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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

SEMESTER END EXAMINATIONS – JANUARY 2018

Course & Branch	**:**	**B.E. : Computer Science & Engineering**	**Semester**	**:**	**V**
Subject	**:**	**Operating Systems**	**Max. Marks**	**:**	**100**
Subject Code	**:**	**CS51/CS512/CS1551**	**Duration**	**:**	**3 Hrs**

Instructions to the Candidates:

- Answer one full question from each unit.
- For the problematic questions, assume the missing data.

UNIT- I

1. a) Describe limited directed execution mechanism for the problem of restricted operations with a time-line. CO1 (08)
   b) Illustrate with a program fork( ), wait( ) and execvp( ) system calls. CO1 (06)
   c) Explain the process state transition diagram. Also illustrate transitions of states for I/O bound and CPU bound processes. CO1 (06)

2. a) Explain the creation of a process with a neat diagram. CO1 (06)
   b) Describe various operating system services. CO1 (06)
   c) Compute average waiting time and average turnaround time using Round Robin RR (Time slice=4ms) and shortest time to completion first (STCF) scheduling algorithms. CO2 (08)

Process	Burst-Time (ms)	ArrivalTime
P1	10	0
P2	5	2
P3	9	3
P4	7	4
P5	4	6

UNIT- II

3. a) Justify that "Multi-Queue Scheduling increases throughput than single-queue scheduling" withan example. CO2 (07)
   b) Illustrate briefly address space layout created by OS to use abstraction of physical memorywith a neat diagram. CO3 (06)
   c) Consider a multilevel paging system has 40-bit virtual address space, and a small (512 byte) page. CO3 (07)
      i. How many pages are possible?
      ii. How many page tables are possible?
      iii. How many entries in the page table?
      iv. How many entries in the directory?
      v. Show the virtual address format.

4. a) Write the equivalent statements for the following code and demonstrate with a neat diagram, "the total no of memory accesses required to fetch the array elements when paging technique is used". Consider Virtual address space of size 32KB and page size is of 1KB, page table address=512.(Assume the relevant data). CO3 (10)

```
int array[500];
for(i=0;i<500;i++)
array[i]=0;
```

b) Briefly explain the merits and demerits of using Single Queue scheduling with necessary diagrams. CO2 (05)

c) With a diagram show how hybrid approach can be used to design efficient page table. CO3 (05)

UNIT- III

5. a) Explain how OS will access the desired page in the swap space to put that page into the physical memory. CO3 (06)

b) Describe the address translation to implement virtualization using segmentation technique. CO3 (06)

c) Explain the concept of fine grained VS course grained segmentation. Also describe support for sharing using segmentation technique. CO3 (08)

6. a) Compare random policy with FIFO replacement algorithm with an example. CO3 (06)

b) Given a virtual address for a segment how does hardware knows the offset value and which segment to refer? Explain with suitable example. CO3 (06)

c) Consider the following page reference string: CO3 (08)
0,1,2,3,0,1,2,3,0,1,2,3,4,5,6,7
How many page faults would occur for the following replacement algorithms assuming 3 frames?
i) LRU replacement ii) FIFO replacement iii) Optimal replacement.

UNIT- IV

7. a) Solve the following using bankers algorithm with the given snapshot of a system. CO4 (10)

Process	Allocation				Maximum				available			
	A	B	C	D	A	B	C	D	A	B	C	D
P0	0	0	1	2	0	0	1	2	1	5	2	0
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

i) Compute the content of need matrix.

ii) Is the system in a safe state?

iii) If a new request from process P1 arrives for (0, 4, 2, 0) can the request be granted immediately?

b) Describe the bounded buffer problem. Also provide the correct solution using mutual exclusion. CO4 (10)

8. a) Describe locks and condition variables to implement concurrency control. CO4 (06)

b) Explain order-violation bug and also the solution to fix the bug with suitable example. CO4 (08)

c) Illustrate thread trace for two threads using a semaphore. CO4 (06)

UNIT- V

9.	a)	Explain how fast file system will place and directions and associated metadata on disk to improve performance.	CO5	(06)
	b)	Describe track buffer used for disk operations with an example.	CO5	(06)
	c)	With an example discuss the implementation of multi – level index technique to support bigger files.	CO5	(08)
10.	a)	Describe various disk scheduling algorithms with examples.	CO5	(06)
	b)	Explain inode bitmap and data bitmap file system structures on the disk. with suitable diagram.	CO5	(06)
	c)	With a file creation timeline diagram explain how OS performs write operation on a disk.	CO5	(08)

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