Printed Pages:03 **Sub Code: KCA203**

Paper Id: 238083 **Roll No.** | | | | | | | | | | |

MCA
(SEM II) THEORY EXAMINATION 2022-23
OPERATING SYSTEMS

Time: 3 Hours ***Total Marks: 100***

Note: Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt *all* questions in brief. 2 x 10 = 20

(a) Define operating system and mention its major functions.
(b) Differentiate between times sharing and real time system.
(c) Distinguish between multilevel queue scheduling and multilevel feedback queue scheduling
(d) How the starvation is different from deadlock? Explain.
(e) Semaphore gives its implementation to avoid busy waiting. Justify.
(f) Compare and contrast Single-threaded and multi-threaded process
(g) What are the Performance Criteria in CPU Scheduling? Explain.
(h) Differentiate between paging and segmentation.
(i) What do you mean by file directories? Explain.
(j) Define link file allocation method.

SECTION B

2. Attempt any *three* of the following: 10x3=30

(a) Explain batch operating system with example.
(b) What is semaphore? Classify the semaphore with their synchronization code.
(c) Define the following terms:-
  (i) Dispatcher
  (ii) Dispatch Latency
  (iii) Optimization of scheduling criteria
  (iv) Swapping
  (v) Context switching
(d) Five memory partitions of 100, 500, 200, 300 & 600 (all in KB) are in order, how would the 'first-fit, best-fit & worst-fit' shall place processes of size 212, 417, 112, & 426 ((all in KB). Deduce the most efficient memory management technique
(e) Discuss in detail the 'Linked, Contiguous, Index & Multi-level Indexing' file allocation schemes.

SECTION C

3. Attempt any *one* part of the following: 10x1=10

(a) Define Process. Explain various steps involved in change of process state with neat transition diagram.
(b) What is the purpose of the System Calls or Application Programming Interface (APIs).Enumerate five system calls used in process management or file management?

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4. Attempt any *one* part of the following: 10x1=10

(a) Define critical section problem. Write the Peterson's solution to solve critical section problem.

(b) What is Producer Consumer problem? How it can illustrate the classical problem of synchronization? Explain.

5. Attempt any *one* part of the following: 10x1=10

(a) Consider three processes, all arriving at time zero, with total execution time of 10, 20 and 30 units respectively. Each process spends the first 20% of execution time doing I/O, the next 70% of time doing computation, and the last 10% of time doing I/O again. The operating system uses a shortest remaining compute time first scheduling algorithm and schedules a new process either when the running process gets blocked on I/O or when the running process finishes its compute burst. Assume that all I/O operations can be overlapped as much as possible. For what percentage of does the CPU remain idle?

1. 0%
2. 10.6%
3. 30%
4. 89.4%

(b) Consider the set of 4 processes whose arrival time and burst time are given below-

Process No.	Arrival Time	Priority	Burst Time		
			CPU Burst	I/O Burst	CPU Burst
P1	0	2	1	5	3
P2	2	3	3	3	1
P3	3	1	2	3	1

If the CPU scheduling policy is Priority Scheduling, calculate the average waiting time and average turnaround time. (Lower number means higher priority)

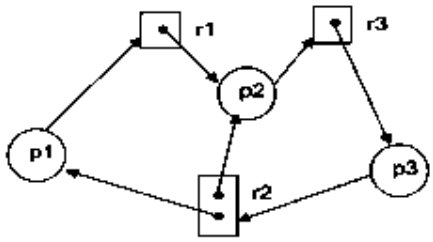
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6. Attempt any *one* part of the following: 10x1=10

(a) Illustrate the following page-replacement algorithms.
   i) FIFO
   ii) LRU

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 four frames

(b) Discuss Resource Allocation Graph (RAG)? Find how many cycles' deadlocks reside in given figure.



7. Attempt any *one* part of the following: 10x1=10

(a) A hard disk having 2000 cylinders, numbered from 0 to 1999. The drive is currently serving the request at cylinder 143,and the previous request was at cylinder 125.The status of the queue is as follows 86, 1470, 913, 1774, 948, 1509, 1022,1750,130. What is the total distance (in cylinders) that the disk arm moves to satisfy the entire pending request for each of the following disk scheduling algorithms?
   (i) SSTF
   (ii) FCFS

(b) Write short note on(any three):
(i)I/O buffering
(ii) Disk storage & scheduling
(iii) File Directory
(iv) RAID

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