FIRST YEAR HIGHER SECONDARY MODEL EXAMINATION, FEBRUARY 2025
ANSWER KEY
SUBJECT: COMPUTER SCIENCE

Part I (1 Mark Each)

1 Mark Questions (5×1=5)

1. **Name the logic gate that has only one input.**
   Answer: NOT gate.
2. **Which flowchart symbol has only entry flow?**
   Answer: Terminal symbol (oval shape).
3. **Mention the C++ arithmetic operator allowed only with integer data.**
   Answer: Modulus operator (%).
4. **Choose the correct output of the C++ code given below.**

```
int a = 8;
float b = a%5;
cout << b/2;
```

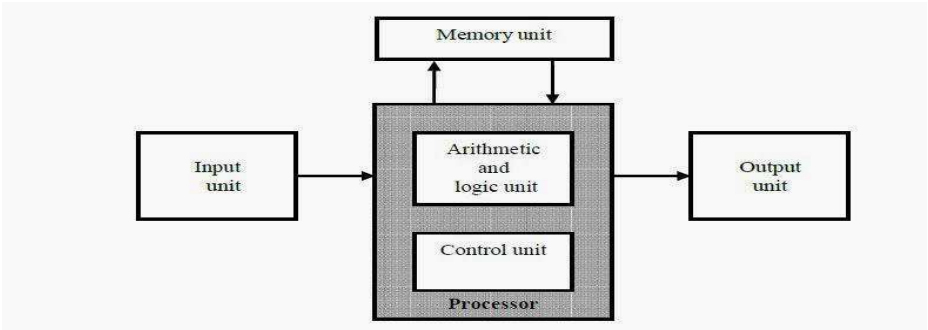
   Answer: c) 1.5
   Explanation: a%5 = 3 → b = 3.0 → b/2 = 1.5.

5. **The C++ array `int num[] = {12, 34, 23, 45, 67};` requires _____ bytes of memory.**
   Answer: 20 bytes (assuming 4 bytes per integer; 5 elements × 4 = 20).
6. **Give an example for Data Terminal Equipment used in computer networks.**
   Answer: Modem/multiplexer/demultiplexer.

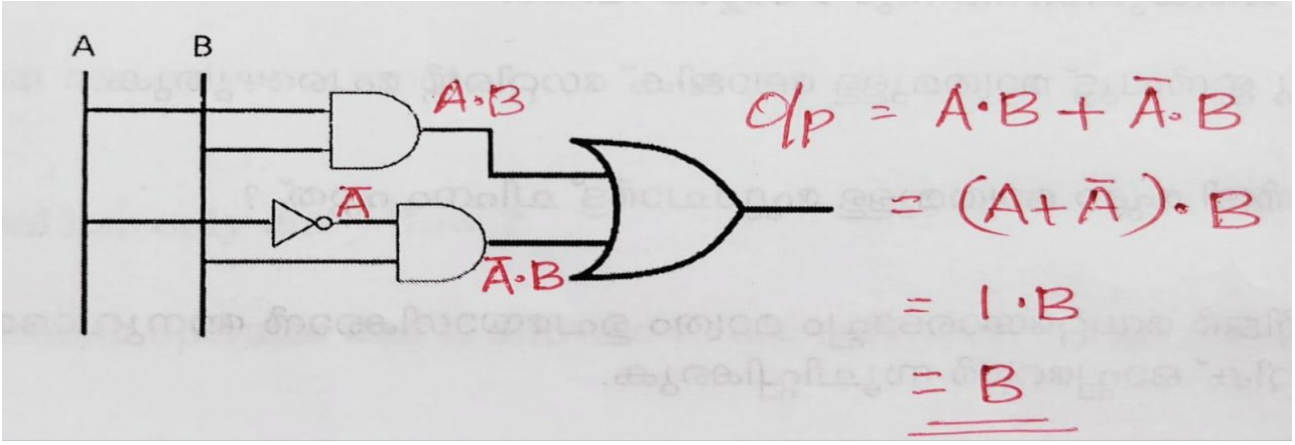
Part II (2 Marks Each)

2 Mark Questions (9×2=18)

7. **Draw the block diagram of Neumann's architecture of computer.**
   Answer:



8. **Briefly write down the concept of Turing test.**
   Answer:
   - Evaluates if a machine can mimic human intelligence.
   - A human interacts with a machine and another human blindly; if the machine is indistinguishable, it passes.
9. **Draw the given logic circuit and mark the outputs of each gate.**
   Answer:



10. **Distinguish between RAM and ROM.**
    Answer:
    - **RAM:** Volatile, read/write, temporary storage.
    - **ROM:** Non-volatile, read-only, permanent firmware storage.
11. **Prepare a short note on debugging.**
    Answer:

    Debugging: The process of identifying and correcting errors in a program.

