



Eduncle

UGC NET

Computer Science and Applications SAMPLE

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Sample questions

1. What is the name of the technique in which the operating system of a computer executes several programmes concurrently by switching back and forth between them ?

- | | |
|------------------|------------------|
| (A) Partitioning | (B) Multitasking |
| (C) Windowing | (D) Paging |

2. Average process size is s byte. Each page entry requires e bytes. The optimum page size, is given by

- | | |
|-------------------|--------------------|
| (A) $\sqrt{(se)}$ | (B) $\sqrt{(2se)}$ |
| (C) s | (D) e |

3. The frequency reuse plan is divided into cell grouping using how many cells, where the number of cells equals N ?

- | | |
|-------|--------|
| (A) 3 | (B) 10 |
| (C) 7 | (D) 21 |

4. Consider the following processes with time slice of 4 milliseconds (I/O requests are ignored) :

Process	A	B	C	D
Arrival time	0	1	2	3
CPU cycle	8	4	9	5

The average turn around time of these processes will be

- | | |
|------------------------|------------------------|
| (A) 19.25 milliseconds | (B) 18.25 milliseconds |
| (C) 19.5 milliseconds | (D) 18.5 milliseconds |

5. Let A and B be two fuzzy integers defined as :

$$A = \{(1, 0.3), (2, 0.6), (3, 1), (4, 0.7), (5, 0.2)\}$$

$$B = \{(10, 0.5), (11, 1), (12, 0.5)\}$$

Using fuzzy arithmetic operation given by

$$\mu_{A+B}(z) = \mu_A \oplus \mu_B = z (\mu_A(x) \otimes \mu_B(y))$$

$f(A + B)$ is _____ . Note: $\oplus \equiv \max$
 $\otimes \equiv \min$

- (A) $\{(11, 0.8), (13, 1), (15, 1)\}$
- (B) $\{(11, 0.3), (12, 0.5), (13, 1), (14, 1), (15, 1), (16, 0.5), (17, 0.2)\}$
- (C) $\{(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 1), (16, 0.5), (17, 0.2)\}$
- (D) $\{(11, 0.3), (12, 0.5), (13, 0.6), (14, 1), (15, 0.7), (16, 0.5), (17, 0.2)\}$

6. Which process model is also called as classic life cycle model ?

- | | |
|-----------------------|-----------------------|
| (A) Waterfall model | (B) RAD model |
| (C) Prototyping model | (D) Incremental model |

7. A / B+ tree index is to be built on the name attribute of the relation STUDENT. Assume that all students names are of length 8 bytes, disk block are of size 512 bytes and index pointers are of size 4 bytes. Given this scenario what would be the best choice of the degree (i.e. the number of pointers per node) of the B+ tree ?
- (A) 16 (B) 42
(C) 43 (D) 44
8. In classful addressing, the IP address 190.255.254.254 belongs to :
- (A) Class A (B) Class B
(C) Class C (D) Class D



SOLUTIONS

1. (B) Multitasking is a concept of performing multiple tasks (also known as processes) over a certain period of time by executing them concurrently.

New tasks start and interrupt already started ones before they have reached completion, instead of executing the tasks sequentially so each started task needs to reach its end before a new one is started. As a result, a computer executes segments of multiple tasks in an interleaved manner, while the tasks share common processing resources such as central processing units (CPUs) and main memory.

Multitasking does not necessarily mean that multiple tasks are executing at exactly the same time (concurrently). In other words, multitasking does not imply parallel execution, but it does mean that more than one task can be part-way through execution at the same time, and that more than one task is advancing over a given period of time.

2. (B) Let page size is p and average process size is s byte.

- Each entry in the page table requires e bytes.

- On average $\frac{p}{2}$ is lost (fragmentation).

