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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

Fifth Semester, B.E. - Computer Science and Engineering

Semester End Examination; February / March - 2022

Operating System

Time: 3 hrs *Max. Marks: 100*

Course Outcomes

The Students will be able to:
CO1: Explain operating system structure, services, types, design and implementation of OS.
CO2: Apply the various algorithms of process scheduling.
CO3: Develop solutions to process synchronization and dead lock problems.
CO4: Analyze various memory management techniques.
CO5: Explain file system implementation and allocation methods.

Note: ***I) PART - A*** *is compulsory.* ***Two*** *marks for each question.*
II) PART - B*: Answer any* ***Two*** *sub questions (from a, b, c) for Maximum of* ***18 marks*** *from each unit.*

Q. No.		Questions	Marks	BLs	COs	POs
		I : PART - A	**10**			
I	a.	Define system calls.	2	L2	CO1	PO1
	b.	Define process.	2	L2	CO2	PO1
	c.	What is deadlock?	2	L2	CO3	PO1
	d.	What is thrashing?	2	L2	CO4	PO1
	e.	Describe file structure.	2	L2	CO5	PO1
		II : PART - B	**90**			
		UNIT - I	**18**			
1	a.	Define operating system. Explain the different types of system calls with example.	9	L2	CO1	PO1
	b.	Define virtual machines. Explain virtual machine and its benefits.	9	L2	CO1	PO1
	c.	List and explain the various services provided by an operating system.	9	L2	CO1	PO1
		UNIT - II	**18**			
2	a.	Briefly explain the two models of interprocess communication.	9	L2	CO2	PO1
	b.	Explain multi threading models in brief. Also differentiate between process and threads.	9	L2	CO2	PO1
	c.	Consider the following set of processes, with the length of the CPU burst given in milliseconds:	9	L3	CO2	PO2

Process	Arrival time	Burst time	Priority
P_1	0	6	4
P_2	3	5	2
P_3	3	3	6
P_4	5	5	3

Contd... 2

i) Draw Gantt charts that illustrate the execution of these processes using priority preemptive and non-priority, SJF preemptive scheduling algorithms.

[Assume that larger number has higher priority]

ii) Calculate the average waiting time and average turnaround time for each of the scheduling algorithm

UNIT - III **18**

3 a. Illustrate "TestAndSet( )" and "Swap( )" instructions and their use in synchronization of processes. 9 L3 CO3 PO2

b. Explain different methods to recover from deadlock. 9 L2 CO3 PO1

c. Consider the following table: 9 L3 CO3 PO2

Allocation

	A	B	C	D
P_1	0	0	1	2
P_2	1	0	0	0
P_3	1	3	5	4
P_4	0	6	3	2
P_5	0	0	1	4

Max

A	B	C	D
0	0	1	2
1	7	5	0
2	3	5	6
0	6	5	2
0	6	5	6

Available

A	B	C	D
1	5	2	0

Using Bankers algorithm check;

i) Compute the need matrix content

ii) Is the system is in safe state?

iii) If a request from process $P_1(0, 4, 2, 0)$ arrives, can it be granted immediately?

UNIT - IV **18**

4 a. Explain the structures of page table. 9 L2 CO4 PO1

b. Consider the following reference string: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6 for a memory with five frames. Calculate the number of page faults for FIFO, LRU and optimal page replacement algorithms. Which is the most efficient among them? 9 L3 CO4 PO2

c. Memory partition of 100 kB, 500 kB, 200 kB, 300 kB and 600 kB are available in order, apply best-fit, worst-fit and first-fit algorithm to place the processes of 212 kB, 417 kB, 112 kB, 426 kB in order. 9 L3 CO4 PO2

UNIT - V **18**

5 a. Define directory structure. Explain different directory structures. 9 L2 CO5 PO1

b. Explain allocation methods. 9 L2 CO5 PO1

c. Explain the access matrix model used for protection purpose. 9 L2 CO5 PO1

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