    Types of Errors:
    1. Syntax errors
    2. Logical errors
    3. Runtime errors
12. **Predict the output of the following algorithm. You can assume any value as input.**

```
Step 1: Start
Step 2: Read A, B
Step 3: Print A, B
Step 4: A = A + B
Step 5: B = A - B
Step 6: A = A - B
Step 7: Print A, B
Step 8: Stop
```

    Answer:
    - Example input: A=5, B=3.
    - After swapping: Outputs 5,3 → then 3,5. (Values are swapped without a temporary variable).

13. **Explain the two data type conversions in C++.**
Answer:
    - **Implicit type conversion (type promotion):** This is done by the compiler and the conversion is from lower data type to higher. (e.g., int to float).
    - **Explicit type conversion (type casting):** This is done by the programmer explicitly and conversion can be to any data type. (e.g., (int) 3.14).
14. **Compare linear search method and binary search method used in arrays.**
Answer:

Linear search method	Binary search method
• The elements need not be in any order	• The elements should be in sorted order
• Takes more time for the process	• Takes very less time for the process
• May need to visit all the elements	• All the elements are never visited
• Suitable when the array is small	• Suitable when the array is large

15. What is the role of arguments in C++ functions? List out the two types of arguments.
Answer:

- **Role of arguments:**
    1. Arguments are used to pass data from the calling function to the called function.
    2. They allow functions to work with different input values, making functions reusable and flexible.
- **Two types of arguments:**
    1. **Actual arguments:** Values passed to the function during the function call.
    2. **Formal arguments:** Variables declared in the function definition to receive the values passed by the actual arguments.

16. Observe the following user-defined function in C++.

```
void fun (int a = 10, b = 5)
{
   return (a + b);
}
```

Identify the errors in this function and give reason for each.
Answer:

1. **Error 1:** The function is declared as `void`, but it tries to return a value (`return (a + b)`).
    - **Reason:** A `void` function cannot return any value.
2. **Error 2:** The parameter `b` is not given a data type.
    - **Reason:** Every parameter in a function must have a data type specified.

17. Write a short note on Bluetooth technology.
Answer:

1. **Definition:** Bluetooth is a wireless technology used for exchanging data over short distances (typically up to 10 meters).
2. **Purpose:** It is commonly used to connect devices like smartphones, headphones, speakers, and keyboards without cables.
3. **Frequency:** It operates in the 2.4 GHz ISM band and uses low-power radio waves.
4. **Advantages:** Easy to use, low power consumption, and widely supported by devices.
5. **Disadvantages:** Limited range and slower data transfer compared to Wi-Fi.

18. Prepare a list of hardware and software required for connecting to the Internet.
Answer:

1. A computer with network interface card
2. Modem
3. Telephone connection
4. An internet account given by an Internet service provider(ISP)
5. Software like Browser

Part III (3 Marks Each)

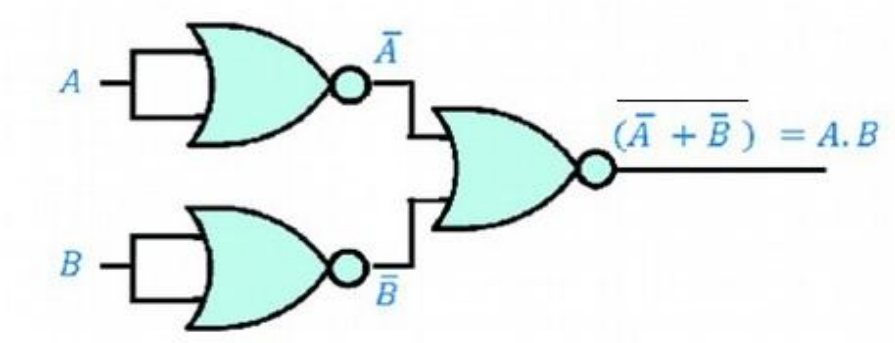
3 Mark Questions (9×3=27)

19. Convert the decimal number 79 into the other three number systems.
Answer:

- Binary: 1001111
- Octal: 117
- Hexadecimal: 4F.

