Adv C Module

1. MCQ

1. Which is a valid C expression?
    a. int my_num = 100000;
    b. int my_num = 100,000;
    c. int my_num = 1000;
    d. int $my_num = 10000;
2. What would be the output of the following program?

```
main()
{
        printf("he\
        nllo");
}
```

    a. he (in the next line) llo
    b. hello
    c. None
    d. henllo
3. Given the following statement enum day = { jan = 1, feb = 4, april, may } What is the value of may?
    a. 4
    b. 6
    c. 5
    d. 11
4. What will be the output of the following C code?

```
#include <stdio.h>
void main()
{
        int x = 1, z = 3;
        int y = x << 3;
        printf("%d\n", y);
}
```

    a. -2147483648
    b. -1
    c. Run time error

d. 8

5. What would be the output of the following program, if the array begins at address 65486?

```
main()
{
        Int arr[ ] = {2, 4, 5, 1, 6};
        printf("%u %u", arr + 1, &arr + 1);
}
```

   a. None of the below
   b. 65488, 65496
   c. 2, 65488
   d. 65488, some garbage

6. Consider the following program

```
void main()
{
        union {
                struct {
                        char c[2];
                        char ch[2];
                        }s;
                struct {
                        int i;
                        int j;
                        }st;
                }u = {12, 1};
                printf("%d %d", u.st.i, u.st.j);
}
```

   Output for this program is:

   a. 12 1
   b. 12 0
   c. 268 0
   d. 0 268

7. Consider the following program.

```
void func1(int *a, int *b, int c)
{
        b = a + c;
}
```

```
main()
{
        int a, b;
        a = 10;
        b = 12;
        func1(&a, &b, a + b);
        printf("%d, %d", a, b);
}
```

The output is:

a. 10, 10
b. 10, 32
c. 10, 12
d. None of the above

8. What will be the output of the following C code?

```
#include <stdio.h>
int main()
{
        if( 7 & 8 )
                printf("Honesty");
                if(~7 & 0x000f) == 8)
                printf("is the best policy\n");
}
```

a. Honesty is the best policy
b. is the best policy
c. Honesty
d. No output

9. Consider the following program

```
Void main()
{
        Int j;
        Unsigned int i = 15;
        J = 0;
        while(j<16)
                printf("%d", (i << j++ & 0x8000)? 1:0);
}
```

Output for this program is:

a. 0000000000001111

b. 1111000000000000
c. 0000000000000000
d. 1111111111111111

10. The redirection operators > and >>
    a. Do the same function
    b. Differ: > is used for input while >> is used for output
    c. Differ: > overwrites, while >> appends
    d. Differ: > write to any file while >> write only to standard output

11. Consider the following program:

```
int counter(int i)
{
        static int count = 0;
        count = count + i;
        return (count);
}
main()
{
        int i, j;
        for(i = 0; i <= 5; i++)
                j = counter(i);
}
```

The value of j at the end of the execution of this program is:
    a. 15
    b. 10
    c. 6
    d. 7

12. Consider the following program:

```
void f1(int *, int);
void f2(int *, int);
void(*p[2]) (int *, int);
main()
{
        int a ;
        int b;
        p[0] = f1;
```

```
p[1] = f2;
a = 3 ;
b = 5;
p[0](&a, b);
printf("%d\t %d\t",, a ,b);
p[1](&a, b);
printf("%d\t %d\t" , a ,b);
}
void f1( int* p, int q)
{
        int tmp ;
        tmp = *p;
        *p = q;
        q = tmp;
}
void f2(int* p, int q)
{
        int tmp;
        tmp = *p;
        *p = q;
        q = tmp;
}
```

The output for this program is:

a. 3 5 3 5
b. 5 5 5 5
c. 5 3 5 3
d. 3 3 3 3

13. What is the out put of the following program

```
main()
{
        char *p = "GOOD";
        char a[ ] = "GOOD";
        printf("\n%d, %d, %d", sizeof(p), sizeof(*p), strlen(p));
        printf(" %d, %d", sizeof(a), strlen(a));
}
```

a. 4, 4, 5, 4, 4
b. 5, 1, 5, 4, 5

c. 4, 1, 4, 5, 4
d. 4, 1, 5, 5, 5

14. What is the output of following program

```
int DIM(int array [ ])
{
        return sizeof(array)/sizeof(int);
}
main()
{
        int arr[10];
        printf("Array diamension is %d", DIM(arr));
}
```

a. Array dimension is 5
b. Array dimension is 1
c. Array dimension is 10
d. Array dimension is 2

