SOMAIYA VIDYAVIHAR UNIVERSITY

09·12·2023 (E)

Semester: July 2023 –October 2023		
Maximum Marks: 100 **Examination: ESE Examination**		**Duration:3 Hrs.**
Programme code: 01 **Programme: B.Tech** COMP	**Class: TY**	**Semester: V (SVU 2020)**
Name of the Constituent College: **K. J. Somaiya College of Engineering**	**Name of the department: Computer Engg.**	
Course Code: 116U01C503	**Name of the Course: Operating System**	
Instructions: 1)Draw neat diagrams 2) All questions are compulsory **3) Assume suitable data wherever necessary**		

Que. No.	Question	Max. Marks
Q1	Solve any Four	20
i)	Define the essential properties of Real Time and Time sharing Operating Systems.	5
ii)	Explain creation and termination operations on Process.	5
iii)	Discuss the various Input/ Output Buffering schemes with suitable diagrams.	5
iv)	Compare the memory organization schemes of contiguous memory allocation, pure segmentation, and pure paging with respect to the following issues: a. External fragmentation b. Internal fragmentation	5
v)	Define process and various states of the process with the help of diagram.	5
vi)	What are cooperating processes? Give atleast three reasons for Interprocess communication.	5
Q2 A	Solve the following	10
i)	Using the below program, identify the values of pid at lines A, B, C, and D. (Assume that the actual pids of the parent and child are 2600 and 2603, respectively.)	5
ii)	Show that, if the wait () and signal () semaphore operations are not executed	5

```
#include <sys/types.h>
#include <stdio.h>
#include <unistd.h>

int main()
{
pid_t pid, pid1;

    /* fork a child process */
    pid = fork();

    if (pid < 0) { /* error occurred */
       fprintf(stderr, "Fork Failed");
       return 1;
    }
    else if (pid == 0) { /* child process */
       pid1 = getpid();
       printf("child: pid = %d",pid); /* A */
       printf("child: pid1 = %d",pid1); /* B */
    }
    else { /* parent process */
       pid1 = getpid();
       printf("parent: pid = %d",pid); /* C */
       printf("parent: pid1 = %d",pid1); /* D */
       wait(NULL);
    }

    return 0;
}
```

	atomically, then mutual exclusion may be violated.	
	OR	
Q2 A	Explain the layered approach to Operating system design? Give the advantages and disadvantages of using the layered approach?	10
Q 2 B	Solve any One	10
i)	With respect to Contiguous memory allocation, Illustrate the working of Best Fit, Worst Fit and First Fit allocation algorithm with suitable examples for each.	10
ii)	Explain Multilevel feedback queue scheduling with example. How it is useful than Multilevel queue scheduling.	10

Que. No.	Question	Max. Marks
Q3	Solve any Two	20
i)	Assume the following workload in a system: Process / Arrival Time / Burst Time P1 5 5 P2 4 6 P3 3 7 P4 1 9 P5 2 2 P6 6 3 Draw a Gantt chart illustrating the execution of these jobs using Shortest Remaining Time First (SRTF) algorithm and also Calculate the average waiting time and average turnaround time.	10
ii)	Paging is a non-contiguous memory allocation scheme. Justify. Explain the role of translation look aside buffer (TLB) in paging.	10
iii)	Explain critical section problem. State Readers-Writers Problem and give its solution using Semaphore.	10

Que. No.	Question	Max. Marks
Q4	Solve any Two	20
i)	Illustrate Inter Process Communication. How to handle it using Shared Memory and Message Passing?	10
ii)	Explain Race conditions with example. Consider a banking system with two functions: deposit (amount) and withdraw (amount). These two functions are passed the amount that is to be deposited or withdrawn from a bank account. Assume a shared bank account exists between a husband and wife and concurrently the husband calls the withdraw() function and the wife calls deposit(). Describe how a race condition is possible and what might be done to prevent the race condition from occurring.	10
iii)	Explain Deadlock Prevention in detail.	10

Que. No.	Question	Max. Marks
Q5	Write short notes on any four	20
i)	Process Control Block	5
ii)	Acyclic graph directories structure	5
iii)	Bit vector for free space management	5
iv)	Peterson solution to the Critical section Problem	5
v)	Recovery from Deadlock	5
vi)	Inverted Page Table	5