Branch : CSE & IT Batch : English

Operating Systems

Memory Management

DPP 01

[MCQ]

1. According to abstract view of memory, memory is _____.

(a) Non-linear three-dimensional array.

(b) Linear three-dimensional array.

(c) Non-linear one-dimensional array of words.

(d) Linear one-dimensional array of words.

[MCQ]

2. What is smallest addressable unit in a memory?

(a) 1 Bit (b) 1 Byte

(c) 2^{10} byte (d) 2^2 bit

[NAT]

3. If there are total 16 words in memory and each word has a size of 8 bytes. How many bits of address is required to refer one word?

[NAT]

4. Consider the following statements:

(i) If there is a memory of size 32 KW, then number of bits required to address one word is x.

(ii) If number of bits required to address a memory are 18 bits, then the memory capacity is y KW.

Calculate x * y?

[NAT]

5. How many of the following are functions of memory manager?

(i) Memory allocation

(ii) Protection

(iii) Fragmentation

(iv) Address Translation

(v) Manage the execution of larger program in smaller memory area.

[MCQ]

6. An operating system uses the Banker's algorithm for deadlock avoidance. There are three types of resource A, B, and C allocated to three processes P_0, P_1, P_2. The below table represents the current system state.

	Allocation			Max		
	A	**B**	**C**	**A**	**B**	**C**
P_0	1	1	3	7	4	8
P_1	5	6	2	7	8	4
P_2	3	2	1	4	5	2

There are 2 units of each resource still available. The system is in safe state. Consider the following independent requests for additional resources in current state.

Request 1: P_0 request 2 units of A, 0 units of B, 1 units of C.

Request 2: P_1 request 2 units of A, 0 units of B, 2 units of C.

Which one of the following is TRUE?

(a) Request 1 can be granted, Request 2 cannot.

(b) Request 2 can be granted, Request 1 cannot.

(c) Both Request 1 and Request 2 can be granted.

(d) Neither of Request 1 and Request 2 can be granted.

[MCQ]

7. Request of any process should be granted iff the resulting state is safe otherwise it is denied, this is known as_____.

(a) Resource -Allocation Algorithm

(b) Resource -Access Algorithm

(c) Resource- Request Algorithm

(d) None of these

[MCQ]

8. Which of the following are deadlock prevention schemes?

(a) Each process request resources either in only increasing order or in only decreasing order.

(b) Whenever a process requests a resources, it does not hold any other resources.

(c) If a process is holding some resources and request another resources that cannot be immediately allocated to it, all resources being held are pre-empted.

(d) All of these

[MCQ]

9. Consider the following system.

	A	B	C	D
P_0	0	0	1	2
P_1	1	0	0	0
P_2	1	3	5	4
P_3	0	6	3	2

Allocation

	A	B	C	D
P_0	0	0	1	2
P_1	1	7	5	0
P_2	2	3	5	6
P_3	0	6	5	2

Max

A	B	C	D
1	5	2	0

Available

Which of the following Statement is/are correct.

(a) The system in unsafe state.

(b) The system in safe state.

(c) Data missing

(d) Deadlock will take place

[MSQ]

10. Consider which of the following statements is/are correct regarding deadlock?

(a) If a system is in unsafe state, the process may complete its execution without entering a deadlock state.

(b) If a process releases all its resources before requesting new resource, then deadlock and starvation both are possible.

(c) Deadlock avoidance is less restrictive than deadlock prevention.

(d) In deadlock avoidance, the request for resources is always granted if the resulting state is safe.

[MCQ]

11. For mutual exclusion to prevail in the system _____.

(a) The processor must be a uniprocessor rather than a multiprocessor.

(b) There must be at least one resource in a sharable mode.

(c) At least one resource must be held in a non-sharable mode.

(d) All of the these.

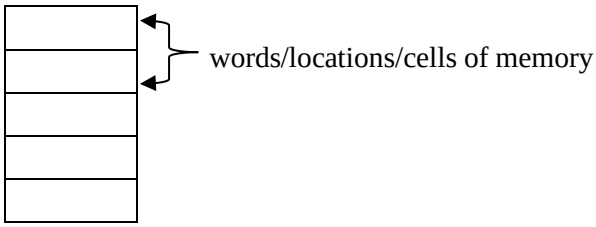
Answer Key

1. **(d)**
2. **(b)**
3. **(4)**
4. **(3840)**
5. **(3)**
6. **(b)**
7. **(c)**
8. **(d)**
9. **(b)**
10. **(a, c, d)**
11. **(c)**

Hints & Solutions

1. (d)

According to abstract view of memory or the memory from developer point of view is known as linear one-dimensional array of words.



