NATIONAL UNIVERSITY OF SCIENCE AND TECHNOLOGY
FACULTY OF APPLIED SCIENCE
COMPUTER SCIENCE DEPARTMENT
JANUARY EXAMINATIONS 2013

SUBJECT: **OPERATING SYSTEMS CONCEPTS**

CODE: SCS1103

INSTRUCTION TO CANDIDATES

Answer any four questions
All questions carry equal marks (25)

Time: 3 hours

QUESTION ONE

a) Distinguish between the following :

i. User level thread and kernel level thread
ii. Main memory and secondary memory
iii. CPU bound and I/O bound process
iv. Multiprogramming and Multiprocessing
v. Paging and segmentation [2x5]

b) A process contains 8 virtual pages on disk and is assigned a fixed allocation of 4 page frames in memory. The following page trace occurs:

1,0,2,2,1,7,1,2,0,1,2,0,3,0,4,5,1,5,2,3,3,4,1,7,6,7,2,2,1,0,7,5,6,2,3

i. Show the successive pages residing in 4 frames using the FIFO replacement policy. [10]
ii. Using the page trace, Assess the relationship between the number of page faults and the size of the page frames. [5]

QUESTION TWO

a) Consider a system that uses the strategies of continuous, linked and indexed allocation. What criteria should be used in deciding which strategy is best utilized for a particular file? [9]

b) Consider the following set of processes with their arrival times and CPU burst time.

Process ID	Arrival time	CPU burst time
1	0	5
2	1	15
3	3	12
4	7	25
5	10	5

i. Draw Gantt charts that illustrate the execution of these processes using SJF and FCFS. [8]
ii. Calculate the average turnaround time and average waiting time for both SJF and FCFS. [4]
iii. Calculate the throughput for both scheduling algorithms. [2]
iv. What conclusions can be drawn from the turnaround time and throughput? [2]

QUESTION THREE

a) Discuss the four necessary conditions for a deadlock to occur. [8]
b) Consider the following system Snap shot using data structures in the bankers algorithm, with resources A,B,C and D and process P0 to P4:

	MAX				ALLOCATION				NEED				AVAILABLE			
	A	B	C	D	A	B	C	D	A	B	C	D	A	B	C	D
P0	6	0	1	2	4	0	0	1								
P1	1	7	5	0	1	1	0	0								
P2	2	3	5	6	1	2	5	4								
P3	1	6	5	3	0	6	3	3								
P4	1	6	5	6	0	2	1	2								
													3	2	1	1

Using the Banker's algorithm, answer the following questions.

i. Calculate the number of resources of type A, B, C and D that are there. [2]
ii. Determine the contents of the NEED matrix. [3]
iii. Evaluate whether the system is safe or not. [4]
iv. If a request for process P4 arrives for additional resources of (1 2 0 0) can the Banker's algorithm grant the request immediately? Show the new system state. [8]

QUESTION FOUR

a) Outline the essential features of the different types of operating systems:
   i. Batch
   ii. Mobile
   iii. Interactive
   iv. Time sharing
   v. Real time [5x3]

b) Compare and contrast the windows operating system platform and the Linux operating system platform under the following :

   i. Process management
   ii. Memory management [5x2]

QUESTION FIVE

a) With the aid of diagrams , describe the following operating system structures:
   i. Monolithic
   ii. Layered
   iii. Client – server [3x3]
b) Discuss the different techniques in which a file can be shared among different users. [8]
c) Differentiate between protection and security. [2]
d) Explain the techniques used for protection of user files. [6]

END OF QUESTION PAPER