THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

Time: 3 Hour. **Monday, 14th May 2018 a.m.**

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) Define the term “metal casting”.

   (b) (i) List four types of casting processes.

   (ii) Briefly explain one advantage of sand casting over die casting.

   (c) Describe the steps involved in preparing a sand mould.

   (d) State four defects that may occur in metal castings.

2. (a) What is “gas welding”?

   (b) (i) Identify three types of flames used in gas welding and describe one use of each.

   (ii) State the function of flux in gas welding.

   (c) Describe the correct procedure of lighting and adjusting a gas welding torch.

   (d) State four safety precautions to observe when using a gas welding set.

3. (a) Define the term “metal shearing”.

   (b) (i) Explain the difference between straight shearing and slitting.

   (ii) State three factors affecting shearing quality.

   (c) Describe how a guillotine shear is operated manually.

   (d) State four causes of burrs when shearing sheet metal.

4. (a) What is meant by “bench vice” in metalwork?

   (b) (i) Mention three parts of a bench vice and state their functions.

   (ii) Explain how to maintain a bench vice for long service life.

   (c) Describe how to clamp and file a metal bar using a bench vice.

   (d) State four safety measures to follow when using a bench vice.

5. (a) Define “drilling jig” and explain its importance in production.

   (b) (i) Differentiate between a jig and a fixture.

   (ii) State two types of jigs used in drilling.

   (c) Describe how a plate jig is used to drill holes in a metal component.

   (d) State four advantages of using jigs in mass production.

6. (a) What is “tool wear”?

(b) (i) State three types of tool wear that occur during machining.

(ii) Explain how tool wear affects the machining process.

(c) Describe how tool wear can be reduced in lathe operations.

(d) State four signs indicating that a cutting tool is worn out.

7. (a) Define “forging” in metal working.

(b) (i) Mention two types of forging and give one example where each is applied.

(ii) State the function of an anvil in forging.

(c) Describe the procedure for forging a round bar into a square section.

(d) State four disadvantages of forging compared to casting.

8. (a) What is meant by “coolant” in machining operations?

(b) (i) State three types of coolants used in metalworking.

(ii) Explain two main purposes of using coolant during machining.

(c) Describe how coolant is applied during lathe operations.

(d) State four risks of not using coolant in heavy machining.