2055
B.E. (Computer Science and Engineering)
Fourth Semester
CS-403: Operating System

Time allowed: 3 Hours

Max. Marks: 50

NOTE: *Attempt* <u>*five*</u> *questions in all, including Question No. I which is compulsory and selecting two questions from each Unit.*

x-x-x

I. Explain in brief:-

a) Write a short note on "Process Control Block".

b) Define the term Waiting time and Turnaround time in reference to scheduling algorithms.

c) What is a page and what is a frame. How are the two related?

d) Define the term deadlock.

e) Differentiate between paging and segmentation. (5x2)

UNIT - I

II. a) What are system calls? Briefly point out its types with illustrations. (3)

b) Solve dining philosopher problem using semaphores. (4)

c) What is inter-process communication? Discuss message passing and the shared memory concept of IPC. (3)

III. a) Calculate the average waiting time and the average turnaround time by drawing the Gantt chart using SRTF and the Priority scheduling algorithm

Processes	Arrival Time	Burst Time	Priority
P1	0	8	3
P2	1	4	2
P3	2	9	1
P4	3	5	4

b) Discuss in detail the multithreading model, its advantages and disadvantages with suitable illustration. (2x5)

IV. a) What is the need of Page replacement? Consider the following reference string
7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

Find the number of Page Faults with FIFO, Optimal Page replacement and LRU with four free frames which are empty initially. Which algorithm gives the minimum number of page faults?

b) Define the first-fit, best-fit and worst-fit strategies of memory placement. Given memory partition of 100 KB, 500 KB, 200 KB and 600 KB (in order). Show with neat sketch how would each of the first-fit, best-fit and worst fit algorithms place processes of 412 KB, 317 KB, 112 KB and 326 KB (in order). Which algorithms make the best use of memory? (2x5)

UNIT - II

V. a) Suppose that a disk drive has 100 cylinders, numbered 0 to 99. The drive is currently serving a request at cylinder 43, and previous request was at cylinder 25. The queue of pending request, in FIFO order is: 86, 70, 13, 74, 48, 19, 62, 50, 30

Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for each of the following disk scheduling algorithms?

    (i) FCFS   (ii) SCAN

b) What do you mean by directory structure? Also briefly explain about single-level, two-level and Tree Structured directories. (2x5)

VI. a) What is Thrashing? What is the cause of Thrashing? How does the system detect Thrashing? What can the system do to eliminate this problem? (4)

b) Discuss the concept of Belady's anomaly with suitable example. (3)

c) Explain "race condition" and also state how process synchronization is handled using semaphore? Explain with algorithms. (3)

VII. a) What is segmentation? Explain the basic method of segmentation with an example.

b) How unsafe state differs from deadlock state? Consider following initial state and identify whether requested resource is and granted or denies for the given cases.

Process	Has	Max
A	2	6
B	1	5
C	2	3
D	3	8

Free = 2

    i)   What will happen if process D request 1 resource?

    ii)   What will happen if process A request 1 resource? (2x5)

x-x-x