- Wasted memory = $\frac{p}{2} + \frac{se}{p}$

- Minimizing it yields the optimal page size

$$\frac{p}{2} + \frac{se}{p} = 0$$

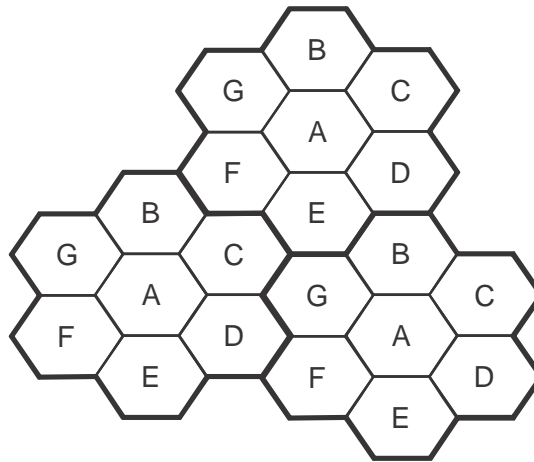
$$\frac{p}{2} = -\frac{se}{p}$$

$$p^2 = -2se$$

$$p = \pm \sqrt{2se}$$

3. (C) The frequency reuse plan is divided into cell grouping using 7 cells, where the number of cells equals N .

The cellular frequency reuse concept. Cells with the same letter use the same set of frequencies. A cell cluster is outlined in bold. In this example, the cluster size is N equal to 7 and frequency reuse factor is $1 / N = 1 / 7$.



4. (B) Gantt chart for the processes are :

A	B	C	D	E	F	G	H
---	---	---	---	---	---	---	---

0 4 8 12 16 20 24 25 26

$$\text{Avg TAT} = ((20 - 0) + (8 - 1) + (26 - 2) + (25 - 3)) / 4 = 18.25 \text{ ms}$$

5. (D) $f(A + B) = ((1 + 10, \min(0.3, 0.5)), (2 + 10, \min(0.6, 0.5)))$
 $f(A + B) = ((3 + 10, \min(1, 0.5)), (4 + 10, \min(0.7, 0.5)))$
 $f(A + B) = ((2 + 11, \min(0.6, 1)), (3 + 11, \min(0.3, 1)))$
 $f(A + B) = ((4 + 11, \min(0.7, 1)), (5 + 11, \min(0.2, 1)))$
 $f(A + B) = ((1 + 12, \min(1, 0.5)), (4 + 12, \min(0.7, 0.5)))$
 $f(A + B) = ((5 + 12, \min(0.2, 0.5)))$

$$= (11, 0.3) (12, 0.5) (13, 0.5) (14, 0.5), (15, 0.2)$$

$$= (12, 0.3) (13, 0.6) (14, 1) (15, 0.7) (16, 0.2)$$

$$= (13, 0.3) (14, 0.5) (15, 0.5) (16, 0.5) (17, 0.2)$$

Now, taking maximum for equal values

$$= (11, 0.3) (12, 0.5) (13, 0.6) (14, 1) (15, 0.7) (16, 0.5) (17, 0.2)$$

6. (A) The waterfall model was first process model to be introduced it is referred to as a linear sequential life cycle model, it is very simple to understand and used in a waterfall model each phase must be completed the next phase can begin and there is no overlapping in the phase.

Requirement analysis



System Design



Implementation



Testing



Deployment



Maintenance

7. (A) Actually the answer given in the UGC answer key is option A. But i would beg to differ with that. Using the formula for calculating the degree with the parameters specified above, the answer we are arriving at is 43 which is actually option C. Let me explain how it is done.
Let n be the degree.
Given, Key size(length of the name attribute of STUDENT) = 8 bytes(k)
Index pointer size = 4 bytes (b)
Disk Block size = 512 bytes
Degree of B + tree can be calculated if we know the maximum number of key a internal node can have. The formula for that is
 $(n - 1) k + n * b = \text{blocksize}$
 $(n - 1) * 8 + n * 4 = 512$
 $8n - 8 + 4n = 512$
 $12n = 520$
 $n = 520 / 12 = 43$
So, the answer is option C.
8. (B) In classful addressing, the IP address 190.255.254.254 belongs to Class B because first nibble lies between 128 - 191.
0-127-Class A
128-191-Class B
192-223-Class C
224-239-Class D
240-above- Class E