Register Number:……..

KUMARAGURU college of technology
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B.TECH DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Fourth Semester

INFORMATION TECHNOLOGY

U15ITT404 : Operating Systems

COURSE OUTCOMES

CO1: Experiment with various CPU scheduling algorithms with the understanding of operating system concepts
CO2: Explain the need for process coordination
CO3: Apply the various memory management strategies
CO4: Illustrate the various file management strategies
CO5: Explain about disk management

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

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Match the items in List I with that of items in List II CO2 [K_2]

List I	List II
A. Mutual Exclusion	i. If a process requests resources that cannot be allocated, then all the resources that process currently holds are released
B. Hold and wait	ii. Each process requests resources in an increasing order of enumeration
C. No preemption	iii. At least one resource must be non-sharable
D. circular wait	iv.Whenever a process requests a resource, it should not hold any other resource

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

2. ---------- manages meta data. CO4 [K_2]

a) Basic file system
b) File-organization module
c) Logical file system
d) I/O control

3. Which of the following statements is (are) true? CO3 [K_2]

1. An operating system provides an environment for the execution of programs
2. In multilevel queue scheduling algorithm, processes can move from one queue to another
3. An address generated by the processor is referred to as physical address
4. External fragmentation can be avoided by paging technique

a) 1,4 b) 2,3
c) 1,2 d) 2,4

4. ---------- is an example of application program CO1 [K_2]

a) Loader b) Web browser
c) Linker d) Macroprocessor

5. Assertion (A): The disk bandwidth is the total number of bytes transferred, divided by the total time between the first request for service and the completion of the last transfer CO5 [K_2]
Reason (R): Bandwidth can be improved by managing the order in which disk I/O requests are serviced

a) Both A and R are Individually true and R is the correct explanation of A b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false d) A is false but R is true

6. --------- selects processes from the disk and loads them into the memory for execution CO1 [K_2]

a) Short-term scheduler b) Middle-term scheduler
c) Medium term scheduler d) Long-term scheduler

7. Select the sequence of steps for selecting a frame for bringing a new page (page fault) into the memory. Assume there is no free frame in the memory CO3 [K_2]

1. Change the valid-invalid bit of the selected page for replacement as invalid
2. Using page replacement algorithm, select a victim page
3. Bring the new page into the victim page frame
4. Reset the page table for the new frame

a) 2-3-4-1 b) 1-2-4-3
c) 3-4-2-1 d) 2-1-3-4

8. ---------- can be used effectively only for sequential access files CO4 [K_2]

a) Indexed allocation b) Linked allocation
c) Contiguous allocation d) Non-contiguous allocation

9. Assertion (A): A monitor type is an ADT that includes a set of programmer-defined operations that are provided with mutual exclusion within the monitor CO2 [K_2]
Reason (R): The monitor construct ensures that only one process at a time is active within the monitor

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

10. In ---------, the head moves from one end of the disk to the other, servicing requests along the way. When the head reaches the other end, it immediately returns to the beginning of the disk without servicing any requests on the return trip — CO5 [K_2]
a) SCAN
b) LOOK
c) C-SCAN
d) C-LOOK

PART B (10 x 2 = 20 Marks)
(Answer not more than 40 words)

11. Compare CPU-bound process and I/O bound process. — CO1 [K_2]
12. What is the function of a dispatcher? — CO1 [K_2]
13. What is a race condition? — CO2 [K_2]
14. Where are counting semaphores used? — CO2 [K_2]
15. Considering a paging system with the page table stored in memory, if a memory reference takes 40 nanoseconds, how long does a paged memory reference take? — CO3 [K_3]
16. Consider a logical address space of 256 pages with a 4 KB page size, mapped onto a physical memory of 64 frames. Calculate the minimum number of bits required for the logical address and physical address. — CO3 [K_3]
17. Name any four file operations. — CO4 [K_2]
18. Compare absolute path name and relative path name. — CO4 [K_2]
19. Compare seek time and latency time. — CO5 [K_2]
20. Name the items a process identity consists of in Linux. — CO5 [K_2]

Answer any FIVE Questions:-
PART C (5 x 14 = 70 Marks)
(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Consider the following scenario — CO1 [K_3]

Process	Burst Time	Arrival time	Priority
P1	4	0	2
P2	3	2	1
P3	2	1	4
P4	5	3	3

Calculate Average Turn Around Time (ATAT) & Average Waiting Time (AWT) by using a) FCFS b) SRTF c) Non-pre-emptive priority scheduling d) Round robin scheduling (Time slice = 2 ns). Lower number for priority means higher priority

22. (i) Explain how the Bounded-buffer problem is solved using semaphores. (5) CO2 [K_2]
(ii) Describe the Monitor solution for Dining-Philosopher problem. (9) CO2 [K_2]
23. (i) With the help of a block diagram, explain the segmentation concept. (9) CO3 [K_2]
(ii) Explain any two page table structures. (5) CO3 [K_2]

24. (i) Describe about the indexed allocation of disk space for files. (9) CO4 [K_2]

(ii) How can a directory be implemented? (5) CO4 [K_2]

25. Consider the following disk requests CO5 [K_3]

45, 2200, 650, 1500, 850, 950, 1850, 200, 2500 and 62. Assume there are 3000 tracks numbered 0 to 2999.The r/w head is at 260th track and it has processed previously the request for the track number 500. Calculate the number of head movements using FCFS,SSTF,SCAN,C-SCAN,LOOK,C-LOOK disk scheduling methods

26. (i) (9) CO2 [K_3]

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

a) What is the Need matrix? b) Is the system in a safe state?

c) If process P2 request for (1, 2, 1), can the request be granted immediately? Explain.

P0 to P4 are processes and A,B,C are resources

(ii) Calculate the number of page faults using LRU and OPT page replacement methods. The reference string is 5 6 4 2 4 1 6 4 6 8 9 2 1 4 and the number of frames is 3. Which replacement technique results in least number of page faults? (5) CO3 [K_3]

27. (i) Describe about the various multithreading models. (9) CO1 [K_2]

(ii) Describe any 3 methods for keeping track of free disk space. (5) CO4 [K2]

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