# 2022

( November )

## COMPUTER SCIENCE

( Honours )

( CS-501 T )

**( Operating System and Introduction to LINUX )**

*Marks* : 56

*Time* : 3 hours

*The figures in the margin indicate full marks for the questions*

Answer **one** question from each Unit

### UNIT—I

**1.** *(a)* Explain the role of an operating system as an extended machine. 3

*(b)* What are system calls? Explain briefly **read** system call. 2+2=4

*(c)* Draw the Gantt chart and calculate the completion time, turn-around time, average turn-around time, waiting time and average waiting time for

the following processes using **Shortest Remaining Time First (SRTF)** scheduling algorithm : 5

| *Process* | *Arrival Time* | *Burst Time* |
|---|---|---|
| *P1* | 0 | 7 |
| *P2* | 1 | 5 |
| *P3* | 2 | 3 |
| *P4* | 3 | 1 |
| *P5* | 4 | 2 |
| *P6* | 5 | 1 |

**2.** *(a)* Write briefly on the ways, a process can be created and a process can be terminated. 2+2=4

*(b)* Bring out the difference between a program and a process. What do you understand by a process control block (PCB)? 5

*(c)* What is a race condition? What is a critical region? What do you understand by mutual exclusion? 1+1+1=3

## UNIT—II

**3.** *(a)* What is a deadlock? What are the necessary conditions for deadlock to occur? Discuss the methods for handling deadlock. 1+4+4=9

*(b)* Explain deadlock detection with one resource of one type. 2





**4.** *(a)* Consider the following snapshot of a system :

| | *Allocation* | | | *Max* | | | *Available* | | |
|---|---|---|---|---|---|---|---|---|---|
| | *X* | *Y* | *Z* | *X* | *Y* | *Z* | *X* | *Y* | *Z* |
| $P_0$ | 0 | 0 | 1 | 8 | 4 | 3 | 3 | 2 | 2 |
| $P_1$ | 3 | 2 | 0 | 6 | 2 | 0 | | | |
| $P_2$ | 2 | 1 | 1 | 3 | 3 | 3 | | | |

Answer the following questions using Banker's algorithm :

*(i)* What is the content of the need matrix?

*(ii)* Is the system in a safe state? Show at least two safe sequences of processes for execution such that the system does not fall in deadlock.

*(iii)* If a request from process $P_0$ arrives for (0, 0, 2), can the request be granted immediately? 1+4+2=7

*(b)* Explain deadlock prevention using attacking the no preemption condition and attacking the hold and wait condition. 2+2=4

## UNIT—III

5. *(a)* Explain the concept of paging with the help of an example. 2

*(b)* Consider the following page reference string :

1, 2, 3, 4, 2, 1, 5, 3, 2, 4, 6

How many page faults would occur in three-page frame by using LRU, OPTIMAL and FIFO page replacement policies? 3×3=9

6. *(a)* Explain the function of the second chance page replacement algorithm to handle page requests, citing with an example. 5

*(b)* What is Belady's anomaly? Explain with an example. 6

## UNIT—IV

7. *(a)* Briefly explain any six attributes of a file. 6

*(b)* Bring out the differences between **sequential file access** and **random file access**. 5





8. *(a)* Suppose the following disk request sequence (track numbers) for a disk with 200 tracks (numbered from 0 to 199) is given :

82, 170, 43, 140, 24, 16, 190

Assume that the initial position of the R/W head is on track 50. Calculate the total number of track movements by R/W head using FCFS, SSTF and Scan disk scheduling algorithms. 3×3=9

*(b)* Briefly explain **I-node**. 2

## UNIT—V

9. *(a)* What is the difference between **cat a.txt** and **cat > a.txt**? Give the syntax of **chmod** command. 3+2=5

*(b)* Explain any three types of **Shell**. 3

*(c)* Explain briefly the kernel. 3

10. *(a)* Write a shell program that checks whether a given integer number is an **Armstrong number** or not. 5

*(b)* Write short notes on the following UNIX commands with an example each : 2×3=6

*(i)* rm.

*(ii)* cp.

*(iii)* wc.

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