20. Prove that Boolean AND operation can be implemented neither using only NOR gates.
Answer:

- NOR is universal.
- **A AND B = NOT(NOR(A, B)).**
- Implement using two NOR gates: **(A NOR A) NOR (B NOR B).**



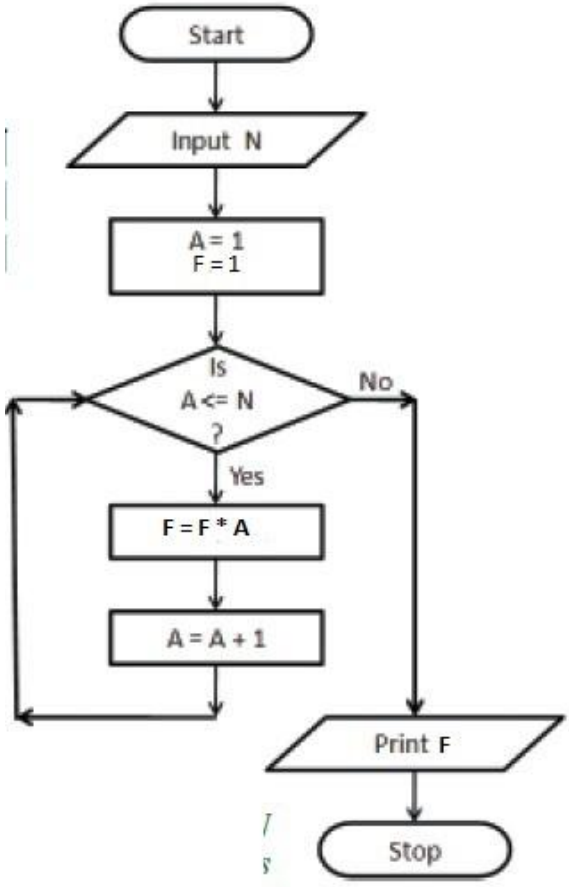
21. Explain the three types of language processors.

Answer:

- **Compiler:** Translates the entire source code in HLL into machine code at once. It generates an executable file that can be run independently.
- **Interpreter:** Translates and executes the HLL source code line by line. It does not generate an independent executable file.
- **Assembler:** Converts assembly code to machine code.

22. Draw a flowchart to input a number and find its factorial.

Answer:



23. Observe the following C++ code segment.

```
int a, b;
cout << "Enter two numbers";
cin >> a >> b;
cout << (a+b) / 2.0;
```

Extract different tokens from this code and fill in the proper cells of the table given below.

Keywords	Literals	Identifiers	Operators
int	"Enter two numbers", 2.0	a, b, , cout, cin	<<, >>, +, /

24. Read the following C++ code segment.

```
int a = 15, b = 10;
cout << a++ << '\t';
b += a;
cout << b%10 << '\t';
cout << ++b;
```

Write the output of this code with proper justification.

Answer: 15 6 27

Explanation:

- a++ prints 15 (post-increment), a becomes 16.
- b += a → b = 26 → 26%10 = 6.
- ++b increments to 27.

25. Write a C++ program to input a number and check whether it is odd or even. Use switch statement for the checking.

Answer:

```
#include <iostream>
using namespace std;
int main()
{
   int num;
   cin >> num;
   switch(num % 2)
{
      case 0: cout << "Even";
            break;
      default: cout << "Odd";
   }
   return 0;
}
```

26. Write an algorithm to sort the numbers in an array in ascending order using bubble sort method.

Answer:

1. **Start**
2. **Input**: Read the number of elements `N`
3. **Declare** an array `AR` of size `N`
4. **Input**: Read `N` elements into `AR`
5. **Perform Bubble Sort**:
6. **Repeat** for `I = 1` to `N-1`:
   Repeat for `J = 0` to `N-I-1`:
   If `AR[J] > AR[J+1]` **then**:
   Swap `AR[J]` and `AR[J+1]`
7. **Output**: Print the sorted array
8. **Stop**

27. **With the help of an example, explain the facilities provided by C++ to input strings containing white spaces.**

Answer:

1. cin.getline():

- Reads an entire line of text, including spaces, until the newline character (\n) is encountered.
- Example:

```
char str[20];
cin.getline(str, 20); // Reads up to 19 characters
cout << str;
```

- Input: Hello World → Output: Hello World.

