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RAMAIAH Institute of Technology

(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
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SUPPLEMENTARY SEMESTER EXAMINATIONS – JULY 2023

Program	:	**B.E :- Information Science and Engineering**	**Semester**	:	**IV**
Course Name	:	**Operating Systems**	**Max. Marks**	:	**100**
Course Code	:	**IS42**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.

UNIT – I

1. a) How does the distinction between kernel mode and user mode function as a rudimentary form of protection (security) in operating system? Justify. CO1 (10)

   b) Explain the process of invoking system call with an example. Also write various system calls. CO1 (10)

2. a) Describe process scheduling? Explain the various levels of scheduling. Distinguish pre-emptive and non-pre-emptive scheduling algorithms? CO1 (10)

   b) Consider the following set of processes with the length of the CPU burst time given in milliseconds: CO1 (10)

Process	Burst Time	Priority
P1	10	3
P2	1	1
P3	2	3
P4	1	4
P5	5	2

The processes are assumed to have arrived in the order p1, p2, p3, p4, p5 all at time 0.

i) Draw four Gantt charts illustrating the execution of these processes using FCFS, SJF, anon pre-emptive priority (a smaller prioritynumber implies a higher priority) and RR (quantum=1) scheduling.

ii) What is the turnaround time of each process for each of the scheduling algorithms in part A?

iii) What is the waiting time of each process for each of the scheduling algorithms in part A? Which of the schedules in part a results in the minimal average waiting time?

UNIT – II

3. a) Prove that the Peterson's Solution for critical section problem is correct with the help of flag and turn variables. CO2 (10)

   b) Describe the conditions under which a deadlock situation may arise? Distinguish between deadlock avoidance and prevention strategies? CO2 (10)

4. a) Consider system with five processor P0 to P4 and 3 resources A, B and C, Resources type A has 10 instances, B has 5 instances and C has 7 instances. CO2 (10)

The snapshot at time T0 is

	ALLOTED	MAX
	A B C	A B C
P0	0 1 0	7 5 3
P1	2 0 0	3 2 2
P2	3 0 2	9 0 2
P3	2 1 1	2 2 2
P4	0 0 2	4 3 3

i)Now the process P1 request one additional resource type A and two instances of C. Determine whether this new site is safe or not.
ii)What is the content of 'need' matrix?
iii) if request from P1 arrives for(1,0,2) can it be granted immediately?

b) Explain about condition variables in monitors with the help of any classical synchronization problem. CO2 (10)

UNIT – III

5. a) What is dynamic storage allocation problem? Address this problem with different strategies with an example. CO3 (08)

b) Draw and explain the working procedure of paging hardware in detail? CO3 (07)

c) Consider a computer system supports 32-bit virtual addresses as well as 32-bit physical addresses. Since the virtual address space is of the same size as the physical address space, the operating system designers decide to get rid of the virtual memory entirely. CO3 (05)

6. a) What is page fault? Explain various steps involved to handle page fault in dynamic demand paging. CO3 (10)

b) Consider the following page reference string: CO3 (10)
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 replacement by LRU, optimal, for three, and four frames? All frames are initially empty and first unique page reference causes a page fault.

UNIT – IV

7. a) Consider that a disk drive has 5,000 cylinders, numbered 0 to 4,999. The drive is currently serving request at cylinder 143, and the previous request was at 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 pending requests for each of the following disk scheduling algorithms? CO4 (10)
i. FCFS ii. SSTF iii. SCAN iv. C-SCAN v. LOOK vi. C-LOOK.

b) Write note on : CO4 (10)
(i) Log structured file system
(ii) Efficiency and Usage of disk space
(iii) File system mounting.

8. a) Explain in detail various disk scheduling algorithms with suitable example. CO4 (10)

b) Explain the following concepts with respect to file. CO4 (10)
i) File operations ii) File Structures iii) File Types.

UNIT – V

9.	a)	Discuss the goals and principles of protection in a modern computer system.	CO5	(10)
	b)	Explain how protection domains combined with an access matrix are used to specify the resources a process may access.	CO5	(10)
10.	a)	Examine capability and language-based protection systems.	CO5	(10)
	b)	Illustrate the networking protocols supported in operating systems.	CO5	(10)

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