SSC GD Constable Exam: Time and Distance Syllabus Summary

Overview:
The Time and Distance topic is an essential part of the Mathematics section in the SSC GD Constable Exam, contributing approximately 2–4 questions (4–8 marks out of 160 total marks) in the Computer-Based Examination (CBE). The syllabus focuses on calculating speed, time, and distance, along with their applications in problems involving relative motion, trains, boats, and real-world scenarios. Questions test computational accuracy, formula application, and problem-solving skills at a 10th-grade level. The exam includes 80 questions (2 marks each, 0.50 negative marking per wrong answer) to be completed in 60 minutes.

Key Topics in Time and Distance:
1. Basic Concepts: Relationship between speed, time, and distance.
2. Average Speed: Calculating average speed for varying speeds or distances.
3. Relative Speed: Speed calculations for objects moving towards or away from each other.
4. Trains: Problems involving trains crossing poles, platforms, or other trains.
5. Boats and Streams: Problems involving upstream and downstream motion.
6. Conversions: Converting units (e.g., km/h to m/s, hours to minutes).
7. Word Problems: Real-world scenarios (e.g., travel time, meeting points, overtaking).
8. Time Taken to Cover Distance: Finding time based on speed and distance.

Important Formula and Techniques:
1. Basic Formula:
   - Distance = Speed × Time (D = S × T)
   - Speed = Distance / Time (S = D / T)

- Time = Distance / Speed (T = D / S)
- Example: A car travels 120 km at 40 km/h, Time = 120 / 40 = 3 hours.

2. Unit Conversion:
  - To convert km/h to m/s: Multiply by 5/18 (1 km/h = 1000 m / 3600 s = 5/18 m/s).
    - Example: 36 km/h = 36 × 5/18 = 10 m/s.
  - To convert m/s to km/h: Multiply by 18/5.
    - Example: 10 m/s = 10 × 18/5 = 36 km/h.

3. Average Speed:
  - Average Speed = Total Distance / Total Time.
  - For equal distances with speeds S_1 and S_2: Average Speed = 2 × S_1 × S_2 / (S_1 + S_2).
  - Example: A car travels 60 km at 30 km/h and 60 km at 40 km/h, Average Speed = 2 × 30 × 40 / (30 + 40) = 2400 / 70 = 34.29 km/h.

4. Relative Speed:
  - Objects moving in same direction: Relative Speed = $|S_1 - S_2|$.
  - Objects moving in opposite direction: Relative Speed = $S_1 + S_2$.
  - Example: Two cars at 40 km/h and 60 km/h moving towards each other, Relative Speed = 40 + 60 = 100 km/h.

5. Trains Problems:
  - Time to cross a pole (stationary object) = Length of train / Speed of train.
    - Example: Train 100 m long at 10 m/s crosses a pole in 100 / 10 = 10 seconds.
  - Time to cross a platform = (Length of train + Length of platform) / Speed of train.
    - Example: Train 100 m long at 10 m/s crosses a 200 m platform in (100 + 200) / 10 = 30 seconds.
  - Time for two trains to cross each other = ($Length_1$ + $Length_2$) / Relative Speed.

- Example: Trains 100 m and 150 m long moving towards each other at 10 m/s and 15 m/s, Time = (100 + 150) / (10 + 15) = 250 / 25 = 10 seconds.

6. Boats and Streams:
   - Downstream Speed = Speed of boat + Speed of stream.
   - Upstream Speed = Speed of boat − Speed of stream.
   - Speed of boat = (Downstream Speed + Upstream Speed) / 2.
   - Speed of stream = (Downstream Speed − Upstream Speed) / 2.
   - Example: Downstream speed = 12 km/h, Upstream speed = 8 km/h, Boat speed = (12 + 8) / 2 = 10 km/h, Stream speed = (12 − 8) / 2 = 2 km/h.

7. Word Problem Applications:
   - Example (Travel Time): A person travels 150 km at 50 km/h, Time = 150 / 50 = 3 hours.
   - Example (Meeting Point): Two cars 100 km apart approach each other at 40 km/h and 60 km/h, Time to meet = 100 / (40 + 60) = 1 hour.
   - Example (Boats): A boat travels 20 km downstream in 2 hours and upstream in 4 hours, Downstream speed = 20 / 2 = 10 km/h, Upstream speed = 20 / 4 = 5 km/h, Boat speed = (10 + 5) / 2 = 7.5 km/h.

Key Points for SSC GD Preparation:
- Focus Areas: Calculating speed, time, distance, average speed, relative speed, and solving word problems (e.g., trains, boats) are frequently tested.
- Question Types: Direct calculations (e.g., time for 100 km at 50 km/h), average speed, relative speed problems, and word problems (e.g., train crossing, boat speeds).
- Difficulty Level: 10th-grade level, requiring accurate formula application and quick calculations.
- Practice Tips: Memorize time, distance, and speed formulas, practice unit conversions, and solve word problems from past SSC GD papers to improve speed and accuracy.