Please write your Exam Roll No.) Exam Roll No. .....

END TERM EXAMINATION

FIFTH SEMESTER [BCA] DECEMBER 2025-JANUARY 2026

Paper Code: BCA-301 ***Subject: Operating System & Linux Programming***

[BATCH 2021-2022 onwards]

Time: 3 Hours ***Maximum Marks: 60***

Note: Attempt all questions as directed. Internal choice is indicated.

Q 1 Attempt any **four** of the followings : **(4x5 =20)**

(a) What is multithreading? Also, differentiate between a thread and process.
(b) Describe different file access methods.
(c) Write the use of ps, pwd, ls, nice and cp commands with an example of each.
(d) Draw and explain Process State Transition Diagram.
(e) What are the necessary conditions for a deadlock to occur?
(f) What are independent and cooperating processes?
(g) Differentiate fixed and dynamic memory partition schemes.
(h) Explain deadlock detection and recovery in detail.

Q2 (a) What are the main functions of an Operating System? Describe real time systems in detail with few application areas. **(6)**
(b) Write a shell script to accept three numbers from user and print the largest number. **(4)**

OR

Q3 (a) Explain the architecture of Linux with the help of a diagram. **(6)**
(b) Explain three modes of vi editor. How can we write, save and execute shell scripts in Linux? **(4)**

Q4 (a) Consider the following set of processes with the given burst time and arrival time: **(6)**

Process	Arrival Time	Burst Time
P1	0	8
P2	2	4
P3	3	9
P4	5	5
P5	5	3

Draw GANTT chart to show the process execution using FCFS, SJF (Non-preemptive) and Round Robin (quantum=4 ms) scheduling algorithms, and calculate average turnaround time and waiting time using each algorithm.

(b) What are schedulers? Define them. **(4)**

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P T.O

OR

Q5 (a) What is Critical Section problem? How do Semaphores provide solution to producer-consumer problem? **(6)**
(b) What is Address Binding? How logical addresses are converted into physical addresses in Paging scheme? **(4)**

Q6 (a) What is the difference between first-fit, best-fit and worst-fit allocation schemes? **(4)**
(b) Consider following set of processes with three resources A, B and C.

Process	Allocation			Max			Available		
	A	B	C	A	B	C	A	B	C
P1	1	1	2	4	3	3	2	1	0
P2	2	1	2	3	2	2			
P3	4	0	1	9	0	2			
P4	0	2	0	7	5	3			
P5	1	1	2	1	1	2			

Using Banker's Algorithm, answer the following questions: **(6)**
i) Find the total number of resources of type A, B and C
ii) Find the content of Need matrix
iii) Is the system in safe state? If yes, then find a safe sequence.

OR

Q7 (a) Consider the given page reference string with three frames, find number of page faults that may occur with following page replacement algorithms:
1, 2, 3, 4, 1, 2, 5, 6, 2, 3, 4, 5, 1, 6, 2, 5 **(6)**
i) Least Recently Used
ii) Least Frequently Used
iii) First- In First-Out
(b) What is Demand Paging? Explain the steps required to handle a page fault? **(4)**

Q8 (a) What do you mean by Disk Space Allocation? Differentiate between Linked and Indexed Allocation Methods. **(6)**
(b) Explain tree and acyclic directory structures. What are the different operations that can be performed on directories? **(4)**

OR

Q9 How does Linux implement File Protection? Explain how we can use chmodcommand to assign permissions on a file using symbolic and numeric methods. **(10)**

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