



Kunal Jha

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Computer Science Engineering(CS)

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TOPICWISE : OPERATING SYSTEM-1 (GATE - 2020) - REPORTS

OVERALL ANALYSIS

COMPARISON REPORT

SOLUTION REPORT

ALL(17)

CORRECT(11)

INCORRECT(6)

SKIPPED(0)

Q. 1

Solution Video

Have any Doubt?



Consider a system with initially 3 empty frame, the page reference string is 0, 1, 3, 1, 2, 4, 7, 3, 0, 2, 1, 3 then the number of page faults using Least Recently Used (LRU) page replacement algorithm.

(A) 9

(B) 10

(C) 11

Your answer is Correct

Solution :

(c)

Reference string 0, 1, 3, 1, 2, 4, 7, 3, 0, 2, 1, 3

0	2	2	2	3	3	3	1	1
1	1	1	7	7	7	2	2	2
3	3	4	4	4	0	0	0	3
4	5	6	7	8	9	10	11	
3 fault	4	5	6	7	8	9	10	11

Total 11 page fault occurrences.

(D) 12

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt?



Consider a system with 8 processes, each process require maximum of 3 instances of resource 'R', what is the maximum value of resources 'R' so that system is in deadlock?

(A) 16

Correct Option

Solution :

(a)

Total 8 process and each process required maximum of 3 instances of 'R'.

For deadlock $R \leq (3 - 1) \times 8$

$$R \leq 2 \times 8$$

$$R = 16$$

Maximum value of R is 16 if R is 17 there is no deadlock.

(B) 17

Your answer is Wrong

(C) 18

(D) 15

QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt?



Match List-I with List-II and select the correct answer using the codes given below:

List-I List-II

A. Best fit

1. Allocation of first free hole that satisfy the requirement

B. First fit

2. Allocation of smallest free hole that satisfy the requirement

C. Next fit

3. Allocation of first free hole from the last allocation that satisfy the requirement

Codes:

A B C

(a) 1 2 3

(b) 2 3 1

(c) 2 1 3

(d) 1 3 2

(A) a

(B) b

(C) c

Your answer is Correct

Solution :

(c)
First fit allocates the first free hole that fulfill the requirement.
Best fit allocates the smallest hole that fulfill the requirement.
Next fit allocates the first free hole from the last allocation.

D d

QUESTION ANALYTICS

**Q. 4****Solution Video****Have any Doubt ?**

Which of the following statement is false?

- A** Processes and Kernel threads can run parallel in multiprocessor system.
- B** Reading the clock of system can be done in user mode.
- C** Accessing the I/O devices needs privileged instruction.
- D** None of these

Your answer is **Correct****Solution :**

(d)
Processes and Kernel level thread can run in parallel in multiprocessor system Kernel level thread treated independently.
Reading the clock of system can be done in user mode but accessing the I/O devices needs privileged instruction.
So all the statement is correct.

QUESTION ANALYTICS

**Q. 5****Solution Video****Have any Doubt ?**

Consider a swapping system in which memory consists of hole sizes in following order:

10 KB, 4 KB, 17 KB, 18 KB, 7 KB, 9 KB, 12 KB, 15 KB, 20 KB
Which hole is taken for segment request of 12 KB

- (i) By using first fit
- (ii) By using best fit
- (iii) By using worst fit

- A** 17 KB, 17 KB, 20 KB
- B** 17 KB, 12 KB, 17 KB
- C** 17 KB, 12 KB, 20 KB

Your answer is **Correct****Solution :**

(c)
Give the sequence of holes
10 KB, 4 KB, 17 KB, 18 KB, 7 KB, 9 KB, 12 KB, 15 KB, 20 KB
First fit

The segment of size 12KB will occupy the first hole in which it can accommodate.
Hence, 17 KB hole is occupied.

Best fit

The hole in which least space is left after filling the segment is selected.
Hence, 12 KB hole is occupied.

Worst fit

The hole with highest size is selected.
Hence, 20 KB hole is occupied.

- D** 17 KB, 18 KB, 12 KB

QUESTION ANALYTICS

**Q. 6****Solution Video****Have any Doubt ?**

Consider a system with 2 K pages in their address spaces, assume that each process keeps its page table in the main memory, to access page table it take 15 ns to reduce the over head a TLB is used which hold 64 entries and to access, it take 3 ns, the hit rate (%) needed for average access time 21 ns is _____
(Upto 1 decimal place)

C 80 [80.0 - 80.0]

Your answer is **Correct** 80**Solution :**

$$\begin{aligned}
 \text{Average access time} &= (t + m) h + (1 - h) (t + 2m) \\
 h &\rightarrow \text{TLB hit time} \\
 t &\rightarrow \text{TLB access time} \\
 m &\rightarrow \text{Memory access time} \\
 &= h(3 + 15) + (1 - h)(3 + 30) \\
 &= h(18) + 33 - 33h \\
 15h &= 12 \\
 h &= 0.8 = 80\%
 \end{aligned}$$

QUESTION ANALYTICS



Q. 7

[▶ Solution Video](#)[Have any Doubt ?](#)

Consider a uniprocessor system which has infinite sequence of processes, process arrive at a rate of 8 processes per minute and each process requires average 3 sec of CPU time, what (%) of time CPU is idle _____.

60

Your answer is Correct60

Solution :

60

Processes are arriving at a rate of 8 processes per minute.

In 60 sec 8 process arrive each process require 3 sec of CPU time, total time required by

$$\text{Processes in 1 min} = 8 \times 3 = 24$$

$$\text{CPU busy time} = \frac{24}{60} \times 100 = 40\%$$

$$\text{Idle time} = 60\%$$

QUESTION ANALYTICS



Q. 8

[▶ Solution Video](#)[Have any Doubt ?](#)

Assume a page reference string with 100 length and 5 distinct page number occurring in it, what is the lower bound on the number of page fault in best case _____.

5

Your answer is Correct5

Solution :

5

There are 5 distinct page number which are present in the page reference string, for the best case the minimum number of page faults will be accessing those page which are present in frame. In the best case the lower bound on the number of page fault is 5.

QUESTION ANALYTICS



Q. 9

[▶ Solution Video](#)[Have any Doubt ?](#)

Consider a system with physical address of 46 bit, virtual address of 64 GB, page size is 16 KB, if the last level page table will fit into one page, number of page table level required is _____.

2

Your answer is Correct2

Solution :

2

Physical address = 46 bit

Virtual address = 64 GB = 36 bit

$$\text{Number of pages} = \frac{\text{Virtual address}}{\text{Page size}} = \frac{2^{36}}{2^{14}} = 2^{22}$$

$$\text{Number of frames} = \frac{2^{46}}{2^{14}} = 2^{32}$$

$$\text{Page table entry size} = 32 \text{ bit} = 4 \text{ B}$$

$$\text{I}^{\text{st}} \text{ level page table size} = 2^{22} \times 4 \text{ B} = 2^{24} \text{ B}$$

$$2^{24} \text{ B} > 16 \text{ KB}$$

$$\text{II}^{\text{nd}} \text{ level page table size} = \frac{2^{24}}{2^{14}} \times 2^2 \text{ B} = 2^{12} \text{ B}$$

$$2^{12} \text{ B} < 16 \text{ KB}$$

So it will fit in one page, total 2 level page table required.

QUESTION ANALYTICS



Q. 10

[▶ Solution Video](#)[Have any Doubt ?](#)

Consider the following statements:

 S_1 : The essential content in page table entry is virtual page number. S_2 : Segmentation is suffers from external fragmentation. S_3 : Paging suffer from internal fragmentation.

Which of the above statement is correct?

 A S_1 and S_2 only B S_2 and S_3 only

Correct Option

Solution :

(b)

 S_1 : The essential content in page table entry is frame number not virtual page number. S_2 : Segmentation is suffers from external fragmentation. S_3 : Paging can suffer from internal fragmentation.Only S_2 and S_3 is correct.

