MACHAKOS UNIVERSITY

University Examinations for 2019/2020

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR THIRD SEMESTER EXAMINATION FOR

DIPLOMA IN INFORMATION TECHNOLOGY

2920/105: OPERATING SYSTEM

DATE: 15/12/2020   **TIME: 11:30 – 2:30 AM**

INSTRUCTIONS
Answer any five(5) questions
Don't write on this question paper

QUESTION ONE

a)   Maendeleo Institute is experiencing data privacy problems within its file system. Explain **three** measures that the institute can put in place to mitigate this problem.   (6 marks)

b)   With the help of a diagram, explain the various process states.   (6 marks)

c)   Operating system employs a number of strategies to determine where to place incoming process. Critically discuss any two memory placement strategies that can be employed to achieve this.   (4 marks)

d)   Priority scheduling algorithm is both pre-emptive and non-pre-emptive. Explain how this is achieved.   (4 marks)

QUESTION TWO

a)   Describe **two** advantages of the *client-server structure* of an operating system.   (4 marks)

b)   Explain **two** strategies that could be used to prevent deadlocks in a computer system.

                                                                                                             (4 marks)

c)   Outline **three** characteristics of the 4th generation of operating systems.   (3 marks)

d)   State **three** examples of network operating systems.   (3 marks)

e) A disk has 30 cylinders, an initial request comes in to read a block on cylinder 5. New more request come in for cylinder 1, 12, 11, 19, 4 and 7 in that order. Represent the cylinder head movement graphically using each of the following disk scheduling algorithms:

    i. Shortest seek Time First

    ii. SCAN

    iii. C-LOOK   (6 marks)

QUESTION THREE

a) Explain the following types of operating systems:

    i. Embedded operating systems;

    ii. Multiprocessor operating systems .   (4 marks)

b) A lecturer described the requirements for *mutual exclusion* during a lesson. Outline **four** requirements that he could have mentioned.   (4 marks)

c) June was required to list objectives for a proposed file system in her company, outline **four** objectives that she was likely to list.   (4 marks)

d) Differentiate between single and double buffering as used in operating systems.   (4 marks)

e) With reference to variable partition, discuss any **two** techniques which can be employed by Operating System to handle external Fragmentation.   (4 marks)

QUESTION FOUR

a) For each of the following statements, identify the most appropriate computer memory that could be used in the following situations justifying your answer:

    i. Faster access time, greater cost per bit.   (2 marks)

    ii. Greater capacity, smaller cost per bit.   (2 marks)

    iii. Greater capacity, slower access speed.   (2 marks)

b) Explain the following terms in relation to deadlocks:

    i. Two phase locking;

    ii. Starvation   ;

    iii. Safe and unsafe states.   (6 marks)

c) Differentiate between synchronous (blocking) and asynchronous (interrupt driven) transfers.

    (4 marks)

d) Beth intents to select a back up scheme for her computer file system. Outline **four** factors she should consider when selecting the backup scheme.   (4 marks)

QUESTION FIVE

a) In a paged-segmented system we have the virtual address space of 64 KB, with 4 segments and a page size of 2 KB. Calculate:-

    i.   The number of bits for the page number;

    ii.   The maximum number of pages in a segment;

    iii.   The maximum segment size;

    iv.   Draw how the logical address is partitioned. (8 marks)

b) Ouline **four** ways in which external devices mainly differ in reference to device management (4 marks)

c) Differentiate between the following pair of terms in respect to operating system:

    i.   Contiguous and non - contiguous allocation;

    ii.   Preemptive and non - preemptive resources. (8 marks)

QUESTION SIX

a) A group of Diploma in ICT students in Machakos University were carrying out an assignment about causes of process termination in operating systems. Explain **four** possible causes they may have written in their report. (8 marks)

a) Outline **two** features of NTFS file system. (2 marks)

b) Explain each of the following terms as used in I/O operations:

    i.   Spooling;

    ii.   Device controller;

    iii.   Device driver. (6 marks)

c) Explain **four** objectives of memory management in operating systems. (4 marks)

QUESTION SEVEN

a) Describe the use of *semaphores* in management of concurrent process. (2 marks)

b) Access to disk is much slower than access to memory, as a result of this difference many file systems have been designed with various optimizations to improve performance. Describe any **two** of this optimization techniques. (4 marks)

c) Explain the following file operations:

    i.   Append

    ii.   Write

    iii.   Seek (6 marks)

d)   Differentiate between *one level* and *two level* directory systems.   (4 marks)

e)   Differentiate between *absolute* and *relative* path names as used in file management.

(4 marks)

QUESTION EIGHT

a)   With the aid of a diagram. Explain the *layered structure* of an operating system.   (4 marks)

b)   Consider a swapping system in which memory consists of the following memory hole sizes in the following order: 10 KB, 4 KB, 20 KB, 18 KB, 7 KB. 9 KB, 12 KB, and 15 KB. Which hole is taken for successive segment requests of: 12 KB, 10 KB and 9 KB for:-first fit, best fit, worst fit, and next fit.   (4 marks)

c)   The table below shows the arrival time and required CPU burst time for three processes. Use it to answer the questions that follow

process	Arrival time (ms)	CPU burst (ms)
A	0	8
B	1	5
C	4	1

Assuming that the operating system uses SJF algorithm

Calculate;

   i.   Draw a Gantt chart to show the order of executions;   (2 marks)

   ii.   Average waiting time;   (4 marks)

   iii.   Average turnaround time;   (4 marks)

   iv.   Throughput.   (2 marks)