1-D linear array

Abstract-view of memory.

2. (b)

Byte is the smallest addressable unit in memory and word-length is measured in the form of byte.

3. (4)

N = 16 {Total words in memory}

m = 8 byte = 64 bit {Size of each word in memory}

So, $n = \log_2 N$ bits

$n = \log_2 16$ bits

n = 4 bits

4. (3840)

(i) N = 32 KW

$\because n = \log_2 N$

$= \log_2(32\ KW)$

$= \log_2(2^5 \times 2^{10})$

n = 15

$\therefore$ **x = 15**

(ii) n = 18

$N = 2^n$

$= 2^{18}$

$= 2^8 \cdot 2^{10}$

= 256 KW

N = 256 KW

y = 256

$\therefore$ **y = 256**

x * y

15 * 256 = **3840**

5. (3)

Functions of memory manager includes:

(i) Memory allocation and deallocation

(ii) Memory protection

(iii) Free space management

(iv) Address translation

Goals of memory manager includes:

(i) Effective memory utilization (No wastage/Avoid fragmentation).

(ii) Manage the execution of larger programs in smaller memory area. Includes the concept of overlays and virtual memory.

6. (b)

Initially,

	Allocation			**Max**			**Need**		
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
$\mathbf{P_0}$	1	1	3	7	4	8	6	3	5
$\mathbf{P_1}$	5	6	2	7	8	4	2	2	2
$\mathbf{P_2}$	3	2	1	4	5	2	1	3	1

Available = A = 2; B = 2; C= 2.

Request 1 asks A = 2; B = 0; C = 1.

Now if Request 1 is permitted, then state would become:

	Allocation			**Max**			**Need**		
	A	**B**	**C**	**A**	**B**	**C**	**A**	**B**	**C**
$\mathbf{P_0}$	3	1	4	7	4	8	4	3	4
$\mathbf{P_1}$	5	6	2	7	8	4	2	2	2
$\mathbf{P_2}$	3	2	1	4	5	2	1	3	1

Available = 0, 2, 1

None of the processes are able to satisfy their need. So, Request 1 can't be permitted.

Request 2 asks A = 2; B = 0; C = 2.

Now if Request 2 is permitted, then state would become:

	Allocation			Max			Need		
	A	B	C	A	B	C	A	B	C
P_0	1	1	3	7	4	8	6	3	5
P_1	7	6	4	7	8	4	0	2	0
P_2	3	2	1	4	5	2	1	3	1

Available = 0, 2, 0

P_1 will be executed.

After P_1, Available = 7, 8, 4

Now, P_2 and P_0 can be executed.

Hence Request 2 can be granted.

7. (c)

Resource- Request algorithm says " Request of any process should be granted iff the resulting state is safe otherwise the request will be denied".

8. (d)

Option A, Ensures circular wait condition.

Option C, Ensures that there will be no- preemption of resources that have been allocated.

Option A, Ensures hold and wait condition never occurs.

9. (b)

Available = 1, 5, 2, 0

Process P_0 can be serviced.

After P_0, Available = 1, 5, 3, 2

Now, Process P_2 can serviced.

After P_2, Available = 2, 8, 8, 6

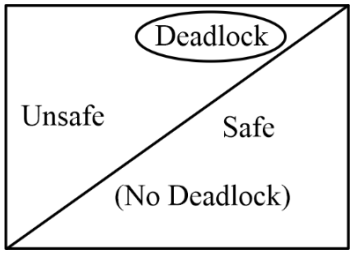
Next P_3 and P_1 can be serviced.

The system in safe state.

Therefore, option B is correct.

10. (a, c, d)

(a)



If a process is in unsafe state it can complete its execution without entering into deadlock. Correct

(b) If the process release all resources before requesting the new resource we are dissatisfying the hold and wait characteristic so deadlock not possible. Incorrect

(c) In deadlock prevention, request for a resource may not be granted even if the resulting state is safe. But in deadlock avoidance, request for a resource is granted if the resulting state is safe. Correct.

(d) In deadlock avoidance (Banker's algorithm), request for a resource is always granted if the resulting state is safe. Correct.

11. (c)

If another process request that resources (non-sharable resources), the requesting process must be delayed until the resources has been released.