C S_1 and S_3 only

D Only S_3

Your answer is **Wrong**

 QUESTION ANALYTICS

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Item 1-10 of 17 < previous 1 2 next >



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ALL(17) CORRECT(11) INCORRECT(6) SKIPPED(0)

Q. 11
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the following statements:

 S_1 : Context switching time in user level threads will be less compared to Kernel level threads.

 S_2 : Threads can share the code segment.

 S_3 : Kernel level threads are best suitable for I/O bound processes.

Which of the above statements is/are correct?

A Only S_1
B S_2 and S_3 only

Your answer is Wrong

C S_1 and S_2 only

D All of S_1 , S_2 and S_3

Correct Option

Solution :

(d)

 S_1 : Context switching time in user level threads will be less compared to Kernel level threads.

 S_2 : Threads can share the code segment.

 S_3 : Kernel level threads are best suitable for I/O bound processes.

QUESTION ANALYTICS


Q. 12
[▶ Solution Video](#)
[Have any Doubt ?](#)


On a system using simple segmentation, compute the physical address for each of the logical address, given the following segment table.

Segment	Base	Length
0	330	124
1	876	211
2	111	99
3	498	302

Match the following addresses using the segmentation.

Logical Address	Physical Address
(i) 0, 99	(a) 720
(ii) 2, 78	(b) 441
(iii) 1, 265	(c) 429
(iv) 3, 222	(d) Trap
(v) 0, 111	(e) 189

A 1 - e, 2 - b, 3 - d, 4 - c, 5 - a

B 1 - b, 2 - c, 3 - e, 4 - d, 5 - a

C 1 - c, 2 - e, 3 - d, 4 - a, 5 - b

Your answer is Correct

Solution :

(c)

(i) For segment 0, length = Logical address 99 < 124

 \therefore Physical address = 330 + 99 = 429

(ii) For segment 2, length = Logical address 78 < 99

 \therefore Physical address = 111 + 78 = 189

(iii) For segment 1, length = Logical address 265 < 211

 \therefore Trap

(iv) For segment 3, length = Logical address 222 < 302

 \therefore Physical address = 498 + 222 = 720

(v) For segment 0, length = Logical address 111 < 124

 \therefore Physical address = 330 + 111 = 441

D 1 - c, 2 - e, 3 - d, 4 - b, 5 - a

QUESTION ANALYTICS


Q. 13
[▶ Solution Video](#)
[Have any Doubt ?](#)


A system has five processes and four allocatable resources. The current allocation and maximum needs are as follows:

Process	Allocated				Maximum				Available			
	X	Y	Z	W	X	Y	Z	W	X	Y	Z	W
P ₀	1	0	2	0	3	2	4	2	a	0	0	b

P_1	0	3	1	2	3	5	1	2			
P_2	2	4	5	1	2	7	7	5			
P_3	3	0	0	6	5	5	0	8			
P_4	4	2	1	3	6	2	1	4			

What is the smallest value of a, b for which the system is in a safe state?

A a = 2, b = 2

Your answer is Wrong

B a = 4, b = 5

C a = 3, b = 4

D a = 2, b = 1

Correct Option

Solution :

(d)

	X	Y	Z	W
P_0	2	2	2	2
P_1	3	2	0	0
P_2	0	3	2	4
P_3	2	5	0	2
P_4	2	0	0	1

Since available is a 0 0 b, let's suppose a takes value 2 and b takes the value 1.

Available = 2 0 0 1

$P_4 \rightarrow$ Complete \rightarrow Avail = (0000 + 6214) = 6214

$P_1 \rightarrow$ Complete \rightarrow Avail = (6214) - (3200) = (3014) + (3512) = (6526)

$P_0 \rightarrow$ Complete \rightarrow Avail = (6526) - (2222) = (4304) + (3242) = (7546)

$P_2 \rightarrow$ Complete \rightarrow Avail = (7546) - (0324) = (7222) + (2775) = (9, 9, 9, 7)

$P_3 \rightarrow$ Complete \rightarrow Avail = (9997) - (2502) = 7495

Hence, the system is in a safe state will value of a as 2 and value of b as 1.

QUESTION ANALYTICS

Q. 14

Solution Video

Have any Doubt ?



Consider the following statements:

S_1 : The total size of address space in a virtual memory system is limited by the available main memory.

S_2 : The best fit techniques for memory allocation ensures the memory will never be fragmented.

S_3 : Locality of reference implies that the page reference being made by a process will always be the page that is being used in the previous page reference.

S_4 : Virtual memory reduces the context switching overhead.

How many of the above statements are false?

A S_1 and S_2 only

B S_1 and S_3 only

C S_1 , S_2 and S_3 only

D S_1 , S_2 , S_3 and S_4

Your answer is Correct

Solution :

(d)

The total size of address space in a virtual memory system is limited by the available secondary storage.

Best fit technique can also suffer from fragmentation.

Locality of reference implies that the page reference being made by a process is likely to be the page used in the previous page reference.

In a system with virtual memory context switch includes extra overhead in switching of address space.

QUESTION ANALYTICS

Q. 15

Solution Video

Have any Doubt ?



Consider a system with virtual address space of 256 GB, page table entry size is 4B, what is the minimum page size (in KB) so that two level paging system is used and first level page table size is exactly same as page size _____.

16

Correct Option

Solution :

16

Virtual address space = 256 GB = 2^{38}

Let 2^P is the page size

$$\text{First level page table size} = \frac{2^{38}}{2^P} \times 2^2 = 2^{40-P}$$

$$\text{Second level page table size} = \frac{2^{40-P}}{2^P} \times 2^2 = 2^{42-2P}$$

Last level page table fit into one page

$$2^P = 2^{42-2P}$$

$$P = 42 - 2P$$

$$3P = 42$$

$$P = 14$$

$$\text{Page size} = 2^{14} = 16 \text{ KB}$$

Your Answer is 1024



ANSWER



Q. 16

[▶ Solution Video](#)[Have any Doubt ?](#)

Consider a file system with disk block size is 512 KB, with 4 direct block addresses, 1 indirect 2 doubly indirect and 1 triple indirect block addresses, if the disk block address size is 32 KB then the maximum possible file size using triple indirect is _____ (GB).

2

Your answer is **Correct2****Solution :**

2

Disk block size = 512 KB

$$\text{Number of address in one disk block} = \frac{512 \text{ KB}}{32 \text{ KB}} = 2^4$$

$$\begin{aligned}\text{Maximum possible file size using triple indirect} &= 1 \times 2^4 \times 2^4 \times 2^4 \times 512 \text{ KB} \\ &= 2^{12} \times 2^9 \text{ KB} = 2 \text{ GB}\end{aligned}$$

Q. 17

[▶ Solution Video](#)[Have any Doubt ?](#)

A disk has 201 cylinders, numbered from 0 to 200. At some time, disk arm is at cylinder 100 and there is a queue of disk access request for cylinders 15, 60, 90, 135, 165, 180. Suppose:

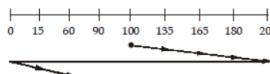
- I. A seek time takes 1 msec per cylinder to move the disk arm.
- II. Directly moving the disk arm from the outermost of the disk (with the largest cylinder number) to the innermost of the disk (without servicing any disk request) takes only 10 msec.
- III. Initially, the disk arm is moving towards higher cylinders. The seek time needed to serve the above requests if the C-scan disk scheduling algorithms is used is _____ msec.

