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9. (i) Define function. Explain how user defined functions can be created in shell programming with example.
- (ii) Give two examples each for the following utilities used in Linux environment: Backup and Networking utilities.

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MCA 2nd Semester 2 Years Course w.e.f. 2020-21

Examination, May-2023

OPERATING SYSTEMS & SHELL

PROGRAMMING

Paper-20MCA22C3

*Time allowed : 3 hours*

*[Maximum marks : 80*

*Note : Question No.1 is compulsory. In addition to Question No.1, attempt four more questions, by selecting at least one question from each Unit. All questions carry equal marks.*

1. (i) Where it is recommended to use Time sharing operating system and why?
- (ii) Medium Term Schedulers are not mandatory but recommended. Comment.
- (iii) State three conditions that must be satisfied by all the solutions suggested for critical section.
- (iv) What do you mean by Producer Consumer problem?
- (v) What important role does Relocation register play in memory management? Give example.
- (vi) Why there is no feasible solution to internal fragmentation? Explain with an example.
- (vii) Write down the features of Bourne Shell as a programming interface.

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- (viii) Define the concept of shell meta characters with apt examples.

**Unit-I**

2. (i) Compare the working and features of Virtual and Non Virtual Machines with the help of labeled diagrams.  
(ii) Define scheduler. What important functionality and calling frequency is attached to the Job scheduler? Justify your answer.
3. (i) Explain different evaluation criteria based on which performance of scheduling algorithms can be analyzed.  
(ii) Shortest Job First scheduling algorithm can be used as pre-emptive and non pre-emptive. Comment

**Unit-II**

4. (i) Elaborate anyone hardware based solution to the critical section problem by using small snippets.  
(ii) What do understand by the Dinning Philosopher Problem as an IPC problem? Suggest one solution to this problem.
5. (i) Explain how deadlocks can be avoided by having knowledge about requirements of all processes by using RAG with an example of each system state: safe as well as unsafe.

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- (ii) How resource preemption can be used to recover the system from deadlocks? Also explain rollback and Victim selection in reference to resource allocation.

**Unit-III**

6. (i) Draw a labeled diagram to represent the working of paging. Explain how it can be used to solve the external fragmentation problem.  
(ii) Write down the working principle of Virtual Memory? Explain the role of lazy pager in implementation of virtual memory management in general purpose computer system.
7. (i) What do you understand by Interrupts? Explain different types of interrupts generated in the system and also explain how these can be handled with the help of diagram.  
(ii) With appropriate examples, elaborate any two disk scheduling algorithms implemented by operating system during I/O management.

**Unit-IV**

8. (i) Describe the usage of different types of loops and braching statements used in shell scripting.  
(ii) Pictorially represent the working architecture of Linux environment. State any two types of shells provided by Linux along with their respective features.

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