THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

(SUPPLEMENTARY)

Time: 3 Hours. **Year: 2004**

Instructions

1. This paper consists of **eight (8)** questions.
2. Answer any **five (5)** questions.
3. Each question carries **twenty (20)** marks.
4. Non-programmable calculators may be used.
5. Communication devices, programmable calculators and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) (i) Define the term 'reaming allowance' in a drilling operation.

   (ii) Give two purposes of the 'land' on a twist drill bit.

   (iii) State four common causes for a rough or scored hole surface after a reaming operation.

   (iv) State two causes for a drill making an oversize hole.

   (b) Describe the process of using a die stock to cut an external thread.

   (c) State three common causes for a tap breaking during an internal threading operation.

2. (a) (i) Differentiate between an internal thread and an external thread.

   (ii) Give an example of a tool used for each type of thread.

   (iii) Explain why the flutes on some reamers are cut with a left-hand helix.

   (b) Explain the term threading and give three requirements of correct threading.

   (c) State four requirements for a good tapping fluid (lubricant).

3. (a) How can the drilling of large diameters in sheet metal be done satisfactorily?

   (b) Explain the importance of using a drill drift when removing a taper shank drill bit from the spindle.

   (c) Give the purpose for each of the following in metal works:

   (i) Counterbore tool pilot

   (ii) Chamfer

4. (a) Explain the concept of 'pitch circle diameter (PCD)' as applied to flange drilling or gear measurement.

   (b) Define the terms 'minor diameter' and 'major diameter' for an external screw thread.

(c) Explain the principle behind using a mandrel (or arbor) in a lathe operation.

5. (a) Draw a flat chisel in a cutting position and show its important geometry angles.

(b) Outline the requirements for laying out lines using a surface gauge or a vernier height gauge.

(c) State three functions of the headstock in a centre lathe.

6. (a) Explain the term 'cutting speed' as used in workshop practice.

(b) (i) Outline the factors that limit the use of the maximum feed to the workshop machine.

(ii) Write two purposes of reamers left-hand helix.

(c) What are the two main purposes of the flutes on a twist drill?

7. (a) Outline four safety precautions specific to using a portable electric hand drill.

(b) Differentiate between a die and a tap in terms of their function.

(c) State three advantages of using a three-jaw self-centering chuck over a four-jaw independent chuck.

8. (a) Calculate the change gears to cut a Right-Hand (R.H.) thread of 10 T.P.I. on a lathe with a lead screw pitch of 4 T.P.I.

(b) Calculate the cutting speed given that the work diameter is 14 mm and the rotation speed (N) is 8 rev/min (Use π=3.142).

(c) What is the pitch, depth, and minor diameter for an M6×1.0 thread?

Given: Pitch(P)=1.0 mm and Depth=0.6134×P.