

# **RRB JE All-in-One Complete Guide 2025**



Your One-Stop Solution to Crack RRB JE 2025 – From Basics to  
Advanced

Publisher: **SWAN India Publication**

## Copyright Page

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## Syllabus Overview

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The **Railway Recruitment Board (RRB) Junior Engineer (JE)** examination is conducted in two stages — **Computer Based Test 1 (CBT-1)** and **Computer Based Test 2 (CBT-2)**. Both stages are designed to evaluate a candidate’s conceptual understanding, problem-solving skills, and technical knowledge relevant to the post of Junior Engineer in Indian Railways.

### Stage I – Computer Based Test (CBT-1)

CBT-1 serves as the **initial screening test** and primarily focuses on evaluating candidates’ general aptitude and basic understanding. It consists of **100 objective-type questions** that must be completed within **90 minutes**.

### Subjects Covered in CBT-1:

1. **Mathematics** – Questions based on arithmetic, algebra, geometry, trigonometry, mensuration, and data interpretation.
2. **General Intelligence and Reasoning** – Logical and analytical reasoning including puzzles, coding-decoding, series, syllogism, and decision-making.

3. **General Awareness** – Current affairs, Indian polity, economy, history, geography, and general knowledge related to Railways.
4. **General Science** – Fundamental concepts from Physics, Chemistry, and Biology (up to the 10th standard level).

**Purpose:** To test the candidate's general mental ability and foundational understanding required for technical reasoning in CBT-2.

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## **Stage II – Computer Based Test (CBT-2)**

CBT-2 is the **core technical examination** that assesses the candidate's professional knowledge in their respective engineering discipline. It consists of **150 objective-type questions** with a duration of **120 minutes**.

### **Subjects Covered in CBT-2:**

1. **General Awareness** – Continued emphasis on current events, scientific developments, and railway-specific updates.
2. **Physics and Chemistry** – In-depth questions focusing on applied concepts and engineering-level fundamentals.
3. **Basics of Computers and Applications** – Computer fundamentals, software, networking, and database basics.
4. **Environment and Pollution Control** – Basic understanding of environmental issues, pollution control, and sustainability practices.
5. **Technical Subjects (Branch-Specific):**
  - **Mechanical Engineering:** Thermodynamics, Fluid Mechanics, SOM, Production Engineering, Machine Design.

- **Electrical Engineering:** Circuits, Machines, Power Systems, Measurements, Control Systems.
- **Civil Engineering:** Building Materials, Structural Analysis, Concrete, Surveying, Hydraulics.
- **Electronics & Communication:** Digital Electronics, Microprocessors, Communication Systems, Control Theory.
- **Computer Science / IT:** Operating Systems, DBMS, Programming, Networking, and Software Engineering.

**Purpose:** To evaluate the candidate's applied technical knowledge and problem-solving capability required for engineering roles in the Indian Railways.

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### **Additional Stages (After CBT-2)**

After qualifying CBT-2, candidates undergo:

- **Document Verification (DV)**
- **Medical Examination (ME)**

Final selection is based on the performance in **CBT-1 + CBT-2**, followed by successful verification and medical fitness.

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### **Key Highlights**

- **CBT-1:** Screening Stage (General Subjects)
- **CBT-2:** Core Technical Stage (Branch-Specific)
- **Mode:** Online (Objective Type)
- **Negative Marking:**  $\frac{1}{3}$  mark deduction for each wrong answer

- **Language:** English and Hindi

This book is structured to cover **each stage comprehensively**, providing a blend of theory, formulas, and practice to help aspirants **excel in both CBT-1 and CBT-2**.

## Part A – General Subjects

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### 1. Mathematics

#### Number System

The number system is the foundation of all mathematical calculations. Every mathematical concept is built upon numbers and their properties. In the RRB JE exam, questions from the number system test your understanding of different types of numbers, their relationships, and rules of divisibility.

