UNIT-IV
Assignment-Cum-Tutorial Questions
SECTION-A

Objective Questions

1. A direct edge P_i----->R_j is called a_____ [ ]
   A) Assignment edge C) Request edge
   B) Claim edge D) Release edge
2. A direct edge R_j----> P_i is called a_____ [ ]
   A) Assignment edge C) Request edge
   B) Claim edge D) Release edge
3. Deadlocks can be described in terms of a directed graph called a_____
   A) Directed Acyclic Graph [ ]
   B) Resource allocation graph
   C) Resource request graph
   D) Resource release graph
4. If each resource type has exactly one instance, then a cycle implies that a deadlock has occurred.
   [T/F]
5. If each resource type has exactly several instances, then a cycle does not imply that a deadlock has occurred.
   [T/F]
6. The surface of a platter is logically divided into circular_____[ ]
   A) Sectors B) Tracks C) platters D) surfaces
7. C-SCAN refers to_____ [ ]
   A) Coding SCAN C) Ceil SCAN
   B) Circular SCAN D) City SCAN
8. SCAN algorithm is also called as_____ [ ]
   A) Circular SCAN B) elevator C) LOOK D)
   B) C-LOOK
9. The time to move from the disk arm to the desired cylinder is called_____

A) Rotational latency [ ]

B) Seek time C) Transfer rate D) Random-access time

10. The time for the desired sector to rotate to the disk head is called_____.

A) Rotational latency [ ]

B) Seek time C) Transfer rate D) Random-access time

11. Which one of the following statement about WAIT-FOR graph is true?

A) An edge Pi->Pj exists in a wait for graph if and only if the corresponding resource allocation graph contains two edges P_i->R_q and R_q->P_j for some resource R_q. [ ]

B) An edge Pi->Rj exists in a wait for graph if and only if the corresponding resource allocation graph contains two edges P_i->R_q and R_q->P_j for some resource R_q.

C) An edge Pi->Pj exists in a wait for graph if and only if the corresponding resource allocation graph contains two edges P_i-> P_j and R_q->P_j for someresource R_q.

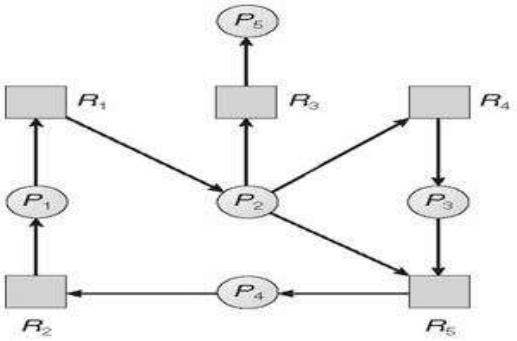
D)An edge Pi->Pj exists in a wait for graph if and only if the corresponding resource allocation graph contains two edges P_i->R_q and P_i ->P_j for some resource R_q.

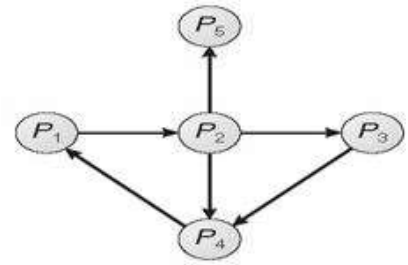
12. Which of the following approaches are used to recover from dead lock

A) Process termination C)Resource preemption

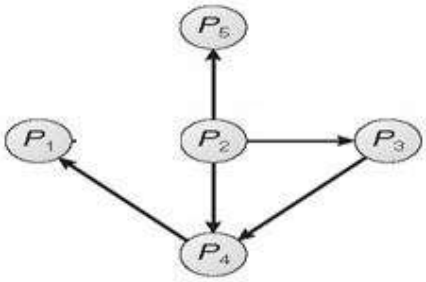
B) Both of the above methods D) None of the above [ ]

13. Which one of the following wait-for graph is equivalent to the given Resource Allocation graph? [ ]

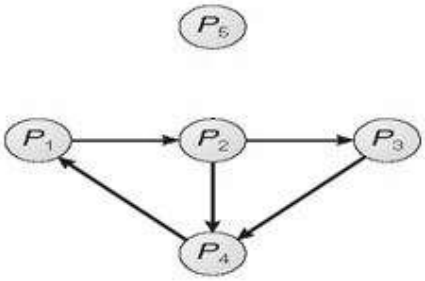




A)



