

Contents

1	Major Topics in JEE Mains	2
2	Major Topics in JEE Advanced	3
3	Recommended Books	3
4	Equations	5
4.1	Rotation Matrix	5
4.2	Continuity	5
4.3	Exponential Function	5
4.4	Heron's Formula	5
4.5	General Polynomial	5
5	Psuedocode for Quicksort Algorithm	5
6	Topics Weightage in Mathematics in JEE Mains	6

List of Figures

1	Trigonometry by Amit M Aggarwal	3
2	Coordinate Geometry by SK Goyal	3
3	Algebra by SK Goyal	4
4	Differential Calculus by Amit M Aggarwal	4
5	Integral Calculus by Amit M Aggarwal	4

List of Tables

Mathematics in JEE

Ayush Gupta

CSE, IIT Dharwad

190030007@iitdh.ac.in

February 2, 2021

Joint Entrance Examination (JEE) is an engineering entrance examination conducted for admission to various engineering colleges in India. It is constituted by two different examinations - JEE Main and the JEE Advanced.

1 Major Topics in JEE Mains

The syllabus includes all the topics in NCERT Maths of Class 11th and 12th. Among them, we broadly name them as follows:

1. Sets and Relation
2. Trigonometry
3. Conic Sections
4. Sequence and Series
5. Quadratic Equation
6. Complex Numbers
7. Permutation and Combination
8. Binomial Theorem
9. Solution of Triangles
10. Statistics
11. Mathematical Reasoning
12. Matrices and Determinants
13. Limits and Continuity
14. Differentiation

15. Application of Derivative
16. Indefinite Integrals
17. Definite Integrals
18. Differential Equations
19. Probability

2 Major Topics in JEE Advanced

Even though JEE Advanced is significantly more difficult than JEE Mains, the syllabus is a bit less in JEE Advanced. Mathematical Reasoning, Statistics, Sets and Relations and other easy topics are not included in JEE Advanced.

3 Recommended Books

Most JEE Students follow the comprehensive books of either Cengage Publication or Arihant Publication. Here, I have listed the books of Arihant Series.

Trigonometry for JEE by Amit M. Agarwal, is designed to bridge the gap between understanding and use of trigonometry in field of Mathematics, Science and Engineering.

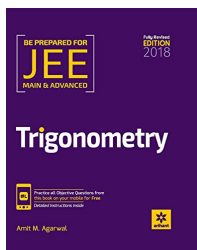


Figure 1: Trigonometry by Amit M Aggarwal

Coordinate geometry by Dr. SK Goyal is designed to provide a connection between algebra and geometry through graphs of lines and curves to help us locate the points in a plane.

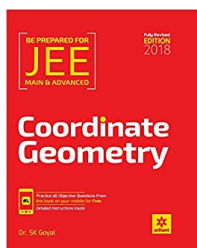


Figure 2: Coordinate Geometry by SK Goyal

Algebra for JEE by Dr SK Goyal, is designed to lay foundation for the most common and malleable types of mathematics used by electricians and engineers for everyday decision making or d training in science and technology.

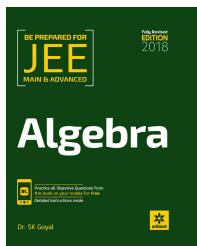


Figure 3: Algebra by SK Goyal

Differential Calculus for JEE, by Amit M. Aggarwal, is designed to study concepts of function derivatives, integrals, the behaviour and rate of how different quantities change on exact premise of calculus problems asked in the JEE.

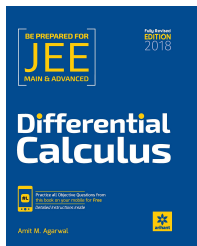


Figure 4: Differential Calculus by Amit M Aggarwal

Integral Calculus by Amit M Aggarwal, is designed to take out the mystique attached with Calculus Problems breaking the problem into steps and solve them tactfully on basis of premise of calculus problems asked in the JEE Main and Advanced.

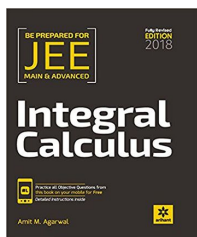


Figure 5: Integral Calculus by Amit M Aggarwal

4 Equations

4.1 Rotation Matrix

$$\begin{bmatrix} \cos \theta & \sin \theta \\ -\sin \theta & \cos \theta \end{bmatrix}$$

For further use, check in Book 3

4.2 Continuity

$$f(x) = \begin{cases} \sin \frac{1}{x} & \text{if } x \neq 0 \\ 0 & \text{if } x = 0 \end{cases}$$

Example of Discontinuous Function. For further examples, refer book 3

4.3 Exponential Function

$$e^x = \sum_{n=0}^{\infty} \frac{x^n}{n!} \quad (1)$$

$$= 1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots \quad (2)$$

$$= \frac{d}{dx} e^x \quad (3)$$

$$= \int e^x dx \quad (4)$$

4.4 Heron's Formula

$$\Delta = \sqrt{s(s-a)(s-b)(s-c)} \quad (5)$$

4.5 General Polynomial

$$f(x) = a_0 + a_1x + a_2x^2 + \cdots + a_nx^n$$

5 Psuedocode for Quicksort Algorithm

define Quicksort(Array,low,high)

if $low \geq high$ **then**

$pivot \leftarrow Partition(Array, low, high)$

 Quicksort(Array,low,pivot)

 Quicksort(Array,pivot,p)

end if

define Partition(Array,low,high)

$pivot \leftarrow Array[high]$

$i \leftarrow low - 1$

```

for j in range low to high -1 do
    if  $Array[j] < pivot$  then
         $i \leftarrow i + 1$ 
        swap( $Array[i], Array[j]$ )
    end if
    swap( $Array[i+1], Array[high]$ )
    return (i+1)
end for

```

6 Topics Weightage in Mathematics in JEE Mains

Name of the Topic	Expected Number of Questions	Expected Marks
Trigonometry	02	08
Matrix and Determinant	02	08
Probability	02	08
Co-ordinate Geometry	02	08
Integral Calculus	04	16
Differential Calculus	07	28

Refer Section 1 to compare.

In [?], Reference is present: