NALANDA COLLEGE – COLOMBO

G.C.E. (Advanced Level)

Information & Communication Technology

Unit Test

Unit 05 – Operating Systems

Answer all questions.

Multiple Choice Questions

1. Which of the following operating systems provides a command line interface?
   (1) Linux (2) Unix (3) Ubuntu (4) Fedora (5) Mac OS

2. Which one of the following is **incorrect** regarding computer operating system?
   (1) It manages resources within the computer.
   (2) A computer can't operate without an operating system.
   (3) Windows, Linux, Mac OS, Novell Netware are examples of operating systems.
   (4) An operating system is needed only to boot the computer.
   (5) It provides an interface to computer users.

3. Consider the following characteristics about evolution of operating systems:
   A - Executing one program at a time
   B - Loading programs to a tape prior to execution.
   C - CPU was idle during input/output operation.
   Which of the above is/are correct regarding Simple Batch systems?
   (1) A only (2) C only (3) A and B only
   (4) B and C only (5) All A, B and C

4. When there is enough space to fit a process in memory, but the space is not contiguous is called …….. .
   (1) Internal Fragmentation (2) Virtual Fragmentation (3) Paging
   (4) Partitioning (5) External Fragmentation

5. Switching the CPU to another process requires to save state of old process and loading new process state is known as ……. .
   (1) process blocking (2) context switch (3) time sharing
   (4) preempting (5) re-entrant

6. A scheduler which selects processes from secondary storage device is called …… .
   (1) Short term scheduler (2) Long term scheduler
   (3) Medium term scheduler (4) Process scheduler
   (5) Very long term scheduler

7. The time interval from the time of submission of a process to the time of the completion of the process is called …… .
   (1) waiting time (2) throughput (3) response time
   (4) completion time (5) turnaround time

8. A system with byte addressable memory has 8 GB of maximum usable memory. How many bits are used to access a byte in this memory?
   (1) 30 bits (2) 33 bits (3) 24 bits (4) 32 bits (5) 64 bits

9. Which of the following contains the states to which a process can be moved from running state?
   (1) New, Ready, Blocked
   (2) Ready, Swapped out and blocked, Terminated
   (3) Blocked, Swapped out and waiting, Ready
   (4) Ready, Blocked, Terminated
   (5) Blocked, Created, Ready

10. Consider the following statements about file systems:
   A - FAT is compatible with many operating systems.
   B - File size is unlimited in FAT 32 file system.
   C - FAT 32 provides more security than NTFS.
   Which of the above is/are correct?
   (1) A only (2) B only (3) A and C only
   (4) B and C only (5) A and B only

11. Consider the following features of storage allocation in operating systems:
   A - High speed data access
   B - Eliminates external fragmentation
   C - Supports direct access
   D - Allows files to grow easily
   Which of the above are advantages of linked allocation?
   (1) A and B only (2) B and D only (3) C and D only
   (4) A, B and C only (5) A, B and D only

12. Consider the following statements about device drivers:
   A - hardware will not function without device drivers.
   B - It is a firmware.
   C - specific to operating system.
   D - hardware independent
   Which of the above statements is/are correct?
   (1) A and C only (2) B and D only (3) C and D only
   (4) A, B and C only (5) A, B and D only

Structured Essay Questions

1. Write three differences between command line interface and graphical user interface.

   ……

   ……

   ……

2. State three differences between NTFS and FAT file system

   ……

   ……

   ……

3. Briefly describes the following types of operating systems.

   (a) Single user – Single task operating systems

   (b) Multi-threading operating systems

   (c) Real-time operating systems

4. Compare and contrast linked allocation and indexed allocation.

	Linked allocation	Indexed allocation
Differences		
Similarities		

5. Write advantages and disadvantages of each of the three allocation methods: contiguous, linked and indexed allocation.

	Advantages	Disadvantages
Contiguous		
Linked		
Indexed		

6. What is the difference between a program and a process?

   ……

   ……

   ……

7. State four resources needed by a process.

   ……

   ……

8. State four information stored in a PCB.

……

……

9. Write the other states a process can transit from each of the following states.

Current State	Next State(s)
Created (new)	
Running	
Blocked	

10. State the type of scheduler which is responsible for each of the following functions in an operating system.

(a) Swapping processes

……

(b) Dispatching processes

……

(c) Admitting created processes to the ready queue

……

11. Identify the state transitions of processes for each of the following conditions.

Condition	State Transition
A new process is assigned the main memory.	
A process has been terminated.	
A process in the ready queue is moved to the virtual memory.	

12. Give one advantage and two disadvantages of using virtual memory in a computer system.

Advantage: ……

Disadvantage: ……

Essay Questions

1. Write the sequence of operations that take place when a computer is switched on.
2. Draw a diagram to show the interaction between the layers hardware, liveware, application software and system software.
3. Explain the following types of operating systems by giving examples.
   (a) Multi-user
   (b) Multiprogramming
   (c) Multithreading
   (d) Real-time
4. Draw a diagram to show the transitions between process states.
5. For each of the following transitions between process states, indicate whether the transition is possible, and for each possible transition, give an example that would cause the transition.
   (a) Running → Blocked
   (b) Blocked →Running
   (c) Running →Terminated
   (d) Created → Swapped out and Ready
6. Briefly describe the following terms
   (a) Context Switching
   (b) Throughput
   (c) Turnaround time
   (d) Dispatch latency
   (e) Waiting time
7. Briefly describe the main functions of each of the three schedulers in an operating system.
8. Explain how multiprogramming improves processor utilization.
9. A file of size 14250 bits needs to be stored in the secondary storage where each block has a size of 512 bytes.
   (a) How many blocks are needed to store the file?
   (b) Calculate the wastage of memory space in the last block.
10. Briefly explain the term Spooling.
11. The memory of a computer system is byte addressable and has the maximum usable size of 8 GB. It uses 12 bits to identify a page.
    (a) Calculate the number of bits required to access any byte in its memory.
    (b) State the number of addresses the system can generate.
    (c) What is the range (starting and ending addresses) of the memory address space identified in the section (b) above?
    (d) Calculate the total number of pages that can be defined by the system.
    (e) Show how to calculate the size of a page in megabytes.

12. Assume that a 32KB program is run on a computer having 16KB of physical memory. The page size of the system is 4KB.
    The page table of this process is shown on the table below.

Page Number	Frame Number	Present/ Absent
0	11	1
1	00	1
2	01	1
3	00	0
4	10	1
5	00	0
6	00	0
7	00	0

    (a) What is the size of a Frame?
    (b) Show how to calculate the number of bits in the offset field.
    (c) What is the length of a virtual address?
    (d) Show how to calculate the maximum usable size of memory.
    (e) Assume this program requires accessing the virtual address 8200. To which physical address will it get transformed to?
    Note: The virtual addresses on page 0 are from 0 to 4095 and on page 1 are from 4096 to 8191 and so on.

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