Total number of printed pages: 2 **D/IV/DCSE404**

2023

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) What is an operating system? Briefly explain the structure of an operating system. 3+5=8

   b) What are batch operating systems and network operating systems? Mention their advantages and disadvantages. 6+6=12

2. a) What is a process? How does it differ from a program? Discuss the simplified layout of a process inside main memory. 1+2+4=7

   b) What do you mean by a thread? What are its types? Mention the advantages of a thread. 3+2+3=8

   c) Write a short note on demand paging. 5

3. Consider the process information for the given set of processes. Assuming the context switch delay to be zero, calculate the average waiting time, average turnaround time, and the completion time using FCFS, SJF (Preemptive and non-preemptive) and RR scheduling algorithms (time quantum= 3). Draw corresponding Gantt charts for each of the algorithms. 20

Process	Arrival Time	Burst Time
P1	0	8
P2	1	9
P3	4	10
P4	5	5

4. a) What is a deadlock? Mention the necessary conditions for deadlocks. Briefly explain how deadlocks can be prevented. 2+4+8=14

b) Explain paging and virtual memory. 6

5. a) Consider the following snapshot of a system: 2+10=12

	Allocation	*Max*	*Available*
	A B C	*A B C*	*A B C*
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

Answer the following questions using Banker's algorithm:

(i) What is the content of the Need Matrix?

(ii) Is the System in a safe state? If yes, then mention one of the safe sequences.

b) Discuss the functions of an operating system. 8

6. a) What is the page fault? Consider the following page-reference string: 6, 1, 1, 2, 1, 6, 0, 3, 4, 0, 2, 1, 2, 4, 0 How many page faults would occur for the following replacement algorithms, assuming three frames? All frames are initially empty, so first unique pages will cost one fault each. 10

(i) FIFO replacement

(ii) Optimal

(iii) LRU

b) Write short notes on the following: (any two) 5x2=10

(i) RTOS (ii) Process states

(iii) Preemptive Scheduling (iii) Resource allocation Graph

(v) Distributed OS