15. What will be the output of the following C code?

```
#include <stdio.h>
int main()
{
        int a = 10;
        double b = 5.6;
        int c;
        c = a + b;
        printf("%d", c);
}
```

a. 15
b. 16
c. 15.6
d. 10

2. Subjective

2.1 Basic Refreshers

1. What is an Inline function?
2. What is the size of the pointer?
3. What is the size of a Void pointer, a null pointer, a char pointer, and an int pointer?

4. Why are we using stdio.h.

2.2 1D Pointers and Functions

1. Explain the pointer with an example

2.3 String

1. Explain the difference between a string and a char array.
2. Explain how you will find the string and char array.

2.5 Storage classes and memory segments

1. What is the use of the extern keyword?

2.6 2D Pointers and DMA

1. What is the size of a void pointer and a null pointer?
2. Are *ptr++ and ++*ptr the same?

2.7 Preprocessing

1. Explain the compilation stages.

2.8 UDT

1. What is the starting value of an enum?
2. What is typedef?
3. What are macros?
4. What is the difference between a structure and a union?

2.9 Miscellaneous

1. Explain the volatile and const keywords.

2.10 FILE I/O

1. Explain fopen, fread, and fwrite in detail.

3. Programming

1. WAP to print the product of each distinct element and its frequency in the order of their first occurrence.

   E.g

   Input: 1 2 3 3 3 4 4 2 2
   Output: 1 2 9 8 4

2. WAP to print the frequency of each distinct element in the order of their first occurrence.

   E.g

   Input: 1 2 2 3 3 3 4 5 5
   Output: 1 2 3 1 2

3. WAP to print the frequency of each distinct character in the order of their first occurrence.

   E.g.

   Input: aabbbccccad
   Output: 23411

4. Write a program to remove a given substring from the main string and replace it with a specified replacement string.

   E.g.

   Main string: "hellohihello"
   Substring: "hi"
   Input string: " bye"
   Output: "hellobyehello”

5. WAP to remove the duplicate elements in a given array.

   E.g.

   Input: 1 2 2 3 3 5 1 5 8
   Output: 1 2 3 5 8

MC Module

1. MCQ

1. Which component is commonly used to store energy temporarily in an electrical circuit?
   a. Resistor
   b. Capacitor
   c. Diode
   d. Transistor
2. In a simple RC low-pass filter, what is its primary function?
   a. Pass high frequencies and block low frequencies
   b. Pass low frequencies and block high frequencies
   c. Amplify signals at all frequencies
   d. Convert AC to DC
3. A potentiometer is mainly used as:
   a. A fixed resistor
   b. A variable resistor to adjust voltage levels
   c. Switch

    d. An oscillator
4. A microcontroller typically differs from a microprocessor because it:
    a. Uses only external memory
    b. Integrates memory and peripherals on-chip
    c. Requires a separate clock generator
    d. It is designed solely for high-speed computations
5. Interrupts in a microcontroller are used to:
    a. Force the immediate execution of a routine on an event
    b. Increase power consumption
    c. Slow down processing speed
    d. Handle only background tasks
6. The bootloader in an embedded system is primarily responsible for
    a. Debugging the application at time
    b. Initialising hardware and loading the main firmware
    c. Managing the power supply
    d. Handling interface tasks
7. Compared with an 8-bit microcontroller, a 16-bit microcontroller:
    a. Has a smaller addressable memory space
    b. Processes 16 bits at a time, potentially increasing efficiency
    c. Consumes significantly less power
    d. Provides fewer peripheral interfaces
8. In SPI, which signal line is used by the master to send data to a slave?
    a. MOSI
    b. MISO
    c. SCK
    d. SS
9. In serial communication, the term baud rate refers to:
    a. The number of bits transmitted per second
    b. The number of symbols transmitted per second
    c. The duration of each transmitted bit

    d. The voltage level of the transmission
10. Which memory type provides the fastest access in a computer system?
    a. Hard-disk drive
    b. Main memory (RAM)
    c. Cache memory
    d. Flash memory
11. The primary purpose of an Interrupt Service Routine (ISR) in an embedded system is to:
    a. Perform routine background computations
    b. Handle asynchronous events as they occur
    c. Manage long-term data storage
    d. Generate system clocks
12. Code portability in embedded systems implies that the code:
    a. Runs only on one specific hardware platform
    b. Can be reused across different platforms with minimal changes
    c. Requires rewriting for each new project
    d. Is written exclusively in assembly language