200

Correct Option

Solution :

200



$$\begin{aligned}\text{Total seek time} &= (135 - 100) + (165 - 135) + (180 - 165) + (200 - 180) + 10 + (15 - 0) + (60 - 15) + (90 - 60) \\ &= 35 + 30 + 15 + 20 + 10 + 15 + 45 + 30 = 200 \text{ msec}\end{aligned}$$

●

Your Answer is 1815



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OVERALL ANALYSIS COMPARISON REPORT **SOLUTION REPORT**

ALL(17) CORRECT(9) INCORRECT(7) SKIPPED(1)

Q. 1

Solution Video

Have any Doubt ?



Which of the following is true?

A Long term scheduler create a new process and loads into memory

Correct Option

Solution :

(a)
 Long term scheduler create a new process and loads into memory by making a transition from new to ready.
 Long term schedule controls the degree of multiprogramming.
 So option (a) is correct.

B Short term scheduler control the degree of multiprogramming

C Both (a) and (b)

D None of these

Your answer is **Wrong**

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt ?



Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I **List-II**

- | | |
|-----------------------|---------------------------------|
| A. Access time | 1. Desired cylinder |
| B. Seek time | 2. Desired sector |
| C. Rotational latency | 3. Actual data |
| D. Data transfer time | 4. Total time from start to end |

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 1 | 2 | 4 |
| (b) | 3 | 2 | 1 | 4 |
| (c) | 4 | 1 | 2 | 3 |
| (d) | 4 | 2 | 1 | 3 |

A a

Your answer is **Wrong**

B b

C c

Correct Option

Solution :

(c)
Access time: total time needed to access the data
 Access time = seek time + rotational latency + data transfer time
Seek time: Time taken to move the head to the correct cylinder that contains desired sector.
Rotational latency: Time taken to move the head to the desired sector within the cylinder.
Data transfer time: Time taken to transfer the actual data.

D d

QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt ?



Time quantum of Round Robin schedules is greater than longest CPU burst time of all process then which of the following is correct.

A FCFS works better than Round Robin

B FCFS and Round Robin behaves same

Your answer is **Correct**

Solution :

(b)
 If the time quantum of Round Robin is greater than Round Robin will act same like FCFS scheduling algorithm.

C Round Robin works better than FCFS

D None of these

QUESTION ANALYTICS



Q. 4

▶ Solution Video

⌚ See Your Answers

Consider the following preemptive priority scheduling algorithms based on dynamically changing priorities. Large priority numbers imply higher priority. When the process is waiting for the CPU in ready queue, its priority changes at a rate ' α '; when its running, its priority changes at a rate ' β '. All processes are given same priority, when they enter the ready queue. Which one of the CPU scheduling algorithm results from $\alpha > \beta > 0$?

A Round Robin Algorithm

B Shortest Job First Algorithm

C First Come First Serve Algorithm

Your answer is Wrong

D Last-In-First-Out

Correct Option

Solution :

(d)

New process in this algorithm will always run immediately and older process will sit in the ready queue until the most recent process finishes. This is essentially last in first out algorithm.

Q. 5

Identify one of the following which need not be part of operating system?

- A CPU scheduling
- B Page replacement
- C Demand paging and virtual memory
- D Compiler

Your answer is Correct

Solution :
(d)
Compiler need not be part of OS, included in standard libraries, which can be accessed by user directly.
CPU scheduling, Page replacement and virtual memory are part of operating system, which need to be privileged.

Q. 6 ▶ Solution Video ⌚ Have any Doubt ? Bookmark

Jobs A, B, C, D and E with running time of 13, 10, 5, 9 and 1 respectively arrive at computer in the time order 0, 5, 7, 10, 12. If the priority of these jobs is in the order C, B, E, A and D and the policy used for scheduling is that a higher priority job always succeeds in preempting. Context switching takes 1 unit of time. The exact number of context switches needed are _____. (Do not count the context switches at time 0 and at the end).

6 Your answer is Correct!

Solution :
6

Process	A_t	B_t	Priority
A	0	13	4
B	5	10	2
C	7	5	1
D	10	9	5
E	12	1	3

Preparing the Gantt Chart,

The Gantt chart shows processes A, B, C, E, A, D over time. The x-axis represents time from 0 to 38. Processes are represented by vertical bars: A (0-13), B (5-15), C (7-12), E (12-13), A (13-22), and D (22-38). Arrows point from the start of each process bar to its priority value: C (1), B (2), E (1), A (5), and D (3).

So, there are total 6 number of context switches.

Q. 7

[Solution Video](#) [Have any Doubt ?](#) [Bookmark](#)

Consider a file system with block size is 4 KB and disk size is 28 MB, to keep track of free block in the disk a bit map is used. Then how many disk blocks required for bit map _____.

1 Correct Option

Solution :
1 Disk size = 28 MB
In bit map, one bit (0 or 1) is used to represent that the block is free or not.
Block size = 4 KB

Number of block = $\frac{28 \times 2^{20}}{4 \times 2^{10}} = 7 \times 2^{10}$
 For each block there is 1 bits thus
 Total size of bit map (in bytes) = $\frac{7 \times 2^{10}}{2^3} = 7 \times 2^8 = 1792 \text{ B}$
 $1792 < 4 \text{ KB}$
 Thus only 1 block is required to store bit map.



Your Answer is 2

QUESTION ANALYTICS

Q. 8

Solution Video

Have any Doubt?



What will be the value of counting semaphore S after executing the following semaphore operation, if initial value of S is 2 _____.
 P, V, V, V, P, P, V, P, V, P, V



Your answer is Correct

Solution:
3

Initial value of counting semaphore is 2
 P, V, V, V, P, P, V, P, V, P, V
 Total 5 P operation and 6 V operation is performed so $-5 + 6 = +1$
 Initial value = 2
 Final value of semaphore S = $2 + 1 = 3$

QUESTION ANALYTICS

Q. 9

Solution Video

Have any Doubt?



Consider the following set of processes with their arrival and CPU burst time.

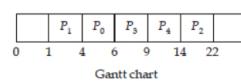
Processes	Arrival Time	CPU Burst Time
P_0	3	2
P_1	1	3
P_2	5	8
P_3	2	3
P_4	8	5

What is the average waiting time of these processes when shortest remaining time first policy is used _____.



Your answer is Correct

Solution:
3



Processes	Waiting Time
P_0	1
P_1	0
P_2	9
P_3	4
P_4	1

$$\text{Average waiting time} = \frac{\sum_{i=0}^n \text{Waiting time of } P_i}{\text{Total process}}$$

$$= \frac{1+0+9+4+1}{5} = 3$$

QUESTION ANALYTICS

Q. 10

Solution Video

Have any Doubt?



Consider the following synchronization mechanism for two process:

Process 1 Entry: while (id == 0); critical section Exit id = 0;	Process 2 Entry: while (id == 1); critical section Exit id = 1;
---	---

Shared variable id is initialized to 0, which of the following is true?



Mutual exclusion and progress is satisfied.

ANSWER

Solution :

(b)

Value of id can be 0 or 1 at a time and only one process can enter into critical section at a time so mutual exclusion is satisfied.
There are strict alteration so progress is not satisfied.

C Process and mutual exclusion both not satisfied.**D** None of these QUESTION ANALYTICS

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Q. 1

Solution Video Have any Doubt ?

Which of the following is true?

A Long term scheduler create a new process and loads into memory

Correct Option

Solution :

(a) Long term scheduler create a new process and loads into memory by making a transition from new to ready.
 Long term schedule controls the degree of multiprogramming.
 So option (a) is correct.

B Short term scheduler control the degree of multiprogramming

C Both (a) and (b)

D None of these

Your answer is Wrong

QUESTION ANALYTICS

+

Q. 2

Solution Video Have any Doubt ?

