DSA Roadmap (in C++)

1. Introduction to CPP-
https://youtu.be/bLo2xBENY0?si=JO8PvC8VJGlcoTK-

- Variables & Outputs - https://youtu.be/sv1ofY9B1q0?si=qds5V3hYKC1_JBW
- If-else & switch - https://youtu.be/ŋCyOjGFfU0?si=xEk1Mjtr0gM-ohr4
- Operators - https://youtu.be/QAemAVPZKKc?si=S DzjaAW8QlZDQ8qY
- Loops in CPP – https://youtu.be/jdg-W5Y4TTg?si=XKuWwmOARCsSORkb

  Practice:

  1. Striver AtoZ sheet (All pattern questions)
  2. Pattern questions https://youtu.be/WZizrQiXhYo?si=lLEoopyT2x54JEk4
- Functions (Pass by Value & Pass by Reference) https://youtu.be/QP_dA2E9E_w?si =-igQUdhJyoKK_JiM https://youtu.be/orKvRjhdRus?si=5 kYjb0s2pBDGtsRn
- Arrays (1D)-https://youtu.be/afoJyiiN1Pw?si=NW 8cfY823If3n7To

  IMPORTANT Questions-

  1. Target Sum - https://youtu.be/DhlDG8f1bZI?si=3WI-et3yVTs50Eu6
  2. Two Pointers - https://youtu.be/rjP83yyzwRY?si=U8xDKyYQowOCYvhl
  3. Prefix Sum - https://youtu.be/OjFxqCApM6E?si=p9TVkDW_o1X9MqBC
- Arrays (2D) -

1. https://youtu.be/lC6d3v0CT4?si=BOLdxNiOPk4aMff
2. https://youtu.be/lC6d3v0CT4?si=BOLdxNiOPk4aMff (Pascal's Triangle)
3. https://youtu.be/OtquH8kqz8w ?si=vsH-ErpoP3muni5T
4. https://youtu.be/PIMrTzS0lMM? si=b_LDb477n2uJWCCd

- Vectors - https://youtu.be/-J6ZKSuaVds?si=YgoWI8XpjSh5j3-Q

Practice: Striver AtoZ sheet (All basic ,medium and advances questions of each topic).

2. Time & Space Complexity

- https://youtu.be/2exHfPLCc44?si=m rWhuORK3MlDlQI9
- https://youtu.be/wendmZfPX_w?si= uo-P_TNg5V3SuIpz

3. Pointers

- https://youtu.be/PnnbciTtnaM?si=Vtg qBJv1iaLM0nDV
- https://youtu.be/lqKl3WHXkY?si=zutHEyluuciTqm7T
- https://youtu.be/5UZaM7UQAW4?si=r 2-KRchNDN0Hc-Sb

4. Recursion

- https://youtu.be/EFCeh3mxqCA?si=m UEyX_Q0sHQJq9v4
- https://youtu.be/48RiwsFetT4?si=23IL X71o2vO3rHSp
- https://youtu.be/kyBcZmWwvk?si=iaWgweH4hIfiqknz
- https://youtu.be/ueZ7mAPh0ZQ?si=c Og07PTVR1i1cHnZ

5. Sorting Techniques

- **Bubble Sort -** https://youtu.be/1DYj1ebMolY?si=zOVa BUPf7lvYIU6C
- **Selection Sort -** https://youtu.be/vjt88RjzeOM?si=qVLO dje9yIClwtCP
- **Insertion Sort –** https://youtu.be/JncVPgnvywI?si=XIpij36m569i9W-L
- **Merge Sort –** https://youtu.be/JqipLIKtolM?si=WU9dj zy1BHygAm13
- **Quick Sort -** https://youtu.be/2qK31-MQnWw?si=rO9x_R0GWDP6JRoI
- **Count Sort –** https://youtu.be/IeFE9lDLmRw?si=Hc kph87dUaG1RrXA
- **Bucket Sort –** https://youtu.be/DlRoUk95rJ4?si=PlROhuUi6LdTvhhi

