JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION - SEPTEMBER 2018

B.Tech 5th Semester

COURSE CODE: 10B11CI511   MAX: MARKS: 15

COURSE NAME: Operating Systems

COURSE CREDITS: 04   MAX. TIME: 1 Hrs

Note: All questions are compulsory. Carrying of mobile phone during examinations will be treated as case of unfair means.

SECTION A (3x1=3)

Q1.

a. When and why medium-term scheduling is performed?

b. List only two factors that need to be considered to determine the degree of multiprogramming in a system?

c. What scheduling policy will you use for each of the following cases? Explain your reasons for choosing them.
   i. The processes arrive at large time intervals.
   ii. The system's efficiency is measured by the percentage of jobs completed

SECTION B (3x2=6)

Q2.

a. What distinguishes system calls (like *write*) from library functions (like *printf*)? Explain how system calls are implemented?

b. What is context switching? Differentiate between the process context switching and thread context switching?

c. When the CPU receives an interrupt, how does it determine what instruction to execute the next?

SECTION C

Q3. Processes go through the following states in their lifetime.
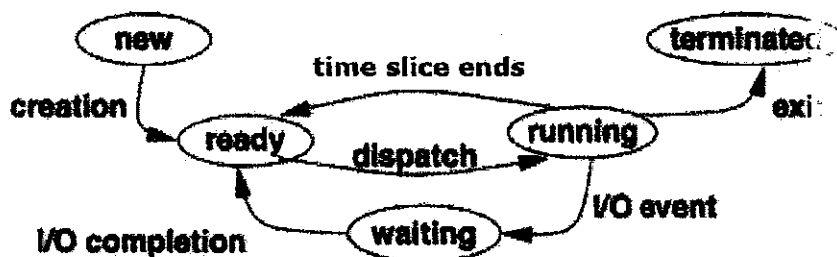
Consider the following events and answer the questions that follow. Assume there are 5 processes, all either in the ready or running states initially. Assume the processes are using a single core processor.

- At time T5: P1 executes a command to read from disk 3.
- At time T15: P3's time slice ends.
- At time T18: P4 executes a command to write to disk 3.
- At time T20: P2 executes a command to read from disk 2.
- At time T24: P3 executes a command to join with P5.
- At time T33: An interrupt occurs indicating that P2's read is complete.
- At time T36: An interrupt occurs indicating that P1's read is complete.
- At time T38: P5 terminates.
- At time T48: An interrupt occurs indicating that P4's write is complete.

For each time T22, T37 and T47, identify which state each process is in? If it is waiting, indicate what it is waiting for? **[1.5]**

Q4. Find the possible output of the following given program. You can assume the program compiles and is able to produce at least one of the output shown. **Briefly explain your answer.** **[1.5]**

```c
int main(int argc, char **argv)
{
    int a = 12;
    int b = 5;
    pid_t pid = fork();

    if (pid > 0)
        b = b + 2;
        /* What does this output? */
        fprintf(stdout,"In parent, a = %d\n",a);
        fprintf(stdout,"In parent, b = %d\n",b);
    else {
        a = a + 3;
        fprintf(stdout,"In child, a = %d\n",a);
        fprintf(stdout,"In child, b = %d\n",b);
    }
}
```

Q5. Assume you have to execute the processes {P0, P1, P2, P3, P4} with arrival times are 0, 10, 10, 80, 85 seconds, and their CPU burst are 80, 20, 10, 20, 50 seconds respectively, on a single core processor machine. Suppose a system uses round robin(RR) scheduling with a quantum of 15 sec. Answer the following: **[3]**

a. Find the average turnaround time using RR.
c. Find the average waiting time using RR.
d. Find the average response time using RR