Match List-I with List-II and select the correct answer using the codes given below the lists:

List-I List-II

- | | |
|-----------------------|---------------------------------|
| A. Access time | 1. Desired cylinder |
| B. Seek time | 2. Desired sector |
| C. Rotational latency | 3. Actual data |
| D. Data transfer time | 4. Total time from start to end |

Codes:

- | | A | B | C | D |
|-----|---|---|---|---|
| (a) | 3 | 1 | 2 | 4 |
| (b) | 3 | 2 | 1 | 4 |
| (c) | 4 | 1 | 2 | 3 |
| (d) | 4 | 2 | 1 | 3 |

A a

Your answer is Wrong

B b

C c

Correct Option

Solution :

(c)
Access time: total time needed to access the data
 Access time = seek time + rotational latency + data transfer time
Seek time: Time taken to move the head to the correct cylinder that contains desired sector.
Rotational latency: Time taken to move the head to the desired sector within the cylinder.
Data transfer time: Time taken to transfer the actual data.

D d

QUESTION ANALYTICS

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Q. 3

Solution Video Have any Doubt ?

Time quantum of Round Robin schedules is greater than longest CPU burst time of all process then which of the following is correct.

A FCFS works better than Round Robin

B FCFS and Round Robin behaves same

Your answer is Correct

Solution :

(b)
 if the time quantum of Round Robin is greater then Round Robin will act same like FSFS scheduling algorithm.

C Round Robin works better than FCFS

D None of these

QUESTION ANALYTICS

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Q. 4

Consider the following preemptive priority scheduling algorithms based on dynamically changing priorities. Large priority numbers imply higher priority. When the process is waiting for the CPU in ready queue, its priority changes at a rate ' α '; when its running, its priority changes at a rate ' β '. All processes are given same priority, when they enter the ready queue. Which one of the CPU scheduling algorithm results from $\alpha > \beta > 0$?

A Round Robin Algorithm

B Shortest Job First Algorithm

C First Come First Serve Algorithm Your answer is Wrong

D Last-In-First-Out Correct Option

Solution :
(d)
New process in this algorithm will always run immediately and older process will sit in the ready queue until the most recent process finishes. This is essentially last in first out algorithm.

Q. 5

Identify one of the following which need not be part of operating system?

- A CPU scheduling
- B Page replacement
- C Demand paging and virtual memory
- D Compiler

Your answer is **Correct**

Solution :
(d)
Compiler need not be part of OS, included in standard libraries, which can be accessed by user directly.
CPU scheduling, Page replacement and virtual memory are part of operating system, which need to be privileged.

Q. 6

[Solution Video](#)

[Have any Doubt ?](#)

Jobs A, B, C, D and E with running time of 13, 10, 5, 9 and 1 respectively arrive at computer in the time order 0, 5, 7, 10, 12. If the priority of these jobs is in the order C, B, E, A and D and the policy used for scheduling is that a higher priority job always succeeds in preempting. Context switching takes 1 unit of time. The exact number of context switches needed are _____. (Do not count the context switches at time 0 and at the end).

6

Your answer is Correct!

Solution :

6

Process	A_f	B_f	Priority
A	0	13	4
B	5	10	2
C	7	5	1
D	10	9	5
E	12	1	3

Preparing the Gantt Chart,

The Gantt chart shows the execution of processes A, B, C, E, B, E, A, and D. The timeline starts at 0 and ends at 38. The processes are scheduled as follows:

- From 0 to 7, process C runs.
- From 7 to 12, process B runs.
- From 12 to 20, process E runs.
- From 20 to 21, there is a context switch to process B.
- From 21 to 29, process E runs.
- From 29 to 38, process A runs.
- At 38, process D begins.

Arrows below the chart indicate context switches at times 7, 12, 20, 21, 29, and 38.

So, there are total 6 number of context switches.

Q. 7

Consider a file system with block size is 4 KB and disk size is 28 MB, to keep track of free block in the disk a bit map is used. Then how many disk blocks required for bit map _____.

1

Solution :

1 Disk size = 28 MB
In bit map, one bit (0 or 1) is used to represent that the block is free or not.
Block size = 4 KB

Correct Option

Number of block = $\frac{28 \times 2^{20}}{4 \times 2^{10}} = 7 \times 2^{10}$
 For each block there is 1 bits thus
 Total size of bit map (in bytes) = $\frac{7 \times 2^{10}}{2^3} = 7 \times 2^8 = 1792 \text{ B}$
 $1792 < 4 \text{ KB}$
 Thus only 1 block is required to store bit map.



Your Answer is 2

QUESTION ANALYTICS

Q. 8

Solution Video

Have any Doubt?



What will be the value of counting semaphore S after executing the following semaphore operation, if initial value of S is 2 _____.
 P, V, V, V, P, P, V, P, V, P, V

3

Your answer is Correct

Solution :

Initial value of counting semaphore is 2
 P, V, V, V, P, P, V, P, V, P, V
 Total 5 P operation and 6 V operation is performed so $-5 + 6 = +1$
 Initial value = 2
 Final value of semaphore S = $2 + 1 = 3$

QUESTION ANALYTICS

Q. 9

Solution Video

Have any Doubt?



Consider the following set of processes with their arrival and CPU burst time.

Processes	Arrival Time	CPU Burst Time
P_0	3	2
P_1	1	3
P_2	5	8
P_3	2	3
P_4	8	5

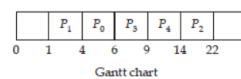
What is the average waiting time of these processes when shortest remaining time first policy is used _____.

3

Your answer is Correct

Solution :

3



Processes	Waiting Time
P_0	1
P_1	0
P_2	9
P_3	4
P_4	1

$$\text{Average waiting time} = \frac{\sum_{i=0}^n \text{Waiting time of } P_i}{\text{Total process}}$$

$$= \frac{1+0+9+4+1}{5} = 3$$

QUESTION ANALYTICS

Q. 10

Solution Video

Have any Doubt?



Consider the following synchronization mechanism for two process:

Process 1

Process 2

Entry:

Entry:

while ($id == 0$);

while ($id == 1$);

critical section

critical section

Exit

Exit

$id = 0$;

$id = 1$;

Shared variable id is initialized to 0, which of the following is true?



Mutual exclusion and progress is satisfied.

ANSWER

Solution :

(b)

Value of id can be 0 or 1 at a time and only one process can enter into critical section at a time so mutual exclusion is satisfied.
There are strict alteration so progress is not satisfied.

C Process and mutual exclusion both not satisfied.**D** None of these QUESTION ANALYTICS

+



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ALL(17)

CORRECT(9)

INCORRECT(7)

SKIPPED(1)

Q. 11

Solution Video

Have any Doubt ?



Process synchronization may have race condition, what is the reason for occurrence of race condition?

 A More than one process entering into critical section at the same time.

Your answer is Correct

Solution :

(a)

Race condition is occur if more than one process entering into critical section at the same time. If mutual exclusion is satisfies race condition will not occur, if only one process is trying to update the shared variable race condition is not occur, it is possible if more than one process trying to update at same time.

 B Mutual exclusion is satisfies. C One process is trying to update the shared variable at a time. D Both (a) and (b)

QUESTION ANALYTICS



Q. 12

Solution Video

Have any Doubt ?



Consider the following statements:

- I. If multiple processes are waiting for the resources instances in circular fashion, than there is always a dead lock situation.
- II. Using large file block size in a fixed block size file system leads to poor disk throughput.

Which of the above statement is correct?

 A I only B II only C Both I and II

Your answer is Wrong

 D None of these

Correct Option

Solution :

(d)

- I. There are four condition required for deadlock, mutual exclusion circular wait, no preemption, hold and wait. If only circular wait then it will not always describe deadlock.
- II. Using large file block size in a fixed block file system leads to better disk throughput but poor disk space utilization.

QUESTION ANALYTICS



Q. 13

Solution Video

Have any Doubt ?



