ISC Mathematics Complete Analysis and Marks Distribution
TIPS on How and What to Study

The curriculum and the exam pattern of ISC Mathematics witnessed a complete overhaul in the year 2018. Earlier, a student had the liberty to leave out a chapter as huge and important as Integration and still score above 90%. But not anymore. With the recent changes in the exam pattern, there are little choices left for a student to leave out any chapter entirely. The council made it clear that they are looking more at the breadth of the knowledge than the depth. Thus, mastering a few chapters and leaving some is not likely to fetch you high marks, given the current exam pattern.

In this article, I would try to give you a detailed analysis of the new pattern and share with you the important topics to learn and the right strategies to follow keeping in mind the latest trends of the exam.

But before we jump into that, let's first have a look at the question paper pattern and the marks distribution.

CLASS XII

The syllabus is divided into **three** sections A, B and C.

Section A is compulsory for all candidates. Candidates will have a choice of attempting questions from **EITHER** Section B **OR** Section C.

There will be one paper of **three** hours duration of 100 marks.

Section A (80 Marks): Candidates will be required to attempt **all** questions. There will be 14 questions in this section. Question 1 will contain 10 parts carrying 2 marks each. Out of the remaining 13 questions, 9 questions will carry 4 marks each and 4 questions will carry 6 marks each. Internal choice will be provided in
three questions of four marks each and two questions of six marks each.

Section A	
Question (1-14)	**Marks**
Question 1	20 (10 x 2)
9 questions	36 (9 x 4)
4 questions	24 (4 x 6)
Total - 14 questions	**80**

Section B/ Section C (20 Marks): Candidates will be required to attempt **all** questions **EITHER** from Section B **OR** Section C. There will be 4 questions in this section. The first question (15 in B and 19 in C) will contain 3 parts carrying 2 marks each. Out of the remaining 3 questions, 2 questions will carry 4 marks each and 1 question will carry 6 marks. Internal choice will be provided in two questions of four marks each.

Section B/C	
Question (15-18/19-22)	**Marks**
Question 15/19(B/C)	6 (3 x 2)
2 questions	8 (2 x 4)
1 question	6 (1 x 6)
Total - 4 questions	**20**

If that was too much data for you, let me simplify it in the breakup given below where I will discuss the important sub-topics within a chapter one by one.

SECTION A: 80 MARKS

1. Relation and Functions (12 marks)

This unit contains two chapters:

i. Relations, Binary Operations and Functions - 6 marks (2+4)

You will get two questions from this chapter one carrying 2 marks and other carrying 4 marks. In both the specimen paper as well as the ISC 2018 paper, the two mark question was asked from Binary Operations and 4 marks from Functions.
Though questions from Relations wasn't asked, the possibility of it appearing in 2019 can't be ruled out.

Important topic – Functions and Binary Operations

ii. Inverse Trigonometric Functions - 6 marks (2+4)

Similar to the above chapter, you will get two questions – one 2 marks question in Question 1 and another standalone question of 4 marks.

The questions mainly come from two areas – Solving equations and Proving Identities.
In 2018 and in the specimen, 2 marks came from Solving part and 4 marks from Proving part.

Important topic – Proving Identities

2. Algebra (14 marks)

This unit consists of two chapters:

i. Determinants - 6 marks (2+4)

The breakup here is again 2+4.
The 2 mark question is of the type "Without expanding at any stage, find the value of/evaluate"
The 4 mark question is of the type "Using properties of determinants, prove that/solve for x" Important topic: Whole chapter with special emphasis to proving questions.

ii. Matrices - 8 marks (2+6)

2 marks in Question 1 and another standalone question of 6 marks.
The 2 marks question is usually a simple straight forward question involving basic operations and properties of matrices like addition, subtraction, multiplication, equality, transpose of a matrix, symmetric matrix, singular matrix, etc.
The 6 marks question will come from Solution of Linear Equations using Matrices –

Martin's Rule OR Finding Inverse of a Matrix using elementary transformations. There is an internal choice here.

Personally, I prefer Martin's rule over Elementary transformations as the procedure is quite mechanical and algorithmic which would fetch you the result in a fixed number of steps, if done correctly.

However, Elementary transformations does not have any fixed rule or approach and the number of transformations required to reach the answer depends on the question and the transformation being applied. When you would arrive at the answer is quite uncertain and you might end up losing a lot of time in the course.

Important topic – Solution of Linear Equations using Matrices – Martin's Rule

3. Calculus (40 marks)

This unit has the maximum weightage carrying half of the total marks in section A. So, needless to say, this is one area which should be done thoroughly and really well. Let's see the chapters comprising this unit and their importance, one by one.

i. Continuity, Differentiability and Differentiation – 10 marks (2+4+4(OR type))

Three questions are asked from these topics.
The 2 marks question can be from either Continuity & Differentiability or from Differentiation One 4 marks standalone question will be from Differentiation.
The other 4 marks optional question comes from Continuity & Differentiability but with an internal choice with the below topic Mean Value Theorems/ L'Hospital Theorem.

ii. Mean Value Theorems/ L'Hospital Theorem - 4 marks (optional)

Only one 4 marks question is expected from this topic that too with an internal choice with Continuity and Differentiability as already mentioned above.

This 4 marks question can come from any one of the three topics – Rolle's Theorem, Lagrange's Mean Value Theorem or L'Hospital Theorem.

Note that there was no question from L'Hospital Theorem in the specimen paper as well as the 2018 paper but, again, that does not rule out the possibility of it coming in 2019.

