**HOPCROFT–KARP ALGORITHM TIME COMPLEXITY:**

The time complexity of the Hopcroft–Karp algorithm can be analysed in terms of the number of iterations of the BFS and DFS phases.Let V be the number of vertices in the graph and E be the number of edges.**1. BEST CASE:**

In the best-case scenario, the algorithm may terminate after a small number of iterations. This occurs when the maximum matching is found quickly. The best-case time complexity of the Hopcroft–Karp algorithm is O (√V. E).

**2. Average Case:**

The average case time complexity depends on the structure of the graph and the distribution of edges. In many practical cases, the algorithm performs well and runs in O (√V. E) time.**3. Worst Case:**

The worst-case time complexity of the Hopcroft–Karp algorithm is O (√V. E). However, in the worst-case scenario, the algorithm may need to iterate O (√V) times, each time performing a BFS and a DFS, resulting in a total time complexity of O (√V. E).

These complexities are derived from the fact that each BFS iteration takes O (E) time, and the maximum number of iterations is O (√V) due to the alternating tree constructed during the BFS phase. Additionally, each DFS call takes O (E) time in the worst case. Therefore, the total time complexity is O (√V. E).