Consider the following proposed solution to dining Philosopher's problem to avoid deadlock. Consider the binary semaphore lock is initialized to 1.

```
Philosopher (int i)
{
    while (1)
    {
        think ();
        wait (lock);
        ... (i)
        wait (fork [i]);
        ... (ii)
        wait (fork [(i + 1)%5]);
        signal (lock);
        ... (iii)
        eat ();
        signal (lock);
        ... (iv)
        signal (fork [i]);
        signal (fork (i + 1)%5);
        signal (lock);
    }
}
```

Which of the following is correct?

 A Removing (i) and (ii) will not affect the code. The code will still work fine. B Removing (iii) and (iv) will not affect the code. The code still work fine.

Correct Option

Solution :

(b)

If, we remove the lock while acquiring the fork. It may lead to deadlock, if all process execute (i) statement before any philosopher has execute (ii) statement. Removal of (iii) and (iv) will not affect the code, since no conflict can occur doing the V operation on forks.

 C Removing both (i), (ii), (iii) and (iv) will not affect the code. The code will still work fine.

D All (i), (ii), (iii) and (iv) are necessary. Removal of any of them will affect the code.

QUESTION ANALYTICS

Q. 14

Solution Video

Have any Doubt?



Consider the following 3 process with 3 counting semaphore r, s, t :

Process 1	Process 2	Process 3
Wait (s)	Wait (r)	Wait (t)
Print ("AB")	Print ("ABC")	Print ("AB")
Signal (t)	Signal (s)	Signal (r)

What will be the initial values of counting semaphore r, s, t to always print "ABABCAB"?

A $r = 1, s = 0, t = 1$

B $r = 0, s = 0, t = 1$

Your answer is Correct

Solution:
(b)

$$r = 0, s = 0, t = 1$$

First process 3 will be execute only because $r = 0$ and $s = 0$ so process 1 and process 2 can not execute.

Process 3 will print ABA and after signal (r), r value become 1 so process 2 will execute and print ABC and last process 1 will execute and print AB.

So finally "ABABCAB" will be printed.

other options may result "ABABCAB" but not always.

C $r = 0, s = 1, t = 1$

D $r = 1, s = 0, t = 0$

QUESTION ANALYTICS

Q. 15

Solution Video

Have any Doubt?



Consider the following two concurrent processes which share a variable X and initial value of X is 0

P_0	P_1
for ($J = 0, J < 8, J++$)	for ($K = 0, K < 8, K++$)
$X = X + 5;$	$X = X + 20;$

What is the maximum possible value of X after completion of both the process _____.

200

Your answer is Correct 200

Solution:
200

Both process P_0 and P_1 can execute concurrently.

If P_0 execute first $x = 40$ then P_1

$$X = 200$$

If P_1 execute first the P_0 then final value of $X = 200$

P_1 and P_0 executing currently final value of $X = 200$

QUESTION ANALYTICS

Q. 16

Solution Video

Have any Doubt?



Consider the following three concurrent processes with two counting semaphore initialized with $A = 3, B = 0$:

Process-1	Process-2	Process-3
while (1)	while (1)	while (1)
{	{	{
P(A);	P(B);	P(B);
Printf("0");	Printf("1");	Printf("3");
V(B);	V(B);	}
}	}	

What is the minimum number of 1's printed by the execution of the above processes?

0

Correct Option

Solution:
0

(i) $A = 3, B = 0$

First process-1 execute three times and process-1 is blocked ($A = 0, B = 3$).

(ii) Process-3 executes next three times and process-3 is blocked ($A = 0, B = 0$).

(iii) Process-2 executes last then it will be blocked by executing P(B) first time.

∴ No '1' is printed by the execution of three processes and all are blocked.

Number of 1's printed = 0



Your Answer is 1

Q. 17

Solution Video

Have any Doubt ?



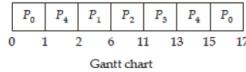
Consider the following table given below (all time in ms):

Processes	Arrival Time	Priority	Burst Time
P_0	0	5 (Lowest)	3
P_1	2	0 (Highest)	4
P_2	5	2	5
P_3	3	3	2
P_4	1	4	3

Operating system uses preemptive priority scheduling to schedule the processes, average turn around time (ms) of these processes are _____. (Upto 1 decimal place)

10.2 [10.1 - 10.3]

Correct Option

Solution:
 10.2 [10.1 - 10.3]


Processes	Waiting Time	Turn Around Time
P_0	14	17
P_1	0	4
P_2	1	6
P_3	8	10
P_4	11	14

$$\text{Turn around time} = \text{Waiting time} + \text{Burst time}$$

$$\text{Average turn around time} = \frac{17 + 4 + 6 + 10 + 14}{5} = 10.2 \text{ ms}$$

Your Answer is 7.8



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ALL(33)

CORRECT(18)

INCORRECT(5)

SKIPPED(10)

Q. 1

Solution Video

Have any Doubt ?



Consider a system having 30 instances of resources ' R ' shared by ' n ' process. Each process require 4 instance of the resource. What is the maximum possible number of processes that must be allowed such that system is in a safe state ?

A 9

Correct Option

Solution :

(a)

Every process needs '4' instance. Hence giving '3' instance to each of the 8 processes will need 24 resources and remaining 1 process will get all 4 resources.

B 8

C 10

Your answer is Wrong

D 11

QUESTION ANALYTICS



Q. 2

Solution Video

Have any Doubt ?



Consider the following statements:

 S_1 : Starvation implies a deadlock situation. S_2 : If multiple processes are waiting for the resources instances in circular fashion then it will never be in deadlock.

Which of the above statements is/are not correct?

 A Only S_1 B Only S_2 C Both S_1 and S_2

Your answer is Correct

Solution :

(c)

 S_1 : Starvation not always implies deadlock, if there is starvation there may not be deadlock. S_2 : If multiple processes are waiting for resources in circular then there may be deadlock if other 3 condition is satisfied and may not be deadlock, if other three condition mutual exclusion, no preemption, hold and wait is not satisfied.So both S_1 and S_2 are not correct. D Neither S_1 nor S_2

QUESTION ANALYTICS



Q. 3

Solution Video

Have any Doubt ?



Consider the following statements:

 S_1 : The main reason to have TLB hardware is to speed up address translation. S_2 : In deadlock avoidance scheme knowledge of resources is required a priori.

Which of the following is correct?

 A Only S_1 B Only S_2

Your answer is Wrong

 C Both S_1 and S_2

Correct Option

Solution :

(c)

The main reason to have TLB hardware is to speedup the address translation by checking 1st in TLB if there is a miss in TLB then only there is a check in main m/m or cache m/m. In deadlock avoidance scheme i.e. Banker's algorithm knowledge of resources is required a priori.

 D Neither S_1 nor S_2

QUESTION ANALYTICS



Q. 4

[▶ Solution Video](#)[Have any Doubt ?](#)

Which of the following is true?

- A One solution to external fragmentation is compaction.
- B External fragmentation exists when there is enough total memory space to satisfy a request but the available space is contiguous.
- C If there are too many programs running in the system then it is likely cause of thrashing.
- D Both (a) and (c)

Your answer is Correct

Solution :

(d)

Both (a) and (c) are correct.

If there are too many programs running in the system then it is a cause of thrasing.

QUESTION ANALYTICS

Q. 5

[▶ Solution Video](#)[Have any Doubt ?](#)

In a demand-paged system, the degree of multiprogramming is fixed at 4. Measurements were made to determine the utilization of CPU and the paging disk. Results obtained are listed in Group-I.

I. Match Group-I and Group-II regarding what describes the measurement best.

- | Group-I | Group-II |
|--------------------------|----------------------------------|
| A. CPU utilization → 13% | 1. System is well utilized |
| Disk utilization → 97% | 2. Can increase multiprogramming |
| B. CPU utilization → 92% | 3. Thrashing |
| Disk utilization → 11% | |
| C. CPU utilization → 21% | |
| Disk utilization → 3% | |

Codes:

- | A | B | C |
|-------|---|---|
| (a) 1 | 2 | 3 |
| (b) 3 | 1 | 2 |
| (c) 3 | 2 | 1 |
| (d) 2 | 3 | 1 |

 a b

Correct Option

Solution :

(b)

• When, CPU utilization is low and disk utilization is very high, the situation is called thrashing.