2.cin.get():

- Similar to cin.getline(), but leaves the newline character in the input buffer.
- Example:

```
char str[20];
cin.get(str, 20); // Reads up to 19 characters
cout << str;
```

- Input: Hello World → Output: Hello World.

3. **gets():**
   - Reads a line of text, including spaces, but does not check array bounds (unsafe).
   - Example:

```
char str[20];
gets(str); // Reads a line of text
cout << str;
```

   - Input: Hello World → Output: Hello World.

4. **List out any three string manipulation functions in C++ and specify the use of each with the help of examples.**

   Answer:

   - strlen(): Returns length of a string (e.g., strlen("Hi") → 2).
   - strcpy(): Copy one string into another (e.g., strcpy(dest, src)).
   - strcat(): Concatenates two strings (e.g., strcat(s1, s2)).

5. **Social media plays an important role in human life. Present three arguments each in favour of and against its use.**

   Answer:

   advantages:

   1. Bring people together,
   2. Plan and organise events,
   3. Business promotion,
   4. Social skills

limitations:

1. Intrusion to privacy,
2. Addiction,
3. Spread rumours

Part IV (5 Marks Each)

5 Mark Questions (2×5=10)

6. **Suppose you want to purchase a computer. Prepare a list of hardware and software components that you require and give reason for including each item.**
   Answer:
   1. Hardware Components:

1. **Processor (CPU)** – The brain of the computer, responsible for processing tasks (e.g., Intel Core i5/i7).
2. **RAM (Memory)** – Ensures smooth multitasking; 8GB or 16GB is ideal.
3. **Storage (SSD/HDD)** – SSD for faster performance, HDD for larger storage.
4. **Monitor, Keyboard & Mouse** – Essential for display and input.

2. Software Components:

1. **Operating System (OS)** – Manages hardware and software (e.g., Windows, macOS, Linux).
2. **Antivirus Software** – Protects against viruses and cyber threats.
3. **Office Suite** – For productivity (e.g., Microsoft Office, Google Docs).
4. **Web Browser** – Required for internet access (e.g., Chrome, Firefox).
5. **Media & Development Software** – Used for editing, designing, and coding (e.g., Photoshop, Visual Studio).

7. **Read the following C++ code segment.**

```
for (n=125, s=0; n>0; n/=10)
   s = s + n%10;
cout << s;
```

a) Explain the execution steps of this code and find the output.
Answer:

- **Output: 8** (sum of digits: 1+2+5=8).
- **Steps:**
  - n=125 → s=0+5=5 → n=12
  - n=12 → s=5+2=7 → n=1
  - n=1 → s=7+1=8 → n=0 → loop ends.

b) Rewrite the above code using do – while statement.

Answer:

```
int n = 125, s = 0;
do {
   s =s+ n % 10;
   n /= 10;
} while (n > 0);
cout << s;
```

32. Two pairs of communication devices are given –

(i) hub and switch (ii) bridge and router.

a) Write the common purpose of devices in pair (i).

Answer: Both connect devices in a LAN (Local Area network).

b) Write the differences between the devices in pair (ii).

Answer:

Bridge:

- A bridge is a device used to segmentize a network.
- A network can be split into different segments and can be interconnected using a Bridge.
- This reduces the amount of traffic on a network.

Router:

- A router is a device that can interconnect two networks of the same type using the same protocol.
- It can find the optimal path for data packets to travel and reduce the amount of traffic on a network.

c) Specify the role of gateway in this context.

Answer:

- A gateway is a device that can interconnect two different networks having different protocols.
- It can translate one protocol to another.
- It can find the optimal path for packets to reach the destination.