AY: 2020-21

YEAR: II

SEMESTER: II   **UNIT:** I to V

SUBJECT NAME: Operating Systems

Blooms Taxonomy levels

L1– Remember, L2-Understanding, L3- Applying /Analysing

Question – Bank   MID-I

UNIT-I

Q.NO	Question	Marks	BT-level
1	Explain the operating system structure.	10	L2
2	Explain the operating system functions.	5	L2
3	Draw and explain OS layered and modular architecture and its services.	5	L2
4	Explain the operating system operations.	5	L2
5	Compare and contrast between different computing environments	5	L4
6	Explain the operating system services.	10	L2
7	With a neat sketch, Explain in detail about the interrelation between various services provided by the operating system	5	L2
8	List and briefly describe types of operating systems.	5	L1
9	Explain what is meant by interleaving and overlapping with respect to multi programming and multi-processing. Assume system have two user processes.	5	L2
10	Explain the process of invoking system call with an example. Also write various system calls.	10	L2

11	Explain the concept of boot strapping and process of system boot	5	L2
12	Briefly Explain the different types of systems: parallel systems, distributed systems and real-time systems, Time-shared operating system?	5	L2
13	Demonstrate the concept of operating system failure analysis and methods of debugging	5	L2
14	Summarize different categories of system programs	5	L2

UNIT-II

Q.NO	Question	Marks	BT-level
1	a) Present Readers and Writers Problem of Synchronization. Explain how to solve it. b) What is Dining Philosophers problem? Discuss the solution to Dining philosopher's problem using monitors.	10	L2
2	a) Explain the steps involved in process creation and process termination. [3] b) Demonstrate FIFO and Round Robin CPU scheduling algorithms with suitable example [7]	10	L2
3	a) Explain in detail, the sequence of actions taken by the operating system to context switch between processes.[3] b) Assume the following workload in a system. All jobs arrive at time 0 in the order given.[6M] Process Burst Time Priority P1 30 High P2 28 High P3 04 Low P4 16 Medium Draw a Gantt chart illustrating the execution of these jobs using Priority CPU scheduling algorithm and also Calculate the average waiting time and average turnaround time.	10	L4

4	Explain the following with examples i) CPU utilization and response time, ii) Average turnaround time and maximum waiting time, and iii) I/O device utilization and CPU utilization	5	L2
5	For the processes listed below, evaluate Average Waiting Time and Average Turnaround Time for: i) FCFS ii) SJF iii) SRT with Gantt chart	10	L5
6	For the processes listed below, evaluate Average Waiting Time and Average Turnaround Time for: i) Non-Preemptive Priority ii) Preemptive Priority ii) RR(Q=2). with Gantt chart	10	L5
7	Write and explain various scheduling criteria's with respect CPU scheduling. And show the calculations for at least 5 processes arriving at consecutive Intervals	5	L2
8	Explain fundamental models of interprocess communication with neat sketch	10	L2
9	a) Compare and contrast thread and process. [3M] b) Explain Process concept. Explain various steps involved in change of a process states with neat transition diagram.[7M]	10	L2
10	Discuss Multithreading Models with neat diagrams.	5	L2
11	What is a Semaphore? Discuss the solution of the Critical Section problem in producer-consumer problem.	10	L2
12	Explain different process operation with example program	10	L2
13	Explain the following client –server communication models with examples a) RPC b) Sockets	10	L2

Table in row 5:

Processes	A.T	B.T	Priority
A	0.0000	5	4
B	2.0001	4	2
C	2.0001	2	6
D	4.0001	4	3

14	Explain the following role of pipes in client –server communication with example.	10	L2
15	Make use of thread library to create POSIX threads.	5	L2
16	Explain Multilevel Queue Scheduling and Multilevel feedback Queue Scheduling	10	L3
17	Explain the concept of thread scheduling with its related system calls	5	L2
18	Explain race condition and different methods to deal with race condition	10	L2
19	a) Explain the usage and structure of monitors with an example b)Compare and contrast Semaphores and monitors	10	L2
20	Explain the concept of barriers with example	5	L2
21	Explain the pseudocode for solving producer and consumer problem using message passing	5	L2

UNIT-III PART-I

Q.NO	Question	Marks	BT-level
1	Given memory partition of 100 KB, 500 KB, 200 KB and 600 KB (in order). Show with neat sketch how would each of the first-fit, best-fit and worst fit algorithms place processes of 412 KB, 317 KB, 112 KB and 326 KB (in order)	5	L3
2	What is effective access time? Compute it for 70% hit ratio, 20 ns to search TLB and 100 ns to access memory. Identify the difference when it is changed to 90% hit ratio	5	L3
3	a) What is fragmentation? Explain the differences between internal and external fragmentation. b) How to solve the fragmentation problem using paging.	10	L2

4	Explain the process of converting virtual addresses to physical addresses with a neat diagram.	5	L2
5	Discuss various issued related to the allocation of frames to processes.	5	L2
6	Explain in detail, the sequence of actions taken by the operating system to context switch between processes.	5	L2
7	Explain the concept of segmentation and hardware support in detail.	10	L2
8	What is Paging? Discuss the Paging model of logical and physical memory. Explain hardware support for paging	10	L2
9	Explain the concept of Contiguous memory allocation.[2M] Explain different memory allocating strategies.[4M] Explain Memory protection scheme[4M]	10	L2
10	What is paging? Explain its structure for 32 -byte memory with 4-byte pages.	5	L2
11	Compare the main memory organization schemes of continuous memory allocation, pure segmentation, and pure paging with respect to the following issues: i) External fragmentation, ii) Internal fragmentation, iii) Ability to share code across the process.	10	L4

