M.Sc. I SEMESTER [MAIN/A.T.K.T.] EXAMINATION
DECEMBER 2022 - JANUARY 2023

COMPUTER SCIENCE

Paper - III

[Operating System]

[Max. Marks : 75] *[Time : 3:00 Hrs.]* *[Min. Marks : 26]*

Note : Candidate should write his/her Roll Number at the prescribed space on the question paper.
Student should not write anything on question paper.
Attempt five questions. Each question carries an internal choice.
Each question carries **15 marks.**

Q. 1 a) What are the different function performed by an operating system ?

b) What is a Process ? What are the different stages in the life of a process.

OR

Consider a system with a set of Processes P_1, P_2 and P_3 and their CPU burst times, priorities and arrival time being mentioned as below -

Process	CPU Burst Time	Arrival Time	Priority
P_1	5	0	2
P_2	15	1	3
P_3	10	2	1

Assume 1 to be the highest priority and calculate average waiting time and average turn around time using following algorithm -

i) First come first served.

ii) Shortest job first.

iii) Shortest remaining time..

iv) Round Robin (Quantum time-2) .

v) Priority preemptive scheduling.

Q. 2 a) What is Critical Section Problem ? What do you mean by semaphores and semaphores in concurrent. operations

b) What is bounded buffer problem and solution using semaphore. Explain in brief.

OR

P.T.O.

a) What are the necessary condition for a deadlock. Explain in detail and write a short note on resource allocation graph.

b) Let us consider the following snapshot for understanding the banker's algorithm -

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P_0	1	1	2	4	3	3	2	1	0
P_1	2	1	2	3	2	2			
P_2	4	0	1	9	0	2			
P_3	0	2	0	7	5	3			
P_4	1	1	2	1	1	2			

1. Calculate the content of the need matrix ?
2. Check if the system is in a safe state ?
3. Determine the total sum of each type of resource ?

Q. 3 Explain the differences between following -

i) Internal and External fragmentation.

ii) Physical address and logical address.

iii) Paging and Segmentation.

OR

Explain virtual memory and page replacement algorithms in detail and consider the following reference string -

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

How many pages faults will occur for -

i) FIFO

ii) LRU

iii) Optimal page replacement algorithm assuming three frames. All frames are initially empty.

Q. 4 a) Explain logical structure of directory in detail with diagram.

b) Explain various methods of file allocation with advantages and disadvantages.

OR

Cont. . .

a) Explain the different operations performed on files.

b) Explain the various access methods of files.

Q. 5 Let's consider a disk consisting of 100 concentric tracks (0-99) and let's assume the operating system needs to access sectors on the following tracks- [43, 52, 24, 65, 70, 48, 16, 61] and the head is to start with at track 20.

Find the average seek time using following disk scheduling algorithms -

i) First come First serve.

ii) Shortest Seek time.

iii) SCAN.

iv) LOOK.

OR

Write short notes on following -

i) Structure of device hardware of software.

ii) Terminal Driver.

iii) Function of Clock Driver.