• In (3), CPU utilization as well as disk utilization both are low, hence, it can be said that, there is a need to increase multiprogramming.

 c d**QUESTION ANALYTICS**

Q. 6

[▶ Solution Video](#)[Have any Doubt ?](#)

Which of the following is true about the user level and Kernel level threads?

- I. Many to one model maps many Kernel threads to one user thread.
- II. Many to one model maps many user threads to one Kernel thread.

 Both I and III I only II only

Your answer is Correct

Solution :

(c)

Many to one model maps many user threads to one Kernel thread.

 Neither I nor II**QUESTION ANALYTICS**

Q. 7

[▶ Solution Video](#)[Have any Doubt ?](#)

Consider two concurrent processes P and Q with shared variable a and b, two binary semaphores A and B are used which is initialized to 1.

Process P:

While (1)

Process Q:

While (1)

,

```

    X1;
    X2;
    a = a + 2;
    b = b - 1;
    Signal (A);
    Signal (B);
}
    X3;
    X4;
    b = b + 1;
    a = a - 3;
    Signal (B);
    Signal (A);
}

```

What is the value of X_1, X_2, X_3, X_4 respectively to satisfy mutual exclusion, progress and bounded waiting?

A Wait (B), wait (A), wait (A), wait (B)

B Wait (A), wait (B), wait (B), wait (A)

C Wait (A), wait (B), wait (A), wait (B)

Your answer is Correct

Solution :

- (c)
 - (a) Wait (B), wait (A), wait (A), wait (B).
If X_1 is executed in process P and then process is preempted and X_3 is executed there is deadlock condition.
 - (b) Wait (A), wait (B), wait (B), wait (A)
There also deadlock may occurs.
 - (c) Wait (A), wait (B), wait (A), wait (B)
This is the correct implementation.

D None of these

 QUESTION ANALYTICS



Q. 8

 Solution Video

 Have any Doubt ?



Consider the following statements:

S_1 : An advantage of aging is to solve starvation problem.

S_2 : A thread running in critical section may get context switched.

Which of the above statements is true?

A S_1 only

B S_2 only

C Both S_1 and S_2

Your answer is Correct

Solution :

- (c)
 - S_1 : Aging is used to solve starvation problem.
 - S_2 : A thread running in user mode in critical section may get context switched.
 - Both S_1 and S_2 is true.

D Neither S_1 nor S_2

 QUESTION ANALYTICS



Q. 9

 Solution Video

 Have any Doubt ?



Which of the following is a disadvantage of user level threads compared to Kernel level threads?

A If mutual exclusion is satisfied on shared resources, then RACE condition arises.

B If the processes are of cooperative processes, then they don't require synchronization.

C If a user level thread of a process execute blocking system call, all threads in that process are blocked.

Correct Option

Solution :

- (c)
 - If mutual exclusion is satisfied on shared resources, then RACE condition does not arises. If the processes are of cooperative processes, then they require synchronization.

D All of the above

 QUESTION ANALYTICS



Q. 10

 Solution Video

 Have any Doubt ?



Which of the following is true?

A There is a bit in the Program States Word (PSW) that indicate the mode of execution is user or Kernel.

B Process identification is a part of process control block.

C Process creation is done in user mode.

D Both (a) and (b)

Correct Option

Solution :

(d)

There is a bit in PSW which will be change when mode is change from Kernel to user or user to Kernel. Process identification is a part of process control block.

 QUESTION ANALYTICS



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Q. 11
[▶ Solution Video](#)
[⌚ Have any Doubt ?](#)


Consider the following processes with their arrival, burst time and priority. (All time in ms)

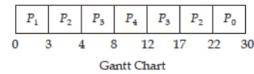
Process	Arrival Time	Burst Time	Priority
P_0	0	8	4 (Lowest)
P_1	0	3	1
P_2	2	6	3
P_3	4	9	2
P_4	8	4	0 (Highest)

Preemptive priority scheduling algorithm is used, average waiting time (in ms) of these processes are _____.

8

 Your answer is **Correct8**
Solution :

8



Waiting time = Turn around time - Arrival time

Process	Waiting Time
P_0	22
P_1	0
P_2	14
P_3	4
P_4	0

$$\text{Average waiting time} = \frac{22 + 0 + 14 + 4 + 0}{5} = 8$$

QUESTION ANALYTICS


Q. 12
[▶ Solution Video](#)
[⌚ Have any Doubt ?](#)


Consider the following page reference string with 3 frames 1, 2, 0, 3, 4, 1, 2, 3, 0, 1, 2, 3, 5, 4, 2. Number of page fault reduced when optimal page replacement is used instead of Least Recently Used (LRU) algorithm _____.

5

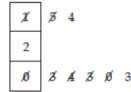
 Your answer is **Correct5**
Solution :

5

Optimal page replacement policy is used 1, 2, 0, 3, 4, 1, 2, 3, 0, 1, 2, 3, 5, 4, 2



Initial 3 page fault.



1 + 1 + 1 + 1 + 1 + 1 + 1

Total = 3 + 7 = 10 page fault

When LRU is used.



3 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1

Total 15 page fault.

So 15 - 10 = 5 page fault is reduced.

QUESTION ANALYTICS


Q. 13
[▶ Solution Video](#)
[⌚ Have any Doubt ?](#)


In a system virtual address space is 42 bit, physical address space is 36 bit, page size is 16 KB and page table entry size 38 bit, the maximum number of bits that can be used for storing protection and other information in the page table entry are _____.

16

 Your answer is **Correct16**

Solution :

16

Page table entry contain bit for representing frame and other information.

$$\begin{aligned}\text{Number of frames} &= \frac{2^{38}}{2^{14}} = 2^{22} \\ 22 + \text{other information bit} &= 38 \\ &= 16\end{aligned}$$

Q. 14

Solution Video

Have any Doubt ?



Consider a system with main memory access time 30 ns, if the page fault rate is 15% and page fault service time is 10 μ sec, the effective memory access time (in μ s) _____.
(Upto 2 decimal places)

1.52 [1.51 - 1.54]

Correct Option

Solution :

1.52 [1.51 - 1.54]

Let P is page fault rate.

$$\begin{aligned}\text{Effective memory access time} &= (1 - P) \times \text{Memory access time} + P \times \text{Page fault service time} \\ &= (1 - 0.15) \times 30 \text{ nsec} + 0.15 \times 10 \mu\text{sec} \\ &= 0.85 \times 30 \text{ nsec} + 0.15 \times 10000 \text{ nsec} \\ &= 25.5 + 1500 \\ &= 1525.5 \text{ ns} = 1.52 \mu\text{s}\end{aligned}$$

Your Answer is 25501.5

Q. 15

Solution Video

Have any Doubt ?



Consider a system with 36 bit virtual address space, with page size is 8 KB. Size of the physical memory is 512 MB, size of the approximate page table (in MB) when page table entry contain 2 valid bit, 2 modified bit and 2 reference bit _____.

24

Your answer is Correct24

Solution :

24

Virtual address space = 36 bit

$$\text{Number of pages} = \frac{2^{36}}{2^{13}} = 2^{23}$$

$$\text{Number of frames} = \frac{2^{29}}{2^{13}} = 2^{16}$$

Page table entry contain 2 valid bit, 2 modified bit and 2 dirty bit.

$$\text{Page table entry size} = 16 + 2 + 2 + 2$$

$$= 22 \approx 3B$$

$$\begin{aligned}\text{Page table size} &= 2^{23} \times 3B \\ &= 8 \times 3 \text{ MB} = 24 \text{ MB}\end{aligned}$$

QUESTION ANALYTICS



Q. 16

Solution Video

Have any Doubt ?