B)



C)

D) No wait-for graph for the given RAG

14. **Consider a system having 'm' resources of the same type. These resources are shared by 3 processes A, B, C, which have peak time demands of 3, 4, 6 respectively. The minimum value of 'm' that ensures that deadlock will never occur is [ ]**

A) 11 B) 12 C) 13 D) 14

15. Which algorithm of disk scheduling selects the request with the least seek time from the current head positions? [ ]
    A) SSTF scheduling C)FCFS scheduling
    B) SCAN scheduling D) LOOK scheduling
16. The circular wait condition can be prevented by [ ]
    A) Defining a linear ordering of resource types C) Using thread
    B) Using pipes D) All of the mentioned
17. For non sharable resources like a printer, mutual exclusion[ ]
    A) Must exist C) Must not exist
    B) May exist D) None of these
18. The disadvantage of a process being allocated all its resources before beginning its execution is : [ ]
    A) Low CPU utilization C) Low resource utilization
    B) Very high resource utilization D) None of these
19. To ensure no preemption, if a process is holding some resources and requests another resource that cannot be immediately allocated to it : [ ]
    A) Then the process waits for the resources be allocated to it
    B) The process keeps sending requests until the resource is allocated to it
    C) The process resumes execution without the resource being allocated to it
    D) Then all resources currently being held are preempted
20. A system has 12 magnetic tape drives and 3 processes : P0, P1, and P2. Process P0 requires 10 tape drives, P1 requires 4 and P2 requires 9 tape drives. [ ]

Process	Maximum needs	Currently allocated
P0	10	5
P1	4	2
P2	9	2

Which of the following sequence is a safe sequence?

A) P0, P1, P2 C) P1, P2, P0

B) P2, P0, P1 D) P1, P0, P2

21. The content of the matrix Need is : [ ]

A) Allocation – Available C) Max – Available

B) Max – Allocation D) Allocation – Max

22. An edge from process Pi to Pj in a wait for graph indicates that :

A) Pi is waiting for Pj to release a resource that Pi needs. [ ]

B) Pj is waiting for Pi to release a resource that Pj needs.

C) Pi is waiting for Pj to leave the system.

D) Pj is waiting for Pi to leave the system.

23. A computer system has 6 tape drives, with 'n' processes competing for them. Each process may need 3 tape drives. The maximum value of 'n' for which the system is guaranteed to be deadlock free is : [ ]

A) 2 B) 3 C) 4 D) 1

24. A system has 3 processes sharing 4 resources. If each process needs a maximum of 2 units then, deadlock : [ ]

A) Can never occur. C) any occur.

B) Has to occur. D) None of these.

SECTION-B

Descriptive Questions

1. Define deadlock and classify the necessary conditions for deadlock?
2. List and explain different methods used for handling deadlocks?
3. Describe in detail about BANKER'S algorithm?
4. With a neat sketch explain the overview of mass storage structure.
5. Differentiate SCAN, C-SCAN and LOOK, C-LOOK disk scheduling algorithms with an example?
6. What is sector sparing? Explain how it is useful in identifying bad blocks in mass storage?
7. Demonstrate in detail about swap-space management?

Problems:

1. Consider the snapshot of a system processes p1, p2, p3, p4, p5,
   Resources A, B, C, D
   Allocation[0 0 1 2, 1 0 0 0, 1 3 5 4, 0 6 3 2, 0 0 1 4]
   Max[0 0 1 2, 1 7 5 0, 2 3 5 6, 0 6 5 2, 0 6 5 6]
   Available[1 5 2 0] .
   i. What will be the content of the Need matrix?
   ii. Is the system in safe state? If Yes, then what is the safe sequence?