6. **Binary Search – https://youtu.be/erpkKxfGkQQ?si=1T_fl9szhrLyQZFR**
7. **Strings – https://youtu.be/kjU04wGSYzw?s i=UGxI-T7sQba0ddAF**
8. **OOPS – https://youtu.be/9roJTTghZJI?si= N-tuMSqQS92-gcoB**
9. **Linked List –**
    - https://youtu.be/Kz_6lUoDO_Y? si=n5JHQeLjtYIazXKm
    - https://youtu.be/OjGR1GpEukY?si=MMNz7oV1ptMgQFz9
    - https://youtu.be/g5EK1Msz8Y?si=_KIYBCoAn_lU_GNIa
    - https://youtu.be/rHrOILOBeyU? si=MmAAj-4RZq76CrRx

10. **Stacks–**
    - https://www.youtube.com/watch?v=6COl6V6mng&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=59
    - https://www.youtube.com/watch?v=V_2reKQOgE88
    - https://www.geeksforgeeks.org/clonea-stack-without-extra-space/
    - https://www.youtube.com/watch?v=Cl_sZKTtWUyM
    - https://www.youtube.com/watch?v=8_YXQ68oHjAs

- https://www.youtube.com/watch?v=0kkDfCOXOI

11. Queues –

- Introduction to queue - https://www.youtube.com/watch?v=W7uB9-TKfTg&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index= 65
- Array implementation of queue **https://www.youtube.com/watch?v=YqrFeU90Coo**
- Introduction to circular queue **https://www.youtube.com/watch?v=KqTJ5MAUj80**
- Reverse first k elements of a Queue **https://www.youtube.com/watch?v=qpCzpi06T-s**
- Implement queue using stack- https://www.youtube.com/watch?v=mDcP7tLuBhc
- Implement queue using Linked List https://www.youtube.com/watch?v=RN1wzY_tnYU

12. Binary Trees –

- Binary tree and its representation- https://www.youtube.com/watch?v=5NiXlPrLslg&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=67
- Find node with max Value & Find the size of Binary tree- https://www.youtube.com/watch?v=Nq_slyv_xtc
- Invert binary tree- https://www.geeksforgeeks.org/writean-efficient-c-function-to-convert-a-tree-into-itsmirror-tree/

- Binary Tree diameter- https://www.geeksforgeeks.org/diameter-of-a-binary-tree/
- Binary tree path- https://www.youtube.com/watch?v=gSFcPOPyq-Y
- Lowest Common Ancestor of binary Tree- https://www.youtube.com/watch?v=JW-9nhktGGA
- Types of Binary Trees- https://www.youtube.com/watch?v=SCjfVE3bFik
- Binary Tree right and Side View- https://www.youtube.com/watch?v=KV4mRzTjlAk
- Balanced Binary Tree- https://www.youtube.com/watch?v=Yt50Jfbd8Po
- Diameter Of binary Tree https://www.youtube.com/watch?v=Rezetez59Nk
- Construct Binary Tree From Preorder & Inorder Traversal- https://www.youtube.com/watch?v=aZNaLrVebKQ
- STRIVERS TREE playlist- https://www.youtube.com/watch?v=_ANrF3FJm7I&list=PLkjdNRgDmcc0Pom5erUBU4ZayeU9AyRRu
- shortest distance between two nodes in bst- https://youtube.com/watch?v=E1f9ncPxgPE
- Shortest Distance between Nodes
- Flatten a Binary Tree- https://www.youtube.com/watch?v=sWf7k1x9XR4&list=PLkjdNRgDmcc0Pom5erUBU4ZayeU9AyRRu&index=38

- Node at Distance K in Binary Tree
- Lowest Common Ancestor in Binary Tree- https://www.youtube.com/watch?v=_-QHfMDde90&list=PLkjdNRgDmcc0Pom5erUBU4ZayeU9AyRRu&index=27

- Max Sum Path from One Node to Another in Binary Teee
- Search and Delete in Binary Search Tree-
- Construct Binary Search Tree from Preorder- https://www.youtube.com/watch?v=aZNaLrVebKQ&list=PLkjdNRgDmcc0Pom5erUBU4ZayeU9AyRRu&index=34

- binary Search Tree Catalan Number Applications
- Zig-Zag Traversal in Binary Search Tree- https://www.youtube.com/watch?v=3OXWEdlIGl4&list=PLkjdNRgDmcc0Pom5erUBU4ZayeU9AyRRu&index=19

- Largest Binary Search Tree
- Longest Binary Search Tree in Binary Tree
- Introduction to AVL Tree Rotations (LL, RR, LR, RL)
- AVL Tree Insertion and Rotations with Example
- AVL Tree Construction