A unix-style *I-node* has the following specifications:

Specification	Value
Disk Block Size	512B
Disk Block address	32 bits
Number of Single pointer	4
Number of Double indirect pointer	3
Number of Triple indirect pointer	1

The maximum possible file using triple indirect size is _____ GB.

1

Your answer is Correct1

Solution :

1

$$\text{Number of disk block pointers that will be fit in 1 block} = \frac{2^9 B}{4 B} = 128$$

Maximum possible file size will be due to triple indirect pointer

$$\begin{aligned}&= 128 \times 128 \times 128 \times 512 B \\ &= 2^7 \times 2^7 \times 2^7 \times 2^9 B \\ &= 2^{30} B = 1 \text{ GB}\end{aligned}$$

QUESTION ANALYTICS



Q. 17

[▶ Solution Video](#)[Have any Doubt?](#)

Consider the following code with two concurrent process:

Process P_1	Process P_2
While (1)	While (1)
{	{
$P(S_x);$	$P(S_y);$
$P(S_y);$	$P(S_x);$
C.S	C.S
$V(S_y);$	$V(S_y);$
$V(S_x);$	$V(S_x);$
}	}

Initial values of binary semaphore S_x and S_y are '1'.

Which of the following is true about the above code?

A Mutual exclusion and deadlock

Your answer is Correct

Solution :

(a) Mutual exclusion will always hold for these processes since only 1 process can enter the critical section at a time. There may be deadlock.

B No mutual exclusion and deadlock

C Mutual exclusion and no deadlock

D No mutual exclusion but no deadlock

QUESTION ANALYTICS



Q. 18

[▶ Solution Video](#)[Have any Doubt?](#)

Consider the following set of processes that need to be scheduled on a single CPU. All the times are given in msec.

Process Name	Arrival Time	Burst Time
A	0	3
B	3	4
C	7	3
D	9	5
E	12	7

Which of the following will give minimum average waiting time for all five processes?

A FCFS only

Your answer is Wrong

B RR ($T.Q. = 3$) only

C SRTF only

D Both (a) and (c)

Correct Option

Solution :

(d)

FCFS:

A	B	C	D	E
0	3	7	10	15

Process Name	Arrival Time	Burst Time	Completion Time	TAT Time	Waiting Time
A	0	3	3	3	0
B	3	4	7	4	0
C	7	3	10	3	0
D	9	5	15	6	1
E	12	7	22	10	3

4/5 = 0.8

RR ($T.Q. = 3$):

A	B	B	C	D	E	D	E
0	3	6	7	10	13	16	18

Process Name	Arrival Time	Burst Time	Completion Time	TAT Time	Waiting Time
A	0	3	3	3	0
B	3	4	7	4	0
C	7	3	10	3	0
D	9	5	18	9	4
E	10	7	22	12	5

9/5 = 1.8

SRTF:

A	B	C	C	D	D	E
0	3	7	9	10	12	15

Process Name	Arrival Time	Burst Time	Completion Time	TAT Time	Waiting Time
A	0	3	3	3	0
B	3	4	7	4	0
C	7	3	10	3	0
D	9	5	15	6	1
E	10	7	22	12	3

4/5 = 0.8

Since FCFS time = SRTF time < RR time.

QUESTION ANALYTICS



Q. 19

[▶ Solution Video](#)[Have any Doubt ?](#)

Assume TLB is used to implement virtual memory and page size of 1 KB is used in virtual memory. The space occupied by the program is contiguous in the main memory. Consider the following code snippet:

```
for(i = 0; i < 1000; i++)
A[i] = 0
```

An array A has 1000 elements and each element of A is an integer. If the integer size is 4 B, then the number of TLB misses that take place when the above code runs are? (Assume initially TLB is empty and has enough space to hold the above entries for the above code)

A 8**B** 4Your answer is **Correct****Solution :**

(b)

Each page size = 1 KB
Size of array [A] = $1000 \times 4 = 4000$ B
 \Rightarrow Number of pages required for A is 4 to hold 4000 bytes
TLB misses = 4

C 10**D** 16

QUESTION ANALYTICS



Q. 20

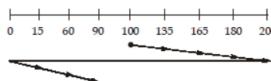
[▶ Solution Video](#)[Have any Doubt ?](#)

A disk has 201 cylinders, numbered from 0 to 200. At some time, disk arm is at cylinder 100 and there is a queue of disk access request for cylinders 15, 60, 90, 135, 165, 180. Suppose:

- I. A seek time takes 1 msec per cylinder to move the disk arm.
- II. Directly moving the disk arm from the outermost of the disk (with the largest cylinder number) to the innermost of the disk (without servicing any disk request) takes only 10 msec.
- III. Initially, the disk arm is moving towards higher cylinders. The seek time needed to serve the above requests if the C-scan disk scheduling algorithms is used? (msec)

A 200Your answer is **Correct****Solution :**

(a)



$$\begin{aligned} \text{Total seek time} &= (135 - 100) + (165 - 135) + (180 - 165) + (200 - 180) + 10 + (15 - 0) \\ &\quad + (60 - 15) + (90 - 60) \\ &= 35 + 30 + 15 + 20 + 10 + 15 + 45 + 30 = 200 \text{ msec} \end{aligned}$$

B 232**C** 226**D** 240

QUESTION ANALYTICS



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Q. 21
[▶ Solution Video](#)
[Have any Doubt ?](#)


Which of the following is typically not TRUE about dynamic linking?

- I. Dynamic linking decreases memory space utilization.
- II. Dynamic linking increases program execution time.
- III. Dynamic linking practically used in majority of operating system.

 A I and II only

 B III only

 C I and III only

 D None of these

Correct Option

Solution :

(d)

- I. Dynamic linking decreases memory space utilization since the shared libraries gets linked during the execution and there is no need to store these initially.
- II. Dynamic linking increases compile time and increases program execution time.
- III. Most of the operating system uses dynamic linking.

QUESTION ANALYTICS

Q. 22
[▶ Solution Video](#)
[Have any Doubt ?](#)

 Consider a system with five jobs P, Q, R, S, T are waiting in ready queue, all jobs entered in ready queue at time $t = 0$, their expected run times are 8, 7, 2, 5, x respectively, the order they must run to minimize average response time if x is given as $3 < x < 5$?

 A S, R, T, Q, P

 B R, S, P, Q, T

 C R, T, S, Q, P

Correct Option

Solution :

(c)

Minimum average response time is when jobs are run by shortest remaining time first algorithm.
 Sequence will be R(2), T($3 < x < 5$), S(5), Q(7), P(8).

 D R, T, Q, P, S

QUESTION ANALYTICS

Q. 23
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the following statements given below:

- I. FIFO replacement policy not suffers from Belady's anomaly.
 - II. The best fit techniques for memory allocation ensures that memory will never be fragmented.
 - III. SRTF (Shortest remaining time first) is the best preemptive scheduling algorithm which can be implemented in time sharing operating system.
- Which of the above statements is/are true?

 A I and III only

 B III only

 C I and II only

 D None of these

Your answer is Correct

Solution :

(d)

- I. FIFO replacement policy does not uses locality of references.
- II. Best fit technique memory allocation technique can also be fragmented.
- III. SRTF can not be implemented because it requires knowledge of burst time in advance. So all statement is not true.

QUESTION ANALYTICS

Q. 24
[▶ Solution Video](#)
[Have any Doubt ?](#)


Consider the following synchronization mechanism for two concurrent process P_1 and P_2 using binary semaphore Q_1 and Q_2 :

```
Process P1:  
While (1)  
{  
    P(Q1)  
    print ("1")  
    print ("0")  
    V(Q2)  
}  
Process P2:  
While (1)  
{  
    P(Q2)  
    print ("0")  
    V(Q1)  
}
```

Which of the following is correct about the above scenario?

