POKHARA UNIVERSITY

Level: Bachelor Semester: Spring Year : 2021
Programme: BE Full Marks: 100
Course: Applied Operating System Pass Marks: 45
Time : 3 hrs.

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks.

Attempt all the questions.

1. a) What is system call? Define major services of operating system. 8
   b) What is CPU bound and I/O bound process? Why inter process communication is required? Explain. 7

2. a) Explain the algorithm of Resource Allocation Graph. Consider a system with three processes (P0-P2) and four allocable resources (A, B, C, D). The total four resources types in the amount as E= (4, 2, 3, 1). The current allocation matrix and request matrix are as follows. 8

   Using Banker's algorithm find:

   i) What will be the context of need matrix?

   ii) Is the system in safe state? If yes, then what is the safe state sequence?

Current Allocation Matrix					Allocation Request Matrix				
Process	A	B	C	D	Process	A	B	C	D
P0	0	0	1	0	P0	0	1	2	1
P1	2	0	0	1	P1	0	0	1	0
P2	0	1	2	0	P2	1	0	2	0

   b) For what purpose semaphores are used? Give solution to producer-consumer problem using semaphores. 7

3. a) How process differs from thread? Explain and differentiate between user and kernel thread. Draw figures to illustrate. 8
   b) What mutual exclusion, race condition and critical condition? Can Peterson's algorithm is guaranteed to solve critical condition problem. Justify your answer. 7

4. a) Define page fault. How many page fault occur for the following reference string for four page frame using Optimal page replacement and LRU algorithms? 8

   reference string : 1,3,1,5,7,7,3,7,4,9,8,1,6,3,4,2,5,8

   b) Explain about Fixed partition and Variable partition. Consider a swapping system in which memory space is as: 7

   400, 700, 1200,250,300 bytes.

   File sizes are as: 900, 25, 600, 200, 300 bytes

   Find the total fragmentation using

   i) First Fit
   ii) Next fit
   iii) Best fit
   iv) Worst fit

5. a) Consider the following request queue (in order): 80, 178, 24, 110, 11, 123, 61, 68 with the head initially at track 45 and the trail track being at 189. 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 algorithms? 8

   i. FCFS
   ii. SSTF
   iii. SCAN (initially moving outward)
   iv. C-SCAN (initially moving inward)

   b) What is fragmentation? Explain segmentation with paging with an example. 7

6. a) What are the three different ways to do input- output? Explain all. 7
   b) What are different file operations? Discuss different file access methods. 8

7. Write short notes on: (**Any two**) 2×5
   a) PCB
   b) Interrupt Handling
   c) DMA
   d) File security in Linux