Q.6 Attempt any two:

i. Explain the following disk scheduling algorithm with examples: **5**
(a) SSTF (b) SCAN (c) LOOK
Comment on the selection of these scheduling methods.

ii. Consider the following page reference string 7,0, 1,2,0,3,0,4,2,3,0,3,2, 1,2,0, 1, 7, 0, 1. How many page faults would occur for FIFO page replacement algorithm, assuming three frames? **5**

iii. Differentiate between protection and security in the file system. How are they implemented? **5**

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Total No. of Questions: 6 *Total No. of Printed Pages:4*

Enrollment No.....

Faculty of Engineering

End Sem Examination May-2024

IT3CO21 Operating System

Programme: B.Tech. Branch/Specialisation: IT

Duration: 3 Hrs. **Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

Q.1 i. To access the services of the operating system, the interface is provided by the _____. **1**
(a) Library (b) System calls
(c) Assembly instructions (d) API

ii. In operating system, each process has its own _____. **1**
(a) Open files
(b) Pending alarms, signals, and signal handlers
(c) Address space and global variables
(d) All of these

iii. System is in the safe state if _____. **1**
(a) The system can allocate resources to each process in some order and still avoid a deadlock
(b) There exist a safe sequence
(c) Both (a) and (b)
(d) None of these

iv. The segment of code in which the process may change common variables, update tables, write into files is known as _____. **1**
(a) Program (b) Critical section
(c) Non – critical section (d) Synchronizing

v. Which one of the following is the address generated by the CPU? **1**
(a) Physical address (b) Absolute address
(c) Logical address (d) None of these

vi. Memory management technique in which a system stores and retrieves data from secondary storage for use in main memory is called? **1**
(a) Fragmentation (b) Paging
(c) Mapping (d) None of these

vii. A process refers to 5 pages, A, B, C, D, E in the order: A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page frames is increased to 4, then the number of page transfers _____. **1**

(a) Decreases
(b) Increases
(c) Remains the same
(d) None of these

viii. When a page is selected for replacement, and its modify bit is set _____. **1**

(a) The page is clean
(b) The page has been modified since it was read in from the disk
(c) The page is dirty
(d) The page has been modified since it was read in from the disk & page is dirty

ix. The time taken to move the disk arm to the desired cylinder is called the _____. **1**

(a) Positioning time
(b) Random access time
(c) Seek time
(d) Rotational latency

x. A floppy disk is designed to rotate _____ as compared to a hard disk drive. **1**

(a) Faster (b) Slower
(c) At the same speed (d) None of these

Q.2 i. Define operating system. **2**

ii. What are system calls? Explain different categories of system calls with examples. **3**

iii. Distinguish among the following terminologies associated with the operating system and explain each of them in detail. Multiprogramming systems, Multitasking systems, Multiprocessor systems. **5**

OR iv. What is an operating system? What are functions of the operating system? **5**

Q.3 i. Explain direct and indirect communications of message passing systems. **2**

ii. Consider the following data with burst time given in milliseconds: **8**

Process	Burst time	Priority
p1	10	3
p2	1	1
p3	2	3
p4	1	4
p5	5	2

The process has arrived in the order p1, p2, p3, p4, p5 all at time 0.
(a) Draw Gantt charts for the execution of these processes using FCFS, SJF scheduling.
(b) What is the turnaround time and waiting time of each process for each of the scheduling algorithms?

OR iii. What are semaphores? Explain how it can be used to implement mutual exclusion. **8**

Q.4 i. Explain the best fit, first fit and worst fit algorithm. **3**

ii. Differentiate between the following: **7**
(a) Paging and segmentation
(b) Page table and segment table

OR iii. The available space list of a computer memory is specified as follows: **7**

Start address block	Address in words
100	50
200	150
450	600
1200	400

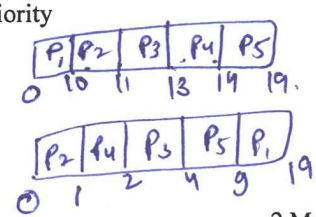
Determine the available space list after allocating the space for the stream of requests consisting of the following block sizes: 25,100,250,200,100,150. Use-
(a) FIRST FIT
(b) BEST FIT
(c) WORST FIT algorithms

