

Government College of Engineering, Amravati
(An Autonomous Institute of Government of Maharashtra)

Sixth Semester B. Tech. (CS / IT)

Summer – 2016

Course Code: CSU602

Course Name: Operating System Design

Time: 2 hr. 30min.

Max. Marks: 60

Instructions to Candidate

- 1) All questions are compulsory.
- 2) Assume suitable data wherever necessary and clearly state the assumptions made.
- 3) Diagrams/sketches should be given wherever necessary.
- 4) Use of logarithmic table, drawing instruments and non-programmable calculators is permitted.
- 5) Figures to the right indicate full marks.

1. Solve any Two

- (a)** What do you mean by System Calls? State and **6M** explain different categories of System Calls
- (b)** Define Process? Explain the different state of process? Describe the reason for transition from **6M** one state to another.
- (c)** Explain inter process communication. And **6M** Difference between direct and indirect communication.

Solve any Two

2

- (a) What is Semaphore? What are the different operations define for semaphore? Give an implementation of Semaphore. 6M
- (b) What are the different synchronization problems? Explain each one. 6M
- (c) What is Critical Region ? How it is used to Solve the Critical Section Problem. Explain with Example. 6M

3.

Solve

- (a) Under What Circumstances do page fault occure? Describe the actions taken by operation System when page fault occure. 6M
- (b) State the necessary Condition for a deadlock to occur. Consider the following snapshot of a System :

	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 ₃	1 3 5 4	2 3 5 6	
P ₄	0 6 3 2	0 6 5 2	
P ₅	0 0 1 4	0 6 5 6	

What is the content of Matrix need? Is the system is in safe state? if a request from process p₁ arrives for (0,4,2,0) can the request be granted immediately?

9/12/13

4

Solve

- (a)** Consider the following Page-reference string: **6M**

1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6.

How many page fault would occur for the following replacement algorithms assuming one, two, three, four, five, six, or seven frames? Remember that all the frames are initially empty, so your first unique pages will cost one fault each

- (a) LRU replacement
- (b) FIFO replacement
- (c) Optimal replacement

- (b)** What is the cause of thrashing? How does the system detect Thrashing? Once the system detects thrashing, what can the system do to eliminate this problem? **6M**

5. **Solve any TWO**

- (a)** With the reference of process scheduling under Linux explain the scheduling for time sharing, processes and real-time scheduling. **6M**

- (b)** Explain the networking structure of Linux With the different layers implementation. **6M**

- (c)** Differentiate between **6M**
- (a) Buffering and cashing
 - (b) Buffering and spooling
 - (c) i/o scheduling and buffering

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1. Solve any TWO

a. What are the different operating system services? **6M**
Explain in brief with example.

b. Draw and Explain the UNIX system structure. **6M**

c. What is the purpose of interrupts? What are the differences between a trap and an interrupt? Can traps be generated intentionally by a user program? If so, for what purpose? **6M**

2. Solve

a. Consider the following five process

Process	P0	P1	P2	P3	P4
Arrival Time	2	4	8	6	0
Burst time	5	7	6	2	8

6M

Cont.

Compute and prepare comparison chart for waiting time, Turn Around Time of each process for FCFS,SJF,RR(Q=2)

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- b. What is the difference between user level tread and kernel level thread? Under what circumstances one in the type better than other? Describe the action taken by the tread library to context switch user level tread.

3 Solve any Two

- a. Justify Peterson solution to the critical-section problem must satisfy the mutual exclusion, progress and bounded waiting.

5. Sol

a. Exp

- b. Illustrate that with example, if the wait() and signal() semaphore operations are not executed atomically, and then mutual exclusion may be violated.

b. Ho
sha
app

- c. What is the meaning of term busy waiting? What other kind of waiting is there in an operating system? Can busy waiting be avoided? Justify with example

c. Exp

4. Solve

a.	Process Allocation	Max	Available	6M
	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		

Write and apply the banker's algorithm to check safe state or not for above snapshot and find the Need.

- a. If a request from process P2 arrives for (1, 0, 0,

0), can the request be granted immediately?

- b.** Consider the following page reference string **6M**
1 2 3 4 2 1 5 6 2 1 2 3 7 6 3 2 1 2 3 6

How many page fault would occur for the following page replacement algorithm by assuming three frames? All frames are initially empty

1. LRU Page replacement
2. Optimal Page replacement
3. FIFO page replacement

5. Solve any TWO

- a.** Explain layered file system structure in detail **6M**

- b** How acyclic graph directory is helpful for file sharing? Illustrate hard link and soft link approaches for file sharing. **6M**

- c** Explain Security in linux with example **6M**

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1 Solve any Two

a List and Explain Services provided by operating 6M
System

b What is an operating system? Explain User view 6M
and System view

c List different categories of System call. Explain 6M
Device management system call in brief

2 a What is critical region? How semaphore is used in 6M
critical section problem? Illustrate with example

b Consider the following set of processes, with 6M

length of CPU-burst time in the milliseconds:

Process	Burst Time	Arrival Time	Priority
P1	12	0	3
P2	8	2	1
P3	2	4	4
P4	5	6	2

Draw Gantt Chart illustrating the execution of the processes using SJF, Priority scheduling and RR (quantum=3) scheduling. What is the turnaround time and waiting time of each process for each of the scheduling?

- 3 a How to find out whether or not system is in safe state for resources has multiple instances? Explain with example 6M
- b What are the necessary conditions for the deadlock to exist? How will you prevent deadlocks? 6M
- 4 Solve any Two
- a Consider the following page reference string 6M
7,0,1,2,0,3,0,4,2,3,0,3,2,1,2,0,1,7,0,1
How many page fault would occur for the following replacement algorithm, assume frame size is three and all frames are empty initially
i) LRU ii.) Optimal Replacement iii) FIFO
- b What is virtual memory? how it is implemented in demand paging 6M
- c When does thrashing occur? Explain the causes of thrashing 6M
- 5 a Solve any Two
Which is the slandered on-disk file system used 6M

by Linux? Explain block allocation policies for it

- b** Explain the general graph directory structure **6M**
- c** Explain the three layer of software implemented by Linux kernel **6M**

6M

6M

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