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Printed Page:-4 **Subject Code:- BBCA0303**

Roll. No:

NOIDA INSTITUTE OF ENGINEERING AND TECHNOLOGY, GREATER NOIDA
(An Autonomous Institute Affiliated to AKTU, Lucknow)
BCA
SEM: III - THEORY EXAMINATION (2025 - 2026)
Subject: Operating System

Time: 3 Hours **Max. Marks: 100**

General Instructions:

IMP: *Verify that you have received the question paper with the correct course, code, branch etc.*

1. *This Question paper comprises of* ***three Sections -A, B, & C.*** *It consists of Multiple Choice Questions (MCQ's) & Subjective type questions.*

2. *Maximum marks for each question are indicated on right -hand side of each question.*

3. *Illustrate your answers with neat sketches wherever necessary.*

4. *Assume suitable data if necessary.*

5. *Preferably, write the answers in sequential order.*

6. *No sheet should be left blank. Any written material after a blank sheet will not be evaluated/checked.*

SECTION-A 20

1. Attempt all parts:-

1-a. Sketch file management efficiency in an OS supporting distributed systems. Which feature is least effective for ensuring data integrity during network failures, and why?(CO1,K3) 1

(a) Backup and recovery mechanisms.
(b) File access controls.
(c) Hierarchical organization without redundancy.
(d) Synchronization protocols.

1-b. Multiprocessor systems based on processor communication come in which mode(CO1,K3) 1

(a) Single core only
(b) Batch oriented
(c) Time-sharing focused
(d) Symmetric and asymmetric

1-c. Identify the roles of client and server.(CO2,K1) 1

(a) Client provides services
(b) Server requests
(c) Client requests, server provides
(d) Both equal

1-d. In client-server systems databases are implemented as.(CO2,K2) 1

(a) Local databases
(b) No servers
(c) Centralized data access

(d) Peer storage

1-e. Describe one or many process states in operating systems.(CO3,K2) 1

(a) Always running
(b) Only terminated
(c) New, ready, running, waiting, terminated
(d) No states exist

1-f. Explain the role of Process Control Block.(CO3,K2) 1

(a) Stores hardware info
(b) Manages files
(c) Controls devices
(d) Contains process information

1-g. Best Fit allocation leads to(CO4,K2) 1

(a) High speed
(b) Large holes
(c) Smallest holes big enough
(d) No holes

1-h. Fixed partitioning leads to which type of fragmentation?(CO4,K2) 1

(a) External fragmentation
(b) Internal fragmentation
(c) Both internal & external
(d) No fragmentation

1-i. Judge the primary drawback of using a linked list for free space management in a real-time operating system where quick allocation is critical.(CO5,K2) 1

(a) High storage efficiency
(b) Slow traversal for finding free blocks
(c) Minimal fragmentation
(d) Easy integration with file allocation tables

1-j. Identify common free space management techniques.(CO5,K1) 1

(a) Only bit vector
(b) Linked only
(c) Grouping only
(d) Bit vector, linked, grouping, counting

2. Attempt all parts:-

2.a. Argue batch processing as an operating method.(CO1,K2) 2

2.b. Discuss the advantages of peer-to-peer computing in networks.(CO2,K3) 2

2.c. Explain the quantum of Round Rtobin (CO3,K3) 2

2.d. Which memory allocation method works best when many processes start and finish quickly, and why?(CO4,K2) 2

2.e. Describe the advantages of buffered I/O.(CO5,K2) 2

SECTION-B 30

3. Attempt all parts:-

3.a. Answer any one of the following:-

3.a.(i)	Examine how a network operating system differs from a distributed operating system.(CO1,K3)	6
3.a.(ii)	Discuss the advantages and disadvantages of using open-source operating systems compared to proprietary operating systems.(CO1,K4)	6

3.b. Answer any one of the following:-

3.b.(i)	Examine the differences between centralized and decentralized computing environments.(CO2,K3)	6
3.b.(ii)	Assess the challenges in securing web-based computing environments compared to traditional models.(CO2,K3)	6

3.c. Answer any one of the following:-

3.c.(i)	Interpret the process state diagram and discuss possible transitions for an executing process.(CO3,K3)	6
3.c.(ii)	Explain with suitable illustration: How OS achieves fairness using Round Robin scheduling.(CO3,K3)	6

3.d. Answer any one of the following:-

3.d.(i)	Compare the first-fit, best-fit, and worst-fit memory allocation schemes in terms of speed, fragmentation, and overall efficiency.(CO4,K5)	6
3.d.(ii)	How can virtual memory be improved to work better with very large data processing tasks?(CO4,K5)	6

3.e. Answer any one of the following:-

3.e.(i)	Solve path resolution problems in tree-structured directories using absolute and relative path examples.(CO5,K3)	6
3.e.(ii)	Evaluate pros and cons of contiguous, linked, and indexed allocation methods in various disk usage scenarios.(CO5,K2)	6

SECTION-C 50

4. Answer any one of the following:-

4-a.	Suppose you are developing the operating system for a self-driving car. What type of operating system would you use and what key features must it have? Justify your answer.(CO1,K3)	10
4-b.	Relate what a distributed operating system is and how it differs from a traditional single-computer OS. Discuss challenges and benefits of distributed OS.(CO1,K3)	10

5. Answer any one of the following:-

5-a.	Analyze the role of event-driven programming in enhancing GUI responsiveness and user experience.(CO2,K3)	10
5-b.	Compare and contrast centralized web-based computing with decentralized peer-to-peer computing environments.(CO2,K3)	10

6. Answer any one of the following:-

6-a.	Critically analyze the advantages and disadvantages of FCFS, SJF, Priority, and Round Robin scheduling algorithms.(CO3,K3)	10
6-b.	Six processes have the following burst and arrival times:	10

P1: Arrival time = 0, Burst time = 4
P2: Arrival time = 1, Burst time = 5
P3: Arrival time = 2, Burst time = 2
P4: Arrival time = 3, Burst time = 1
P5: Arrival time = 4, Burst time = 6
P6: Arrival time = 6, Burst time = 3
If the time quantum is 2 units, use the Round Robin algorithm to determine the completion, waiting, and turnaround times for each process. Also calculate the average waiting time and the average turnaround time.(CO3,K3)

7. Answer any one of the following:-

7-a.	Compare the number of page faults in FIFO for 3 and 4 frames using the string 7,0,1,2,0,3,0,4,2,3,0,3,2 with detailed numerical analysis.(CO4,K3)	10
7-b.	Evaluate FIFO page replacement algorithm with detailed examples and discuss its potential drawbacks.(CO4,K2)	10

8. Answer any one of the following:-

8-a.	Apply the working principles of SCAN and C-LOOK scheduling. Explain how their movement patterns differ and how this affects average seek time.(CO5,K4)	10
8-b.	Suggest a simple way to improve file protection in an operating system.(CO5,K6)	10