

For Library Use

‘সম্মান মন্ত্র সন্মতি: সম্মানী’

UNIVERSITY OF NORTH BENGAL

B.Sc. Major 2nd Semester Examination, 2025

COMSMAJ203-COMPUTER SCIENCE**DISCRETE STRUCTURES**

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

*The figures in the margin indicate full marks.***GROUP-A****Answer any four of the following**

3×4 = 12

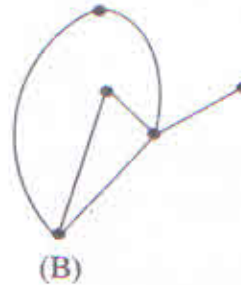
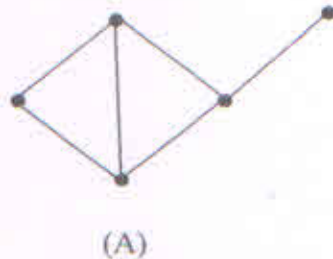
1. State the de Morgan's law and prove that using venn diagrams.
2. Find, how many different one to one functions are there from a set A with m elements to a set B with n elements.
3. State the master theorem for solving recurrence relation.
4. Define Big Omega (Ω) notation. Prove that $4n^2 + 2n + 1 = \Omega(n^2)$.
5. Define incidence and degree. Show that the number of vertices of odd degree in a graph is always even.
6. What is Hamiltonian path? Explain with example.

GROUP-B**Answer any four of the following**

6×4 = 24

7. (a) State the sum and product rule of counting theory.
(b) How many ways an organisation containing 26 members can elect a president, a vice president and a secretary?
8. (a) What do you mean by Reflexive, Symmetric and Transitive relations?
(b) Determine whether the following relation is reflexive, symmetric and transitive
 $R = \{(x, y) : y \text{ is divisible by } x\}$ where $x, y \in A = \{1, 2, 3, 4, 5, 6\}$.
9. State and explain well formed formula.
10. (a) Define paths and cycles in a graph.
(b) What do you mean by planar graph?

(c) Verify whether the following two graphs are isomorphic or not.



11.(a) What is tautology and contradiction?

(b) Prove the following:

$$(p \vee q) \wedge (p \vee \sim q) \equiv p$$

12. Use mathematical induction to prove:

$$1^2 + 2^2 + 3^2 + \dots + n^2 = \frac{n(n+1)(2n+1)}{6}$$

GROUP-C

Answer any *two* of the following

12×2 = 24

13. Discuss the significance of asymptotic notations. Explain Iteration method, substitution method and Recursion Tree method for solving recurrence relations.
14. Define spanning tree. What is rank and nullity? Discuss the Kruskal's algorithm for computing minimal spanning tree.
- 15.(a) State and explain pigeonhole principle.
- (b) In a survey of 300 people, 180 like Tea 150 like Coffee and 100 like Juice. Additionally 90 like both Tea Coffee, 60 like both Tea and Juice, 50 like both Coffee and Juice and 30 like all three. How many people like at least one of the beverages?
- (c) Using Mathematical induction principal show that $P(n) = \sum_{i=1}^n i = \frac{n(n+1)}{2}$.
16. Write short notes on the following:
- (a) Poset
- (b) Properties of binary tree
- (c) Euler path.

—x—



সমাজে ন-ক: সমিতি: সমাজী

UNIVERSITY OF NORTH BENGAL
B.Sc. Major 2nd Semester Examination, 2025

COMSMAJ204-COMPUTER SCIENCE
OBJECT ORIENTED PROGRAMMING USING JAVA

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

The figures in the margin indicate full marks.

GROUP-A

Answer any *four* of the following

3×4 = 12

1. Discuss about Java Byte Code.
2. Differentiate between entry controlled and exit controlled loops.
3. Predict the output:
(i) "COMPOSITION".substring(3, 6);
(ii) "LUCKNOW".substring(0, 4);
4. State the values of n and ch:

```
char c = 'A';  
int n = c + 1;  
char ch = (char)n;
```
5. Give the output of the following program segment and also mention how many times the loop will be executed.

```
int i;  
for(i = 5; i > 10; i++)  
{  
    System.out.println(i);  
}  
System.out.println(i*4);
```
6. Evaluate the expression when the value of x = 4.

```
x = (--x) + (x++) + x;
```

GROUP-B

Answer any *four* of the following

6×4 = 24

7. Discuss various kinds of constructors in Java.
8. Explain briefly about exception handling in Java.

9. What are interfaces? Write a program in Java to implement interface.
10. Discuss JVM, JDK.
11. How to create packages and use them in Java?
12. Briefly explain about applet life cycle.

