UECS2103 / UECS2403 / UECS2423 Operating Systems
Test 2

Write your name and course on each answer sheet. Total: **60** marks
Answer all questions.

1.

a)

Needed			
R1	R2	R3	R4
2	4	3	3
0	3	1	1
1	3	3	2
2	4	2	0
2	0	2	3

Resources available: 1 3 2 1
P2 completed, resources available: 1 4 3 2
P3 completed, resources available: 2 5 4 2
P4 completed, resources available: 3 8 4 3
P1 and P5 can continue, thus the system state is safe.

b) Resources available after granted R4: 1 2 2 1
Resources needed by P1 after the request is granted: **2, 3, 3, 3**
None of the processes will be able to run to completion.
The request should **NOT** be granted.

2.

4	3	2	5	3	1	5	2	3	4	1	3	5
4	4	4	5	5	5	5	5	5	4	4	4	5
–	3	3	3	3	3	3	2	2	2	1	1	1
–	**–**	2	2	2	1	1	1	3	3	3	3	3

3.

a) 24GB / 8KB = 3 mil. Pages
page table size = 3 mil. * 8 bytes = 24MB

b) page table size = 24MB (from part a)
24MB / 8KB = 3,000 pages
root page table size = 3,000 * 8 bytes = 24KB

4.

Next track	Number of tracks
155	35
165	10
185	20
195	10
15	180
35	20
45	10
90	45
95	5
Total	**335**

5. Any THREE of the followings:
   Least amount of processor time consumed so far.
   Least number of lines of output produced so far.
   Most estimated time remaining.
   Least total resources allocated so far.
   Lowest priority.

6. Extract the page number and offset from the virtual address.
   Check if the page table entry found in TLB, if it is found, get the frame number.
   If the page table entry is not found in TLB, index to page table to get the frame number.
   If frame number is unavailable, the page has not been loaded into main memory.
   Add the offset to the frame number to get the real address.

7. If small number of page frames allocated, only a small number of pages can be loaded into the main memory. Thus, the fault rate will be high.
   The page fault rate becomes lower when more page frames are allocated.

8. Bigger I/O buffer size able to read in more data in advanced.
   Thus, the process will not be blocked to wait for data to be read in.
   The performance of a process is increased.