UNIT-III PART-II

Q.NO	Question	Marks	BT-level
1	Consider the reference string: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 1, 2, 0, 1, 7, 0, 1 for a memory with three frames. Trace FIFO, optimal page replacement algorithms.	10	L3
2	What is a page fault? Explain the steps involved in handling a page fault with a neat sketch.	5	L2
3	What is Thrashing? What is the cause of Thrashing? How does the system detect Thrashing? What can the system do to eliminate this problem?	10	L2

ANDHRA LOYOLA INSTITUTE OF ENGINEERING AND TECHNOLOGY

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Accredited by NAAC & An ISO 9001:2015 Certified Institution
Vijayawada,Andhra Pradesh - 520008.

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4	Consider the following page reference string: 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 the optimal page replacement algorithm, Assuming three frames and all frames are initially empty.	5	L3
5	How demand paging affects the performance of a computer system? Give explanation.	5	L2
6	Explain the difference between External fragmentation and Internal fragmentation. How to solve the fragmentation problem using paging.	5	L2
7	Consider the following page reference string: 1,2,4,7,3,5,6,3,6,1,4,2,3,6,5,2 How many page faults would occur for the optimal page replacement algorithm, assuming four frames and all frames are initially empty.	5	L3
8	Explain implementation of virtual memory through Demand Paging.	10	L2
9	Illustrate the page-replacement algorithms i) LRU ii) LRU-Approximation Page Replacement use the reference string 7, 0,1, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2,1, 2, 0, 1, 7, 0,1 for a memory with three frames.	10	L3
10	What is demand paging? Discuss the hardware support required to support demand paging.	5	L2
11	Explain different kernel memory allocation schemes	5	L2
12	Explain copy-on-write procedure	5	L2

UNIT-IV

Q.NO	Question	Marks	BT-level
1	What is Safe-state? Write the Bankers algorithm for deadlock avoidance and explain it with the help of an example.(with Single and Multiple resources)	10	L2

2	Consider the following and find out the possible resource allocation sequence with the help of deadlock detection algorithm processes: p0, p1, p2, p3, p4, Resources A, B, C Allocation [0 1 0, 2 0 0 , 3 0 3, 2 1 1, 0 0 2] Max[0 0 0, 2 0 2, 0 0 0, 1 0 0, 0 0 2] Available[0 0 0].	10	L3
3	Explain the following concepts with respect to file: i) File operations ii) File Structures iii) File Types iv)File Attributes	10	L2
4	Discuss in detail the file allocation techniques: Sequential, Indexed and Linked.	10	L2
5	Explain the techniques used to prevent the deadlocks.	10	L2
6	How to Recover From Deadlock situations? Discuss in detail.	5	L2
7	Explain deadlock avoidance process using Resource-Allocation-Graph.	5	L2
8	Write short notes on: i) FCFS and ii) SSTF Disk Scheduling schemes.	5	L2
9	In detail explain the structure of disk with a neat diagram.	5	L2
10	Explain Deadlock detection algorithm with an example.	10	L2
11	a) Explain different operations on File. [5M] b) Write short notes on : i) Contiguous and ii) Linked File allocation methods [5M]	10	L2
12	Differentiate SCAN, C-SCAN and LOOK, C-LOOK disk scheduling algorithms with an example.	10	L3
13	Explain various file system management and optimization techniques.	10	L2
14	a) Discuss in detail about different file access methods. [3M] b) What are the necessary conditions that lead to deadlock and define strategies for dead lock prevention? [7M]	10	L2
15	Briefly explain about single-level, two-level and Tree-Structured directories.	5	L2

16	Consider a disk queue with following requests for I/O to blocks on cylinders 30,70,115,130.110,80,20,25 (Assume disk head is at 90) Draw FCFS and SSTF scheduling and also determine how many times the disk head changes its direction for each of the above mentioned scheduling techniques.	10	L3
17	In detail explain the structure of disk with a neat diagram.	5	L2
18	Discuss various types of disk storage attachments.	5	L2
19	List out the various methods for free-space management and explain them.	5	L2
20	Explain Ostrich algorithm with an example	5	L2
21	Briefly explain the implementation of a) Files b) Directories	10	L2
22	Explain the concept of Virtual file system and its implementation	5	L2
23	Explain the different concepts of disk management	7	L2

UNIT-V

Q.NO	Question	Marks	BT-level
1	Explain the following a) Goals of protection b) Principles of Protection c) Domain of Protection	10	L2
2	Describe the access matrix model and its implementation used for protection purpose.	10	L2
3	a) Explain the concept role-based access in Solaris 10 [5M] b) Revocation access rights [5M]	10	L2
4	Briefly explain the various kinds of a) program threats b) system and network threats.	10	L2

5	Explain the role of cryptography as a security tool	10	L2
6	Explain the underlying concept of user authentication.	10	L2
7	Explain the following security defences a) Security Policy b) Vulnerability Assessment c) Virus Protection d) Auditing, Accounting, and Logging e) Intrusion detection	10	L2
8	a) Explain the role of firewall in protection [2M] b) Explain DMZ [4M] c) List out Firewall vulnerabilities [4M]	10	L2
9	List out different classifications of computer security	5	L2