GROUP-C

Answer any two of the following

12×2 = 24

13. Explain about various types of operators in Java.
14. Discuss various types of inheritance supported by Java.
15. Write a Java program to arrange the elements using bubble sort.
16. With an appropriate transition diagram discuss the complete life cycle of thread.

—x—



সমান্য মন্ত্র: সমিতি: সমানী

UNIVERSITY OF NORTH BENGAL

BCA Major 2nd Semester Examination, 2025

BCAPMAJ203-BACHELOR OF COMPUTER APPLICATION**DIGITAL ELECTRONICS**

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

*The figures in the margin indicate full marks.***GROUP-A****Answer any four of the following****3×4 = 12**

1. State the De-Morgan's law and prove it.
2. Implement the given function using NAND gates only:

$$F(x, y, z) = \sum m(0, 6)$$
3. How does a 2 bit comparator work?
4. Differentiate between combinational and sequential circuit.
5. Why D Flip-flop is known as Delay Flip-flop? Define forbidden state in S-R-Flip-flop.
6. Define toggle. What is race condition?

GROUP-B**Answer any four of the following****6×4 = 24**

7. (a) Determine the value of base x if $(211)_x = (152)_8$
 (b) Represent $(3452)_{10}$ in Excess-3 code.
 (c) Perform $(-50) - (-10)$ in binary using the signed -2's complement.
8. Simplify the Boolean expression using K-map

$$F(A, B, C, D) = \sum m(0, 2, 3, 8, 10, 11, 14) + d(7, 15)$$
9. Design and explain about Full adder.
10. Draw and explain the circuit diagram of 1×4 demultiplexer.
11. Draw the circuit diagram of ring counter.
12. (a) Analyze the differences between Latch and flip-flop.
 (b) Distinguish between synchronous and asynchronous counters.

GROUP-C

Answer any two of the following

12×2 = 24

- 13.(a) Which gates are called as the universal gates and why? Implement the basic gates using Universal gates.
- (b) Design a binary to Gray code converter circuit.
- 14.(a) Draw and explain the circuit diagram of Decimal to BCD Encoder.
- (b) Draw and explain the circuit diagram of 4 bit parallel adder cum subtractor circuit.
15. Discuss different types of shift registers.
16. Write a short note on the following:
 - (a) ASCII
 - (b) CMOS
 - (c) SOP and POS.

—x—



‘সমান্যে মন্ত্র: সমিতি: সমানী’

UNIVERSITY OF NORTH BENGAL

BCA Major 2nd Semester Examination, 2025

BCAPMAJ204-BACHELOR OF COMPUTER APPLICATION

JAVA PROGRAMMING

Time Allotted: 2 Hours 30 Minutes

Full Marks: 60

The figures in the margin indicate full marks.

GROUP-A

Answer any four questions

3×4 = 12

1. What is overriding?
2. Define Autoboxing.
3. What are wrapper classes?
4. What is the use of this keyword?
5. What are constructors?
6. What is garbage collection?

GROUP-B

Answer any four questions

6×4 = 24

7. Explain operator overloading with the help of an example.
8. Explain the features of JAVA Language.
9. Describe access control specifiers with example.
10. Explain different exception types in JAVA with the help of examples.
11. Write down different string handling methods.
12. What is an interface? Write the differences between an interface and a class.

GROUP-C

Answer any two questions

12×2 = 24

13. With an appropriate transition diagram discuss the complete life cycle of an applet.
14. Illustrate the iteration statements with suitable example.
15. What is inheritance? Write a java program to demonstrate the multilevel inheritance.
16. What is a package? How will you create and import package? Explain with the help of a program.

