MCS-041

MASTER OF COMPUTER APPLICATIONS (MCA) (REVISED)

Term-End Examination

December, 2022

MCS-041 : OPERATING SYSTEMS

Time : 3 Hours   *Maximum Marks : 100*

Weightage : 75%

Note : *(i)* *Question **No. 1** is compulsory.*

(ii) *Attempt any **three** questions from the rest.*

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1. (a) Consider the set of processes (P1, P2, P3, P4). Calculate the average waiting time, average turn-around time, processor utilization and throughput for SJF, FCFS and RR (quantum = 2), scheduling algorithms :   10

Process	Arrival Time	Processing Time
P1	0	2
P2	1	2
P3	3	4
P4	4	3

(b) List and explain the essential conditions for a deadlock to occur, with an example. Write and discuss any deadlock avoidance algorithm.   10

(c) How can we ensure authentication in a Network Operating System ? Suggest any *two* techniques.   5

(d) Write and explain the token-based mutual exclusion algorithm in distributed operating system.   10

(e) State and explain the hardware support for paging.   5

2. (a) For the page string/reference string as 0, 1, 2, 4, 6, 8, 2, 4, 1, 2, 0 with 3 memory frames, calculate the number of page faults that occur using OPT and FCFS page replacement algorithms.   10

   (b) Define the concept of critical section. What is mutual exclusion and how does it solve the problems of a critical section ? Explain Dekker's algorithm for mutual exclusion in process synchronization.   10

3. (a) Define a context switch. Explain the overhead incurred due to context switching on a process/thread. Also discuss its working principle with the help of a neat diagram.   10

   (b) Discuss any *five* Design Goals of Distributed Systems.   10

4. (a) Briefly explain the Take-Grant model with reference to the security model. Mention its drawbacks.   10

(b) Explain the concepts of shared memory, distributed memory and distributed shared memory.   10

5. Write short notes on the following :   5×4=20

(a) Rule-based Access control

(b) Process management in WINDOW

(c) SSTF disk scheduling algorithm

(d) Virtual memory

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