



**Mahindra University Hyderabad**  
École Centrale School of Engineering  
Minor-I

Program: B. Tech.  
Subject: Operating Systems  
Start Time: 02:00 PM

Year: 3<sup>rd</sup>  
Subject Code: CS3102  
Time Duration: 1.5 hours

Semester: V  
Date: 12 Sept 2024  
Max. Marks: 30

**Instructions**

1. No marks will be given without proper justifications.

Q1. Assess the validity (True/False) of these operating system-related statements, and offer justifications for your answers. **(5 × 1 = 5 marks)**

- a) A context switch occurs only when a process terminates or issues an I/O request.
- b) "System calls, like requesting file I/O or memory allocation" is an INTERRUPT.
- c) An executable and a process are the same.
- d) When called, the *fork()* system call always returns a positive value.
- e) CPU retrieves instructions from the hard disk.

Q2. Answer the following questions: **(3 + 3 + 2 + 2 = 10 marks)**

- a) Draw the process state diagram (preemptive mode).
- b) Considering the diagram in part-a, assume that a process needs to take a keyboard input to perform its execution. Explain step-by-step transitions of states starting from the process is being created.
- c) Is it possible for a process to be in more than one state at the same time? Justify.
- d) Suppose a process is in suspended block/wait state. What are the possible states to which it can do a transition? Explain.

Q3. Answer the following questions: **(2 + 1 + 2 = 5 marks)**

- a) Consider the following C program. Assume there are no syntax errors and the program executes correctly. Assume the fork system calls succeed. What is the output printed to the screen when we execute the below program?

```
#include <stdio.h>
int main()
{
    fork();
    printf("All the Best.\n");
    return 0;
}
```

- b) Write the command for displaying date and time after "1 year 4 months" in Linux.
- c) Briefly explain about gzip and alias commands.



Q4. Consider the following set of processes, with the length of the CPU burst time given in milliseconds (see table). The processes are assumed to have arrived in the order P1, P2, P3, P4, P5, all at time 0.

Process Id	Burst Time
P1	2
P2	1
P3	8
P4	4
P5	5

- a) Draw two Gantt charts that illustrate the execution of these processes using the following scheduling algorithms: FCFS and SJF. (1.5 + 1.5 = 3 marks)
- b) Calculate the average turnaround time and waiting time in each of the scheduling algorithms in part-a? (1 + 1 = 2 marks)
- c) For the scenario above, if SJF (preemptive) is applied instead of SJF (non-preemptive), will the average waiting time of SJF (preemptive) be different from SJF (non-preemptive)? Justify your answer. (5 marks)
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