P P SAVANI UNIVERSITY

Fourth Semester of B. Sc. (I.T.) Examination

Nov-Dec. 2021

SSIT2040 Operating Systems

30.11.2021, Tuesday **Time: 12:30 p.m. to 03:00 p.m.** **Maximum Marks: 60**

Instructions:

1. The question paper comprises of two sections.
2. Section I and II must be attempted in separate answer sheets.
3. Make suitable assumptions and draw neat figures wherever required.
4. Use of scientific calculator is allowed.

SECTION – I

Q - 1 MCQ/Short Question/Fill in the Blanks (Any Five) **[05]**

(i) What is Operating System?

(ii) Enlist different types of scheduler.

(iii) Which module gives control of the CPU to the process selected by the short-term scheduler?

(iv) Which algorithm uses Time quantum value for scheduling?

(v) Define Deadlock.

(vi) A set of instructions is called _____.

(vii) Program which acts as an interface between a user and the hardware is called _____.

Q - 2 (a) What is Process Control Block (PCB)? Explain process state diagram with diagram. **[05]**

Q - 2 (b) Explain different services of Operating System (OS). Discuss generations of OS in brief. **[05]**

OR

Q - 2 (a) What is Operating System? Write different type of Operating System and explain any two of them. **[05]**

Q - 2 (b) What do you mean by Deadlock Avoidance? Write Banker's Algorithm. **[05]**

Q - 3 (a) Write short Notes on following: **[05]**

(a) Context Switching (b) CPU Scheduling Criteria's

Q - 3 (b) Find Average Waiting Time(WT) and Turn Around Time(TAT) for the following example using Round Robin Algorithm (Time Quantum-TQ=2): **[05]**

Process	Arrival Time	CPU cycle
P1	0	13
P2	1	4
P3	2	3
P4	3	6
P5	4	5

OR

Q - 3 (a) Find Average Waiting Time (WT) and Turn Around Time (TAT) for the following example using First Come First Serve (FCFS). **[05]**

Process	Arrival Time	Burst Time
P1	0	2
P2	2	3
P3	4	4
P4	6	5
P5	8	6

Q - 3 (b)	Explain types of Semaphore? Consider a system in which initial value of counting semaphore S is 7. Following operations are performed in given sequence 12P, 10V, 13P, 8V, 3P. What is final value of counting semaphore S.? Do any process are waiting over S and if yes then how many? Else how many processes are still allowed to enter into CS?	[05]
Q - 4	Attempt any one.	[05]
(i)	What is Readers-Writers Problem? Explain its solution using Semaphore.	
(ii)	What is Producer-Consumer Problem? Explain its solution using Semaphore.	

SECTION – II

Q - 1	MCQ/Short Question/Fill in the Blanks (Any Five)	[05]
(i)	What is virtual memory?	
(ii)	Give example of internal fragmentation.	
(iii)	What is belady's anomaly?	
(iv)	Enlist different techniques of contiguous memory allocation.	
(v)	What is logical address space?	
(vi)	Define device driver.	
(vii)	On a movable head system, the time it takes to position the head at the track is known as _____.	
Q - 2 (a)	Explain steps of DMA data transfer with necessary diagram.	[05]
Q - 2 (b)	Explain various file attributes in detail.	[05]

OR

Q - 2 (a)	Suppose that a disk drive has 5000 cylinders, numbered 0 to 4999. The drive is currently serving a request at cylinder 143, and the previous request was at cylinder 125. The queue of pending requests, in FIFO order, is 86, 1470, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position, what is the total distance (in cylinders) that the disk arm moves to satisfy all the pending requests, for each of the following disk scheduling (1) SSTF (2) C-SCAN	[05]
Q - 2 (b)	What is page fault? Explain the steps to service page fault with example.	[05]
Q - 3 (a)	What is directory structure in file system? Explain any two in brief.	[05]
Q - 3 (b)	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 LRU replacement algorithms, assuming four frames? Remember all frames are initially empty.	[05]

OR

Q - 3 (a)	For the following page reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 Calculate the page faults applying the following Optimal Page Replacement Algorithms for a memory with three frames. Initially pages 7, 0 and 1 are already present in physical memory.	[05]
Q - 3 (b)	Explain following in brief: (1) Sequential file access method (2) Indexed file access method	[05]
Q - 4	Attempt any one.	[05]
(i)	Explain concept of paging with suitable example.	
(ii)	Explain the following memory allocation algorithms: (1) Best-fit (2) Worst-fit	

****