x'y) (xz') (y'z) + xyz

(c) What is a tautology? If P and Q are statements, show whether the statement $(P \rightarrow Q) \vee (\sim P)$ is a tautology or not. **(3 Marks)**

(d) Explain the symmetric difference of sets with the help of real-life examples. **(2 Marks)**

Q4.

(a) How many words can be formed using the letters of "EXCEPTIONAL", 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? Explain with an example. What are the different types of relations? Explain with an example for each. **(8 Marks)**

Q5.

(a) How many different professional committees of 8 people can be formed, each containing at least 4 Managers, at least 2 Public Servants and 2 IT Professionals from a list of 8 Managers, 6 Public Servants and 8 IT Professionals? **(3 Marks)**

(b) A and B are mutually exclusive events such that P(A) = 1/3 and P(B) = 1/4 . Find P (A $\cup$ B).What is the probability of P(A $\cap$ B), and why? **(2 Marks)**

(c) What is Pascal's triangle? Explain. **(2 Marks)**

(d) Explain how to find the inverse of a function with the help of an example. **(3 Marks)**

Q6.

(a) How many ways are there to distribute 25 district items into 7 distinct boxes with:

i) At least three empty boxes.

ii) No empty box. **(2 Marks)**

(b) Explain properties of Set. **(2 Marks)**

(c) Three Sets A, B and C are: A = {1,7, 8, 9, 13, 15, 17}, B = { 1,2, 3, 4, 5, 6, 8, 9, 10 } and C {1, 2, 3, 5, 7, 9, 10, 11, 13}. Find A $\cup$ B $\cap$ C ; A $\cap$ ~B $\cup$ C; A $\cap$ B $\cup$ C and (A $\cap$ ~C).

(4 Marks)

(d) Explain circular permutation with an example**.** **(2 Marks)**

Q7.

(a) Compare predicate and proposition logic. **(2 Marks)**

(b) What is inductive logic? How is it used in problem-solving? Explain with an example. **(3 Marks)**

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

(d) Write the following statements in symbolic form: **(2 Marks)**

(i) Mr. Ravi is thin but healthy.

(ii) Either do not eat unhealthy food or be ready to visit the doctor.

Q8.

(a) Find the inverse of the following functions **(3 Marks)**

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

(b) What is a Boolean function? Explain with an example. **(2 Marks)**

(c) Show for an integer greater than zero $2^n >= n+1$ **(2 Marks)**

(d) Write the inverse and contrapositive for these sentences: **(3 Marks)**

(i) If it does not rain, then you will go to market.

(ii) If you are not honest, you are harmful to society.