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MCS-041

MASTER OF COMPUTER APPLICATIONS (MCA)

Term-End Examination

June, 2023

MCS-041 : OPERATING SYSTEMS

Time : 3 Hours *Maximum Marks : 100*

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

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

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1. (a) A system has 4 processes P_1, P_2, P_3, P_4 and two resource types R_1 and R_2. The system has 2 units of R_1 and 3 units of R_2. Consider the following scenario :

P_1 requests 2 units of R_2 and 1 unit of R_1

P_2 holds 2 units of R_1 and 1 unit of R_2

P_3 holds 1 unit of R_2

P_4 requests 1 unit of R_1.

Show the resource graph for this state. Find out whether the system is in deadlock. If yes, then list the processes which causes the deadlock. 8

(b) For the following processes, prepare a Gantt chart and calculate average turn around time, average waiting time using : 6

(i) Shortest Remaining Time First (SRTF) (Pre-emptive)

(ii) Round Robin (quantum = 3)

(iii) FCFS

Process	Arrival Time	Burst Time
A	0	10
B	0	5
C	2	3
D	5	20
E	10	2

(c) Compare and contrast paging and segmentation. 4

(d) Define a process. How does an operating system implements the process ? 6

(e) Discuss the Bus-oriented System Architecture (of multiprocessor interconnection). 6

(f) Given a reference string 1, 2, 3, 4, 1, 5, 6, 2, 3, 7, 5, 7, 2, 9, 3, 4, 3, 1, 2. Calculate the page fault using FIFO, LRU and optimal algorithm with four frames. 10

2. (a) What do you mean by a critical section ? Explain the Mutex solution for critical section with its characteristics and drawbacks. 10

(b) Explain the Dining Philosophers problem. Suggest the solution for the same. 10

3. (a) What is Virtual Memory ? How does an operating system manages the virtual and physical space in memory ? 10

(b) Explain the different ways to allocate the disk space. Explain each in detail. 10

4. (a) Why do we need the distributed operating system ? List the advantages of distributed system over centralised system. Also, list the problems associated with the distributed system. 10

(b) Differentiate between kernel and shell. Also, explain the structure of Unix OS with the help of a diagram. 10

5. (a) What are deadlocks ? What are the *four* necessary conditions for occurrence of deadlock according to Coffman ? 6

(b) Differentiate between security policy and security model. Explain the different security models that can be implemented for system security in an operating system. 10

(c) Differentiate between Direct Communication and Indirect Communication in terms of message passing system in interprocess communication. 4