FINAL EXAMINATION

ENGLISH FOR MATHEMATIC EDUCATION

PART 1

MATHEMATICS AND MODERN CIVILIZATION

"Mathematics is the queen of natural knowledge" (K.F.Gauss). That is true. Maths supplies a language, methods and conclusions for science. It enables scientists to predict result, furnishes science with ideas to describe phenomena and prepares the minds of scientists for new ways of thinking.

It would be quite wrong to think that maths had been giving so much to the sciences and receiving nothing in return. Physical objects and observed facts had often served as a source of the elements and postulates of maths. Actually, the fundamental concepts of many branches of maths are ones that had been suggested by physical experiences.

Scientific theories have frequently suggested directions for pursuing maths investigations, thus furnishing a starting point for maths discoveries. For example, Copernican astronomy had suggested many new problems involving the effects of gravitational attraction between heavenly bodies in motion. These problems had been developing the further activities of many scientists in the field of differential equations.

1. According to the text, what role does mathematics play in science?

a) Mathematics predicts scientific results.

b) Mathematics provides a language for science.

c) Mathematics describes natural phenomena.

d) All of the above.

2. Which statement is true about the relationship between mathematics and science, based on the text?

a) Mathematics only benefits science without receiving anything in return.

b) Mathematics is completely separate from physical objects and observed facts.

c) Physical experiences often suggest fundamental concepts in mathematics.

d) Scientific theories never influence mathematics investigations.

3. What did Copernican astronomy contribute to mathematics?

a) It provided new problems related to gravitational attraction.

b) It introduced differential equations to the field of mathematics.

c) It discovered the effects of motion on heavenly bodies.

d) It suggested new ways of thinking in mathematics.

Answer: a) It provided new problems related to gravitational attraction.

4. According to K.F. Gauss, what is mathematics often referred to as?

a) The king of natural knowledge

b) The queen of natural knowledge

c) The language of natural knowledge

d) The method of natural knowledge

Answer: b) The queen of natural knowledge

5. What does mathematics supply to science?

a) Language

b) Methods

c) Conclusions

d) All of the above

6. How does mathematics contribute to the minds of scientists?

a) It enables scientists to predict results.

b) It furnishes science with ideas to describe phenomena.

c) It prepares scientists for new ways of thinking.

d) It develops physical objects and observed facts.

PART 2

Niels Henrik Abel

He was born on August 5, 1802, in Finnoy, Norway. He was the second of six children. At the age of 13 he was sent to the Cathedral school in Christiania (Oslo).

In 1817 his maths teacher Holmbe recognized his talent and started giving him special problem and recommended special books outside the curriculum. Soon he became familiar with most of the important mathematical literature.

When he was 18, his father died. He had to support his family. He gave private lessons and did odd jobs. However, he continued to carry out his mathematical research.

In his last year of school, he worked on the problem of the solvability of the quintic equation, a problem that had remained since the sixteenth century. Unable to find an error and unable to understand his arguments, he was asked by the editor to illustrate his method. In 1824, during the process of illustration he discovered an error. This discovery led him to a proof that no such solution exists. He also worked on elliptic functions and in essence revolutionized the theory of elliptic functions.

He traveled to Paris and Berlin to find a teaching position. Then poverty took its toll and he died from tuberculosis on April 6, 1829. Two days later a letter from Crelle reached his address, conveying the news of his appointment to the professorship of mathematics at the University of Berlin.

1. Where was Niels Henrik Abel born?

a) Christiania (Oslo)

b) Finnoy, Norway

c) Berlin, Germany

d) Paris, France

2. At what age was Abel sent to the Cathedral school in Christiania?

a) 5

b) 13

c) 18

d) 24

3. Who recognized Abel's talent and started giving him special problems and recommended books outside the curriculum?

a) His father

b) His maths teacher Holmbe

c) The school principal

d) The editor of a mathematical journal

4. What problem did Abel work on in his last year of school?

a) The solvability of the quadratic equation

b) The solvability of the cubic equation

c) The solvability of the quintic equation

d) The solvability of the quartic equation

5. What was the outcome of Abel's work on the solvability of the quintic equation?

a) He found a solution to the problem.

b) He discovered an error in his arguments.

c) He proved that a solution exists.

d) He revolutionized the theory of elliptic functions.

6. Which branch of mathematics did Abel revolutionize?

a) Algebra

b) Geometry

c) Calculus

d) Elliptic functions

7. Where did Abel travel to find a teaching position?

a) Paris and Berlin

b) Oslo and Christiania

c) Berlin and Oslo

d) Christiania and Paris

8. How did Abel die?

a) Old age

b) Tuberculosis

c) Poverty

d) Accidental injury

9. What news reached Abel two days after his death?

a) His appointment to a professorship in Paris

b) His appointment to a professorship in Berlin

c) His family's financial stability

d) His breakthrough in elliptic functions

10. Which of the following did Abel NOT do to support his family?

a) Give private lessons

b) Work odd jobs

c) Continue his mathematical research

d) Find a teaching position

PART 3

MATHEMATICAL LOGIC

In order to communicate effectively, we must agree on the precise meaning of the terms which we use. It's necessary to define all terms to be used. However, it is impossible to do this since to define a word we must use others words and thus circularity cannot be avoided. In mathematics, we choose certain terms as undefined and define the others by using these terms. Similarly, as we are unable to define all terms, we cannot prove the truth of all statements. Thus, we must begin by assuming the truth of some statements without proof. Such statements which are assumed to be true without proof are called axioms. Sentences which are proved to be laws are called theorems. The work of a mathematician consists of proving that certain sentences are (or are not) theorems. To do this he must use only the axioms, undefined and defined terms, theorems already proved, and some laws of logic which have been carefully laid down.

Answer the following questions!

1. Why is it necessary to define terms in order to communicate effectively?
2. Why is it impossible to define all terms?
3. How does mathematics handle the issue of defining terms?
4. What are axioms in mathematics?
5. What are theorems in mathematics?
6. What is the main task of a mathematician?
7. How does a mathematician establish the truth of a theorem?
8. What are the limitations faced in proving the truth of all statements?
9. What are the laws of logic?
10. What does the work of a mathematician involve?

PART 4

Read the following text through voice-note and send it to WhatsApp group with your name and students ID as a caption!

Do not forget to introduce yourself first before you read the text!

In mathematics, we choose certain terms as undefined and define the others by using these terms. Similarly, as we are unable to define all terms, we cannot prove the truth of all statements. Thus, we must begin by assuming the truth of some statements without proof. Such statements which are assumed to be true without proof are called axioms. Sentences which are proved to be laws are called theorems. The work of a mathematician consists of proving that certain sentences are (or are not) theorems.