Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40922

B.E/B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Fourth Semester

Computer Science and Engineering

CS 3451 — INTRODUCTION TO OPERATING SYSTEMS

(Common to : Information Technology)

(Regulations 2021)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Operating Systems.
2. List out different services of operating systems.
3. What do you mean by cooperating process?
4. Define IPC.
5. What is address binding?
6. What is page fault, and how is it handled?
7. Name the three methods of allocating disk space for file systems.
8. List the operations that can be performed on the directory.
9. Define virtualization.
10. State the merits of Android OS.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the following terms with necessary illustrations.

    (i) Buffering (2)
    (ii) Spooling (2)
    (iii) Time sharing systems (3)
    (iv) Distributed systems (3)
    (v) Real-time systems. (3)

Or

(b) What are system calls? Explain different categories of system calls with examples. (13)

12. (a) (i) Explain the difference between long-term, short-term, and medium-term schedulers. (5)

(ii) Discuss about threads. (8)

Or

(b) (i) Explain deadlock prevention and avoidance. (5)

(ii) Given 3 processes, A, B and C, three resources, x, y, and z and following events, (8)

(i) A requests x

(ii) A requests y

(iii) B requests y

(iv) B requests z

(v) C requests z

(vi) C requests x

(vii) C requests y

Assume that requested resources should always be allocated to the request process if available. Draw the resource allocation graph for the sequences. Also, mention whether it is a deadlock. If it is, how to recover from the deadlock.

13. (a) (i) Explain paging scheme of memory management. (5)

(ii) Discuss about the different memory allocation techniques. (8)

Or

(b) Consider the following page-reference string

7 0 1 2 0 3 0 4 2 3 0 3 2 1 2 0 1 7 0 1 2 3 4.

(i) How many Page hits would occur in the following page replacement algorithms, assuming four-page frames? Remember that all frames are initially empty, so your first unique pages will all cost one fault each.

- Least-Recently-Used (2)
- First-In-First-Out replacement (2)
- Optimal replacement. (3)

(ii) Calculate the hit ratio for each of the above algorithms. (3)

(iii) Which algorithm is the best for the above case and why? (3)

14. (a) Write short notes on :

(i) Directory organization. (4)

(ii) File system mounting. (4)

(iii) Kernel (I/O) system. (5)

Or

(b) Suppose that a disk drive has 5000 cylinders numbered 0 to 4999 the drive currently services a request at cylinder 143, and the previous request was at cylinder 125. the queue of pending requests in the FIFO order is 86, 1470, 913, 1774, 948, 1509, 1022, 1750 and 130. Starting from the current position, what is the total distance (in cylinders) that the disk arm moves to satisfy all pending requests for each of the following algorithms:

(i) FCFS (3)

(ii) SSFT (3)

(iii) SCAN (3)

(iv) LOOK (2)

(v) C-SCAN. (2)

15. (a) Distinguish the various functional behaviors of IOS and Android with suitable examples. (13)

Or

(b) Explain the concept of virtual machines with a suitable sketch. Also, bring out its benefits and features. (13)

PART C — ($1 \times 15 = 15$ marks)

16. (a) Consider the 5 processes, A, B, C, D and E, as shown in the table. The highest number has low Priority. Find The completion order of the 5 processes under the policies.

Process	Arrival Time	Burst Time	Priority
A	0	6	3
B	2	4	4
C	4	2	3
D	7	4	2
E	11	2	1

(i) Draw four Gantt charts illustrating the execution of these processes using FCFS, pre-emptive SJF, non-pre-emptive Priority and RR (Quantum= 2) scheduling. (8)

(ii) Calculate the average waiting and turnaround times for the above scheduling algorithms. (7)

Or

(b) Represent and explain the drawback of the typical 'Semaphore" solution to Dining Philosophers' problem with pseudo code, and also provide a solution to remedy the drawback. (15)