

UPSC DPA Questions & Answers



1. What is a Data Structure?

Ans: A data structure is a way of organizing the data so that the data can be used efficiently. Different kinds of data structures are suited to different kinds of applications, and some are highly specialized to specific tasks. For example, B-trees are particularly well-suited for the implementation of databases, while compiler implementations usually use hash tables to look up identifiers.

2. What are linear and non-linear data Structures?

Ans:

- **Linear:** A data structure is said to be linear if its elements form a sequence or a linear list. Examples: Array, Linked List, Stacks, and Queues
- **Non-Linear:** A data structure is said to be non-linear if the traversal of nodes is nonlinear in nature. Example: Graph and Trees.

3. What are the various operations that can be performed on different Data Structures?

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Ans: Insertion? Add a new data item in the given collection of data items.

Deletion? Delete an existing data item from the given collection of data items.

Traversal? Access each data item exactly once so that it can be processed.

Searching? Find out the location of the data item if it exists in the given collection of data items.

Sorting? Arranging the data items in some order i.e. in ascending or descending order in case of numerical data and in dictionary order in case of alphanumeric data.

4. What is Stack and where it can be used?

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Ans: Stack is a linear data structure in which the order LIFO(Last In First Out) or FILO(First In Last Out) for accessing elements. Basic operations of the stack are: Push, Pop, Peek

6. What is computer architecture?

Ans: "Computer architecture refers to hardware instructions, software standards and technology infrastructure that define how computer platforms, systems and programs operate. This means that computer architecture outlines the system's functionality, design and compatibility."

7. What are some of the components of a microprocessor?

Ans: "Some of the components of a microprocessor include the arithmetic and logic unit, which performs math computations such as division, addition and subtraction and Boolean functions; registers, which act as the temporary data holding places of microprocessors; control units, which receive signals from the CPU and move data from one microprocessor to

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another; and memory caches, which accelerate the computing process, as the CPU doesn't have to use the slower RAM to retrieve data."

8. What is MESI?

Ans: "MESI stands for the four states of the cache blocks, which are Modified, Exclusive, Shared, and Invalid. It's also known as the "Illinois protocol". It's used to maintain cache coherency in hierarchical memory systems. MESI is the most common protocol that supports write-back cache. Its use in personal computers became common with the introduction of Intel's Pentium processor."

9. What are the different hazards?

Ans: "Hazards have three classes. These include the structural hazards, which occur from resource conflicts when the hardware can't support all possible combinations of instructions in synchronized overlapped execution; data hazards, which occur when instructions that manifest data dependence change data in different stages of a pipeline; and control hazards, which occur from the pipelining of branches and other instructions that modify the PC."

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10. What is pipelining?

Ans: "Pipelining, also known as "pipeline processing", is the process of collecting instruction from the processor through a pipeline. It stores and executes instructions in an orderly process."

11. What is a cache?

Ans: "A cache is a small amount of memory, which is a part of the CPU. It's placed closer to the CPU than the RAM. It temporarily holds data and instructions that the CPU is likely to reuse."

12. What is meant by the term OOPs?

Ans: OOPs refer to Object-Oriented Programming. It is the programming paradigm that is defined using objects. Objects can be considered as real-world instances of entities like class, that have some characteristics and behaviors.

13. What is the need for OOPs?

Ans: There are many reasons why OOPs is mostly preferred, but the most important among them are:

OOPs helps users to understand the software easily, although they don't know the actual implementation.

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With OOPs, the readability, understandability, and maintainability of the code increase multifold.

Even very big software can be easily written and managed easily using OOPs.

14. What are some major Object Oriented Programming languages?

Ans: The programming languages that use and follow the Object-Oriented Programming paradigm or OOPs, are known as Object-Oriented Programming languages. Some of the major Object-Oriented Programming languages include:

- Java
- C++
- Javascript
- Python
- PHP
- And many more.

15. What are the main features of OOPs?

Ans: OOPs or Object Oriented Programming mainly comprises of the below four features, and make sure you don't miss any of these:

- Inheritance
- Encapsulation
- Polymorphism
- Data Abstraction