Q. Code:941613

Reg. No. | | | | | | | | | | | | |

B.E. / B.TECH. DEGREE EXAMINATIONS, MAY 2024

Fourth Semester

IT22401 – OPERATING SYSTEM CONCEPTS

(*Information Technology*)

(Regulation 2022)

TIME:3 HOURS **MAX. MARKS: 100**

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Understand the basic concepts and functions of operating systems.	**2**
CO 2	Apply the concepts of process synchronization and inter process communication.	**3**
CO 3	Evaluate the performance of CPU Scheduling Algorithms, Deadlock Algorithms and Memory Management Algorithms	**5**
CO 4	Analyze the functionality of file systems and diverse disk management Techniques	**4**
CO 5	Assess the performance of various operating systems.	**5**

PART- A (20x2= 40Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	How do clustered systems differ from multiprocessor system?	**1**	**2**
2.	How does the distinction between kernel mode and user mode function as a rudimentary form of protection?	**1**	**2**
3.	How do user programs and system services interact in a micro-kernel architecture?	**1**	**2**
4.	Describe the general methods for passing parameters to the operating system.	**1**	**2**
5.	Identify the benefits and the disadvantages of automatic and explicit buffering?	**2**	**2**
6.	How would you explain the advantages offered by thread pools?	**2**	**3**
7.	Identify the potential challenges and risks associated with thread termination and mention how to handle it.	**2**	**3**
8.	Demonstrate the use of semaphores in a concurrent programming scenario.	**2**	**3**
9.	Illustrate critical Section with an example.	**3**	**3**
10.	What happens if the process tries to access a page that was not brought into memory?	**3**	**3**
11.	How do you limit the effects of thrashing?	**3**	**3**
12.	Define Virtual memory and describe its benefits.	**3**	**2**
13.	Differentiate Shared lock and exclusive lock	**4**	**4**
14.	Illustrate the relationship between index file and relative file.	**4**	**3**

15.	Describe the characteristics of I/O devices.	**4**	**2**
16.	Enlist different types of directory structure	**4**	**2**
17.	Analyze purpose of prototype page-table entry in Windows 2000?	**5**	**4**
18.	What are three advantages of dynamic linking of libraries compared to static linking?	**5**	**3**
19.	Summarize the various levels of interrupt protection.	**5**	**2**
20.	Discuss Linux's security model.	**5**	**2**

PART- B (5x 10=50Marks)

		Marks	CO	RBT LEVEL
21. (a)	Explain System components and its responsibilities in detail	**(10)**	**1**	**2**
	(OR)			
(b)	Describe how system calls are implemented.	**(10)**	**1**	**2**
22. (a)	Provide two examples of multi threading that improve performance over a single-threaded solution.	**(10)**	**2**	**3**
	(OR)			
(b)	Demonstrate how semaphores are utilized in traditional synchronization challenges.	**(10)**	**2**	**3**
23. (a)	Illustrate how Demand paging plays a major role in memory management with neat sketch	**(10)**	**3**	**3**
	(OR)			
(b)	Consider the following page reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for the following replacement algorithms, assuming four frames? (Note: all frames are initially empty) i) LRU replacement ii) FIFO replacement	**(10)**	**3**	**3**
24. (a)	Suppose that a disk drive has 5,000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at	**(10)**	**4**	**3**

cylinder 125. The queue of pending requests, in FIFO order, is 86,1470,913,1774,948,1509,1022,1750,130.

Starting from the current head position, what is the total distance(in cylinders) that the disk arm moves to satisfy all the pending requests for each of the following disk scheduling algorithms.

a) FCFS

b) SSTF

c) SCAN

(OR)

(b)	Illustrate in detail about the most common schemes for defining the logical structure of a Directory	**(10)**	**4**	**3**
25. (a)	Inspect Memory management in Linux System with neat sketch	**(10)**	**5**	**3**

(OR)

(b)	Examine the implementation of Network Structure in the Linux Kernel.	**(10)**	**5**	**3**

PART- C (1x 10=10Marks)

(Q.No.26 is compulsory)

		Marks	CO	RBT LEVEL
26.	Consider the following snapshot of a system:	**(10)**	**3**	**5**

	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
T_0	1	2	0	2	4	3	1	6	2	2	2	3
T_1	0	1	1	2	2	4	2	4				
T_2	1	2	4	0	3	6	5	1				
T_3	1	2	0	1	2	6	2	3				
T_4	1	0	0	1	3	1	1	2				

Using the banker's algorithm, determine,

a. What is the content of the matrix Need?

b. Is the system in a safe state?

c. If the state is safe, illustrate the order in which the threads may complete. Otherwise, illustrate why the state is unsafe.

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