

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- FEB-2023

COURSE CODE(CREDITS-3): 18B11CI411

MAX. MARKS: 15

COURSE NAME: Operating System

COURSE INSTRUCTORS: Dr. P.K. Gupta, Dr. Hari Singh, Dr. Monika Bharti, Mr. Prateek

MAX. TIME: 1 Hour

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

Q1. In a multiprogramming environment on a uni-processor, assume that there are five processes P1, P2, P3, P4, and P5 in the ready queue arrived in this order. Each process is assigned the uni-processor in this order. Each process executes for 5 seconds on the processor and then goes for a single I/O of 10 seconds in the I/O queue and goes back in the ready queue. In this way, each process completes its total CPU burst of 10 seconds in 2 rounds. Assume other timings as negligible. **[CO1] (2x2=04 Marks)**

- (a) Draw a neat and clean Gantt chart showing processing time over the processor and I/O system.
(b) What is the idle time of the processor and the I/O system?

Q2. Draw a tree structure from the following program and write the output produced. **[CO2] (03 Marks)**

```
int doWork() {
    fork();
    fork();
    printf("Hello world! \n")
}
int main() {
    doWork();
    printf("Hello world! \n");
    exit(0);
}
```

Q3. Describe the difference in memory usage by a single threaded process and a multi-threaded process with a suitable diagram. **[CO2] (02 Marks)**

Q4. Using Amdahl's Law, calculate the speedup gain of an application that has a 60 percent parallel component for: **[CO2] (02 Marks)**

- (a) two processing cores
(b) four processing cores

Q5. Consider the set of processes with arrival time (in milliseconds), CPU burst time (in milliseconds), and priority (0 is the highest priority) shown below. None of the processes have I/O burst time.

[CO3] (04 Marks)