United International University
Operating Systems, Class Test 3 Assignment
Deadline: 11:55 pm, Tuesday, 30 September 2025
Total Marks: 20

<table>
<tr><th>SL</th><th>Question</th><th>Marks</th></tr>
<tr><td>1</td><td>Consider a system with paging-based memory management, whose architecture allows for a 256 MB virtual address space for processes. The size of logical pages and physical frames is 2 KB. The system has 4 GB of physical RAM. The system allows a maximum of 256 processes to run concurrently. Assuming the OS uses hierarchical paging and each page table entry requires an additional 7 bits (beyond the frame number) to store various flags. Assume page table entries are rounded up to the nearest byte.
a) What is the size of the offset?
b) How many Virtual pages and Physical frames are there?
c) Find the size of a single page table.
d) Design a multi level page table for the given virtual memory.
e) calculate the maximum memory space required to store the page tables of all processes in the system.
f) calculate the minimum memory space required to store the page tables of a process</td><td>1
2
3
3
3
2</td></tr>
<tr><td>2</td><td>A system uses 16-bit virtual addresses with a page size of 256 bytes. The physical memory is 4 KB.
<table><tr><td>VPN</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td><td>9</td><td>10</td><td>…</td></tr><tr><td>PFN</td><td>3</td><td>15</td><td>20</td><td>6</td><td>1</td><td>9</td><td>7</td><td>11</td><td>17</td><td>8</td><td>4</td><td>…</td></tr><tr><td>Valid</td><td>1</td><td>1</td><td>0</td><td>1</td><td>1</td><td>1</td><td>0</td><td>1</td><td>0</td><td>0</td><td>1</td><td>…</td></tr></table>Translate the following virtual addresses to physical addresses or report a page fault:
a) 0x02A3
b) 0x064B
c) 0x0A10</td><td>6</td></tr>
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