1. Basics

What will be the output of the following code?

```
#include <stdio.h>
int main() {
    int a = 5 / 2;
    printf("%d", a);
    return 0;
}
```

1. a) 2.5
   b) 2
   c) Compiler error
   d) Undefined behavior

2. Which of the following is not a valid C keyword?
   a) volatile
   b) inline
   c) typeof
   d) restrict
3. Which of the following is true about macros in C?
   a) They can accept arguments.
   b) They are processed during runtime.
   c) They are type-checked.
   d) All of the above.

   What will the following code output?

```
#include <stdio.h>
int main() {
    printf("%d", sizeof('A'));
    return 0;
}
```

4. a) 1
   b) 2
   c) 4
   d) Compiler error

What is the output of the following code?

```
#include <stdio.h>
int main() {
    int a = 10, b = 20;
    printf("%d %d", a++, ++b);
    return 0;
}
```

5. a) 10 20
   b) 11 21
   c) 10 21
   d) Undefined behavior

---

2. Functions

6. What is the purpose of a function prototype in C?
   a) To define a function
   b) To declare a function
   c) To execute a function
   d) None of the above

7. Can a function in C return multiple values?
   a) Yes, using a structure
   b) Yes, using pointers
   c) No
   d) Both a and b

   What will the following code output?

```
#include <stdio.h>
void increment(int x) {
    x++;
}
int main() {
    int a = 5;
    increment(a);
    printf("%d", a);
    return 0;
}
```

8. a) 5
   b) 6
   c) Undefined
   d) Compiler error

9. Which of the following function declarations is invalid?
   a) void myFunc();
   b) int myFunc(int x, int y = 10);
   c) float myFunc(float x);
   d) int myFunc(...);

   What is the output of the following recursive function?

```c
#include <stdio.h>
int mystery(int n) {
    if (n <= 0) return 1;
    return n * mystery(n - 2);
}
int main() {
    printf("%d", mystery(5));
    return 0;
}
```

10. a) 15
    b) 75
    c) 1
    d) Undefined

---

3. Arrays

11. How is a 2D array stored in memory in C?
    a) Column-major order
    b) Row-major order
    c) Both a and b
    d) None of the above

    What will the following code output?

```c
#include <stdio.h>
int main() {
```

```
    int arr[3] = {1, 2, 3};
    printf("%d", arr[4]);
    return 0;
}
```

12. a) 0
    b) 3
    c) Garbage value
    d) Compiler error

13. Which of the following is true about passing arrays to functions?
    a) Arrays are passed by value.
    b) Arrays are passed by reference.
    c) Only the first element is passed.
    d) None of the above.

14. What is the purpose of `sizeof(arr) / sizeof(arr[0])` for an array `arr[]`?
    a) To calculate the length of the array
    b) To calculate the size of each element
    c) To find the total memory allocated
    d) None of the above

15. Which of the following correctly initializes a 2D array?
    a) `int arr[2][2] = {{1, 2}, {3, 4}};`
    b) `int arr[2][2] = {1, 2, 3, 4};`
    c) Both a and b
    d) None of the above

---

4. Pointers

What does the following code output?

```
#include <stdio.h>
int main() {
    int x = 10;
    int *ptr = &x;
    printf("%d", *ptr);
    return 0;
```

```
}
```

16. a) 10
    b) Address of x
    c) Undefined
    d) Compiler error

17. What is pointer arithmetic?
    a) Adding two pointers
    b) Performing arithmetic on a single pointer
    c) Both a and b
    d) None of the above

    What will the following code output?

```
#include <stdio.h>
int main() {
    int arr[] = {1, 2, 3};
    printf("%d", *(arr + 1));
    return 0;
}
```

18. a) 1
    b) 2
    c) 3
    d) Compiler error

19. What happens when you call `free()` on a NULL pointer?
    a) Memory leak
    b) No action
    c) Program crash
    d) Undefined behavior

20. What does `calloc()` do that `malloc()` does not?
    a) Initializes memory to zero
    b) Allocates less memory
    c) Is faster
    d) None of the above

---

5. Memory Allocation

21. Which library is required for dynamic memory allocation?
    a) stdio.h
    b) stdlib.h
    c) string.h
    d) math.h

22. What is returned by `malloc()` on failure?
    a) -1
    b) NULL
    c) Garbage value
    d) Compiler error

    What will the following code output?

```
#include <stdio.h>
#include <stdlib.h>
int main() {
    int *ptr = malloc(0);
    if (ptr) printf("Allocated");
    else printf("Not Allocated");
    return 0;
}
```

23. a) Allocated
    b) Not Allocated
    c) Undefined behavior
    d) Compiler error

24. Which function reallocates memory to a larger or smaller size?
    a) realloc()
    b) malloc()
    c) calloc()
    d) free()

25. What is the size of memory allocated by `int *ptr = malloc(sizeof(int) * 5);`?
    a) 5 bytes
    b) 10 bytes
    c) 20 bytes (on a 4-byte int system)
    d) None of the above

