🧠 **Java String – Complete Topic Structure**

1️⃣ Basic Fundamentals

1. What is a String in Java

2. String as a class in java.lang package

3. String creation methods

   o   Using string literal

   o   Using new keyword

4. Memory handling: String Constant Pool (SCP) vs Heap memory

5. Immutability of String (why Strings are immutable)

2️⃣ String Comparison & Equality

6. Difference between == and .equals()

7. equalsIgnoreCase() method

8. compareTo() and compareToIgnoreCase()

9. Lexicographical comparison examples

3️⃣ String Operations / Methods

10. length(), charAt(), indexOf(), lastIndexOf()

11. substring() (single & double parameter versions)

12. contains(), startsWith(), endsWith()

13. toUpperCase(), toLowerCase(), trim()

14. replace(), replaceAll(), replaceFirst()

15. split() and join()

16. isEmpty() and isBlank()

17. toCharArray() and conversion between String ↔ char[]

18. valueOf() and String.format()

4️⃣ String + Character Handling

19. Using Character class with Strings (isDigit(), isLetter(), etc.)

20. Counting vowels, consonants, digits, and spaces

21. Frequency of characters

22. Removing duplicates / special characters

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5 Mutable Strings

23. StringBuilder introduction

24. StringBuffer introduction

25. Difference between String, StringBuilder, and StringBuffer

26. Common methods (append(), insert(), delete(), reverse(), capacity(), ensureCapacity())

27. Thread safety difference (Builder vs Buffer)

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6 Common String Programs (Practice Level)

28. Reverse a string

29. Check palindrome string

30. Count words in a string

31. Check anagram

32. Remove spaces / extra spaces

33. Find duplicate characters

34. Frequency of characters / words

35. Longest word in a sentence

36. String rotation check

37. Find first non-repeating character

38. Capitalize each word

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7 Advanced / Misc Concepts

39. Interning (intern() method)

40. String immutability in depth

41. Performance comparison: String vs StringBuilder vs StringBuffer

42. String pooling behavior in runtime

43. Memory optimization with Strings