13. Heaps –

- Introduction- https://www.youtube.com/watch?v=NKJnHewiGdc&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=80
- Max heap insertion and deletion- https://www.youtube.com/watch?v=NEtwJASLU8Q

14. Hashmaps –

- Introduction- https://www.youtube.com/watch?v=7mUKGHznpfg&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=85

- Iterate Over a Hashmap https://www.geeksforgeeks.org/traversing-a-map-orunordered_map-in-cpp-stl/

15. **Tries –**
    - Introduction- https://www.youtube.com/watch?v=Y6dOuGjwsxU&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=87
    - Longest common prefix problem- https://www.youtube.com/watch?v=VTr3Nh7BadI&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=88
    - Implementing a phone directory - https://www.youtube.com/watch?v=SK2S5lQegVg&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=89

16. **Backtracking –**
    - Introduction- https://www.youtube.com/watch?v=wjqSZy4pMT4&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=90
    - N- queen problem- https://www.youtube.com/watch?v=9wEwqNdOAVQ

17. **Graphs –**
    - Introduction- https://www.youtube.com/watch?v=EaK6aslcC5g&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=93
    - BFS in graph- https://www.youtube.com/watch?v=b5kij1Akf9I&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=94
    - BFS in graph- https://www.youtube.com/watch?v=aJa3UhydXc&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&in dex=95

- CYCLE detection in undirected graph-
  https://www.youtube.com/watch?v=1cSzxlhxOw8&list=PLDzeHZWIZsTryvtXdMr6rPh4IDexB5NIA&index=96

18. Graphs and Dynamic Programming–

Follow Love Babbar playlist-
https://www.youtube.com/watch?v=EaK6aslcC5g&list=PLDzeHZWIZsTobi35C3I-tKB3tRDX6YxuA
https://www.youtube.com/watch?v=PGsgv6nXhLw&list=PLDzeHZWIZsTomOPnCiU3J95WuŋE36wsb

19. Greedy Algorithms-

https://www.youtube.com/watch?v=HZOUwKCKF5o

ADDITIONAL TIPS:

Video Lectures to Follow in Sequence

1. Start with College Wallah
   - Watch from Lecture 1 to 47
2. Switch to Apna College
   - Watch from Lecture 91 to 116
3. Back to College Wallah
   - Watch from Lecture 49 to 53
4. Learn AVL Trees on GATEHUB
   - Watch "Introduction to AVL Tree | Rotations (LL, RR, LR, RL) with example"

- Watch "AVL Tree Insertion and Rotation | AVL Tree Construction"

5. Move to Striver's Tree Playlist

   - Complete the entire Striver Tree Playlist

6. Finish Remaining College Wallah Lectures

   - Watch from Lecture 53 to 67

Suggested Playlists:

1. College Wallah: https://youtube.com/playlist?list=PLxgZQoSe9cg0df_GxVjz3DD_Gck5tMXAd&si=SKMJN5BSh4FlYoUQ
2. Apna College: https://youtube.com/playlist?list=PLfqMhTWNBTe0b2nM6JHVCnAkhQRGiZMSJ&si=_2UR90omfyWpB_L8
3. Striver: https://youtube.com/playlist?list=PLkjdNRgDmcc0Pom5erUBU4ZayeU9AyRRu&si=yy9QdN0gyn8p34dX
4. Code with Harry: https://youtube.com/playlist?list=PLu0W_9lII9agpFUAlPFe_VNSlXW5uE0YL&si=Jg8dE4jw2JcjFIne

Practice Platforms for DSA:

For Beginners and Intermediate Learners:

- HackerRank (Start with Easy Problems)
- A2OJ Ladder (Focus on Easy Questions)
- LeetCode

- GeeksForGeeks
- Code Studio

For Advanced Learners:

- Codeforces
- CodeChef
- HackerEarth (For Competitive Programming)
- CSES (More Category-Wise Problems)

What You Should Avoid (For Now):

- LeetCode Blind 75
- Top Interview Questions 150

Tip: Avoid these advanced problems initially. You can try them at the very end if you want to test your skills!

Summary:

Follow the video lectures in the given sequence, focus on important topics, practice on the suggested platforms, and avoid advanced problem sets until you have covered the basics.