---

6. File Handling

26. Which function is used to open a file in C?
    a) fopen()
    b) open()
    c) create()
    d) None of the above
27. What is the purpose of the "w" mode in `fopen()`?
    a) Read
    b) Write
    c) Append
    d) Read and write
28. What does `ftell()` return?
    a) Current position of the file pointer
    b) Size of the file
    c) File name
    d) None of the above
29. What happens when `fclose()` is called on an already closed file?
    a) Undefined behavior
    b) Program crash
    c) No action
    d) Compiler error
30. Which of the following is not a file handling function?
    a) fseek()
    b) fprintf()
    c) fread()
    d) None of the above

---

7. Image Processing (LodePNG)

31. Which format does LodePNG primarily handle?
    a) JPEG
    b) PNG

c) BMP
d) TIFF

32. What does the alpha channel in a PNG image represent?
    a) Red intensity
    b) Transparency
    c) Contrast
    d) Brightness
33. Which function is used to decode a PNG file with LodePNG?
    a) lodepng_decode32()
    b) lodepng_load()
    c) png_decode()
    d) lodepng_read()
34. What is the purpose of converting an image to grayscale?
    a) Reduce file size
    b) Remove transparency
    c) Simplify processing
    d) Increase color depth
35. Which of the following is true about histogram equalization in image processing?
    a) Enhances image contrast
    b) Converts image to binary
    c) Removes noise
    d) Resizes the image

36. Basics

What will the output of the following code be?

```
#include <stdio.h>
int main() {
    int x = 0;
    if (x = 5) {
        printf("True");
    } else {
        printf("False");
    }
    return 0;
}
```

a) True
b) False
c) Compiler error
d) Undefined behavior

---

37. Functions

Which of the following statements about inline functions in C is true?
a) They must always be defined before use.
b) They reduce function call overhead.
c) They are evaluated at runtime.
d) They cannot contain loops.

---

38. Arrays

What is the output of the following code?

```
#include <stdio.h>
int main() {
    int arr[] = {10, 20, 30};
    int *p = arr;
    printf("%d", *(p + 1));
    return 0;
}
```

a) 10
b) 20
c) 30
d) Compiler error

---

39. Pointers

Which of the following is not valid for a void pointer?
a) It can store the address of any data type.
b) It can be dereferenced without a cast.
c) It can be used for dynamic memory allocation.
d) It must be typecast before dereferencing.

---

40. Memory Allocation

What will happen if `free()` is called twice on the same pointer?
a) Memory is deallocated twice.
b) Memory leak occurs.
c) Undefined behavior.
d) No action is taken.

---

41. File Handling

Which of the following is used to read a single line from a file?
a) fgetc()
b) fgets()
c) fread()
d) fscanf()

---

42. Image Processing

Which of the following accurately describes a pixel in an image?
a) A single color intensity value.
b) A 3D coordinate.
c) A data point with RGBA or grayscale values.
d) None of the above.

---

43. Basics

Which of the following is not a valid format specifier in C?
a) %lf
b) %ld
c) %hf
d) %c

---

44. Functions

What will the output of the following code be?

```
#include <stdio.h>
```

```
void swap(int a, int b) {
    int temp = a;
    a = b;
    b = temp;
}
int main() {
    int x = 10, y = 20;
    swap(x, y);
    printf("%d %d", x, y);
    return 0;
}
```

a) 10 20
b) 20 10
c) Undefined behavior
d) Compiler error

---

45. Arrays

Which of the following is the correct way to declare a dynamic array in C?
a) `int arr[10];`
b) `int *arr = malloc(10);`
c) `int *arr = malloc(10 * sizeof(int));`
d) `int arr[] = {0};`

---

46. Pointers

What does the following code output?

```
#include <stdio.h>
int main() {
    int x = 10;
    int *p = &x;
    int **pp = &p;
    printf("%d", **pp);
    return 0;
```

```
}
```

a) 10
b) Address of p
c) Address of x
d) Compiler error

---

47. Memory Allocation

Which function is used to copy a block of memory in C?
a) memcpy()
b) memmove()
c) strcpy()
d) Both a and b

---

48. File Handling

What does the `rewind()` function do in C?
a) Moves the file pointer to the end of the file.
b) Moves the file pointer to the beginning of the file.
c) Clears the file buffer.
d) Resets file permissions.

---

49. Image Processing

What is the result of downscaling an image in C using LodePNG?
a) Reduced file size with potential quality loss.
b) Increased file size and reduced clarity.
c) Both file size and quality remain unchanged.
d) The image becomes grayscale.

---

50. Mixed Concepts

What will be the output of the following code?

```
#include <stdio.h>
int main() {
```

```
    int arr[] = {1, 2, 3, 4};
    printf("%d %d", arr[2], *(arr + 2));
    return 0;
}
```

a) 2 2
b) 3 3
c) 3 4
d) Compiler error