2. Basic electronics

1. Explain the rectifier.
2. Explain the inductor.
3. What is RISC and CISC?

3. Basics

1. What are the key features of PIC microcontrollers?
2. Does the microcontroller board have a LAN port?

4. Interrupts

1. What are the specifications of the PIC18F4580 (such as how many bits, etc.)?
2. Difference between a microprocessor and a microcontroller.

5. Projects

1. Explain Car black box project.

6. ADC

1. Explain ADC in detail.

7. Embedded Systems

1. What does mean embedded system?

8. Protocols

1. What are the pins involved in the UART protocol?
2. What are the pins involved in the SPI protocol?
3. Is UART asynchronous or synchronous?
4. Explain the I2C protocol and the UART protocol
5. Modes of communication.
6. What is the difference between SPI and I²C protocols?
7. What is data arbitration?

9. PWM

1. Explain the PWM in detail.

CPP Module

1. A class that is designed only to act as a base class but not used to create objects is known as a _____ class.
    a. Inherited class.
    b. Base class.
    c. Abstract class.
    d. Virtual class
2. When is the Virtual Table created?
    a. Every Class has a VTable.
    b. When Class inherits from another Class.
    c. Class has at least one Virtual Function.
    d. When a Class Overrides the function of the Base class.
3. Which of the following is not a member of the class?
    a. Friend function
    b. Static function
    c. Const function

d. Virtual function

4. What will be the output of the following CPP code?

```
#include <iostream>
using namespace std;
class Test
{
        static int x;
        public:
                Test() {x++;}
                static int getX() {return x;)
};
int Test:: x = 0;
int main()
{
        cout<< Test::getX() << “ ";
        Test t[5];
        cout << Test::getX();
}
```

   a. 0 5
   b. 0 0
   c. 5 5
   d. Compiler error

5. What will be the output of the following CPP code?

```
#include <iostream>
#include <exception>
using namespace std;
int main (
{
        try
        {
                int* myarray = new int[1000];
                cout << "allocated";
        }
        catch (exception& e)
        {
```

```
            cout << "Standard exception: "<<e.what() << endl;
        }
        return 0;
}
```

a. Allocated
b. Standard exception
c. Depends on the memory
d. Compilation error

6. What will be the output of the following CPP code?

```
#include <iostream>
using namespace std;
class Base1 {
public:
        ~Base1() { cout << "Base1's destructor" << endl; }
};
class Base2 {
public:
        ~Base2() { cout << " Base2's destructor" << endl; }
};
class Derived: public Base1, public Base2 {
public:
        ~Derived() { cout << " Derived's destructor" << endl; }
};
int main()
{
        Derived d;
        return 0;
}
```

a. Derived's destructor
   Base2's destructor
   Base1's destructor
b. Base1's destructor
   Base2's destructor
   Derived's destructor
c. Derived's destructor

d. Compiler Dependent.

7. Identify the line that will give an error in the following program

```
#include <iostream>
using namespace std;
class A
{
public:
        void print() { cout << "A::print()"; }
};
class B: private A
{
public:
        void print() { cout << "B::print()";}
};
class C: public B
{
public:
        void print() { A::print(); }
};
int main()
{
        C b;
        b.print();
}
```

   a. void print() { A::print(); }
   b. A::print()
   c. B::print()
   d. No error.

8. Which of the following is true about inline functions and macros?
   a. Inline functions do type checking for parameters, macros don't.
   b. Macros are processed by the pre-processor, and inline functions are processed in later stages of compilation.

c. Macros cannot have a return statement, but inline functions can.
d. All of the above.

