Operating System (315319)

MSBTE Diploma · K-Scheme · Model Question Paper — Set B

Time: 3 Hours **Max. Marks: 70**

Instructions:

1. All questions are compulsory.
2. Answer each next main question on a new page.
3. Illustrate your answers with neat sketches wherever necessary.
4. Figures to the right indicate full marks.
5. Assume suitable data, if necessary.
6. Mobile phone, pager and any other electronic communication devices are not permissible in the examination hall.

Q.1 Attempt any FIVE of the following: **10**

a) Name the different states of a process.

b) List any four system calls related to file management.

c) Define: i) Turnaround time ii) Response time

d) Distinguish between preemptive and non-preemptive scheduling. (Any two points)

e) Define fragmentation. List its types.

f) State any four operations that can be performed on a file.

g) State the purpose of the *ps* command. Give any two of its options.

Q.2 Attempt any THREE of the following: **12**

a) Differentiate between time-sharing operating system and real-time operating system. (Any four points)

b) Describe the activities of the operating system in: i) File management ii) I/O system management

c) Explain Round Robin scheduling. Four processes P1, P2, P3, P4 arrive at time 0 with burst times 10, 4, 5 and 3 ms. Find the average waiting time using Round Robin with time quantum 4 ms.

d) Describe two-level directory structure with a diagram. State its advantages.

Q.3 Attempt any THREE of the following: **12**

a) What is a scheduler? Explain long-term scheduler and short-term scheduler.

b) Differentiate between user-level threads and kernel-level threads. (Any four points)

c) Explain the concept of virtual memory with a diagram. State its advantages.

d) Describe sequential and direct file access methods with examples.

Q.4 Attempt any THREE of the following: **12**

a) Explain variable (dynamic) partitioning with a diagram. How can external fragmentation be removed?

b) How can a deadlock be prevented by denying i) hold and wait ii) circular wait conditions? Explain.

c) Explain any four CPU scheduling criteria.

d) Explain indexed file allocation with a diagram. How does it differ from linked allocation?

e) Describe bitmap method of free-space management. A disk has 24 blocks (0–23); blocks 1, 2, 4, 5, 6, 9, 10, 13, 14, 15, 18, 22 are free and the rest are allocated. Write the bit vector.

Q.5 Attempt any TWO of the following: **12**

a) Explain any six services provided by the operating system to users and programs.

b) Consider the following processes:

Process	Arrival time	Burst time
P1	0	7
P2	1	4
P3	2	9
P4	4	3

Draw the Gantt charts and calculate the average waiting time and average turnaround time using: i) Round Robin (time quantum = 3 ms) ii) SRTN (Shortest Remaining Time Next)

c) Explain paging with the help of paging hardware diagram. If the page size is 1 KB and page 2 is stored in frame 5, find the physical address of logical address 2500.

Q.6 Attempt any TWO of the following: **12**

a) Explain distributed operating system with a diagram and state its advantages. Also explain mobile operating system with examples.

b) Consider the page reference string: 6, 1, 2, 1, 4, 6, 3, 1, 2, 4, 6, 2, 3, 1, 4. Find the number of page faults using LRU and Optimal page replacement algorithms with 3 page frames.

c) A system has three resource types A, B, C and five processes P0–P4. The current state is:

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

Available = (A, B, C) = (2, 1, 0). Using Banker's algorithm, find the Need matrix and check whether the system is in a safe state. If yes, give the safe sequence.

Note: This is a **model question paper prepared by Ananda Technologies** only for practice and exam preparation, based on the pattern of previous MSBTE question papers and the K-scheme syllabus. It is **not an official MSBTE paper**, and it does **not** mean that these questions will come in the exam. Answers follow standard textbook points; marks shown are indicative. Free for students — anandatechnologies.in