

GARISSA UNIVERSITY

UNIVERSITY EXAMINATION 2017/2018 ACADEMIC YEAR TWO SECOND SEMESTER EXAMINATION

SCHOOL OF INFORMATION SCIENCE

FOR THE DEGREE OF BACHELOR OF COMPUTER SCIENCE

COURSE CODE: COM 223

COURSE TITLE: OPERATING SYSTEMS

EXAMINATION DURATION: 3 HOURS

DATE: 09/04/18

TIME: 9.00-12.00 PM

INSTRUCTION TO CANDIDATES

- The examination has SIX (6) questions
- Question ONE (1) is COMPULSORY
- Choose any other THREE (3) questions from the remaining FIVE (5) questions
- Use sketch diagrams to illustrate your answer whenever necessary
- Do not carry mobile phones or any other written materials in examination room
- Do not write on this paper

This paper consists of FOUR (4) printed pages

please turn over



QUESTION ONE (COMPULSORY)

Discuss the major activities of an operating system in regard to the following tasks

i.	Process management,	[5 marks]
ii.	Memory management,	[5 marks]
iii.	Secondary-storage management	[5 marks]
iv.	Input and output management	[5 marks]
v.	File management	[5 marks]

QUESTION TWO

(a) Explain the following techniques applied to increase the performance of disk system

i.	Disk caching	[2 marks]
ii.	Raid disks	[2 marks]
iii.	Blocking	[2 marks]

- (b) Draw the state diagram of a 5 process model from its creation to termination, including all transitions, and briefly elaborate every state and every transition. [5 marks]
- (c) Suppose there are 2 copies of resource. A, 3 copies of resource B, and 3 copies of resource C. Suppose further that process 1 holds one unit of resources B and C and is waiting for a unit of A; that process 2 is holding a unit of A and waiting on a unit of B; and that process 3 is holding one unit of A, two units of B, and one unit of C. Draw the resource allocation graph. Is the system in a deadlocked state [5 marks]

QUESTION THREE

(a)	Compare the	ne relative merits of paging and segmentation systems	[4 marks]
(b)	In a paged	segmented system, a virtual address consists of 32 bits of which 12 bits are a	
	displaceme	nt, 11 bits are a segment number and 9 bits are a page number. Calculate	
	i.	Page size	[2 marks]
	ii.	Maximum segment size	[3 marks]
	iii.	Maximum number of pages	[2 marks]
(c)	Explain the	e term device independence and indicate the contributions made by device dri	vers in this
	respect		[4 marks]



QUESTION FOUR

(a)	Explain the terms critical regions and mutual exclusions and their roles in inter process	
	communication	[5 marks]
(b)	Explain the nature of producer and consumer problem and derive an outline solution using	
	semaphores	[5 marks]
(c)	The user's needs are dynamic and evolving frequently. The operating system should meet the	he user's
	needs at all times. Explain five characteristics of future operating systems	[5 marks]

QUESTION FIVE

- (a) Explain the essential properties of the following types of operating systems: [9 marks]
 - i. Batch
 - ii. Time sharing
 - iii. Distributed
- (b) Given memory partitions of 100K, 500K, 200K, 300K, and 600K (in order), how would each of the First-fit, Best-fit, and Worst-fit algorithms place processes of 212K, 417K, 112K, and 426K(in order)? Which algorithm makes the most efficient use of memory [3 marks]
- (c) Examine the following table of resource requirements for four processes and determine whether the current allocation is a safe state to avoid a deadlock. Account for your answer [3 marks]

3

Process	max needs	current usage
P1	7	3
P2	4	1
Р3	6	2
P4	6	1

Available resources = 3



QUESTION SIX

(a)	With t	he help of a flow chart explain the following data transfer modes	[12 marks]
	i.	Programmed	
	ii.	Interrupt driven	
	iii.	Direct memory access	
(b)	Explai	n five features of a good password system in a multi user environment	[3 marks]

