Total number of printed pages:2

Diploma(D)/IV/DCSE404

2024

OPERATING SYSTEM

Full Marks : 100

Time : Three hours

The figures in the margin indicate full marks for the questions.

*Answer **any five** questions.*

1. a) Define operating system. Briefly explain the functions of an operating system. 2+6=8

   b) Write the difference between batch operating system and time sharing operating system. 6

   c) What is a thread? How does it differ from a process? What is multithreading? 2+2+2=6

2. Consider the following set of processes as given below. 5x4=20

Process	Arrival Time (milliseconds)	Burst Time (milliseconds)
P1	0	5
P2	1	3
P3	2	1
P4	3	2
P5	4	3

   Compute the average waiting time and average turnaround time for the following scheduling algorithms:

   i) FCFS ii) SJF (non-preemptive)

   iii) SJF (preemptive) iv) RR (time quantum = 2 milliseconds)

3. a) What is Producer Consumer problem in OS? Explain the solution using semaphore. 4+10=14

   b) Write a short note on Process Control Block. 6

4. a) Define race condition. How do we avoid race conditions? 2+6=8

b) What is the need of Page replacement? Consider the following reference string 3+9 =12

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 three frames which are empty initially.

5. a) What is segmentation? Explain the Address Translation (Mapping) in a Segmented System with suitable example. Mention its advantages and disadvantages. 2+8+4=14

b) What is deadlock? What are the necessary conditions for deadlock? 2+4=6

6. a) Let there be five processes (P0 to P5) and three resource types A, B and C. Resource type A has 10 instances, B has 6 instances and C has 7 instances. Suppose that at time t_0, the following snapshot of the system has been taken: 2+10=12

Processes	Allocation A B C	Max A B C	Available A B C
P0	1 1 2	4 3 3	2 1 0
P1	2 1 2	3 2 2	
P2	4 0 1	9 0 2	
P3	0 2 0	7 5 3	
P4	1 1 2	1 1 2	

Using Banker's algorithm,

i. Calculate the content of the need matrix?

ii. Check if the system is in a safe state? If yes, what is the safe sequence?

b) What is daisy chain? Define the terms port and bus. 2+2=4

c) Write the Difference between Serial Port and Parallel Ports. 4

7. Write short notes on the following (any four): 4x5 = 20

i) Semaphore ii) Distributed Operating System

iii) Spooling in OS iv) Preemptive scheduling

v) Context Switch vi) Memory Compaction

****