Important topics:
i) Differentiation (must do)
ii) Continuity (only basics) and M.V.T/L'Hospital Theorem OR
iii) Only Continuity & Differentiability (Full)

iii. Application of Derivatives – 12 marks (2+4+6)

This chapter consists of 5 subtopics:-

a. Error and Approximation.
b. Increasing and decreasing functions.
c. Equations of Tangent and Normal

d. Rate measure.
e. Maxima and minima

Three questions come from this chapter as given below. 2 mark question – Can be asked from either a or b.

4 marks question – One from c and one from d with an internal choice.(OR type question). You have to choose any one.

6 marks question – This is booked for e only. This question may or may not have an internal choice. If there is an internal choice, it will be from the same topic.

Important topics: You should ideally do all the topics from this chapter. You may only leave one of c or d as per your choice.

Usually, most students find Tangents and Normal difficult because it involves other concepts of Coordinate Geometry including conic sections which are not in the ISC XII syllabus.

If you are one among them, you should definitely drop that topic.

iv. Indefinite Integrals/Definite Integrals – 12 marks (2+4+6)

Three questions, one each of 2 marks, 4 marks and 6 marks, come from here.

In this case it is difficult to distribute the marks between the two chapters. Any of the three questions can be from any of the two chapters.

Any one of the 4 marks and the 6 marks question will have an internal choice between the two chapters.

In 2018, you could have answered all the 12 marks only by doing Indefinite integrals. There was only one 6 marks question from Definite Integrals in an internal choice.

Whatever be the combination, you will have the choice of attempting at least 6 marks, on the whole, from each of the two chapters.

Important topic – Both with equal weightage.

My suggestion would be to keep a balance between both the chapters and try to attempt all the 6 marks from Definite Integrals as it is the easier of the two.

Indefinite Integrals is a nightmare for many and one of the most dreaded chapters in ISC Maths. But if you know the basic types of Indefinite integrals, you might get lucky with an easy question. So, do not leave any chapter blindly.

v. Differential Equations – 6 marks (2+4)

This topic consists of two parts:
a. Formation of Differential Equations (2 marks)
b. Solution of Differential Equations (4 marks)

- Separation of Variables
- Homogeneous equations
- Linear Differential equations.

The 4 mark question may have an internal choice from the same chapter. Of the three different types, Linear form is usually seen to be the favourite of the paper setters.

Important topics –

i) Formation of Differential Equations
ii) Solution of Linear Differential Equations

4. Probability (14 marks)

The only individual chapter with the maximum marks. A total of four questions are asked from this chapter and none of them have any internal choice! That makes it the 'must do' chapter.

The chapter can be divided into sub-topics like:

a. Laws of Probability, addition theorem, multiplication theorem, conditional probability.
b. Independent events, Total probability, Bayes' theorem.
c. Random variable, probability distribution and it's mean and variance, Binomial distribution and it's mean and variance

Two questions come in Question 1 carrying 2 marks each – these questions are usually asked from subtopics in a.

One four marks question – Can be from either b or c. One six marks question. – Can be from either c or b.

Important topics: Conditional probability, Independent events, Total probability, Bayes' theorem, Binomial distribution.

SECTION B: 20 MARKS

5. Vectors – 6 Marks (2+4)

Two questions are asked from this chapter one of two marks and the other of four marks. The 4 marks question will have an internal choice from the same chapter.

6. Three – Dimensional Geometry – 8/10 Marks (2+2+4 or 2+2+6)

There are two topics in this chapter namely, Lines and Planes. There are three questions with two questions carrying 2 marks each and one question carrying either 4 marks or 6 marks.

One 2 Marks question – Lines
Second 2 marks question – Planes.

You may also get a question involving both Lines and Planes as they are related topics.

Third question can be of:

Either 4 marks – This is an OR type question. One question will come from Line and another from Planes with an internal choice between them.

Or 6 marks – This will come from Planes only.

7. Applications of Integrals – 6/4 Marks

Only one question of either 4 marks or 6 marks come from this chapter.

If 4 marks, it will be an OR type question with an internal choice from the same chapter. If 6 marks, it will be only one standalone question.

SECTION C: 20 MARKS

8. Application of Calculus – 8 Marks (2+2+4)

Three questions come from this chapter. Two questions carrying 2 marks each and one OR type question carrying 4 marks with an internal choice from the same chapter.

9. Linear Regression – 6 Marks (2+4)

Two questions come from this chapter. One question carrying 2 marks and one OR type question carrying 4 marks with an internal choice from the same chapter.

10. **Linear Programming – 6 Marks**

Only one standalone question of 6 marks.

Final Verdict:

- It is quite evident that from the detailed breakdown above that one cannot afford to leave out any chapter entirely. You will have to attempt at least one question from every chapter. You might skip specific sub-topics but not the whole chapter if you are looking to score high.

- For students looking for an average score or to just pass the exam they should try to do at least the following topics from Section A:

    i. Relation and Functions Matrices
    ii. Continuity Differentiation
    iii. Mean Value Theorem/L'Hospital Theorem
    iv. Application of Derivatives – Only Error and Approximation, Rate Measure and Maxima and Minima Definite Integrals
    v. Differential Equations – Linear type
    vi. Probability – Independent events, Baye's theorem and Probability distribution with Binomial type.

- Between Section B and C, it is strongly recommended to attempt Section C as it contains quite

simple and straightforward chapters. The questions are very formulaic and are pretty easy to score. In either section, you have to study all the topics as the marks are fairly divided among the chapters.

- Please go through both the ISC Specimen paper and ISC 2018 paper thoroughly and solve them. ISC 2018 paper was quite similar to the specimen paper with just slight changes here and there. ISC 2019 is also expected to be along the same lines.

Best Wishes for ISC 2019!