

(2½ 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.

**Q. 1 Attempt All (Each of 5Marks)****(15M)****(a) Multiple Choice Questions-**

- 1) Round robin scheduling is essentially the pre-emptive version of \_\_\_\_\_.  
 a) FIFO  
 b) Shortest job first  
 c) Shortest remaining  
 d) Longest time first
- 2) A page fault occurs  
 a) when the page is not in the memory  
 b) when the page is in the memory  
 c) when the process enters the blocked state  
 d) when the process is in the ready state
- 3) Multiprogramming systems \_\_\_\_\_.  
 a) Are easier to develop than single programming systems  
 b) Execute each job faster  
 c) Execute more jobs in the same time  
 d) Are used only on large main frame computers
- 4) \_\_\_\_\_ is the situation in which a process is waiting on another process, which is also waiting on another process ... which is waiting on the first process. None of the processes involved in this circular wait are making progress.  
 a) Deadlock  
 b) Starvation  
 c) Dormant  
 d) None of the above
- 5) A major problem with priority scheduling is \_\_\_\_\_.  
 a) Definite blocking  
 b) Starvation  
 c) Low priority  
 d) None of the above

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

(hardware, software, PCB, FCB, processes, real time , LRU, FIFO)

- 1) The operating system of a computer serves as a software interface between the user and the \_\_\_\_\_.
- 2) A \_\_\_\_\_ contains information about the file, including ownership, permissions, and location of the file contents.
- 3) A thread is a \_\_\_\_\_ process.

- 4) \_\_\_\_\_ OS pays more attention on the meeting of the time limits.  
 5) \_\_\_\_\_ page replacement algorithm suffers from Belady's anomaly.  
 (c) Answer in 1 – 2 sentences.
- What is operating system?
  - What is cascading termination?
  - Discuss the term safe state?
  - What is copy on write with respect to virtual memory?
  - Explain the concept of file?

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

- Explain System Calls with respect to following: definition, types and execution.
- What is file management? Write the activities of operating system in regard to file management.
- What are the advantages and disadvantages of threads?
- Discuss Layered Approach in comparison with Kernel based Approach.
- Explain the term cooperating processes. What are the advantages of the same?
- State and explain various multithreading models.

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

- Consider the following table. Calculate average waiting time and turnaround time using SJF. (use non-pre-emptive technique)

Process	Arrival Time	Burst Time
P1	0	07
P2	4	04
P3	6	03
P4	8	04
P5	8	04

- What is a deadlock? State necessary and sufficient conditions for the same.
- Explain semaphores with respect to following points:
  - definition
  - counting semaphore
  - binary semaphore
  - wait operation
  - signal operation

- (d) Assume

**1) Total resources in system:**

A B C D

6 5 7 6

**2) Available system resources are:**

A B C D

3 1 1 2

**3) Processes (currently allocated resources):**

A B C D

P1 1 2 2 1

P2 1 0 3 3

P3 1 2 1 0

**4) Processes (maximum resources):**

A B C D

P1 3 3 2 2

P2 1 2 3 4

P3 1 3 5 0

Compute the need array and check whether system is under safe state or not. Also find safe sequence.

(e) Explain the following concepts:

(1) Starvation (2) aging (3) TAT (4) waiting time (5) CPU utilization

(f) Explain critical section problem in brief.

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

(a) Write a note on SCAN and C-SCAN scheduling algorithm.

(b) Explain the concept of page fault. How the same can be handled by OS?

(c) Consider the following page references string and find total number of page faults using LRU and FIFO where page frame size is 3.

**c d e d e f c e d f**

(d) State and explain different attributes of file.

(e) Disk request come into the disk driver for cylinder 10, 22, 20, 2, 40, 6 and 38 in that order. Find total head movements for each of the following algorithm FIFO and SRTF

(f) Write short notes on:

- 1) DMA
- 2) Polling

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

(a) State various responsibilities of child and parent process.

(b) Depict the gantt chart for FCFS and RR algorithm for the following problem and explain which is better? ( for RR time slice is 5 units)

Process	P1	P2	P3	P4	P5
Burst time	9	15	3	8	14

(c) Write a note on Dining-philosophers problem.

(d) Define the following terms:

- 1) Seek time
- 2) Rotational latency
- 3) Access time
- 4) Transfer time
- 5) Page fault

(e) State and explain various techniques of free space management.