1. What is a thread in Java?

A) A self-contained running program. B) A class in the `java.lang` package. C) A single sequential flow of control within a process. D) An object that provides a way to divide a program.

Correct Answer: C

2. Which of the following is a motivation for using threads?

A) To have separate address spaces. B) Resource utilization by using wait time efficiently. C) Threads carry considerable state information. D) To avoid sharing memory.

Correct Answer: B

3. What is the difference between a process and a thread?

A) A thread is a self-contained running program. B) A process is a single sequential flow of control within a program. C) Processes share the same address space. D) Threads exist as subsets of a process.

Correct Answer: D

4. In the Java Thread Memory Model, where are instance fields stored?

A) Local stack B) Registers C) Heap memory D) Method parameters

Correct Answer: C

5. Which of the following is true about threads compared to processes?

A) Threads are typically independent. B) Threads have separate address spaces. C) Context switching between threads in the same process is typically faster. D) Processes share state and memory.

Correct Answer: C

6. Which of the following is NOT a thread state in Java?

A) New state B) Runnable state C) Executing state D) Dead state

Correct Answer: C

7. How can you create a thread in Java?

A) By extending the `java.lang.Runnable` class. B) By implementing the `java.lang.Thread` interface. C) By extending the `java.lang.Thread` class or implementing the `java.lang.Runnable` interface. D) By using the `createThread()` method.

Correct Answer: C

8. What does the priority of a thread tell the scheduler?

A) The memory allocation for the thread. B) How important the thread is. C) The execution time of the thread. D) The type of data the thread processes.

Correct Answer: B

9. What does the `join()` method do?

A) It causes the currently executing thread to pause. B) It assigns a priority to a thread. C) One thread may call `join()` on another thread to wait for the second thread to complete. D) It interrupts a thread.

Correct Answer: C

10. What is the purpose of the `yield()` method?

```
A)  To cause the currently executing thread to sleep.
B)  To assign a priority to the thread.
C)  To force the thread to terminate.
D)  To cause the currently executing thread to pause and allow other
threads to execute. [cite: 173, 174]

Correct Answer: D
```

11. What happens when you call the `sleep()` method?

```
A)  The thread releases all locks.
B)  The thread's execution pauses for a given number of milliseconds.
[cite: 176]
C)  The thread is interrupted.
D)  The thread terminates.

Correct Answer: B
```

12. What is Interruption in the context of threads?

```
A)  A mechanism to assign priority to a thread.
B)  A way to pause a thread's execution.
C)  A mechanism whereby a thread that is waiting (or sleeping) can be
made to prematurely stop waiting. [cite: 181]
D)  A method to terminate a thread immediately.

Correct Answer: C
```

13. What is a daemon thread?

```
A)  A thread with the highest priority.
B)  A thread that provides a general service in the background as
long as the program is running. [cite: 184]
C)  A thread that cannot be interrupted.
D)  A thread that runs only once.
```

Correct Answer: B

14. What is a race condition?

A) A condition where threads execute in a specific order.
B) A condition where one thread always finishes before another.
C) A condition where the order of execution of two or more threads may affect some variable or outcome in the program. [cite: 192]
D) A condition where threads never interfere with each other.

Correct Answer: C

15. What is a Semaphore?

A) A mechanism where only one thread can access a resource at a time.
B) An object containing a value and two operations and used for communication between threads. [cite: 194]
C) A way to make variables atomic.
D) A type of lock in Java.

Correct Answer: B

16. What is a Mutex?

A) A value that cannot be interrupted by the thread scheduler.
B) A mechanism in which only one piece of code is running at a time by means of a lock. [cite: 197]
C) A variable that is always read from main memory.
D) A method that cannot be interrupted.

Correct Answer: B

17. What does "Synchronization" mean in Java?

A) Making all variables `volatile`.
B) Ensuring that only atomic operations are performed.
C) When one object passes a message to another object, then both objects are in a synchronized state. [cite: 199, 200]
D) Preventing race conditions by allowing multiple threads to access shared resources simultaneously.

Correct Answer: C

18. What is an Atomic Operation?

A) An operation that can be interrupted by the thread scheduler.
B) An operation that must be read from main memory every time.
C) An operation that cannot be interrupted by the thread scheduler. [cite: 201]
D) An operation that involves multiple threads.

Correct Answer: C

19. What is a `volatile` variable?

A) A variable that can only be accessed by one thread.

B) A variable that is always stored in the local stack.
C) A variable that, every time it is used, must be read from main memory. [cite: 202, 203]
D) A variable that is automatically synchronized.

Correct Answer: C

20. What is a Critical Section?

A) A piece of code that can be executed by multiple threads concurrently.
B) A piece of code that must be executed by one thread at a time. [cite: 209]
C) A section of code that defines `volatile` variables.
D) A section of code that handles exceptions.

Correct Answer: B

21. Which methods are used for Inter-Thread Communication?

A) `start()` and `run()`
B) `sleep()` and `yield()`
C) `wait()`, `notify()`, and `notifyAll()` [cite: 212]
D) `interrupt()` and `join()`

Correct Answer: C

22. What is the difference between `sleep()` and `wait()`?

A) `sleep()` releases the lock, while `wait()` does not.
B) `wait()` releases the lock when it is called, but `sleep()` does not. [cite: 216]
C) `sleep()` is used for inter-thread communication, while `wait()` is not.
D) There is no difference between them.

Correct Answer: B

23. Where can you call `wait()`, `notify()`, or `notifyAll()`?

A) In any method.
B) Only within a `synchronized` method or block. [cite: 217]
C) In the `main()` method.
D) Outside of any method.

Correct Answer: B

24. What is Deadlock?

A) A condition where threads are running too fast.
B) A situation where one thread gets stuck waiting for another thread, which in turn waits for another thread, etc., until the chain leads back to a thread waiting on the first one. [cite: 223]
C) A condition where threads are interrupted.
D) A state where threads are sleeping.

Correct Answer: B

25. Which of the following is NOT a deprecated method for stopping a thread?

A) `stop()` [cite: 230]
B) `suspend()` [cite: 230, 232]
C) `resume()` [cite: 230, 232]
D) `interrupt()`

Correct Answer: D

26. What is the alternative to using deprecated methods like `stop()`?

A) Using `Thread.sleep()`
B) Using a flag to tell the thread when to terminate itself by exiting its `run()` method. [cite: 231]
C) Using `Thread.yield()`
D) Using `Thread.interrupt()`

Correct Answer: B

27. What is the purpose of the `Thread.interrupt()` method?

A) To pause a thread.
B) To resume a thread.
C) To terminate a thread immediately.
D) To interrupt a thread that is waiting or sleeping. [cite: 234, 235]

Correct Answer: D

28. What is a Thread Group?

A) A way to assign priorities to threads.
B) A collection of synchronized methods.
C) A collection of threads. [cite: 237]
D) A mechanism for thread-local storage.

Correct Answer: C

29. What is the purpose of `ThreadLocal`?

A) To share data between threads.
B) To define a mechanism so that a variable is local to the thread itself. [cite: 245]
C) To inherit values from a parent thread.
D) To create a group of threads.

Correct Answer: B

30. What is the difference between `ThreadLocal` and `InheritableThreadLocal`?

A) There is no difference.
B) `InheritableThreadLocal` is used for synchronization.
C) `InheritableThreadLocal` allows a thread-specific value to be inherited from the parent thread to the child thread. [cite: 250]
D) `ThreadLocal` is a subclass of `InheritableThreadLocal`.

Correct Answer: C