MACHAKOS UNIVERSITY

University Examinations for 2018/2019

SCHOOL OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF COMPUTING AND INFORMATION TECHNOLOGY

FIRST YEAR SECOND SEMESTER EXAMINATION

DIPLOMA IN INFORMATION COMMUNICATION TECHNOLOGY

DIT 105: OPERATING SYSTEM

DATE: 8/5/2019 **TIME: 8.30-10.30 AM**

INSTRUCTIONS

Answer **question ONE and any other TWO questions.**

QUESTION ONE (30 MARKS)

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) Outline **four** possible reasons for suspending a process during processing. (4 marks)

e) In a paged-segmented system we have the virtual address space of 64 KB, with 16 segments and a page size of 4 KB. Calculate:-

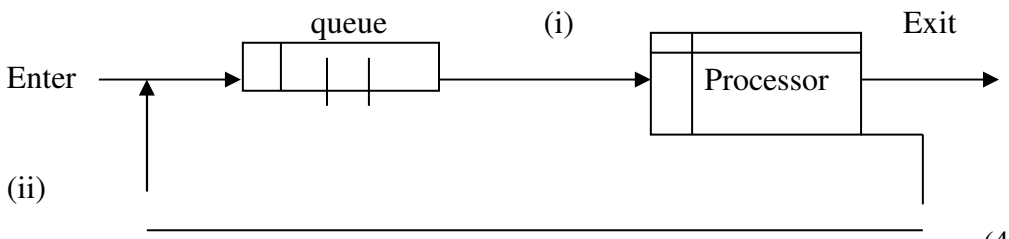
i. The number of bits for the page number;

ii. The maximum number of pages in a segment;

iii. The maximum segment size;

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

f) The figure below shows a block diagram of a two state process diagram. Outline the role of the parts labelled (i) and (ii)



(4 marks)

g) Outline **two** characteristics of the third generation operating systems. (2 marks)

QUESTION TWO (20 MARKS)

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

i. Spooling;

ii. Device controller;

iii. Device driver. (6 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)

QUESTION THREE (20 MARKS)

a) Explain each of the following terms with reference to inter-process communication:

i. Critical sections;

ii. Busy waiting;

iii. Kernel;

iv. Message passing. (8 marks)

b) A group of ICT module 1 students in Machakos University College were carrying out an assignment on objectives of memory management in operating systems. Explain **four** objectives that they could have mentioned. (4 marks)

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

d) 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)

QUESTION FOUR (20 MARKS)

a) Explain the following terms with reference to process management as used in operating systems:

i. Thread

ii. Through put (4 marks)

b) Study the following algorithm of concurrent memory requests by two processes and answer the questions that follow

Time	*process 1*	*process 2*
T1	No request	No request
T2	Request and hold 80 kb	Request and hold 70kb
T3	No request	No request
T4	Request 110kb	Request 120kb

Assuming a total of 250kb is available for allocation:

i. Identify the most probable time at which a deadlock may occur. Justify your answer (2 marks)

ii. Suggest **two** ways of avoiding the deadlock. (2 marks)

iii. Explain **four** conditions that must apply for a deadlock to take place in a computer system. (4 marks)

c) Differentiate between *virtual* and *physical* memory addressing as used in operating systems. (4 marks)

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

QUESTION FIVE (20 MARKS)

a) The following series of processes with the given estimated run-times arrive in the READY queue in the order shown

Process	Arrival time	Estimated run time
A	0	10
B	1	50
C	3	2
D	4	100
E	7	5

Assuming SJF and SRTF scheduling policies are used, FOR EACH POLICY:-

i. Draw a Gantt chart to show the order of executions;

ii. Calculate the waiting time for each process;

iii. Calculate the wait-time/run-time ratio for each process;

iv. Calculate the average turn around time;

v. Identify **one** disadvantage of each of the policies. (16 marks)

b) Differentiate between *absolute* and *relative* path names as used in file management. (4 marks)