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

B.E./ B.TECH. DEGREE EXAMINATIONS, MAY 2023

Fourth Semester

IT18403 – OPERATING SYSTEM CONCEPTS

(Information Technology)

(Regulation 2018A)

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

COURSE OUTCOMES	STATEMENT	RBT LEVEL
CO 1	Interpret the basic concepts and functions of operating systems.	4
CO 2	Apply various CPU scheduling algorithms and practice deadlock prevention and avoidance algorithms.	3
CO 3	Compare and Contrast various memory management schemes.	2
CO 4	Demonstrate the functionality of file systems	3
CO 5	Examine the working principles of various operating systems	5

PART- A(10x2=20Marks)

(Answer all Questions)

		CO	RBT LEVEL
1.	What is the difference between kernel and user mode? Explain how having two distinct Modes aids in designing an operating system.	1	2
2.	Classify the functions of operating system.	1	4
3.	Sketch the many-to-one model, the one-to-one model, and the many-to-many Model of threads.	2	3
4.	Determine the four situations under which CPU scheduling decisions take place.	2	5
5.	Describe the actions taken by operating system when a page fault occurs.	3	2
6.	What is thrashing? How do you limit the effects of thrashing?	3	2
7.	Sketch the structure of a hard disc and explain its components.	4	3
8.	Show the schemes available for defining the logical structure of a directory.	4	3
9.	Illustrate the various components that make up a full Linux system.	5	4
10.	Provide an overview of the Win32 function calls used to handle fibers, threads, and processes.	5	2

PART- B (5x 14=70Marks)

		Marks	CO	RBT LEVEL
11. (a)	Summarize with a neat sketch the steps involved in making a system call also discuss in detail the types of system calls provided by an operating system.	(14)	1	4
	(OR)			
(b)	Examine the various design approaches available to explore the components of Operating systems.	(14)	1	4
12. (a)	Demonstrate the effectiveness of semaphores in solving dining philosopher's problem.	(14)	2	3
	(OR)			
(b)	Explore the various proposals available for achieving mutual exclusion, so that while one process is busy updating shared memory in its critical region, no other process will enter its critical region and cause trouble.	(14)	2	3
13. (a)	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. Estimate how many page faults would occur for the following replacement algorithms, assuming two, three, four, frames? All frames are initially empty, first unique pages will cost one fault each. • LRU replacement • FIFO replacement • Optimal replacement	(14)	3	2
	(OR)			
(b) (i)	Consider a logical address space of 64 pages of 1,024 words each, mapped onto a physical memory of 32 frames. a. How many bits are there in the logical address? b. How many bits are there in the physical address?	(7)	3	2
(ii)	Given six memory partitions of 300 KB, 600 KB, 350 KB, 200 KB, 750 KB, and 125 KB (in order), how would the first-fit, best-fit, and worst-fit algorithms place processes of size 115 KB, 500 KB, 358 KB, 200 KB, and 375 KB (in order)? Rank the algorithms in terms of how efficiently they use memory.	(7)	3	2
14. (a)	Examine file-system design tradeoffs, including access methods, file Sharing, file locking, and directory structures for university file system.	(14)	4	3
	(OR)			
(b)	Illustrate the suitable approaches available to allocate space for files so that disk space is utilized effectively and files can be accessed quickly.	(14)	4	3

		Marks	CO	RBT LEVEL
15. (a)	Explain in detail the interesting features and design innovations of NTFS file system.	**(14)**	**5**	**5**
	(OR)			
(b)	Summarize the Linux process model and illustrate how Linux schedules processes and provides inter-process communication.	**(14)**	**5**	**5**

PART- C (1x 10=10Marks)
(Q.No.16 is compulsory)

		Marks	CO	RBT LEVEL
16.	Consider the following snapshot of system in which four resources A, B, C and D are available. The system contains a total of 6 instances of A,4 of resource B ,4 of resource C,2 resource of D.	**(10)**	**2**	**3**

	Allocation				Maximum				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
P1	2	0	1	1	3	2	1	1	6	4	4	2
P2	1	1	0	0	1	2	0	2				
P3	1	0	1	0	3	2	1	0				
4	0	1	0	1	2	1	0	1				

Compute what each process might still request.

i. Is the system in a safe state? Why or why not?

ii. Is the system deadlocked? Why or why not?

iii. If a request from P3 arrives for (2, 1, 0, 0), can the request be granted immediately?

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