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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; Dec. - 2019

Operating System

Time: 3 hrs

Max. Marks: 100

Note: Answer FIVE full questions, selecting ONE full question from each unit.

UNIT - I

- 1 a. Define Operating system. Explain different views of operating system. 8
- b. What are virtual machines? Explain VM-WARE architectures with neat diagram. 8
- c. Explain process management activities. 4
- 2 a. Explain dual mode operation in OS with a neat block diagram. 6
- b. List and explain the services provided by operating system. 6
- c. What are system calls? Briefly point out its types. 8

UNIT - II

- 3 a. Illustrate with a neat sketch, the process state and process control block. 8
- b. List the four major categories of benefits derived from the multi threaded programming. 4
- c. What is interprocess communication? Discuss the methods to implement message parsing IPC in detail. 8
- 4 a. Suppose the following jobs arrive for processing at the times indicated, each job will run the listed amount of time (all times are in multi seconds)

Job	Arrival time	Burst Time
P ₁	0.0	8
P ₂	0.4	4
P ₃	1.0	1
P ₄	1.5	4

- i) Give a Gantt chart illustrating the execution of these jobs using the FCFS and non-preemptive SJF scheduling algorithm 10
- ii) What is the turnaround time of each job for each of the scheduling algorithms in part (i)?
- iii) What is the waiting time of each job for each of the scheduling algorithm in part (i)
- iv) Which of the algorithms in part (i) results in the minimum average waiting time (overall job)?
- v) Compare average turnaround limit if CPU is left idle for the first 1 ms and then SJF Scheduling is used (P₁ and P₂ will wait during this time)
- b. Explain the different multithreading models. 5
- c. Discuss scheduling criteria used in operating system. 5

UNIT - III

- 5 a. What is critical section-problem? Explain semaphore solution to critical section problem. 7
- b. What are the monitors? Explain its usage and implementation. 8

- c. Define deadlock? What are its characteristics? 5
- 6 a. Consider the following snapshot of a system. The available resources are A = 3, B = 3, C = 4 and D = 6.

Process	Allocation				Max			
	A	B	C	D	A	B	C	D
P ₀	3	1	0	2	7	5	3	4
P ₁	2	0	0	1	3	4	2	5
P ₂	3	0	1	1	10	3	2	3
P ₃	1	2	1	0	4	2	2	2
P ₄	0	2	0	0	4	2	3	1

10

- i) What is the content of matrix NEED?
- ii) Is the system is in SAFE state? If so , give the range sequence.
- iii) Is a request from a process P₂ arrives for (2 2 0 1)? Can the request be granted immediately?
- b. Define race condition, explain Reader-Writer problem with semaphore in detail. 6
- c. Develop an algorithm to detect deadlock in a system with multiple instances of each resource type. 4

UNIT - IV

- 7 a. What is a Translation look aside buffer? Explain TLB in detail with a simple paging system with neat diagram. 10
- b. Consider the paging reference stream: 1, 2, 3, 4, 2, 1, 5, 6, 2, 1, 2, 3, 7, 6, 3, 2, 1, 2, 3, 6. How many page faults would occur for LRU and optimal page replacement algorithms, assuming 3 and 5 frames? Which one of them is most efficient? 10
- 8 a. What are the advantages of using an inverted page table? Explain the concept of inverted page table with a neat diagram? 6
- b. Describe the access matrix model used for protection purpose. 8
- c. Write short notes on:
 - i) External and Internal fragmentation 6
 - ii) Dynamic loading and Linking

UNIT - V

- 9 a. Explain the linked and indexed allocation method with a neat diagram. 10
- b. Suppose that the disc drive has 5000 cylinders numbered 0 to 4999. The drive is currently serving or request was at cylinder 143 and the previous request was at cylinder 125. The queue of pending requests in FIFO order is 86, 1420, 913, 1774, 948, 1509, 1022, 1750, 130 Starting from the current head position what is the total distance that the disk arm moves to satisfy all the pending requests with SSTF and SCAN scheduling algorithms? 10
- 10 a. What is a file? Explain in detail the different access methods. 6
- b. With a neat diagram, explain components of a Linux system in detail. 6
- c. What are directories? List different types of directory structure with examples. 8