SASTRA DEEMED UNIVERSITY

(A University under section 3 of the UGC Act, 1956)

End Semester Examinations

December 2022

Course Code: **CSE308**

Course: **OPERATING SYSTEMS**

QP No. :**U349R**

Duration: **3** hours

Max. Marks:**100**

PART - A

Answer any FOUR questions   **4 x 20 = 80 Marks**

1. a) Explain the two models of interprocess communication. What are the strengths and weaknesses of the two approach? (10)
   b) Discuss on storage structures in a computer with a neat hierarchy diagram. (10)

2. a) What is the purpose of system calls? Explain the types of system calls provided by operating systems. (14)
   b) Describe short term, medium term and long-term schedulers. (6)

3. Consider the following set of processes, with the length of CPU burst given in milliseconds:

Process	Burst time	Priority
P1.	2	2
P2	1	1
P3	8	4
P4	4	2
P5	5	3

The processes are assumed to have arrived in order P1, P2, P3, P4, P5 all at time 0. Illustrate execution of the following algorithms: FCFS, SJF, Non preemptive priority (larger number implies higher priority) and RR (quantum =2) using:

    a) Draw Gantt chart for the processes in the table using the above algorithms.

    b) 2.Calculate Turnaround time and waiting time for each of the scheduled algorithms.

    c) Which of the algorithm results in minimum waiting time?

4. a) Describe the Bounded - buffer problem and give a solution for the same using semaphores. Write the structure of producer and consumer processes. (10)

    b) A single processor system has three resource types A, B, C which are shared by four processes namely P1, P2, P3 and P4. Banker's algorithm is used by OS to avoid the deadlock. The below table shows the current allocation and maximum demand by the processes.

Process	Max	Allocation
P1	8,2,3	3,1,0
P2	4,8,5	3,8,4
P3	9,7,1	9,6,0
P4	7,0,4	0,0,4

There are still (2,1,2) instances of (A, B, C) are available respectively.

    i) 1.Find the need matrix. (2)

    ii) Which of these two requests will be granted? (2)

        Req1: P1 requests 1,1,1 of A, B, C respectively

        Req2: P4requests 1,0,1 of A, B, C respectively

    iii) Identify a safe state for the above. (6)

5. a) Consider the following page-reference string:

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

How many page faults would occur for the following replacement algorithms, assuming frame size is 4. Remember that frames are initially empty.

(i) LRU replacement. (ii) FIFO replacement.
(iii) Optimal replacement. (10)
b) Discuss on paging hardware with TLB using a neat diagram. (10)

6. a) Explain various file allocation methods. (10)
   b) Discuss on Interrupt and DMA methods for IO Interfacting in detail. (10)

PART – B

Answer the following   **1 x 20 = 20 Marks**

7. a) A hard disk having 2000 cylinders, numbered from 0 to 1999. the drive is currently serving the request at cylinder 143, and the previous request was at cylinder 125.The status of the queue is as follows: 86, 1470, 913, 1774,948,1509,1022,1750,130.
   What is the total distance (in cylinders) that the disk arm moves to satisfy the entire pending request for each of the following disk-scheduling algorithms?
   (i) SSTF (ii) FCFS (iii) SCAN (iv) C-SCAN . (12)

   b) Consider six memory partitions of size 200 KB, 400 KB, 600 KB, 500 KB, 300 KB and 250 KB. These partitions need to be allocated to four processes of sizes 357 KB, 210 KB, 468 KB and 491 KB in that order. Perform the allocation of processes using First Fit Algorithm, Best Fit Algorithm and Worst Fit Algorithm. Identify which algorithm performs better. (4)

   c) A page table for a 16-bit virtual and physical address and with 4096-byte pages is shown below.   A B C D E F (4)

Page	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Page frame	9	1	14	10	-	13	8	15	-	0	5	4	-	-	3	2

Convert the following virtual address (in Hex) to equivalent physical address. Answer can be in either in decimal or Hexadecimal.
   i) 0xE12C   ii) 0x3A9D   iii) 0xA9D9   iv) 0x7001

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