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

789 METAL WORKING AND MECHANICAL PRACTICE

Time: 3 Hours **Monday, 13th May 2019 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).

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1. (a) (i) Give the meaning of the term 'fitting' as used in mechanical workshop activities.
   (ii) Write five points to signify the proper use of a bench vice.
   (b) Explain how the metal chipping process is carried out in the workshop.
   (c) (i) Outline the advantages of using a power hacksaw.
   (ii) Identify two materials which are commonly used for making hacksaw blades.
   (iii) With examples, give four parameters which are used to determine the size of a hand hacksaw.

2. (a) Briefly explain four points to be kept in mind in order to get good results in the hand filing operation.
   (b) Give three methods of filing.
   (c) Describe the following features in connection with files:
   (i) Size of the file
   (ii) Cut of the teeth
   (iii) Grade of cut of the file
   (iv) Shape of the file.
   (d) Draw a hand file and show its eight parts.

3. (a) Write four advantages of braze welding.
   (b) In four points, give the importance of borax flux for welding process.
   (c) Briefly explain two factors that influence the effectiveness of brazing operations.
   (d) Classify the brazing alloys into two essential categories as used in welding.

4. (a) Explain the term 'electric arc welding'.
   (b) (i) To which flow of an electric energy the arc welding is based on?
   (ii) Write the hazards of ultraviolet rays and suggest the ways to prevent them.
   (c) Sketch a neat diagram with six labeled parts to demonstrate the coated electrode in working process.
   (d) Outline five criteria to be considered during an electrode selection.

5. (a) Outline three basic types of chip produced when cutting metals.
   (b) How are anvils and swage blocks used in connection with metal cutting?
   (c) Explain the term threading and give five requirements of correct threading.
   (d) Draw a flat chisel in a cutting position and show the important geometry angles.

6. (a) Explain the function of each of the following:
   (i) The angle plate
   (ii) Vee blocks.
   (b) Explain the general procedures of marking out a workpiece.

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

7. (a) (i) Explain cutting speed as used in workshop practice.
(ii) Calculate the cutting speed, given that the work diameter is 14mm and the rotation speed (N) is 8 rev/m; take $\pi = 3.142$.
(iii) Calculate the change gears to cut R.H. thread of 10 T.P.I.

(b) (i) Outline the factors that limit the use of the maximum feed to the workshop machine.
(ii) What is the pitch, depth, minor diameter, width of crest, and width of root for M6 x 1.0 thread? Given that:
- D = 0.54127 P
- Crest = 0.125P
- Root = 0.25P

8. (a) How can the drilling of large diameters in sheet metal be done satisfactorily?
(b) What are the four causes for the defect of making oversize hole when drilling?
(c) Write two purposes of reamers left hand helix.
(d) Give the purpose for each of the following in metal works:
(i) Counterbore tool pilot
(ii) Chamfer.

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