A It will print $10^n 0^n$, where $n > 0$ and $Q_1 = 0$ and $Q_2 = 1$.

B It will print $(100)^n$ where $n > 0$ and $Q_1 = 1$ and $Q_2 = 0$.

Your answer is Correct

Solution:

(b)

Two binary semaphore Q_1 and Q_2 when $Q_1 = 0$, $Q_2 = 1$, $(010)^n$ will be printed.

When $Q_1 = 1$, $Q_2 = 0$

Process P_1 will execute and then Process P_2 execute and print $(100)^n$.

C It will print $((10)^n 0^n)^n$ where $n > 0$ and $Q_1 = 1$ and $Q_2 = 0$.

D None of these

QUESTION ANALYTICS



Q. 25

Solution Video

Have any Doubt ?



Consider the following statements:

S_1 : Translation look aside buffer necessarily not be saved on a context switch between processes.

S_2 : Program counter must be saved when context switch between processes.

S_3 : System calls are usually invoked by using a software interrupt.

Which of the above statements is/are correct?

A S_1 and S_2 only

B S_2 and S_3 only

C S_1 and S_3 only

D S_1 , S_2 and S_3

Correct Option

Solution:

(d)

S_1 : Translation look aside buffer need not to be saved.

S_2 : Program counter, stack counter and general purpose register must be saved when context switch.

S_3 : System calls are usually invoked by using a software interrupt.

QUESTION ANALYTICS



Q. 26

Solution Video

Have any Doubt ?



Consider the following statements:

I. Dirty bit is used to indicate an illegal access of page.

II. Belady's anomaly indicates page fault rate may decrease on increasing the number of allocated frames.

III. Thrashing can always be avoided by swapping.

Which of the above statements is/are correct?

A S_1 and S_3 only

B S_3 only

C S_1 and S_2 only

D None of these

Correct Option

Solution:

(d)

I. Dirty bit is used to check that page is modified or not, to avoid unnecessary write.

II. Belady's anomaly indicates page fault rate may increase on increasing the number of allocated frames.

III. Thrashing can not be avoided by swapping.

QUESTION ANALYTICS



Q. 27

Solution Video

Have any Doubt ?



Consider the following statements:
S₁: Multilevel queue scheduling each queue may have different scheduling algorithm.
S₂: Each queue have different priority in multilevel queue scheduling.
S₃: File allocation table maintain the list of free disk blocks in the unix file system.

Which of the above statements is correct?

A S₁ and S₂ only

Correct Option

Solution :

(a) In multilevel feedback queue each queue may use different scheduling algorithm and each queue have different priority. File allocation table does not maintain the list of free block, it is maintained by the super block.

B S₂ only

C S₂ and S₃ only

D S₁ and S₃ only

QUESTION ANALYTICS



Q. 28

Solution Video

Have any Doubt ?



A virtual memory has a page size of 1 K words, there are 4 frame and eight pages, page table contains the following entries.

Page	Frame number
0	3
5	2
2	1
7	0

Which of the following list of virtual address will not cause any page fault if these addresses are generated by the CPU?

A 1023, 2080, 4096, 6040

Correct Option

B 1020, 3011, 5940, 7195

Solution :

(b)
Page size 1 K = 1024 word

Page	Frame number
0	0 - 1023
1	1024 - 2047
2	2048 - 3071
3	3072 - 4095
4	4096 - 5119
5	5120 - 6143
6	6144 - 7167
7	7168 - 8191

Page 0, 2, 5, 7 are already in memory so for these pages there is no page fault.

- (a) Pages 0, 2, 4, 5 are needed for page 4 there is page fault.
- (b) Pages 0, 2, 5, 7 are needed so no page fault.
- (c) Pages 1, 3, 4, 6 so page fault.
- (d) Pages 0, 1, 5, 7 for 1 there is page fault.

C 2021, 4050, 5112, 7110

D 964, 1591, 5660, 7268

QUESTION ANALYTICS



Q. 29

Solution Video

Have any Doubt ?



Consider a semaphore S with atomic operation wait and signal implementation given below:

```

Wait:
Wait (a);
c -- ;
if (c < 0)
{
    signal (a);
    wait (b);
}
signal (a);

```

```

Signal:
Wait (a);
c ++ ;
if (c <= 0)
    signal (b);
else
    signal (a);

```

Initial value of a = 1, b = 0 and c = S = 5, then 3 wait and 2 signal operations are performed, resulting value of S is _____.

4

Your answer is Correct!

Solution :
4

In the wait code

Initial value of c = 5

wait (a) = a = 0

c -- = c = 4

It is the code for counting semaphore wait operation implemented with help of binary semaphore.

Same for the signal operation.
Resulting value of S = 5 - 3 + 2 = 4

QUESTION ANALYTICS



Q. 30

Solution Video

Have any Doubt?



Consider a system with five resources P, Q, R, S, T and four processes the process allocation table is given below:

Process	Allocated					Maximum					Available				
	P	Q	R	S	T	P	Q	R	S	T	P	Q	R	S	T
P_1	1	0	2	1	1	1	1	2	1	3	0	0	X	1	1
P_2	2	0	1	1	0	2	2	2	1	0					
P_3	1	1	0	1	1	2	1	4	1	1					
P_4	1	1	1	1	0	1	1	2	2	1					

The smallest value of X for which the above system in safe state _____.

3

Correct Option

Solution :

3

When $X = 1$ process P_4 can execute but other process can not execute.

When $X = 2$, then also only P_4 can execute.

When $X = 3$ all process can execute in order P_4, P_3, P_2, P_1 .

First P_4 is execute and available become $(1, 1, 4, 2, 1)$, process P_3 need is $(1, 0, 4, 0, 1)$ now P_3 will execute and than P_2 and P_1 .

QUESTION ANALYTICS



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ALL(33)

CORRECT(18)

INCORRECT(5)

SKIPPED(10)

Q. 31

Have any Doubt ?



Consider the following code:

```
main ()
{
    fork ();
    fork ();
    printf("madeeasy");
}
```

Total how many processes created by above code including parent process _____.

4

Correct Option

Solution :

4

 $2^n - 1 = 2^2 - 1 = 3$ Child processes + 1 parent process

Total 4 process.

Your Answer is 5

QUESTION ANALYTICS



Q. 32

Solution Video

Have any Doubt ?



A system uses Last In First Out (LIFO) page replacement policy, consider system has initially 4 empty frame. If system uses 100 distinct page in sequential order then access same 100 pages in reverse order, the number of page fault occurrences _____.

196

Your answer is Correct196

Solution :

196

System has 4 empty frames and access 100 pages in sequential order so initially 100 page fault.
LIFO page replacement algorithm is used.Page

1	2	3	100
---	---	---	-----

 are in frames.When 100 is access again no page fault and from 99 - 4 there is 96 page faults.
So total 196 page faults.

QUESTION ANALYTICS



Q. 33

Solution Video

Have any Doubt ?



Consider a disk with 12380 bytes per track having a rotation time of 20 msec and average seek time is 45 ms, time taken (in ms) to read a block of 1024 bytes from this disk _____ (Upto 2 decimal places)

56.65 [56.62 - 56.66]

Your answer is Correct56.65

Solution :

56.65 [56.62 - 56.66]

Total time to read a block of 1024 bytes = Seek time + Rotational latency + Transfer time

Seek time = 45 ms

$$\text{Rotational latency} = \frac{20}{2} = 10 \text{ ms}$$

$$\text{Transfer time} = \frac{1024 \times 8 \times 20}{12380 \times 8} = 1.65 \text{ msec}$$

$$\text{Total time} = 45 + 10 + 1.65 = 56.65 \text{ ms}$$

QUESTION ANALYTICS



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1

2

3

4

next >