National University of Computer & Emerging Sciences, Karachi
8 CS-Department

Lab Final

Course Code: CL205	**Course Name: Operating Systems Lab**
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"If there is something, you don't know today. You will surely learn afterwards. Life is not an exam hall."
BEST OF LUCK!

Instructions

- Rules are made to break them. So, invent yours and I'll break.

Time: 90 minutes **Max Marks:** 40 points

This program will create _8**_ child processes and _**14**_ threads? (5 marks)**

```
int main()
{
    printf("OS\n");
    fork();
    pthread_create(&tid, NULL, thread, NULL);
    fork();
    printf("OS\n");
    pthread_create(&tid, NULL, thread, NULL);
    fork();
    pthread_create(&tid, NULL, thread, NULL);
    return 0;
}
```

Output

```
OSOS
```

```
int main() {
        printf("%d\n", getpid());
        a=fork();
        printf("%d\n", getpid());
        if (a==0){
        printf("%d\n", getpid());
        fork();
        printf("%d\n", getpid());
        }
        printf("       Done!\n");
return 0;
}
```

Output

```
<process id><c
```

Write appropriate system calls in the blanks **(5 marks)**

```
int main(void) {
        int shmid;
        key_t key;
        char *shm, *s;
        key = 2211;
        fflush(stdin);
        if((shmid = ________shmget_(key, MAXSIZE, IPC_CREAT | 0666)) < 0)
                die("error");
        if((shm = __________shmat ( __shmid____, NULL, 0)) == (char*) -1)
                die("error");
        for(s = shm; *s != '\0'; s++)
                putchar(*s);
        *shm = '*';
        printf("\n");
        exit(0);
}
```

Advantage of FIFO over pipe is

a) related processes can communicate
b) unrelated processes can communicate
[✓ c) all of the mentioned]
d) none of the mentioned

Which is Fastest IPC?

a) Message Queue
[✓ b) shared memory]
c) Socket
d) All of the mentioned

What are the two basic function for any module? **(5 marks)**

1. ____OUT OF SYLLABUSOU________
2. ______________________________

Command for compiling module ________OUT OF SYLLABUSOUT________
Command for module details ______________________________

What is the output on the terminal after compiling?

```
printk(KERN_INFO "Hello World. \n");
printk(KERN_INFO "Final Paper of OS");
printk("GoodBye");
return 0;
```

<nothing>

// creating 3 parallel threadspthread_create(&thic

In which pattern pthread_create and pthread_join can create a serial execution of threads and parallel. Illustrate by writing code for 3 threads. **(2 marks)**

// creating 3 serial threadspthread_create(&t

True or false: Code in an OpenMP program that is not covered by a pragma is executed by all threads. **(1 marks)**

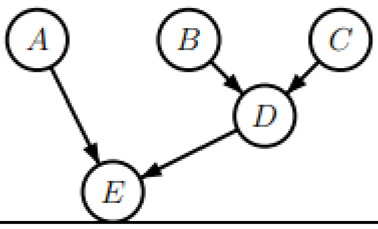
Procom has 4 volunteers on their front desk.

- Volunteer 1 manages On day registration
- Volunteer 2 handles announcements
- Volunteer 3 handles sponsors
- Volunteer 4 resolve queries of participants

Implement this system using OpenMP for total 100 participants. Asuming 25 participants for each volunteer. (5 marks)

```
#pragma omp parallel for num_threads(4)for(int i=0; i<100; i++){   Participant p = par
```

Write a sketch of a C program that uses Pthreads to execute the five functions in a way that is maximally parallel, but adheres to the above dependency graph.
The edge from node B to node D means that functionB must be called, and must return, before functionD can be called. **(2 marks)**



pthread_create(&a, 0, funA, 0);pthread_create(&b, 0, funB, 0);pthread_create(&c, 0, funC, 0

Write all possible output on executing the code below? (3 marks)

```
sem_t mutex;

void* thread(void* arg)
{
   Int a= * ((int*)arg);
   printf("\nEntering..\n");
   sem_wait(&mutex);
   printf("\n %d Entered..\n",a);
   sleep(4);
   printf("\nJust Exiting...\n");
   sem_post(&mutex);
}
int main()
{
   sem_init(&mutex, 0, 1);
   pthread_t t1,t2;
```

Output

Entering..0 Entered..Just Ex

Entering..1 Entered..Just Exitir

Entering..0 Entere

Entering..1 Ente

Entering..Entering..0 Er

Entering..Ente

```
    pthread_create(&t1,NULL,thread,&0);
    pthread_create(&t2,NULL,thread,&1);
    pthread_join(t1,NULL);
    pthread_join(t2,NULL);
    sem_destroy(&mutex);
    return 0;
}
```

The classic problems of producers (such as CPUs) and consumers (such as a printers) concerns one or more process data that one or more process consumes later through a single buffer. Systems must make sure that the producer won't try to add data to full a buffer, and the consumer won't try to make withdrawals from an empty buffer. And for the integrity of data only one process must be allowed to access the buffer at a time. Assume buffer contain 5 files maximum, design the procedures and consumers' processes using semaphores. **(5 marks)**

```
#include <stdio.h>#include <unistd.h>#include <semaphore.h>#define BUFF_SIZE (5)sem_t full, empty, mut
```

Write a code snippet which sets default behavior of ctrl+\, ignores ctrl+Z, assign funcA to ctrl+C.and func B to floating point error. **(5 marks)**

```
signal(SIGQUIT, SIG_DFL);signal(SIGTSTP, SIG_IGN);signal(S
```

Write output on executing the code below? (2 marks)

```
int main(void)
{
        int child_pid, i;
        child_pid = fork();
        if (child_pid == 0)
        {
                for (i = 0;  i < 20000000; i++)
                {
                }
                cout << "Bye from Child!" << endl;
        }
        else
        {

                sleep(1);
                kill(child_pid, SIGINT);
                cout << "Bye from Parent " << endl;
    }
}
```

Output

```
Bye from Child!
```