

Time: 3 hours

Max. Marks: 80

N.B.: 1) Question No.1 is compulsory.

2) Attempt any **THREE** questions out of the remaining **FIVE** questions.3) **Figures** to the **right** indicate **full** marks.4) Assume suitable data if **necessary**.Q1 Attempt any **FOUR** of the following

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- What is the content of page table? Explain.
- Compare process scheduling and process switching.
- What is Semaphore? What is its significance?
- Explain UNIX OS kernel.
- Explain Direct Memory Access (DMA) in detail.

Q.2

- Consider the following snapshot of the processes:

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Process	Burst time	Arrival time	Priority
P1	8	0	1
P2	20	1	3
P3	3	2	2
P4	6	3	5
P5	12	4	4

- Draw the Gantt chart for the execution of the processes, showing their start time and end time using FCFS, SJF (without considering the priority), priority scheduling (pre-emptive), RR (with time quantum=5),
- Calculate turnaround time, and average waiting time and average turnaround time for the system.

- Explain with suitable example, how virtual address is converted to physical address?

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Q.3

- Consider the following state of a system with four processes, P1, P2, P3, and P4, and five types of resources, RS1, RS2, RS3, RS4, and RS5:

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$$C = \begin{bmatrix} 0 & 1 & 1 & 1 & 2 \\ 0 & 1 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 2 & 1 & 0 & 0 & 0 \end{bmatrix}$$

$$R = \begin{bmatrix} 1 & 1 & 0 & 2 & 1 \\ 0 & 1 & 0 & 2 & 1 \\ 0 & 2 & 0 & 3 & 1 \\ 0 & 2 & 1 & 1 & 0 \end{bmatrix}$$
 $E = (24144)$ $A = (01021)$

Using the deadlock detection algorithm check deadlock is there or not? If deadlock is there, then identify the processes that are deadlocked.

b What is virtual memory technique? Discuss segmentation with example. 10

Q.4

a Consider the following reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. Find the number of page faults with FIFO, Optimal Page Replacement and LRU with frame size=4, 10

b State features of Cloud OS. Enlist its advantages and disadvantages. 10

Q.5

a What is demand paging? Discuss the hardware support required to support demand paging. 10

b What is Threading and Multithreading? Explain importance of Multithreading. 10

Q.6 Write short notes on any FOUR 20

a Necessary conditions for deadlock

b RAID levels

c Disk Scheduling

d Real Time Operating System

e Deadlock avoidance

f Process Control Block

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