

Name: _____ Roll No: _____ InvSign: _____

CS1109/CS1110 (Introduction to Computing)

MidSemExam 15th Sep 2025 2PM-4PM Total Marks:60

Write Precise Answers in the Space Provided. Use Answersheet for Rough Work

1. [1+1+2+2 Marks] Convert $(-126.75)_{10}$ to its

1.a) Equivalent binary number.

ANS: **-1111110.11**

1.b) Normalize binary number (exponential form).

ANS: **-1.11111011x2⁶**

1.c) Single Precision Floating Point Number (Exponents in Decimal or Binary)

Sign: **1** Exponent: **10000101** Mantissa: **1111 1011 0000 0000 0000 000**

Exponent Bias: $6+127=133 = (10000101)_2$

1.d) Double Precision Floating Point Number (Exponents in Decimal or Binary)

Sign: **1** Exponent: **10000000101** Mantissa: **1111 1011 0000 0000 0000 0000 0000 0000 0000 0000 0000 0000**

Exponent Bias: $6 + 1023 = 1029 = (10000000101)_2$

2. [2 Marks] Evaluate the following expressions using standard rule

a) In Integer Domain: $X=25/12*15*3+3*7+(11/10)^2+2$

ANS: **114**

b) In FP domain: $X= 25/12.0*15*3.0*15.3+3*7.2+(11.0/10)^2+2$

ANS: **1459.185**

3. [2 Marks] Write the upper and lower bounds of values of the Mantissa of a single Precision floating-point number.

ANS: Lower bound : **1.0000 0000 0000 0000 0000 000 = 1.0**

Upper Bound: **1.1111 1111 1111 1111 1111 1111 = 2-2⁻²³**

4. [3 Marks] Identify all the invalid function names and report why it is invalid for each one.

_for32 ✓ **#funname** ✗ **start with#** **3main** ✗ **start with 3**

square%fun ✗ **have %** **cos_v2** ✓ **while** ✗ **Keyword**

5. [1 Mark] Write the name of a popular free open-source C compiler used to compile the C Code.

ANS: **GCC / gcc**

6. [1 Mark] Write equivalent if-else statement for the following code

ODD= n%2 ? 1 :0; ANS: **if (n%2 ==1) ODD =1; else ODD=0;**

11. [2 Marks] What will be the issue if we forget to put & in the scanf function?

```
int A;  
scanf("%d", A);
```

During Compilation :

During Runtime:

ANS: Compilation Warning, but compile Runtime: Segmentation Fault core dumped, error

Compile Time warning: format '%d' expects argument of type 'int *', but argument 2 has type 'int'

12. [2 marks] What will be the output of this code snippet?

```
printf("%d %d %d %d", sizeof(int*), sizeof(float *), sizeof(char*), sizeof(void *));
```

ANS: 8 8 8 8

All value will be same, as all are addresses

13. [3 Marks] Given the following code. What set of values of N, the value of X gets evaluated to 1, where N is a 32-bit unsigned integer.

```
X = !(N && N-1); //This is not bitwise AND, but Simple AND
```

```
X = X && (N && 0x88888888);
```

ANS: 1st Statement : if N=0 and N=1 result X=1 otherwise X=0

2nd Statement: if N=0; 1 && (0&& 0x88888888)=1 && 0 =0

if N=1; 1 && (1&& 0x88888888)=1 && 1 =1

Final Answer is when N=1 value of X=1

AND operation: (Non-zero && Non-Zero) \Rightarrow 1

14. [4 Marks] Write the loop invariant properties and loop bound function of the following C code, which calculates the factorial of N.

```
int F=1, n=1;  
while(n<=N) F *= n++;
```

ANS: Loop Invariant properties: true before entering loop, in each iteration and after the iteration it is true.

Properties are "F store factorial current value of n" or "F store product from 1.2.3. Upto n".

Loop Bound Function: Decreased every iteration and loop terminate when LBF=0, so LBF is LBF= N-n+1

15. [2 Marks] Identify the range of values to be printed by the following for loops. You can use dot (...)

```
for (i=1; i<=N; i=i*2) printf("%d ", i); ANS : [1, 2, 4, 8, ..., 2floor(log2 N)]
```

```
for (i=1; i<=N; ++i) printf("%d ", i); ANS: [1, 2, 3, ..., N]
```

16. [2 Marks] Declare an integer array of size 10 and initialize the first five elements to 1.

ANS : int A[10]={1,1,1,1,1};

17. [2 Marks] What will be the output of the following code snippet

```
int A[10][20], i, j, *P;  
for(i=0; i<10; i++)  
for(j=0; j <20; j++) A[i][j]=i*10+j;  
P=A+10; //Error may arise, P=(int*) A+10; is correct one  
printf("%d", *(P+49));
```

ANS: *(P+49) = *(A+10+49)=*(A+59)=

A[59/20][59%20] = A[2][19]; which store i*10+j= 2*10+19=39 ANS:39

18. [3 Marks] Write a small C code to reverse a string of size 40 bytes, without using an additional character array. You can use additional one-character storage and as many index variables i, j, and k. The last character of the string is '\0'.

```
char Str[40]="I am a registered student of CS1109/1110"; //Some says 41 chars OK
int start=0; end=39; char Tmp;
while(start<end){
    Tmp=Str[start]; Str[start]=Str[end]; Str[end]=Tmp;
    start=start+1; end=end-1;
}
printf("%s\n", Str); //Should print reversed string
```

19. [2 Marks] What will be the output of the following code snippet

```
int A[10]={1,4,4, 20,1,2,4,6,10, 20}, *p, *q;
q=A; p=&A[3];
printf("%d", q-p); // ANS = -3
```

20. [3 Marks] Write six benefits of using functions in a C program. [use only words, not sentences]

ANS: Any six of "Modular, Testable, Readable, Debuggable, Managable, Code Reusability, Reduced Program Size"

21. [2 Marks] What is the meaning of the signature of a function in a C Program?

ANS: A function signature consists of (a) Function Name, (b) parameter list : the number, order, and data types of the parameters that the function expects to receive and (c) return type of function.

22. [2 Marks] What will be result of gcc compilation the following code

```
#include<stdio.h>
int main(){
    printMSG("Hi\n");
    return 0;
}
void printMSG(char *m){ printf("%s", m);}
ANS: Compilation error: printMSG is not defined before use
```

23. [2 Marks] What are the rules of function declaration, function call, and function definition in terms of function parameters, return type, and the name of the function in C programming?

ANS1: Online: Function signature should match in Declaration, Call/Invocation and Definition

ANS2: For all function, In the Declaration, Call and Definition all the function name, return type should match and all the parameter lists types should match in one to one order

24. [3 Marks] Which area these variables get mapped in Memory Layout?

```
int A=20; //
void myfun(){
    int A=50; //
    int *p; //
}
```

ANS: global A=20 mapped to DATA Segment/Area
Local A=50 mapped to Stack Segment/Area
P Mapped to stack Segment/Area