Mock Exam 3: Arrays, Structs, and Style

Time Limit: 1 hour
Total Marks: 100

Section A: Multiple Choice Questions (30 marks)

Choose the best answer for each question. 2 marks each.

Question 1: How do you declare an array of 5 integers in C? a) `array int[5] numbers;` b) `int numbers[5];` c) `int[5] numbers;` d) `numbers[5] int;`

Question 2: What is the index of the first element in a C array? a) 1 b) 0 c) -1 d) Depends on declaration

Question 3: What will this code print?

```
int arr[4] = {10, 20, 30, 40};
printf("%d", arr[2]);
```

a) 20 b) 30 c) 2 d) Error

Question 4: Which is the correct way to initialize an array? a) `int arr[3] = {1, 2, 3, 4};` b) `int arr[3] = {1, 2, 3};` c) `int arr[] = {1, 2, 3, 4, 5, 6};` d) Both b and c are correct

Question 5: What makes code "readable"? a) Short variable names b) No comments c) Meaningful variable names and proper indentation d) Long lines of code

Question 6: Which variable name follows good style? a) `x` b) `student_count` c) `a1` d) `var`

Question 7: How do you access a member of a struct? a) `student->name` b) `student.name` c) `student[name]` d) `student::name`

Question 8: What will this loop print?

```
int nums[3] = {5, 10, 15};
for (int i = 0; i < 3; i++) {
    printf("%d ", nums[i]);
}
```

a) 5 10 15 b) 0 1 2 c) 15 10 5 d) 1 2 3

Question 9: Which is NOT a good programming style practice? a) Using meaningful variable names b) Proper indentation c) Writing long, complex expressions d) Adding helpful comments

Question 10: How do you declare a struct in C? a) `struct student { int id; char name[20]; };` b) `Student { int id; char name[20]; }` c) `struct { int id; char name[20]; } student;`

d) `class student { int id; char name[20]; };`

Question 11: What happens when you pass an array to a function? a) The entire array is copied b) Only the first element is passed c) The array's address is passed d) Nothing happens

Question 12: Which is the correct way to iterate through an array? a) `for (int i = 1; i <= size; i++)` b) `for (int i = 0; i < size; i++)` c) `for (int i = 0; i <= size; i++)` d) `for (int i = size; i > 0; i--)`

Question 13: What does `arr[0]` represent? a) The size of the array b) The first element of the array c) The last element of the array d) The address of the array

Question 14: Which comment style is better? a) `x = x + 1; // increment x` b) `student_count++; // add one more student to our count` c) `// add 1` followed by `x++;` d) No comments needed

Question 15: How do you create an array of structs? a) `struct student class[30];` b) `student struct[30] class;` c) `array struct student[30];` d) `struct[30] student class;`

Section B: Code Sorting and Completion (30 marks)

Question 16: Rearrange Code (10 marks) Arrange these lines to create a working function that finds the maximum value in an array:

```
A. int max = array[0];
B. int find_max(int array[], int size) {
C. return max;
D. for (int i = 1; i < size; i++) {
E. if (array[i] > max) {
F. }
G. max = array[i];
H. }
I. }
```

Write the correct order: _____

Question 17: Complete the Struct (10 marks) Complete this code to create and use a student struct:

```c
struct _________ {
    int id;
    char name[_________];
    double _________;
};

int main(void) {
    struct student s1;
    s1._________ = 12345;
    strcpy(s1._________, "Alice");
    s1.gpa = 3.8;
```

```
    printf("Student: %s, ID: %d, GPA: %.1lf\n",
           s1._________, s1._________, s1._________);
    return 0;
}
```

Question 18: Fix the Style (10 marks) Rewrite this code with proper style:

```
int x,y,z;if(x>y){z=x;}else{z=y;}printf("max is %d",z);
```

Your improved version:

```
// Write your improved version here
```

Section C: Write Complete Programs (40 marks)

Question 19: Grade Calculator (20 marks) Write a complete program that:

- Creates an array to store 5 student grades
- Prompts the user to enter all 5 grades
- Calculates and displays the average grade
- Finds and displays the highest grade
- Uses proper variable names and formatting

Include these functions:

- `calculate_average(int grades[], int size)` - returns the average
- `find_maximum(int grades[], int size)` - returns the highest grade

Question 20: Student Database (20 marks) Write a program that manages student information using structs:

Create a struct called `student` with:

- `id` (integer)
- `name` (string up to 30 characters)
- `age` (integer)
- `gpa` (double)

Write a program that:

- Creates an array of 3 students
- Fills in the information for each student by prompting the user

- Displays all student information in a neat format
- Finds and displays the student with the highest GPA

Example output:

```
=== Student Database ===
Student 1: John (ID: 101, Age: 20, GPA: 3.5)
Student 2: Mary (ID: 102, Age: 19, GPA: 3.8)
Student 3: Bob (ID: 103, Age: 21, GPA: 3.2)

Highest GPA: Mary with 3.8
```

Answer Template

Section B Solutions:

Question 16 - Correct Order:

```
Line order: _____________________________________
```

Question 17 - Complete the Struct:

```
// Write your completed code here
```

Question 18 - Fixed Style:

```
// Write your improved code here
```

Section C Solutions:

Question 19 - Grade Calculator:

```
// Write your complete program here
```

Question 20 - Student Database:

```
// Write your complete program here
```

Marking Rubric

- **MCQ (30 marks):** 2 marks per correct answer
- **Code Sorting/Completion (30 marks):** 10 marks per question
  - Correct logic: 7 marks
  - Proper syntax: 3 marks
- **Complete Programs (40 marks):** 20 marks each
  - Correct struct/array usage: 8 marks
  - Proper function implementation: 8 marks
  - Good style and formatting: 4 marks

Tips for Success:

- Use meaningful variable names
- Indent your code properly
- Check array bounds carefully
- Remember that arrays start at index 0
- Test your logic with sample values