PRN No.	

Total No. of Printed Pages: 2

PAPER CODE	U314-294-(ESE)

(AY:2024-25) December 2024 (ENDSEM) EXAM

TY B. TECH (SEMESTER - I)

COURSE NAME: Operating System **Branch: E&TC** **COURSE CODE: ETUA31204**

T.Y B. Tech PATTERN 2020

Time: [1Hr 30 Min] **[Max. Marks: 40]**

(*) Instructions to candidates:

1) **Figures to the right indicate full marks. Use of scientific calculator is allowed**
2) **Use suitable data wherever required**
3) **All questions are compulsory. Solve any two sub question each from Questions 1 and 2**
4) **Solve any one sub question (2 marks) from Questions 3 ,4 ,5 and 6 and sub question of 4 marks is compulsory from questions 3,4,5, and 6**

Q. No.		Question Description	Max. Marks	CO mapped	BT Level
1	a	Compare and contrast the structural design of the UNIX and Windows operating systems. How do the design differences impact their performance and security features?.	[4]	1	Analyze
	b	Compare different types of operating systems, including their pros and cons.	[4]	1	Analyze
	c	Discuss the role and structure of System Calls in Operating Systems.	[4]	1	Analyze
2	a	Define multithreading and explain its benefits. Differentiate between user-level and kernel-level threads.	[4]	2	Understand
	b	What is context switching? Explain with the help of a diagram.	[4]	2	Understand
	c	Compute the average waiting time using the Round Robin scheduling algorithm for the following set of processes (assume a time quantum of 2 units): Process: P1 Burst Time (ms): 5 P2: 9 P3: 6 P4: 2	[4]	2	Understand
3	a	Describe how operating systems support multicore architectures.	[2]	3	Understand
	b	List out the benefits and challenges of OS support for GPU programming.	[2]	3	Understand
	c	Explain the concept of a hypervisor and its role in modern computing.	[4]	3	Understand
4	a	Evaluate the Dining Philosophers Problem by analyzing the synchronization challenges it presents and discussing potential strategies to avoid deadlock and ensure resource sharing among the philosophers.	[2]	4	Evaluate
	b	Evaluate the role of semaphores in process synchronization by analyzing their types (binary and counting semaphores) and	[2]	4	Evaluate

		discussing how they can prevent race conditions in concurrent programming.			
	c	Evaluate the Banker's Algorithm by analyzing its application in resource allocation and safety checking. Given the following system state: Available Resources: A: 3 B: 2 C: 2 Maximum Resource Needs A B C P1: (7, 5, 3) P2: (3, 2, 2) P3: (9, 0, 2) P4: (2, 2, 2) P5: (4, 3, 3) Current Allocations: A B C P1: (0, 1, 0) P2: (2, 0, 0) P3: (3, 0, 2) P4: (2, 1, 1) P5: (0, 0, 2)	[4]	4	Evaluate
5	a	What is logical to physical address translation? Discuss its significance in memory management.	[2]	5	Analyze
	b	Analyze the impact of a page fault on system performance. How do frequent page faults affect overall system throughput, and what factors contribute to page fault rates?	[2]	5	Analyze
	c	A system has 3 page frames, and the following sequence of page references occurs: Page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2 1. Using the Least Recently Used (LRU) page replacement algorithm, analyze the number of page faults that occur. 2. Determine the efficiency of the LRU algorithm in handling this reference string, and compare the result with what would happen using FIFO page replacement.	[4]	5	Analyze
6	a	Discuss the concept of a directory structure in file management. How do different directory structures (single-level, two-level, and hierarchical) impact file access?	[2]	6	Understand
	b	Explain different techniques of free space management in file systems. How do these techniques impact the efficiency of storage allocation?	[2]	6	Understand
	c	Consider a disk with 200 cylinders, numbered 0 to 199. The disk head is currently at cylinder 50 and is moving towards the higher-numbered cylinders. The disk request queue contains the following requests in the order they arrived: Requests: 82, 170, 43, 140, 24, 16, 190 1. Draw the disk movement diagram using the SCAN Disk Scheduling Algorithm. 2. Calculate the total seek time for the disk arm to satisfy all requests using the SCAN Disk Scheduling Algorithm.	[4]	6	Understand