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MCS-041

**MASTER OF COMPUTER
APPLICATIONS (REVISED)**

(MCA)

Term-End Examination

December, 2025

MCS-041 : OPERATING SYSTEMS

Time : 3 Hours

Maximum Marks : 100

Weightage : 75%

Note : (i) *Question No. 1 is compulsory.*

(ii) *Attempt any **three** questions from
the rest.*

1. (a) Why is operating system needed in computer system ? Explain generations of operating systems. 7
- (b) What is paging ? Discuss basic paging technique in detail. 8
- (c) What are system calls and their use ? Explain the following system calls : 10
 - (i) Fork/Join

- (ii) Suspend
 (iii) Resume
 (iv) Exit
- (d) List the types of multiprocessor operating system and explain any *two* types of it. 5
- (e) What is Banker's algorithm ? Apply Banker's algorithm to check safe or unsafe state in the following example :

10

No. of Processes 5 : (P₁, P₂, P₃, P₄, P₅)

No. of Resources 3 : A (10 instances)

B (5 instances)

C (7 instances)

at time T₀

Process	Allocation			Max.			Available		
	A	B	C	A	B	C	A	B	C
P ₁	0	1	0	7	5	3	3	3	2
P ₂	2	0	0	3	2	2			
P ₃	3	0	2	9	0	2			
P ₄	2	1	1	2	2	2			
P ₅	0	0	2	4	3	3			

2. (a) What is Interprocess Communication ?
Explain it. 4
- (b) How to solve interprocess synchronization problem using Dekker's solution for mutual exclusion ? 6
- (c) What do you mean by Process Scheduler ? Discuss short-term scheduler, medium-term scheduler and long-term scheduler. 5
- (d) Explain virtual memory with suitable diagram. 5
3. (a) What is Disk Management ? How does it work ? Explain continuous and non-continuous memory allocation with suitable diagram. 10
- (b) Describe access matrix security model in detail. 6
- (c) Differentiate between Rule-based access control and Role-based access control. 4

4. (a) Explain the memory management technique in Windows 2000. 6
- (b) Discuss the design issues involved in a distributed system. 6
- (c) What is Multiprocessor-Synchronization ? Explain how the following work : 8
- (i) Test-and-Set
 - (ii) Compare-and-Swap
 - (iii) Fetch-and-Add
5. Write short notes on the following : $5 \times 4 = 20$
- (i) Semaphore
 - (ii) RAID
 - (iii) Crossbar-connected system
 - (iv) Round Robin Scheduling Algorithm
 - (v) SCAN and C-SCAN Disk Scheduling Algorithm

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