1️⃣ CLASS & OBJECT

a) Basic Questions

1. What is a class?
- A class is a blueprint or template used to create objects. It defines properties (variables) and behaviors (methods).
- Example: A class Car defines colour, model, and speed.

2. What is an object?
- An object is a real instance of a class. It represents a real-world entity created using a class.
- Example: myCar is an object of the Car class.

3. Difference between class and object?

Class	Object
Blueprint	Real instance
Logical entity	Physical entity
Does not use memory	Uses memory
Created once	Can be created many times

4. How many objects can be created from one class?
- Any number of objects can be created from a single class.
- Example: From Student class → 100 student objects can be created.

5. What is the real-world example of a class and object?
- Class: Student
- Objects:
  - Student1 (Rahul)
  - Student2 (Anjali)
- The class defines common details, objects store actual values.

6. What happens when an object is created?
- When an object is created:
  - Memory is allocated in heap
  - Constructor is called

- Object gets initialized with values

7. Where are objects stored in memory?

- Objects are stored in heap memory.
- The reference variable is stored in stack memory.

8. What is the role of new keyword?

- The new keyword is used to:
  - Create an object
  - Allocate memory
  - Call the constructor
- Example: Student s = new Student();

9. Can a class exist without objects?

- Yes, a class can exist without objects.
- A class is just a definition—it doesn't need objects to exist.

10. Can an object exist without a class?

- No, an object cannot exist without a class.
- Every object must be created from a class.

b) Technical / Memory Based

11. What is object reference?
- An object reference is a variable that stores the address (location) of an object in memory.
- It does not store the object itself, it only points to the object.
- EXAMPLE: Student s = new Student();
  - s → reference
  - new Student() → object

12. Difference between reference and object?

Reference	Object
Stores memory address	Stores actual data
Points to object	Lives in heap memory
Stored in stack memory	Stored in heap memory
Does not contain values	Contains variables & methods

13. What is heap memory?
- Heap memory is a part of JVM memory where objects are stored.
- Key points:
  - Used for dynamic memory allocation
  - Shared across threads
  - Objects live here until garbage collected

14. How does JVM allocate memory to objects?
- When an object is created:
  - JVM checks heap for free memory
  - Allocates memory to object
  - Calls constructor
  - Returns object address
  - Address is stored in reference variable
- Flow: new → memory allocated → constructor called → reference gets address

15. What happens if no reference points to an object?
- The object becomes eligible for garbage collection.

- JVM automatically removes it
- Memory is freed
- This prevents memory leaks

c) <u>Tricky</u>

16. Can we create an object without new keyword?
- Yes, in Java we can create objects without using new in some special ways.
- Common ways:
- But: In real projects and interviews, new is the most common and preferred way.
- NOTE: es, objects can be created without new, but rarely used in real applications.

17. Can a class be empty?
- Yes, a class can be completely empty.
- EXAMPLE: class Demo {
  }
- No variables
- No methods
- This is valid Java code and often used as a marker or placeholder.

18. Can we create multiple objects in a single line?
- Yes, we can create multiple objects in one line.
- Example: Student s1 = new Student(), s2 = new Student();
- **NOTE: Multiple objects of the same class can be created in a single statement.**

19. What happens if we create an object but don't use it?
- If an object is created but no reference is used or it is not used later, then:
    - The object occupies memory
    - If no reference exists → it becomes eligible for garbage collection
    - JVM will automatically remove it
- EXAMPLE: new Student(); // object created but not stored
- NOTE: This object is immediately eligible for garbage collection.