**Department of Computer Science and Engineering**

**A**

**Midterm Examination Spring 2023**

**CSE 321: Operating Systems**

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| **Duration:** 1 Hour 15 Minutes | **Total Marks:** 25 |

Answer the following questions.

Figures in the right margin indicate marks.

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| 1.  **CO1** | a) **Explain** why main memories are usually volatile.  b) **Distinguish** between monolithic and microkernel OS structures.  c) A program has a process that will allow its child process to complete first. **Which** system call can be used in this scenario? **Explain** what may happen in absence of this system call.  d) **Find** the output of the following code snippet.   |  | | --- | | const int len = 2;  int main(){  int id;  int a[] = {10,7};  int b = len-1;  id = fork();  if (id < 0){  printf("fork failed\n");  }  else if(id == 0){  printf("child process executing\n");  }  else{  wait(NULL);  printf("parent process executing\n");  a[b-1]=a[b-1]-2;  a[b] = a[b]+2;  }  for(int i=0;i<len;i++){  printf("value of a[%d]: %d\n",i,a[i]);  }  return 0;  } | | [2]  [3]  [2]  [3] |
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| 2.  **CO2** | |  |  |  | | --- | --- | --- | | **Processes** | **Arrival Time** | **Burst Time** | | P1 | 0 | 11 | | P2 | 20 | 6 | | P3 | 14 | 9 | | P4 | 20 | 8 | | P5 | 15 | 8 | | P6 | 16 | 8 | | P7 | 2 | 2 |   a) **Draw** a Gantt chart and illustrate the execution of the process using the **Round Robin** scheduling algorithm **(time quantum = 5 units)**. **Calculate** the **average waiting** and **turnaround** **time,** | [3+2] | |
|  | b) **Apply** **Shortest Remaining Time First (SRTF)** scheduling algorithm. **Draw** the Gantt chart and **Calculate** the **average waiting** and **turnaround time.**  c) **Compare** the results and **identify** the most suitable scheduling algorithm in this scenario. | [2+2]  [1] | |
| 3.  **CO3** | a) A system has processes to execute of which **35%** is parallel. If the number of cores is increased from **3 to 5**, Explain what will be the increase/decrease in performance?  b) A program has multiple threads that need to perform a task which involves similar computation on a large scale of data. **Identify** which kind of parallelism can be applied in this scenario. **Provide** proper justification with a **real-life example** of the scenario mentioned above. | [2]  [3] | |