9. What will be the output of the code below?

```
#include <iostream>
using namespace std;
class X
{
public: X()
        { cout<<"X";}
        ~X()
        { cout<<"~X";}
}
class Y: public X
{
public: Y()
        { cout<<"Y";}
        ~Y()
        { cout<<"~Y";}
};
int main()
{
        Y obj;
        return 0;
}
```

a. XY~Y~X
b. XY~X~Y
c. X~XY~Y
d. X~X~YY

10. What will be the output of the following CPP code?

```
#include <iostream>
#include <string>
using namespace std;
class A
{
```

```
        int a, b;
        float d;
public:
        void change(int i){
                a=i;
        }
        void value_of_a(){
                cout<<a:
        }
class B: private A
{
};
int main(int argc, char const *argv[])
{
        Bb;
        cout<<sizeof(B);
        return 0;
}
```

a. Compilation error
b. Segmentation fault
c. 12
d. 1

Ds Module

1. Linked lists

1. WAP to check whether the linked list contains a loop or not.
2. WAP to delete the nth last element in an SLL.
3. What is the difference between algorithms and data structures?
4. WAP is used to create and delete a node in an SLL.
5. What are the different types of linked lists**?**
6. WAP to delete a node somewhere in the middle without using any temp variable
7. List the differences between Arrays and linked lists

8. Insert & delete element in a single linked list(insert_at_first, insert_last, insert_after, insert_before, delete_first)
9. WAP to insert 5 elements in DLL and SLL.
10. WAP to insert the data between 2 nodes in a DLL (insert_after, insert_before)
11. WAP to perform basic operations in a single list (insert, delete, print)

2. Stack

1. Explain the stack application.
2. Explain the prefix conversion from postfix.

3. Searching and Sorting Techniques

1. Explain Quick Sort with an example
2. Write a program for bubble sort

4. Queue

1. Explain the functions of the queue

5. Hashing

1. Explain the use of the hash table.

6. Trees

1. Explain Trees with an example.
2. How many binary trees can be created using n nodes?

LI Module

1. MCQ

1. Which of the following is not a file transfer protocol
    a. SCP
    b. SFTP
    c. FTP
    d. SSH
2. $1 will be used in shell scripts for?
    a. First number
    b. First argument

    c. first command
    d. None of the above
3. Cycle stealing is used in which concept?
    a. Interrupts
    b. DMA
    c. Programmed I/O
    d. None of the above
4. Which of the following involves a context switch?
    a. Privileged instruction
    b. Floating point exception
    c. System call
    d. All the above
5. What comes first in an IP packet
    a. Source MAC address
    b. Source IP address
    c. Destination MAC address
    d. Destination MAC address
6. What action is taken when the processor under execution is interrupted by a non-maskable interrupt?
    a. The processor serves the interrupt request after completing the execution of the current instruction.
    b. The processor serves the interrupt request after completing the current task.
    c. The processor serves the interrupt request immediately.
    d. The processor serving the interrupt request depends upon the priority of the current task under execution.
7. Electronic mail uses this Application layer protocol
    a. HTTP
    b. SMTP
    c. FTP
    d. SIP
8. Which information must be known to the client in socket programming for initiating a handshake?

    a. IP address of the Server
    b. Both the IP address of the Server & Port number
    c. Port number
    d. Neither port number nor IP address
9. In Linux, which utility will you use to see the dynamic listing of running processes?
    a. ps.
    b. top.
    c. ls
    d. cal
10. In the OSI layer, which layer is above the Network Layer
    a. Transport Layer
    b. Data link layer
    c. Physical Layer
    d. Presentation layer

2. Basics

1. What is the difference between static linking and dynamic linking?
2. Explain the kernel space.
3. Explain the device drivers and subsystems.
4. What is BIOS?
5. What is the chmod command in Linux?
6. What is the ps command in Linux?
7. What is the difference between user and kernel spaces?
8. How to change permissions in Linux.
9. Explainthe 755 permission.
10. How to check the current running process in Linux.
11. What are the use of these commands: find, grep, and ps?

3. System call

1. Explain the system call in detail.

4. Networking

1. Explain the networking in detail

5. Process

1. Explain the synchronization.
2. What is process blocking?

6. IPC

1. What is shared memory? why ? (with real-time Example)
2. IPC mechanism breaf Explanation (PIPE, FIFO, SHM).
3. Explain the IPC mechanism.

