(2 ½ Hours) [Total Marks: 75]

N.B.   1) All questions are compulsory.
2) Figures to the right indicate marks.
3) Illustrations, in-depth answers and diagrams will be appreciated.
4) Mixing of sub-questions is not allowed.
5) Assume suitable data if required.

Q. 1   Attempt All (Each of 5Marks) (15M)

(a)   Multiple Choice Questions

   i.   The _____ provides a file-system interface where clients can create, update, read, and delete files.
        a) compute -server system   b) client-server system
        c) web-server system   d) file-server system

   ii.   As information is used, it is copied into a faster storage system, _____ on a temporary basis.
        a) ROM   b) memory   c) cache   d) RAM

   iii.   When several processes access and manipulate the same data concurrently and the outcome of the execution depends on the particular order in which the access takes place, is called _____

        a) Linking   b) Race condition
        c) synchronization   d) process communication

   iv.   On some systems, binary semaphores are known as _____ locks which provide mutual exclusion.
        a) mutex   b) 2PL   c) permanent   d) semaphore

   v.   A compiler _____ symbolic addresses to relocatable addresses.
        a) fetches   b) sends   c) renames   d) binds

(b)   **Fill in the blanks. Use following pool to answer question.**

   Pool (shells, multiprogramming, processes, boot control block, pure demand paging, dynamic loading)

        i.   On the systems with multiple command interpreters to choose from, the interpreters are known as _____

        ii.   _____ increases CPU utilization by organizing jobs so that the CPU always has one to execute.

        iii.   By switching the CPU among _____, the operating system can make the computer more productive.

        iv.   A _____ can contain information needed by the system to boot an operating system.

        v.   In _____ scheme, processor never brings a page into memory until it is required.

(c) **Answer in 1 – 2 sentences.**

1) What is mean by cascading termination?
2) Where system resource allocation graph can be used?
3) What is a safe state?
4) Enlist the contents of file control block?
5) Write definition of a file?

Q. 2 Attempt the following (Any THREE) (15M)

(a) Write operating system services.
(b) What is process management? Write the activities of operating system in regard to process management.
(c) Describe various types of system calls in detail.
(d) Write a note on layered approach of an operating system.
(e) Define co-operating processes. Explain its four benefits.
(f) Write a short note on multithreading models.

Q. 3 Attempt the following (Any THREE) (15M)

(a) Define following terms with respect to CPU scheduling:
- CPU utilization
- Throughput
- Turnaround Time
- Waiting Time
- Response Time

(b) Consider following processes and their burst cycles. Assume time slice is of 5 units. Find average waiting for each process.

Process	A	B	C	D	E
CPU Burst Time	10	12	7	10	15

(c) Write a short note on critical section problem.

(d) What do you mean by semaphore? Discuss their types.

(e) Find safe sequence for the following snapshot of system. Also compute the content of need matrix. [from the given model assume suitable data if required.]

Allocation			
	A	B	C
P1	0	1	0
P2	3	0	2
P3	3	0	1

Need			
	A	B	C
P1	7	4	3
P2	0	2	0
P3	6	0	0

Available = [2 3 0]

(f)   Discuss the techniques of Recovery from deadlock.

Q. 4   Attempt the following (Any THREE)   **(15)**

(a)   Write a short note on paging.

(b)   Define the following terms:

- Seek time
- Rotational latency
- Access time
- Page fault
- File

(c)   What are the different types of access methods of a file? Explain them in brief.

(d)   For the following page reference string calculate number of page faults with LRU algorithm with frame size = 03

Reference string = a,b,c,d,b,e,f,b,c,b

(e)   Explain free space management techniques with respect to file management.

(f)   Assume that the disk drive has 300 cylinders, numbered from 0 to 299. The drive is currently serving a request at cylinder 110. The pending request queue is 100, 40, 120, 210, 240, 180. (Assume head movement is in the direction of 299)

What is the total distance travelled by the head for 'SSTF' disk scheduling algorithm?

Q. 5   Attempt the following (Any THREE)   (15)

(a)   Explain 5- State process model diagram and its states.

(b)   Describe user threads and kernel threads.

(c)   Define deadloack and state its necessary and sufficient conditions.

(d)   Discuss types of schedulers.

(e)   Discuss the following allocation algorithms

        i.   First Fit
       ii.   Best Fit
     iii.   Worst Fit
     iv.   Compaction
     v.   External fragmentation

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