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RAMAIAH
Institute of Technology

(Autonomous Institute, Affiliated to VTU)
(Approved by AICTE, New Delhi & Govt. of Karnataka)
Accredited by NBA & NAAC with 'A' Grade

EXAMINATIONS SEPTEMBER /OCTOBER 2021
SUPPLEMENTARY SEMESTER / GRADE IMPROVEMENT/ RE –REGISTERED CANDIDATES

Program	:	**B.E. : Computer Science and Engineering**	**Semester**	:	**V**
Course Name	:	**Operating Systems**	**Max. Marks**	:	**100**
Course Code	:	**CS51**	**Duration**	:	**3 Hrs**

Instructions to the Candidates:

- Answer any five full questions.
- Write figures wherever necessary.

1. a) Differentiate between User view and system view of the operating system. CO1 (06)
   b) List and explain the responsibilities of the operating systems in connection with process management and memory management. CO1 (08)
   c) Why is a just-in-time compiler useful for executing Java programs? CO1 (06)

2. a) Differentiate between User mode and kernel mode operation of the operating system. CO1 (06)
   b) What is the main advantage of the microkernel approach to system design? How do user programs and system services interact in a microkernel? architecture? What are the disadvantages of using the microkernel approach? CO1 (06)
   c) Explain with a neat figure, the various services provided by the operating-system that are helpful to the users and for system itself. CO1 (08)

3. a) Differentiate between small-term, medium-term and long-term scheduler. CO2 (06)
   b) Consider the following snapshot of the system, draw the Gantt chart and find the average waiting time and turnaround time by using i) FCFS algorithm ii) Priority algorithm CO2 (08)

Process	Arrival-Time	Burst-Time	Priority
P1	0.0	6	4
P2	3.0	5	2
P3	3.0	3	6
P4	5.0	5	3

   c) Consider the methods used by processes P1 and P2 for accessing their critical sections whenever needed, as given below. The initial values of shared boolean variables S1 and S2 are randomly assigned. CO2 (06)

Method Used by P1

```
while (S1 == S2) ;
Critica1 Section
S1 = S2;
```

Method Used by P2

while (S1 != S2) ;
Critica1 Section
S2 = not (S1);

Which one of the following statements describes the properties achieved? Justify your answer

(i) Mutual exclusion but not progress
(ii) Progress but not mutual exclusion
(iii) Neither mutual exclusion nor progress
(iv) Both mutual exclusion and progress.

4. a) Determine how many times the string "hello" gets printed on the screen. Justify your output. CO2 (06)

```
int main()
{
fork( );
fork( );
fork( );
printf("hello\n");
return ( );
}
```

b) Discuss different modes of Inter process communication among different processes. CO2 (08)

c) State and design an algorithm for reader-writers problem using semaphore by considering all the parameters. CO2 (06)

5. a) Consider the following snapshot of a system: CO3 (08)

	Allocation	*Max*	*Available*
	A B C D	*A B C D*	*A B C D*
P_0	0 0 1 2	0 0 1 2	1 5 2 0
P_1	1 0 0 0	1 7 5 0	
P_2	1 3 5 4	2 3 5 6	
P_3	0 6 3 2	0 6 5 2	
P_4	0 0 1 4	0 6 5 6	

Answer the following questions using the banker's algorithm:

i. What is the content of the matrix Need?
ii. Is the system in a safe state?
iii. If a request from process P1 arrives for (0,4,2,0), can the request be granted immediately?

b) Compare the main memory organization schemes of contiguous-memory allocation, pure segmentation, and pure paging with respect to the following issues: CO3 (06)

i. External fragmentation
ii. Internal fragmentation.

c) Explain with a neat figure, the steps of handling a page fault. CO3 (06)

6.	a)	Given five memory partitions of 100 KB, 500 KB, 200 KB, 300 KB, and 600 KB (in order), how would each of the first-fit, best-fit, and worst-fit algorithms place processes of 212 KB, 417 KB, 112 KB, and 426 KB (in order)?	CO3	(06)
	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 three frames? Remember that all frames are initially empty, so your first unique pages will cost one fault each. i. LRU replacement ii. FIFO replacement iii. Optimal replacement.	CO3	(08)
	c)	Illustrate recovery from deadlocks using resource pre-emption.	CO3	(06)
7.	a)	Explain indexed allocation of a disk space with a suitable diagram.	CO4	(06)
	b)	Describe the various types of access methods for a file system.	CO4	(08)
	c)	Compute the disk arm moves to satisfy all the pending requests using SSTF and SCAN disk-scheduling algorithms for the following scenario. Suppose that a disk drive has 500 cylinders, numbered 0 to 499. The drive is currently serving a request at cylinder 127, and the previous request was at cylinder 64. The queue of pending requests, in FIFO order, is:86, 147, 313, 177, 48, 150, 102, 175, 30.	CO4	(06)
8.	a)	Illustrate In-memory file-system structures for a file read operation with a neat diagram.	CO4	(06)
	b)	Explain the various types of file systems in the Solaris operating system.	CO4	(06)
	c)	Describe the tree structured and acyclic-graph directories using suitable diagrams.	CO4	(08)
9.	a)	Define the following terms: i) Image ii) Container iii) Dockerfile iv)Docker Client v) Docker Daemon /Engine.	CO5	(05)
	b)	Discuss how containers differ from Hypervisor based virtualization.	CO5	(07)
	c)	With a neat diagram explain the architecture of Dockers.	CO5	(08)
10.	a)	Explain the various ways in which a user can configure the containers to be accessible.	CO5	(06)
	b)	Show how a user can identify which network mode is being used by a container.	CO5	(06)
	c)	With a neat diagram describe Docker Container Life Cycle.	CO5	(08)

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