

THE NORTHCAP UNIVERSITY	Question paper for Major Test 2026	Review Date:
	School of Engineering & Technology	Session: Jan-Jun 2026
	Programme Name: BCA	Maximum Marks: 100
	Course Name: Operating System	Duration: 3 hrs
	Course Code: BCL 204	Sheet 1 of 2
	Semester: Even, 4th Semester	

Note:

1. All the questions are compulsory.
2. Marks and COs are indicated against the questions.

CO1: Understand the basic concepts of Operating Systems and their services
 CO2: Apply the concept of process scheduling and acquire knowledge of process synchronization
 CO3: Describe and apply the Deadlock Avoidance & Recovery techniques.
 CO4: Discuss and understand various Memory Management Techniques
 CO5: To compare and analyze various Disk scheduling algorithms

SECTION A (25 marks)

Q. No.	Question	Marks	CO's
Q1.	Explain various file allocation techniques used in operating systems with suitable diagrams.	5	CO5
Q2.	Differentiate between hard real-time and soft real-time operating systems.	5	CO1
Q3.	Explain the concept of a file and list its important attributes.	5	CO5
Q4.	Define Semaphore and explain the operations performed on it.	5	CO2
Q5.	What is a Wait-For Graph? How is it used to detect deadlock?	5	CO3

SECTION B (60 marks)

Q6.	A) Explain in detail the three types of schedulers in an operating system. B) Explain different scheduling criteria used in CPU scheduling.				6+6=12	CO2																												
Q7.	<table><tr><th>Process</th><th>Allocation</th><th>Max</th><th>Available</th></tr><tr><td></td><td>A B C D</td><td>A B C D</td><td>A B C D</td></tr><tr><td>P0</td><td>0 0 1 2</td><td>0 0 1 2</td><td>1 5 2 0</td></tr><tr><td>P1</td><td>1 0 0 0</td><td>1 7 5 0</td><td></td></tr><tr><td>P2</td><td>1 3 5 4</td><td>2 3 5 6</td><td></td></tr><tr><td>P3</td><td>0 6 3 2</td><td>0 6 5 2</td><td></td></tr><tr><td>P4</td><td>0 0 1 4</td><td>0 6 5 6</td><td></td></tr></table>	Process	Allocation	Max	Available		A B C D	A B C D	A B C D	P0	0 0 1 2	0 0 1 2	1 5 2 0	P1	1 0 0 0	1 7 5 0		P2	1 3 5 4	2 3 5 6		P3	0 6 3 2	0 6 5 2		P4	0 0 1 4	0 6 5 6					2+2+8=12	CO3
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Using Banker's algorithm, answer the following questions: - i) How many resources of type A, B, C, D are there? ii) What are the contents of need matrix?																																		

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	iii) Find if the system is in safe state? If it is, find the safe sequence, and write the steps properly (show all steps).		
Q8	A) What is paging? Explain address translation in paging with the help of paging hardware and TLB (translation look aside buffer) B) Define the following terms 1. Thrashing 2. Demand paging 3. Swapping.	6+6=12	CO4
Q9	A) Define page fault and explain how page faults are handled with the help of a neat diagram. B) Differentiate between internal and external fragmentation.	7+5=12	CO4
Q10	Consider the following page reference string: 5, 0, 1, 0, 2, 3, 0, 2, 4, 3, 3, 2, 0, 2, 1, 2, 7, 0, 1, 1, 0. Calculate the number of page faults related to LRU, FIFO, and optimal page replacement algorithms respectively, assuming 03-page frames and all frames are initially empty	4+4+4=12	CO4
SECTION C (15 marks)			
Q11	Consider a disk queue with requests for I/O to blocks on cylinders 176, 79, 34, 60, 92, 11, 41, 114. The head is initially at cylinder number 50 moving towards larger cylinder numbers on its servicing pass. The cylinders are numbered from 0 to 199. Find the total head movement (in number of cylinders) incurred while servicing these requests. Also, draw necessary diagrams. A) FCFS B) SSTF C) CSCAN D) LOOK E) CLOOK	3*5=15	CO5

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