Register Number:……

MCA DEGREE EXAMINATIONS: NOV/DEC 2024

(Regulation 2020)

First Semester

Master of Computer Application

P20CAT1103: Advanced Operating Systems

COURSE OUTCOMES

CO1: Know the basic concepts of operating systems.

CO2: Understand process management, synchronization and deadlock concepts.

CO3: Analyze various memory management techniques and disk scheduling algorithms.

CO4: Demonstrate file system, Allocation Methods and Free space management.

CO5: Understand Virtualization.

CO6: Compare various mobile operating System

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Assertion(A) : Operating system is known as a resource manager CO1 [K3]
   Reason (R) : Operating system manages resources like memory, processor and I/O devices.
   a) Both A and R are correct and R is the correct explanation for Statement A
   b) Both A and R are correct but R is not the correct explanation for Statement A
   c) A is correct but R is incorrect
   d) A is incorrect but R is correct

2. Which one of the following is not true? CO1 [K3]
   I. Kernel is the program that constitutes the central core of the operating system.
   II. Kernel is the first part of operating system to load into memory during booting.
   III. Kernel is made of various modules which cannot be loaded in running operating system.
   IV. Kernel remains in the memory during the entire computer session.
   a) I only
   b) III only
   c) III and IV only
   d) I,II ,III and IV

3. Process is known as _____. CO2 [K1]
   a) program in high level language kept on disk
   b) contents of main memory
   c) a program in execution
   d) a job in secondary memory

4. Match list I with list II and select the correct answer using the codes given below CO2 [K2]

List I	List II
A. Loader	i. Process state
B. Process	ii. System software
C. Running	iii. Identify and Remove errors
D. Debug	iv. Active entity

	A	B	C	D
a)	ii	iv	i	iii
b)	i	ii	iii	iv
c)	iii	i	ii	iv
d)	iv	iii	ii	i

5. A page faults occurs when _____. CO3 [K2]

a) the segmentation starts
b) the page is not found in the main memory
c) the deadlock happens
d) the page found in the memory

6. Assertion (A) : In some page-replacement algorithms, the page-fault rate may increase as the number of allocated frames increases. CO3 [K3]
Reason(R): Increase in page faults is known as Belady's anomaly which occurs mostly in FIFO page replacement

a) Both A and R are correct and R is the correct explanation for Statement A
b) Both A and R are correct but R is not the correct explanation for Statement A
c) A is correct but R is incorrect
d) A is incorrect but R is correct

7. Which of the following are disk scheduling algorithms? CO3 [K3]
I. SSTF
II. SCAN
III.SCAT
IV.C-SCAN

a) I only
b) I and II only
c) I, II and IV only
d) I, II and III

8. File type can be represented by_____. CO4 [K2]

a) file name
b) file extension
c) file identifier
d) file attributes

9. What is the primary purpose of virtualization in an operating system? CO5 [K2]

a) To improve the performance of the CPU
b) To enable multiple operating systems to run concurrently on a single physical machine
c) To increase the physical memory of a system
d) To reduce the hardware dependency of the OS

10. In which language Microsoft's Windows kernel is developed? CO6 [K2]

a) Java
b) C
c) C++
d) Python

PART B (10 x 2 = 20 Marks)

11.	Define Operating Systems.	CO1	[K1]
12.	What is the main advantage of multiprocessing?	CO1	[K2]
13.	List the different states of a process.	CO2	[K2]
14.	How a scheduler can help in job scheduling?	CO2	[K2]
15.	Is it possible to have a deadlock involving only one process? Justify your answer.	CO3	[K1]
16.	What is storage compaction?	CO3	[K2]
17.	Compare internal and external fragmentation.	CO3	[K3]
18.	What are the advantages of using a hierarchical directory structure in file management?	CO4	[K2]
19.	Define seek time.	CO4	[K1]
20.	What is swift? Were it is used?	CO6	[K3]

PART C (10 x 5 = 50 Marks)

21.	What are the five major activities of an operating system in regard to process management?	CO1	[K2]
22.	Write a short note on system calls.	CO1	[K2]
23.	Discuss about what semaphores are, their usage, and implementation given to avoid busy waiting using binary semaphores.	CO2	[K3]
24.	Consider the following set of processes, with the length of the CPU burst time given in milliseconds	CO2	[K5]

Process	Burst Time	Priority
P1	9	3
P2	6	1
P3	1	2
P4	9	4
P5	3	5

Solve the given problem using FCFS, SJF, Priority scheduling and Round robin (TQ= 1 ms)

a) Draw Gantt chart
b) Calculate waiting time, turnaround time of each process.
c) Calculate average waiting time and average turnaround time.

25.	Explain the differences between contiguous memory allocation and paging. What are the advantages and disadvantages of each?	CO3	[K2]
26.	Given memory partitions of 200KB,400KB, 100KB,150KB,and 500KB in that order, how would each of the first-fit, best-fit, and worst-fit algorithms place the processes of 200KB, 417KB,1120KB,and 450KB(in order)?Which algorithm makes most efficient use of memory?	CO3	[K4]
27.	What is the difference between contiguous and non-contiguous memory allocation in disk management?	CO4	[K3]
28.	Explain the different types of file access methods in an operating system.	CO4	[K2]
29.	Write a short note on Virtualization.	CO5	[K2]
30.	Analyze iOS and Android mobile operating systems in terms of performance and security in detail.	CO6	[K3]

Answer any TWO Questions
PART D (2 x 10 = 20 Marks)

31. Why operating system is known as a Resource Manager ? List out the major activities of an operating system. CO1 [K2]

32. Consider the following system snapshot using data structures in the Banker's algorithm, with resources A, B, C, and D, and process P0 to P4: CO3 [K4]

	Max	Allocation	Available
	A B C D	A B C D	A B C D
P0	5 0 1 2	4 0 0 1	4 2 1 2
P1	1 7 5 0	1 1 0 0	
P2	2 3 5 6	1 2 5 4	
P3	1 6 5 3	0 6 3 3	
P4	1 6 5 6	0 2 1 2	

Using Banker's algorithm, answer the following questions.
(a) How many resources of type A, B, C, and D are there?
(b) What are the contents of the Need matrix?
(c) Is the system in a safe state? Why

33. Consider the following page reference string: CO4 [K5]
7,0,1,2,0,3,0,4,2,3,0,3,0,3,2,1,2,0,1,7,0,1
How many page faults would occur for the following replacement algorithms, assuming there are three frames? Remember all frames are initially empty, so your first unique pages will all cost one fault each.
- LRU replacement 3
- FIFO replacement 3
- Optimal replacement 3

Which page replacement algorithm is best, why? 1

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