2. Consider the following and find out the possible resource allocation sequence with the help of deadlock detection algorithm processes p0, p1, p2, p3, p4, Resources A, B, C
   Allocation [0 1 0, 2 0 0 , 3 0 3, 2 1 1, 0 0 2]
   Max[0 0 0, 2 0 2, 0 0 0, 1 0 0, 0 0 2]
   Available[0 0 0].
   i. What will be the content of the Need matrix?
   ii. Is the system in safe state? If Yes, then what is the safe sequence?

3. A computer system uses the Banker's Algorithm to deal with deadlocks. Its current state is shown in the table below, where P0, P1, P2 are processes, and R0, R1, R2 are resources types.

	Maximum Need			**Current Allocation**			**Available**		
	R0	**R1**	**R2**	**R0**	**R1**	**R2**	**R0**	**R1**	**R2**
P0	4	1	2	**P0** 1	0	2	2	2	0
P1	1	5	1	**P1** 0	3	1			
P2	1	2	3	**P2** 1	0	2			

   i. Show that the system can be in safe state?

ii. What will the system do on a request by process P0 for one unit of resource type R1?

4. Four resources ABCD. A has 6 instances, B has 3 instances, C has instances and D has 2 instances.

Process	Allocation ABCD	Max ABCD
P1	3011	4111
P2	0100	0212
P3	1110	4210
P4	1101	1101
P5	0000	2110

i. Is the current state safe?

ii. If P5 requests for (1,0,1,0), can this be granted?

5. Why disk scheduling is needed? Schedule the given requests **98, 183, 37, 122, 14, 124, 65, 67, 10, 150** with the following disk scheduling algorithms and calculate seek time?
   a. FCFS disk scheduling
   b. SSTF disk scheduling
   c. SCAN disk scheduling
   d. C-SCAN disk scheduling
   e. LOOK disk scheduling
   f. C-LOOK disk scheduling

SECTION-C

Previous GATE/NET questions

1. A system contains three programs and each requires three tape units for its operation. The minimum number of tape units which the system must have such that deadlocks never arise is _____

GATE-CS-2014 [ ]

A) 6 B) 7 C) 8 D) 9

2. A system has 6 identical resources and N processes competing for them. Each process can request atmost 2 resources. Which one of the following values of N could lead to a deadlock?**GATE-CS-2015**[ ]

A) 1 B) 2 C) 3 D) 4

3. Considering a system with five processes P0 through P4 and three resources types A, B, C. Resource type A has 10 instances, B has 5 instances and type C has 7 instances. Suppose at time t0 following snapshot of the system has been taken: **GATE-CS-2014**

Process	Allocation	Max	Available
	A B C	A B C	A B C
P_0	0 1 0	7 5 3	3 3 2
P_1	2 0 0	3 2 2	
P_2	3 0 2	9 0 2	
P_3	2 1 1	2 2 2	
P_4	0 0 2	4 3 3	

i. What will be the content of the Need matrix?
ii. Is the system in safe state? If Yes, then what is the safe sequence?

4. An operating system uses the Banker's algorithm for deadlock avoidance when managing the allocation of three resource types X, Y, and Z to three processes P0, P1, and P2. The table given below presents the current system state. Here, the Allocation matrix shows the current number of resources of each type allocated to each process and the Max matrix shows the maximum number of resources of each type required by each process during its execution.

	Allocation			Max		
	X	Y	Z	X	Y	Z
P0	0	0	1	8	4	3
P1	3	2	0	6	2	0
P2	2	1	1	3	3	3

There are 3 units of type X, 2 units of type Y and 2 units of type Z still available. The system is currently in a safe state. Consider the following independent requests for additional resources in the current state:
REQ1: P0 requests 0 units of X, 0 units of Y and 2 units of Z
REQ2: P1 requests 2 units of X, 0 units of Y and 0 units of Z
Which one of the following is TRUE? **GATE-CS-2014** [ ]

A) Only REQ1 can be permitted.
B) Only REQ2 can be permitted.
C) Both REQ1 and REQ2 can be permitted.
D) Neither REQ1 nor REQ2 can be permitted

5. Which of the following is NOT a valid deadlock prevention scheme?
GATE CS 2000 [ ]

A) Release all resources before requesting a new resource
B) Number the resources uniquely and never request a lower numbered resource than the last one requested.
C) Never request a resource after releasing any resource
D) Request and all required resources be allocated before execution