

Roll No.

Total No. of Questions : 09]

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MCA (Sem. - 4th)
OPERATING SYSTEMS
SUBJECT CODE : MCA - 404

Paper ID : [B0118]

[Note : Please fill subject code and paper ID on OMR]

Time : 03 Hours

Maximum Marks : 60

Instruction to Candidates:

- 1) Attempt any One question from each Sections - A, B, C & D.
- 2) Section - E is **Compulsory**.
- 3) Use of Non-Programmable **Scientific Calculator** is allowed.

Section - A

(1 × 10 = 10)

- Q1)** In Multiprogramming and Time-sharing environment, several users share the system simultaneously. The situation can result in various security problems.
- (a) What can be the two such problems? Elaborate your answer with appropriate examples.
 - (b) Can we ensure the same degree of security in time shared machines as we have in case of dedicated machines? Explain your answer.
- Q2)** Differentiate a thread from a process. What resources are used when a thread is created? How do they differ from those when a process is created?

Section - B

(1 × 10 = 10)

- Q3)** (a) What is the purpose of paging the page tables?
(b) Consider a logical-address space of eight pages of 1024 words each, mapped into physical memory of 32 frames.
- (i) How many bits are in the logical address?
 - (ii) How many bits are there in the physical address?
- Q4)** Given memory partitions of 100 KB, 500 KB, 200 KB, 300 KB and 600 KB (in order), how would each of the first-fit, best fit and worst fit algorithms place the processes of 212 KB, 417 KB and 112 KB and 426 KB (in order)? Which algorithm makes most efficient use of the memory? Also justify your criteria of choosing the process that makes efficient usage of memory.

Section - C

(1 × 10 = 10)

- Q5)** Consider a system that supports the strategies of continuous, linked and indexed allocations. What criteria should be used in deciding which strategy is best utilized for a particular file? Elaborate your answer with appropriate examples.

Q6) Suppose that disk drive has 500 cylinders numbered 0 to 499. The drive is currently serving a request at cylinder 143 and requests are in the order 125. The current pending requests in TCF order are

86, 1470, 311, 1774, 948, 1761, 652, 1783, 170

Starting from the current head position, what is the total distance (in cylinders) that the drive must move to satisfy the pending requests for each of the following disk scheduling algorithms?

- (a) FCFS
- (b) SSTF
- (c) SCAN
- (d) LOOK
- (e) C-SCAN

Section - D

(11 × 10 = 110)

Q7) (a) Consider a system consisting of four resources of the same type that are shared by three processes, each of which needs to hold two resources. Show that the system is deadlock free.

(b) Suppose that you have coded the Banker's algorithm as a safety algorithm and now have been asked to implement the deadlock detection algorithm. Can you do so by simply using the safety algorithm and handling it by $Max = Waiting + Allocation$ where $Waiting$ is a vector specifying the resource processes are waiting for. Explain your answer.

Q8) Can you avoid the deadlock problem with a self-lock avoidance? Support your answer by giving suitable examples.

Section - E

(11 × 2 = 22)

Q9) a) Define memory allocation.

b) What are the main types of allocation?

c) What is the purpose of system call?

d) Difference between program threads and system threads?

e) Define semaphore?

f) What are the concepts of segmentation and paging in combined system?

g) Can a process have a deadlock involving only one single process? Give reason.

h) What is the impact of process on the overall system performance?

i) Why are page sizes always powers of 2?

j) What are the various file access modes?

