THE UNITED REPUBLIC OF TANZANIA
NATIONAL EXAMINATIONS COUNCIL OF TANZANIA
DIPLOMA IN SECONDARY EDUCATTION EXAMINATION

740 **MATHEMATICS**

Time: 3 Hours **Year: 2024**

Instructions.

1. This paper consists of sections **A** and **B** with total of **Fourteen(14)** questions.
2. Answer **all** questions
3. Section **A** comprises **Ten (10)** questions with total of **40** marks, while section B has four questions with total of **60** marks..
4. Cellular phones are **note** allowed in the examination room.
5. Write your **examination Number** on every page of your answer booklet(s).

SECTION A (40 Marks)

Answer **all** questions from this section. Each question has **four (4)** marks.

1. Determine whether the given sentences are mathematical statement and give reasons for their responses:
   (a) I did not pass the examination, did I?
   (b) I passed the examination
   (c) I entered in a classroom without permission
   (d) Please sir, may I enter in the classroom?

2. (a) Evaluate the integral $\int_0^1 \frac{dx}{\sqrt{1+x^2}}$ correct to 5 decimal places.

   (b) Find the value of t correct to 5 decimal places, if $e^t = \sqrt{\frac{s(s+w)}{(s-w)^2}}$ given that s = 8.235 and W = 4.365.

   (c) Find the value of the expression $\sqrt{\pi^{\sqrt{2}} + \left(\frac{\ln 22}{\cos\ 55^0}\right)^2}$ correct to 5 decimal places.

3. Locate the feasible region and determine corner points that would allow you to evaluate the objective function of the linear programming problem.

   Linear programming problem: Maximize f(x) = 18x + 10y
   subject to: ,4x + y ≤ 20, 2x + 3y ≤ 30, 2x + y ≥ 12.

4. Outline the steps that a teacher has to follow when guiding students to understand the theorem that states that, “an angle in a semi-circle is a right angle.

5. A shadow of an object is cast into a wall. Find the position of the object so that the length of the shadow is twice the length of the object.

6. A boat is sailing directly towards a cliff. The angle of elevation of a point on the top of a cliff and straight ahead of the boat increases from 10_o and 15_o as the boat sails at a distance of 50 m. Find the height of the cliff, approximately to one decimal place.

7. Prove that $\tanh^{-1}\left(\frac{x^2-1}{x^2+1}\right) = \ln x$

8. Outline four curriculum materials that are applied in teaching and learning of Mathematics.

9. If vectors $\underline{a} = 3\underline{i} - 7\underline{j} + t\underline{k}$ and $\underline{b} = 5\underline{i} + \underline{j} - 2t\underline{k}$ are perpendicular, find the value(s) of *t*.

10. Briefly explain four properties of teaching and learning aids for effective understanding of learners.

SECTION B (60 Marks)

Answer **all** questions from this section. Each question has **fifteen (15)** marks.

11. (a) Identify type of the conic section $2x^2 - 4x - 4y - 2 = 0$ by its centre, focus, and axis.

    (b) Sketch the graph of $\frac{x^2}{9} + \frac{y^2}{16} = 1$, hence label the vertices, co-vertices and centre.

12. (a) (i) A committee consisting of 5 men and 6 women is to be chosen from 7 men and 9 women. In how many ways can this be done?

    (ii) A box contains 2 yellow marbles, 5 red marbles and 4 green marbles. How many red marbles should be taken from the box so that the probability of taking one green marbles is equal to 21.

    (b) The probability that a man will have a capital given that he started a business is 0.4, the probability that the man will start the business given that he has capital is 0.25 and the probability that he will have the capital and start the business is 0.12. Find the probability that he will:
    (i) start the business
    (ii) have the capital and not start the business.

13. In order to improve teaching and learning of Mathematics, teachers should be equipped with assessment tools. Analyse six assessment tools that you can use to assess students understanding of Mathematics.

14. Competence on the principles of teaching and learning of Mathematics. Explain six principles of teaching and learning of Mathematics".