Operating Systems (Section 4B & 4C)
Assignment # 3
Assignment deadline Friday, 28 May 2021, 11:00 PM
Read Guidelines carefully

Question # 01

Write a program that input a character from user and print it the required times using thread.

Question # 02

Write the output for the following codes:

A)

```c
void *thread_function(void *);
int run_now = 1;
int main()
{
        int res;
        pthread_t a_thread;
        res = pthread_create(&a_thread, NULL, thread_function, NULL);
        int print_count1 = 0;
        while (print_count1++ < 20)
        {
                if (run_now == 1)
                {
                        printf("1");
                        run_now = 2;
                }
                else sleep(1);
        }
        printf("Waiting for thread to finish...\n");
        res = pthread_join(a_thread, NULL); printf("Thread joined, it returned %s\n");
        exit(0);
        void *thread_function(void *)
        {
                int print_count2 = 0;
                while (print_count2++ < 20)
                {
                        if (run_now == 2)
                 {
                        printf("2"); run_now = 1;
                 }
                else
                 {
                        sleep(1);
                 }
            }
                pthread_exit(NULL);
        }
}
```

B)

```cpp
#include <iostream>
#include <chrono>
#include <thread>

void independentThread()
{
    std::cout << "Starting concurrent thread.\n";
    std::this_thread::sleep_for(std::chrono::seconds(2));
    std::cout << "Exiting concurrent thread.\n";
}

void threadCaller()
{
    std::cout << "Starting thread caller.\n";
    std::thread t(independentThread);
    t.detach();
    std::this_thread::sleep_for(std::chrono::seconds(1));
    std::cout << "Exiting thread caller.\n";
}

int main()
{
    threadCaller();
    std::this_thread::sleep_for(std::chrono::seconds(5));
}
```

Question # 03
Write a program that create an array of 7 threads using for loop and return Thread ID and Process ID from each thread and comments on the IDs of threads and process.

Question # 04

a) Compile the following program and observe and explain the output.

```c
#include <stdio.h>
#include <pthread.h>
#include <stdlib.h>

void * thread1()
{
    int c = 0;
    while(c++ < 100)
        printf("Hello!!\n");
}

void * thread2()
{
    int c = 0;
    while(c++ < 100)
        printf("How are you?\n");
}

int main()
{
        int status;
        pthread_t tid1,tid2;

        pthread_create(&tid1,NULL,thread1,NULL);
        pthread_create(&tid2,NULL,thread2,NULL);
        pthread_join(tid1,NULL);
        pthread_join(tid2,NULL);
        return 0;
}
```

b) Modify the program to create four threads using the same two functions (**thread1** and **thread2**)
c) Run both versions and include screenshots of the output.

Guidelines

- A single violation of guideline will lead to Zero mark in your assignment.
- You will have maximum marks if you have done the entire task.
- Only ".doc (or) .docx" file should be uploaded on **Google Classroom**, Assignment would not be accepted via email, Facebook or USB flash drive etc.
- Do not zip your assignment it should be uploaded as individual file in following format.
- "RollNo_Assignment_No.doc"
- Paste all the required outputs in the single .doc file.
- Deadlines should be kept in mind no extension in assignment dates
- This is an individual assignment. PLAGARISM IS NOT ACCEPTABLE!
- Follow the instructions as it is, otherwise your assignment would not be accepted at all.