—x—



‘সামান্য মন্ত্র: সমিতি: সামান্য’

UNIVERSITY OF NORTH BENGAL

SEC 2nd Semester Examination, 2025

SEC - POOBSEC219-COMPUTER SCIENCE

HTML PROGRAMMING

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

Answer any *five* of the following

1×5 = 5

1. State the use of Line break tag in HTML.
2. What do you understand by hyperlink?
3. Why tag is used in HTML?
4. Write down the use TH, TR and TD tag.
5. Write down the use of and <p> tag.
6. What is the purpose of the <title> tag?
7. Which tag is used to create a numbered list?
8. How do you create a password input field?

GROUP-B

Answer any *three* of the following

5×3 = 15

9. Explain the structure of an HTML document.
10. Briefly describe various types of headings and paragraph available in HTML.
11. Explain the different types of form input fields in HTML with examples.
12. Differentiate between ordered lists, unordered lists and definition lists in HTML.
13. Explain the <table> tag in HTML.

Write down the html code to create the following table;

Item	Price
ABC	200
XYZ	180
PQR	220
MNO	300

GROUP-C

Answer any two of the following

10×2 = 20

14. Describe various HTML form elements and their usage with example.
15. Design a HTML page describing your CV.
16. By using HTML code, create the webpage as follows:
 - (a) Background colour: yellow
 - (b) Title of the page: My Department
 - (c) The logo of your department (From file logo.gif) is to be placed at the centre of the page
 - (d) Your department name is to be scrolled on the page from right to left.
17. Create a registration form using html that will contain every type of input field. (eg. dropdown, checkbox, textfield etc.)

—x—



সম্মান মন্ত্র: সন্নিহিত: সম্মানী

UNIVERSITY OF NORTH BENGAL

SEC 2nd Semester Examination, 2025

SEC - UBCASEC12002-BACHELOR OF COMPUTER APPLICATION

PROGRAMMING IN C

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

Answer any five questions

1×5 = 5

1. What is ternary operator?
2. Name one logical operator.
3. What is the significance of '&' symbol?
4. Which is not a valid C variable?
(i) avg (ii) fact (iii) # num (iv) Variable_num
5. What are the four storage classes used in C language?
6. What are keywords?
7. Mention four string handling functions.
8. A float variable occupies _____ byte in memory.

GROUP-B

Answer any three questions

5×3 = 15

9. Discuss casting of datatypes with the help of an example.
10. Differentiate between call by value and call by reference.
11. Explain the switch statement with program code.
12. Differentiate between structure and union. Give example.
13. Explain the multidimensional array with example.

GROUP-C

Answer any two questions

10×2 = 20

14. Explain different looping statements with example.
15. Write a C program to search an element from an array using binary search.
16. Explain the use of malloc(), calloc() and free() functions with the help of examples.
17. Write a C program to check whether a string is palindrome or not.

—x—



‘সম্মান মন্ডল সমিতি: সম্মানী’

UNIVERSITY OF NORTH BENGAL
SEC 2nd Semester Examination, 2025

SEC - UCMSSEC12002-COMPUTER SCIENCE

DIGITAL ELECTRONICS

Time Allotted: 2 Hours

Full Marks: 40

The figures in the margin indicate full marks.

GROUP-A

Answer any five questions

1×5 = 5

1. What are the different types of number system?
2. Expand the term BCD.
3. Draw the circuit diagram of NAND gate.
4. What is Venn diagram?
5. Define a full adder.
6. What do you mean by triggering of flip-flop?
7. What is a combinational circuit?
8. What is shift register?

GROUP-B

Answer any three questions

5×3 = 15

9. How a Boolean function can be represented in SOP standard format? Discuss with an example.
10. Simplify following function using K-MAP:

$$F(A, B, C, D) = \sum_m (0, 2, 5, 7, 8, 10, 13, 15)$$
11. Discuss a 8×1 multiplexer with proper diagram.
12. What do you mean by race around condition? How it can be overcome?
13. Write a short note on CMOS logic family.

GROUP-C

Answer any two questions

10×2 = 20

14. Discuss different types of number system with proper example.
15. Describe a J-K flip-flop with proper diagram and truth table. Implement AND, OR and NOT gate using NAND gate.
16. Discuss different logic family in brief.
17. Explain different laws of Boolean algebra.

—X—