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

MATHEMATICS

740

Time: 3 Hours

Friday, 13th May 2011 a.m.

INSTRUCTIONS

1. This paper consists of sections A, B and C.
2. Answer **all** questions in section A and **two (2)** questions from each of sections B and C.
3. Sections A and B carry 30 marks each, section C carries 40 marks.
4. Mathematical tables and non-programmable calculators may be used.
5. Cellular phones are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

This paper consists of 4 printed pages.

2011

SECTION A (30 Marks)

Answer **all** questions in this section.

1. (a) If vector **v** of a magnitude 27 units is parallel to vector $\mathbf{a} = \mathbf{i} + 8\mathbf{j} + 4\mathbf{k}$. Determine the value of vector **v**.

   (b) Find the gradient of the graph of $3\sqrt{x^2 + y^2} = 50xy$ at the point (2, 1).

2. A student is required to answer fourteen questions out of eighteen questions in a test.

   (a) How many choices has she?

   (b) If she must answer the first ten questions how many choices has she?

3. Using a calculator, find the value of:

   (a) $\tan 36^0 48'$

   (b) $\ln(\sin^3 2)$

4. (a) Mention four important steps to be followed when formulating a system of linear constraints from word problem.

   (b) Sketch the following system of linear inequalities:

   $x \geq 0$

   $y \geq 0$

   $x + 3y \leq 6$

5. Using the following information:

   Q is the midpoint of segment $\overline{PR}$

   $\overline{PT} \cong \overline{RS}$

   $\overline{TQ} \cong \overline{SQ}$

   Prove that, $\Delta PQT \cong \Delta RQS$.

6. List down four importance of teaching mathematics in schools.

7. Give three reasons why a table of specification is very important to teacher in constructing mathematics test.

8. Outline three advantages of using a text book as one of the curriculum materials in learning mathematics.

9. Identify six criteria of a well stated objective.

10. Briefly explain two principles that you could use to promote mathematics learning among the learners.

SECTION B (30 Marks)

Answer **two (2)** questions from this section.

11. (a) Using integration, show that the volume of a sphere is $\frac{4}{3}\pi r^3$.

(b) Integrate $\frac{4x}{2x^2+x-3}$ with respect to x.

12. (a) Find the derivative of the given $f(x) = \frac{uv}{w}$

(b) From the first principle, find the derivative of $\frac{x+1}{x-1}$ with respect to x.

13. (a) Using laws of algebra simplify the proposition $\sim(p \wedge q) \wedge (\sim p \vee q)$.

(b) Verify that $(p \wedge q) \rightarrow (p \vee q)$ is a tautology.

(c) Draw an electrical network of the proposition $(p \wedge q) \vee (p \wedge r)$.

14. (a) Find the equation of the tangent line which touches ellipse at the point (-2, 1).

(b) Show that $16x^2 + 25y^2 + 96x - 50y = 231$ is an equation of ellipse. Hence, find its centre.

SECTION C (40 Marks)

Answer **two (2)** questions from this section.

15. The "domain and range" is proposed in the syllabus as one of the subtopics to be used in teaching the selected topics.

(a) Write three specific objectives of the subtopic.

(b) Write its main topic and the competence of the topic.

(c) Describe a good introduction of subtopic while teaching.

16. Suppose you are in a panel for preparation of a mathematics text book for ordinary level mathematics. Describe five characteristics of a text book with high quality.

17. Evaluate five challenges that teachers meet while using the basic mathematics syllabus for secondary schools in Tanzania. Give five suggestions to remedy the situation.

18. Prepare two multiple-choice test items with four distracters from each of the following themes:

(a) Domain and Range

(b) Tangent properties

(c) Chord properties of a circle