7. Signal

1. Explain how to handle the SIGKILL signal.
2. Explain when the SIGCHLD signal will occur.

8. Socket

1. Explain the use of a socket.
2. How to create a TCP and UDP socket.

9. Threads

1. What is a semaphore?
2. Race condition? Critical section Implementation with mutex method and Semaphore (Using real-time example)
3. When we are using the mutex method, and when we are using the semaphore. (with real-time example)
4. Instead of a mutex, if you use a semaphore? Instead of a semaphore, if you use a mutex, what happens? Explain in detail.
5. What is the difference between a binary mutex and a mutex with an example?
6. What is the difference between thread and pthread?
7. Explain about process and thread. Can we create threads or processes in Kernel Space?
8. What is the difference between a mutex and a semaphore?
9. What is the difference between a process and a thread?

Aptitude

1. Look carefully at the pattern and then choose which pair of numbers comes next. –D 28 25 5 21 18 5 14
    a. 10 7
    b. 11 8
    c. 11 5
    d. 5 10
2. The words in the bottom row are related in the same way as the words in the top row. For each item, find the word that completes the bottom row of words.

Candle	Lamp	Floodlight
Hut	Cottage	???

    a. Tent
    b. City
    c. Dwelling
    d. House
3. Marathon is to race as hibernation is to _____
    a. Winter
    b. Sleep
    c. Bear
    d. Dream
4. What is the next number in the series: 1, 2, 4, 13, 31, 112?
    a. 212
    b. 224
    c. 274
    d. 229
5. Daal is now being sold at Rs. 20 per kg. During the last month, its rate was Rs. 16 per kg. By what percentage should a family reduce its consumption so as to keep the expenditure fixed?
    a. 22%
    b. 20%
    c. 24%
    d. 18%

6. The speed of the boat in still water is 10 kmph. If it travels 24 kmph downstream and 16 kmph upstream in the same amount of time, what is the speed of the stream?
    a. 3Kmph
    b. 3.5kmph
    c. 2kmph
    d. 4kmph
7. A man was engaged on a job for 30 days on the condition that he would get a wage of Rs. 10 for each day he works, but he must pay a fine of Rs. 2 for each day of his absence. If he gets Rs. 216 at the end, for how many days was he absent from work?
    a. 4
    b. 5
    c. 7
    d. 9
8. There are two candles of equal lengths and of different thicknesses. The thicker one lasts six hours. The thinner one takes 2 hours less than the thicker one. Ramesh lights the two candles at the same time. When he went to bed, he saw the thicker one was twice the length of the thinner one. How long ago did Ramesh light the two candles?
    a. 4 hours
    b. 3 hours
    c. 2 hours
    d. 1 hour
9. A cube of 8 cubic meters is painted on all sides. If this cube is divided into cubes of 1 cubic meter each, how many cubes will have none of their faces painted?
    a. 3
    b. 2
    c. 1
    d. 0
10. A cricketer scores 87 runs in his 17th Test Match and his career average runs increases by 3 runs. What is his current average?
    a. 36
    b. 39
    c. 40

d. 33

11. How long will a train 100m long travelling at 72kmph take to overtake another train 200m long travelling at 54kmph
    a. 1 min
    b. 1 min 15 sec
    c. 70 sec
    d. 55 sec
12. Family X went on vacation. Unfortunately, it rained for 13 days when they were there, but whenever it rained in the mornings, they had clear afternoons and vice versa. In all, they enjoyed 1 morning and 12 afternoons. How many days did they stay there total?
    a. 13
    b. 18
    c. 23
    d. 26
13. A contractor agreeing to finish a work in 150 days employed 75 men, each working 8 hours daily. After 90 days, only 2/7 of the work was completed. Increasing the number of men by _____, each working now for 10 hours daily, the work can be completed in time.
    a. 250
    b. 150
    c. 225
    d. 100
14. If the total distance of a journey is 120 km. If one goes at 60 kmph and comes back at 40 kmph, what is the average speed during the journey?
    a. 44Kmph
    b. 52Kmph
    c. 48Kmph
    d. 40Kmph
15. In a group of 15,7 have studied Latin, 8 have studied Greek, and 3 have not studied either. How many of these studied both Latin and Greek
    a. 5
    b. 3
    c. 2
    d. 0