Q.5 i. What is virtual memory? Discuss the benefits of virtual memory techniques. **4**

ii. Explain the following: **6**
(a) Thrashing
(b) Operating system in security

OR iii. Discuss about page replacement algorithms with example. **6**

Marking Scheme
IT3CO21 Operating System

Q.1	i)	To access the services of the operating system, the interface is provided by the **Answer: b (System Call)**	**1**
	ii)	In operating system, each process has its own _____ **Answer: d (all of the mentioned)**	**1**
	iii)	System is in the safe state if _____ **Answer: a (the system can allocate resources to each process in some order and still avoid a deadlock)**	**1**
	iv)	The segment of code in which the process may change common variables, update tables, write into files is known as _____ **Answer: b (critical section)**	**1**
	v)	Which one of the following is the address generated by the CPU? **Answer: c(logical address)**	**1**
	vi)	Memory management technique in which a system stores and retrieves data from secondary storage for use in main memory is called? **Answer: b(paging)**	**1**
	vii)	A process refers to 5 pages, A, B, C, D, E in the order: A, B, C, D, A, B, E, A, B, C, D, E. If the page replacement algorithm is FIFO, the number of page frames is increased to 4, then the number of page transfers _____ **Answer: b (increases)**	**1**
	viii)	When a page is selected for replacement, and it modify bit is set **Answer: d (the page has been modified since it was read in from the disk & page is dirty)**	**1**
	ix)	The time taken to move the disk arm to the desired cylinder is called the **Answer: c (seek time)**	**1**
	x)	A floppy disk is designed to rotate _____ as compared to a hard disk drive. **Answer: b (slower)**	**1**
Q.2	i.	Define Operating System? Definition - 2 Marks	**2**
	ii.	What are system calls? Explain different categories of system calls with examples? System calls - 1 Marks Different categories -2 marks	**3**
	iii.	Distinguish among the following terminologies associated with the operating system and explain each of them in detail. Multiprogramming systems, Multitasking systems, Multiprocessor systems? Operating system terminologies - 2 Marks Types of system - 3 Marks	**5**
OR	iv.	What is an operating system? What are functions of the operating system? Operating system - 2 Marks Functions - 3 Marks	**5**
Q.3	i.	Explain direct and indirect communications of message passing systems. Direct communications -1 Marks Indirect communications -1 Marks	**2**
	ii.	Consider the following data with burst time given in milliseconds: process Burst time Priority p1 10 3 p2 1 1 p3 2 3 p4 1 4 p5 5 2  Gantt charts -2 Marks FCFS - 3 Marks SJF - 3 Marks	**8**
OR	iii.	What are Semaphores? Explain how it can be used to implement mutual exclusion Semaphores - 4 marks Mutual exclusion -4 marks	**8**

Q.4	i.	Explain the best fit, first fit and worst fit algorithm? Best fit - 1 Marks First fit - 1 Marks Worst fit - 1 Marks	3
	ii.	Differentiate between the following: a) Paging and Segmentation - 3.5 Marks b) Page table and segment table - 3.5 Marks	7
OR	iii.	The available space list of a computer memory is specified as follows: Start address block address in words 100 50 200 150 450 600 1200 400 Determine the available space list after allocating the space for the stream of requests consisting of the following block sizes: 25,100,250,200,100,150 Use i) FIRST FIT - 2 Marks ii) BEST FIT and - 2 Marks iii) WORST FIT algorithms - 2 Marks Diagram - 1 Marks	7
Q.5	i.	What is virtual memory? Discuss the benefits of virtual memory techniques. Virtual memory - 2 Marks Benefits - 2 marks	4
	ii.	Explain the following: a) Thrashing - 3 Marks b) Operating System in Security -3 Marks	6
OR	iii.	Discuss about page replacement algorithms with examples? Algorithm - 3 Marks Example - 3 Marks	6
Q.6		Attempt any two:	
	i.	Explain the following disk scheduling algorithm with examples. i)SSTF ii) SCAN iii) LOOK Comment on the selection of these scheduling methods? disk scheduling algorithm -2 marks a) SSTF -1Marks b) SCAN -1 Marks	5

		c)LOOK - 1 Marks	
	ii.	Consider the following page reference string 7,0, 1,2,0,3,0,4,2,3,0,3,2, 1,2,0, 1, 7, 0, 1. How many page faults would occur for FIFO page replacement algorithm, assuming three frames? Page replacement algorithm -2 marks Step -3 Marks	5
	iii.	Differentiate between protection and security in the file system. How are they implemented? 5 Differences (1 mark each) - 5 marks	5