First Question | No. of Branches (1) | (5/20)
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Q1 B1 | (5/5)

**Choose the best Answer:**

1) Portion of operating system that is in main memory, and it contains most frequently used functions is called:
   - a) Dispatcher.
   - b) Kernel
   - c) Cash.
   - d) Scheduler.

2) The contents of the IR register is:
   - a) The next instruction to be fetched
   - b) The instruction to be executed
   - c) The address of the next instruction to be fetched.
   - d) The data to be used by the ALU.

3) A Program in execution is called:
   - a) Process.
   - b) Thread.
   - c) Job.
   - d) a, b
   - e) a, b, c

4) When a process is in main memory, and it is waiting for an event, its state is called:
   - a) Blocked
   - b) Suspended
   - c) Ready
   - d) Terminated

5) Which of the following is a reason of process termination:
   - a) New batch job
   - b) Interactive login
   - c) Spawned by existing process
   - d) All of the above
   - e) None of the above
   - f) One of the following is NOT a reason of process termination:
   - a) Child Termination
   - b) Normal Completion
   - c) Bound Violation
   - d) Arithmetic Error
7) Which of the following OSs supports Single user processes and only supports one thread per process:
   a) MS DOS
   b) Windows
   c) UNIX
   d) Solaries

8) Why does the location of such a program in real memory may be relocated many times?
   a) because of swapping
   b) because of memory compaction
   c) because of blocking a process
   d) a,b
   e) All of the above.

9) A computer systems where Single processor executes a single instruction stream to operate on data stored in a single memory is called:
   a) Single Instruction Single Data stream (SISD).
   b) Single Instruction Multiple Data stream (SIMD).
   c) Multiple Instruction Single Data stream (MISD)
   d) Multiple Instruction Multiple Data (MIMD)

10) A process can be switched because of:
    a) Clock interrupt
    b) I/O interrupt
    c) Memory fault
    d) All of the above

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**Second Question**

<table>
<thead>
<tr>
<th>No. of Branches (1)</th>
<th>(5/20)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Q2 B1</strong></td>
<td>(5/5)</td>
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</tbody>
</table>

**Essay Questions**

1) Draw the life cycle of a process. Include the states a process may be in and the transitions from one state to another, including what causes a process to make a transition?

2) Describe briefly the evolution of Operating Systems?

3) What is an interrupt? How are multiple interrupts dealt with?

4) If a system is in an unsafe state, does that imply that the system is deadlocked? Explain you answer?

5) What is the difference between process and thread? Show the advantages of threads over process?
Q3 B1
A restaurant has two saucepans and two frying pans. Three chefs are cooking.
- Chef 1 needs to use a frying pan and two saucepans.
- Chef 2 needs to use two frying pans and a saucepan.
- Chef 3 needs to use a frying pan and a saucepan.

At a certain point in time
- Chef 1 is using a frying pan.
- Chef 2 is using a saucepan.
- Chef 3 is using a frying pan.

(a) Draw a Resource Allocation Graph for this system.
(b) Is the system deadlocked? Explain?

Q3 B2

In this problem you will apply the Bankers algorithm. You are given the following maximum needs matrix and the current resource allocation matrix:

<table>
<thead>
<tr>
<th>Maximum Needs</th>
<th>Total System Resources</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td>P0</td>
<td>7</td>
</tr>
<tr>
<td>P1</td>
<td>3</td>
</tr>
<tr>
<td>P2</td>
<td>9</td>
</tr>
<tr>
<td>P3</td>
<td>2</td>
</tr>
<tr>
<td>P4</td>
<td>4</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current Resource Allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>P0</td>
</tr>
<tr>
<td>P1</td>
</tr>
<tr>
<td>P2</td>
</tr>
<tr>
<td>P3</td>
</tr>
<tr>
<td>P4</td>
</tr>
</tbody>
</table>

1) How many is the available recourses of each resource type?
2) Determine the remaining need of each process for each resource? And then show if the system is in safe state?
3) If process P3 makes a request for a resource of type B, should the request be granted? Explain your answer.

Good Luck