S.No. : 471

NCS 4402

No. of Printed Pages : 05

Following Paper ID and Roll No. to be filled in your Answer Book.

PAPER ID : 43210 Roll No. 1 2 4 0 [redacted]

B. Tech. Examination, 2026

(Even Semester)

OPERATING SYSTEMS

Time : Three Hours] *[Maximum Marks : 60*

Note :– Attempt all questions.

SECTION – A

1. Attempt all parts of the following : 8×1=8

   (a) What is the main goal of an operating system?

   (b) Define context switching.

   (c) What is the difference between a process and a thread?

   (d) What is a semaphore?

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(e) Define deadlock avoidance.

(f) What is demand paging?

(g) What is disk seek time?

(h) What is thrashing?

SECTION – B

2. Attempt any two parts of the following : 2×6=12

(a) Explain the structure and functions of an operating system.

(b) What is multithreading? Explain the benefits of multithreading.

(c) Explain the critical section problem and Peterson's solution.

(d) Explain the concept of virtual memory and demand paging.

SECTION – C

Note :– Attempt all questions. Attempt any two parts from each questions. 8×5=40

3. (a) Consider the following processes :

Process	Arrival Time	Burst Time	Priority
P1	0	8	3
P2	1	4	1
P3	2	9	4
P4	3	5	2

(i) Draw Gantt chart using preemptive priority scheduling.

(ii) Calculate average waiting time.

(iii) Calculate average turnaround time.

(b) Explain different CPU scheduling algorithms with example :

(i) FCFS

(ii) SJF

(iii) Priority scheduling

(iv) Round Robin

(c) Explain scheduling criteria used to evaluate CPU scheduling algorithms.

4. (a) Consider the following data from three resources (A, B, C) :

Process	Allocation			Maximum		
	A	B	C	A	B	C
P0	0	1	0	7	5	3
P1	2	0	0	3	2	2
P2	3	0	2	9	0	2
P3	2	1	1	2	2	2
P4	0	0	2	4	3	3

Available resources :

A = 3, B = 3, C = 2

(i) Compute need matrix.

(ii) Determine whether the system is in safe state.

(iii) Find safe sequence.

(b) Explain the four necessary conditions of deadlock with examples.

(c) Explain deadlock prevention and deadlock avoidance techniques.

5. (a) Reference string :

1, 2, 3, 4, 2, 1, 5, 2, 4, 5, 3, 2, 5, 2

Number of frames = 3.

(i) Apply FIFO page replacement algorithm.

(ii) Apply LRU page replacement algorithm.

(iii) Calculate number of page faults.

(b) Explain paging and segmentation with diagrams.

(c) What is thrashing? Explain its causes and prevention techniques.

6. (a) Disk request queue :

98, 183, 37, 122, 14, 124, 65, 67

Initial head position = 53.

(i) Apply FCFS disk scheduling.

(ii) Apply SSTF disk scheduling.

(iii) Calculate total head movement.

(b) Explain file system structure and directory implementation methods.

(c) Explain kernel I/O subsystem and swap space management.

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