B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E.   **Semester:** V
Branch: Electronics and Communication Engineering   **Duration:** 3 hrs.
Course Code: 19EC5PE2OS   **Max Marks:** 100
Course: Operating System

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
                  2. Missing data, if any, may be suitably assumed.

UNIT - I

1	a)	Compare the key features of various classes of operating system.	**10**
	b)	Consider a time-sharing system having five processes P1, P2, P3, P4 and P5 having CPU bursts 4ms, 11ms, 5ms, 7ms and 6ms respectively, followed by i/o bursts of 15ms, 30ms, 8ms, 15ms and 42ms respectively. Given time slice = 3ms. Prepare the time chart and schedule list of their operation.	**10**

OR

2	a)	Define the system parameters: i. Response time ii. Throughput.	**04**
	b)	Identify the functions and services offered by a kernel-based OS.	**06**
	c)	A multiprogramming system has active processes P1, P2, P3, P4, P5 having the following characteristics.	**10**

Process	P1	P2	P3	P4	P5
t_{cpu}	4ms	6ms	8ms	10ms	5ms
$t_{i/o}$	15ms	12ms	6ms	5ms	10ms

Draw the timing chart for the system when

    i.   CPU bound programs have higher priority.
    ii.   I/O bound programs have higher priority.

UNIT - II

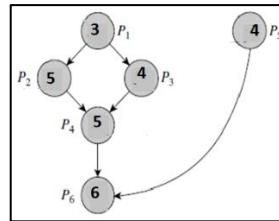|			
3	a)	Write a Linux C program, to create a child process. Both the parent and child should print their Process ids. Let the child process execute "execlp()" to print the date, also list out the file names in the current working directory. Interpret the results.	**07**
	b)	Identify the four fundamental states of a process and illustrate transition between states with appropriate conditions.	**08**
	c)	Analyse the event handling workflow of the kernel when a process requests an i/o operation on a device and when the i/o operation completes.	**05**

OR

4	a)	A process is in the *blocked swapped* state. **i.** Give a sequence of state transitions through which it could have reached this state. **ii.** Give a sequence of state transitions through which it can reach the *ready* state. Is more than one sequence of state transitions possible in each of these cases?	**10**
	b)	Compare a Process Control Block(PCB) and a TCB(Thread Control Block)	**10**

UNIT - III

5	a)	A system has five processes waiting in the ready queue. Find the schedule based on non-pre-emptive HRN algorithm and calculate the average weightage and average turnaround time.	**07**

Process	P1	P2	P3	P4	P5
Admission time	0ms	6ms	3ms	7ms	2ms
Execution time	5ms	3ms	5ms	8ms	4ms

	b)	If the application deadline is 27ms for which the process precedence graph is given here. Find the execution schedule based on EDF and check for the deadline overrun if any. Justify your answer.	**08**

	c)	With an appropriate example of producer-consumer processes sharing a single buffer demonstrate the semaphore implementation to protect the control transfer between them.	**05**

OR

6	a)	Implement Round robin scheduling with a time slice of 4 milli seconds for the processes listed in the table 2, find the average waiting time. Table 2 Processes for Scheduling	**10**

Process	P1	P2	P3
Service time	24	3	3

	b)	Differentiate critical section and race condition with example.	**10**

UNIT - IV

7	a)	Consider 6 consecutive memory blocks of sizes 60B-A, 180B-F, 135B-A, 165B-F, 80B-A and 200B-F (A-allocated, F-free). A process makes an allocation request for 110B, 45B and 170B. Perform memory allocation using
		    i. First fit technique
		    ii. Best fit technique
		    iii. Next fit technique
			07

	b)	With the help of a neat diagram, explain the actions of Virtual Memory Manager in demand loading of a page.	**07**
	c)	Mention the page table attributes used by MMU in paging scheme.	**06**

OR

8	a)	Describe the kernel functions for reuse of memory.	**06**

	b)	Consider 6 consecutive memory blocks of sizes 40B-F, 20B-A, 30B-A, 40B-F, 60B-A & 40B-F (A-allocated, F-free). With free list representation, demonstrate the typical merging of memory using boundary tags when each allocated block goes free individually.	**08**
	c)	In a system having three processes P1, P2 & P3 active with their page entries, if the logical address given by CPU for P2 is (3,250), analyse a scenario of page translation with a neat diagram. [Assume page 7 is allotted]	**06**

UNIT - V

9	a)	Analyse the possible steps to be followed by an interrupt handler.	**10**
	b)	Define device driver. List and discuss the various functions of device independent i/o software.	**10**

OR

10	a)	Why is it necessary to integrate device driver to the operating system kernel. Substantiate your answer with appropriate description	**10**
	b)	Differentiate Programmed I/O and Interrupt driven I/O	**10**

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