9. (a)

Processes	Burst Time	Arrival Time
P1	10	0
P2	5	1
P3	2	3
P4	7	5
P5	9	7

7+8

Deduce the Average Turn Around Time and Average Waiting Time using Shortest Remaining Time First and Round Robin Scheduling.

10.(a) What is the purpose of modify bit in page table? 2

(b) Consider the following page reference string : 8

7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1

How many page faults would occur for the following replacement algorithms assuming 3 frames are available. Also assume that initially none of pages in main memory.

(i) Optimal replacement, (ii) FIFO replacement.

(c) What is thrashing? 2

(d) Explain Belady's anomaly. 3

11.(a) Briefly explain different free space management techniques. 6+6+3

(b) If the size of each data block is 512 bytes in Unix file system, assuming the size of a pointer is 4 bytes. Find the maximum size of a file when Inode block contains 10 direct pointers, 1 single indirect pointer, 1 double indirect pointer and 1 triple indirect pointer.

(c) Explain compaction.

IT-503

Operating System

Time Allotted: 3 Hours Full Marks: 70

The questions are of equal value.
The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable.

GROUP A
(Multiple Choice Type Questions)

1. Answer all questions. 10×1 = 10

(i) Which of the following is (are) non pre-emptive scheduling algorithm?

(A) FCFS (B) SJF
(C) Round Robin (D) priority scheduling

(ii) Which of the following is not the layer of operating system?

(A) kernel (B) shell
(C) application program (D) critical section

(iii) Where does the swap space reside?

(A) RAM (B) DISK
(C) ROM (D) on-chip cache.

(iv) An address generated by the CPU is commonly referred to as

(A) logical address (B) physical address
(C) relational address (D) virtual address

(v) Cryptography technique is used in

(A) polling (B) job scheduling
(C) protection (D) file management

(vi) TLB is a kind of

(A) virtual memory (B) interrupt
(C) cache (D) main memory

(vii) The smallest possible unit of disk storage is

(A) word (B) segment
(C) block (D) extent

(viii) The main advantage of the interrupt concept is elimination of

(A) spooling
(B) polling
(C) job scheduling
(D) blocking the current running process

(ix) Context switching is

(A) part of the spooling (B) part of pooling
(C) part of interrupt handling (D) part of interrupt servicing

(x) To enable a process to be larger than the amount of memory allocated to it, one can use

(A) overlays (B) paging
(C) compaction (D) swapping

GROUP B
(Short Answer Type Questions)

Answer any *three* questions. 3×5 = 15

2. Mention the basic principle of Round Robin scheduling. Specify the impact of time quantum on its performance. 2+3

3. (a) Describe process control block (PCB) in details. 2+1+2
(b) What is a Process? Draw and explain the process state diagram?

4. (a) What do you mean by preemptive and non-preemptive scheduling? 3+2
(b) What are the different scheduling criteria.

5. (a) What is semaphore? 1+4
(b) Write Peterson algorithm for two process critical section problem?

6. (a) What is dispatch latency? 2+3
(b) Explain RPC.

GROUP C
(Long Answer Type Questions)

Answer any *three* questions. 3×15 = 45

7. What is paging? Explain the hardware for paging. How does paging differ from segmentation with respect to hardware? What is Virtual memory? How can segmentation be done with the concept of virtual memory? What is External fragmentation? 2+5+2+1+3+2

8. (a) What is Deadlock? List four necessary conditions for the occurrence of deadlock. 1+4
(b) Does presence of cycle in a resource allocation graph necessarily creates deadlock. 3
(c) Consider the following snapshot of a system.

Processes	Allocation				Max				Available			
	A	B	C	D	A	B	C	D	A	B	C	D
~~P0~~	~~0~~	~~0~~	~~1~~	~~2~~	~~0~~	~~0~~	~~1~~	~~2~~	~~1~~	~~5~~	~~2~~	~~0~~
P1	1	0	0	0	1	7	5	0				
P2	1	3	5	4	2	3	5	6				
P3	0	6	3	2	0	6	5	2				
P4	0	0	1	4	0	6	5	6				

Answer the following questions using Banker's Algorithm : 1+3+3

(i) What is the Need Matrix?
(ii) Is the system in safe state? If yes what is the safe sequence?
(iii) If a request can be process P1 arrives for (0, 4, 2, 0) can the request be granted immediately.