#### Types of Numbers

1. **Natural Numbers:** Counting numbers starting from 1, 2, 3, 4, 5, ...
2. **Whole Numbers:** All natural numbers including zero → 0, 1, 2, 3, 4, ...
3. **Integers:** All positive and negative whole numbers → ... -3, -2, -1, 0, 1, 2, 3 ...
4. **Rational Numbers:** Numbers that can be written in the form  $p/q$ , where  $q \neq 0$  (e.g.,  $1/2$ ,  $-3/4$ , 7).
5. **Irrational Numbers:** Numbers that cannot be written in the form  $p/q$  (e.g.,  $\sqrt{2}$ ,  $\pi$ ,  $\sqrt{5}$ ).
6. **Real Numbers:** Combination of rational and irrational numbers.

#### Important Properties

- **Even Numbers:** Numbers divisible by 2 (like 2, 4, 6, 8, ...).
- **Odd Numbers:** Numbers not divisible by 2 (like 1, 3, 5, 7, ...).
- **Prime Numbers:** Numbers greater than 1 that have only two factors (1 and itself), e.g., 2, 3, 5, 7, 11.

- **Composite Numbers:** Numbers having more than two factors, e.g., 4, 6, 8, 9, 10.
- **Co-prime Numbers:** Two numbers having no common factor except 1 (e.g., 8 and 15).

### **LCM (Least Common Multiple)**

The smallest number which is exactly divisible by each of the given numbers.

### **HCF (Highest Common Factor)**

The greatest number which divides each of the given numbers exactly.

### **Relation between LCM and HCF:**

$\text{HCF} \times \text{LCM} = \text{Product of the two numbers}$

### **Example:**

Find the HCF and LCM of 12 and 18.

Prime factors of 12 =  $2^2 \times 3^1$

Prime factors of 18 =  $2^1 \times 3^2$

HCF =  $2^1 \times 3^1 = 6$

LCM =  $2^2 \times 3^2 = 36$

Check:  $6 \times 36 = 216 = 12 \times 18 \checkmark \square$

### **Divisibility Rules**

These rules help to quickly determine whether a number is divisible by another number without performing the division.

- **By 2:** If the last digit is even (0, 2, 4, 6, 8).
- **By 3:** If the sum of digits is divisible by 3.
- **By 4:** If the last two digits form a number divisible by 4.
- **By 5:** If the last digit is 0 or 5.
- **By 6:** If the number is divisible by both 2 and 3.
- **By 8:** If the last three digits form a number divisible by 8.
- **By 9:** If the sum of digits is divisible by 9.

- **By 10:** If the number ends in 0.
- **By 11:** If the difference between the sum of digits in odd and even positions is divisible by 11.

### **Example (Divisibility Test):**

Is 938 divisible by 11?

Sum of digits in odd positions =  $9 + 8 = 17$

Sum of digits in even positions = 3

Difference =  $17 - 3 = 14$  (not divisible by 11)

Hence, 938 is not divisible by 11.

### **Remainder Theorem**

If a number  $N$  is divided by  $a$  and leaves remainder  $r$ , then

$$N = a \times q + r$$

(where  $q$  is the quotient).

### **Example:**

When 17 is divided by 5, remainder = 2.

$$17 = 5 \times 3 + 2$$

### **BODMAS Rule**

When solving arithmetic operations, always follow this order:

**B** → **Brackets**, **O** → **Of**, **D** → **Division**, **M** → **Multiplication**, **A** → **Addition**, **S** → **Subtraction**

### **Example:**

Solve:  $15 - 3 \times (2 + 1)$

Step 1:  $(2 + 1) = 3$

Step 2:  $3 \times 3 = 9$

Step 3:  $15 - 9 = 6$

### **Short Tricks for Exam**

- To find the number of digits in a number  $N$ : use formula  
 $\text{Digits} = \lfloor \log_{10}(N) \rfloor + 1$
- For divisibility checks, always start from smaller divisors (2, 3, 5) to save time.
- Memorize prime numbers up to 100 — they help in factorization questions.

## About SWAN India Publication

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