

PAST QUESTIONS AND ANSWERS

GENERAL METAL WORK

MAY/JUNE 2009

1a. Enumerate TWO safety measures each as regards the use of the following hand tools.

1. Scriber
2. Chisel
3. File
4. Try-square

1. **Scriber:** Scriber should be handed over to person/persons through the handle not with the sharp end.

2. **Chisel**

1. Chisel should never allowed to much room when it does, it should be removed by grinding.
2. Never chisel in the direction where there are other people.

3. **File:**

1. File should never be used without handle
2. File should never be allowed to drop on the floor

3. **Try-Square**

1. Never use the try square as a hammer
2. Try-Square should not be allowed to drop on the floor or hand the t blade

1b. Explain the following terms

- i. Ferrous metals
- ii. Non-ferrous metal

- 1. **Ferrous Metal:** This is the type of metal that contain iron, which includes all iron steel.
- 2. **Non-Ferrous Metals:** Non-Ferrous Metal are metals that is without iron e.g. Aluminum, Brass, copper etc.

1c. In tabular form, classify the following metals into ferrous and non-ferrous

- i. Aluminum
- ii. Copper
- iii. Wrought iron
- iv. Pig iron
- v. Brass
- vi. Bronze
- vii. Mild Steel
- viii. High carton Steel

	Ferrous Metal	Non-ferrous Metal
1.	Wrought Iron	Aluminum
2.	Pig Iron	Copper
3.	Mild Steel	Brass
4.	High Carbon Steel	Bronze

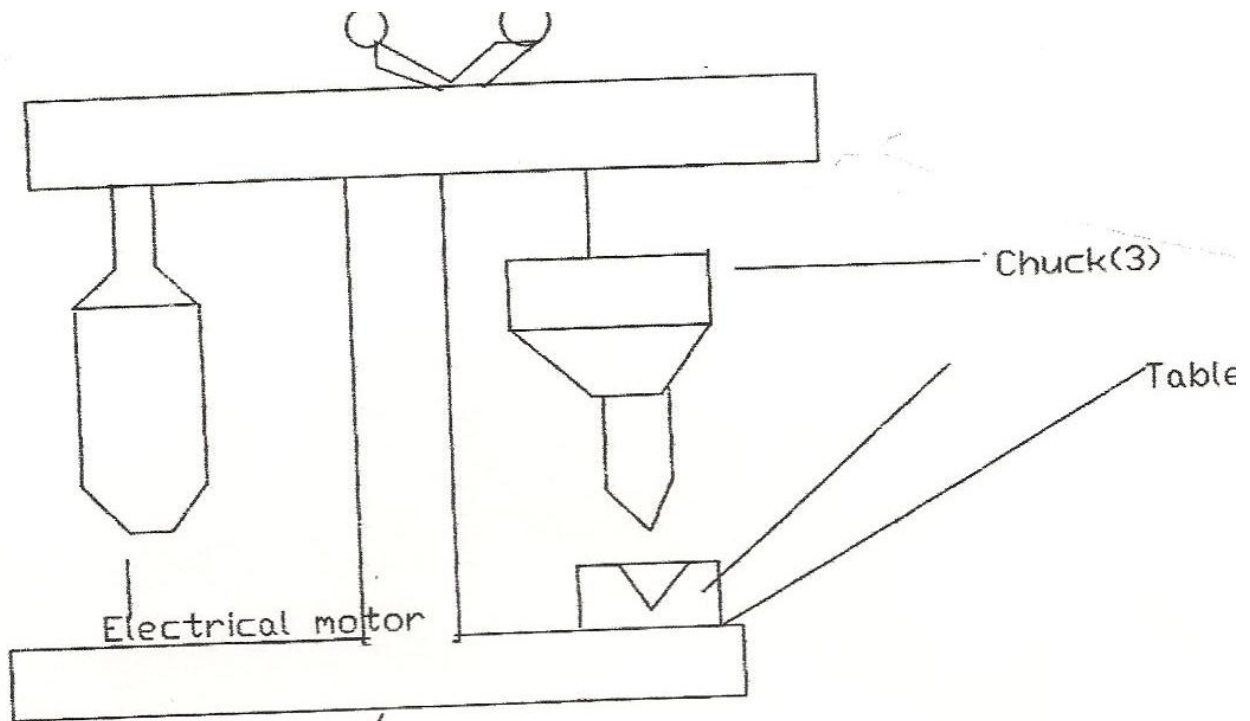
2a. Distinguish between the terms bench work and work bench.

Bench Work: This is the type of job performed on the bench e.g sawing and filing while work bench is the table or the platform on which the job is carried out.

b. What is Drilling? Drilling is the process or method of creating or originating a hole in any of the engineering material.

c. With a god sketch, show the following parts on a bench drilling machine

- i. The electric motor
- ii. Spindle
- iii. Chuck
- iv. Base



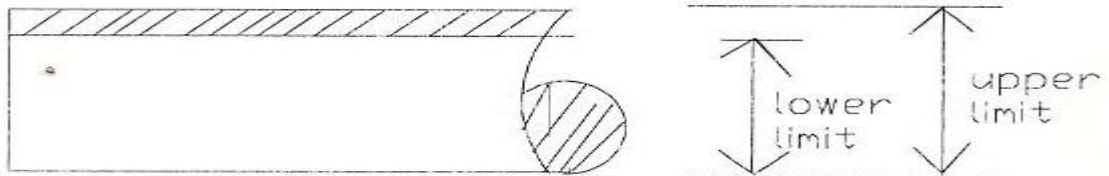
2d. In Sequential order explain the process of tapping a blind hole.

1. Use the formula $T = D - P$ to know the taper size (The drill bit size)
2. Drill to the required depth
3. Use the second and bottoming tap respectively to thread the blind hole while the tap being to thread the blind hole while the top being used is squared with the work or job being taped. The second and bottoming tap can also be referred to as taper and plug tap respectively.

3a. Write short note on each of the following.

1. Tolerance
2. Upper Limit
3. Lower limit
4. Bilateral Dimension

1. **Tolerance:** This is the difference between the largest and lowest limits of a dimension e.g the upper limit (U.L.) of a dimension 2.001 and the lower limit (LL) 1.999. the tolerance is $2.001 - 1.999$ which is 0.002 (mm).
2. **Upper Limit:** This is the maximum dimension allowed on any component.
3. **Lower Limit:** This is the lowest dimension allowed on any component
4. **Bilateral Dimension:** This is the type of dimension given on both side of any component e.g \pm e.g a shaft of diameter 20mm is to be produce, the limit on the shaft is ± 0.05 mm i.e. the limit is on the both side of dimension 20mm which is 20.05 or 19.95mm respectively.



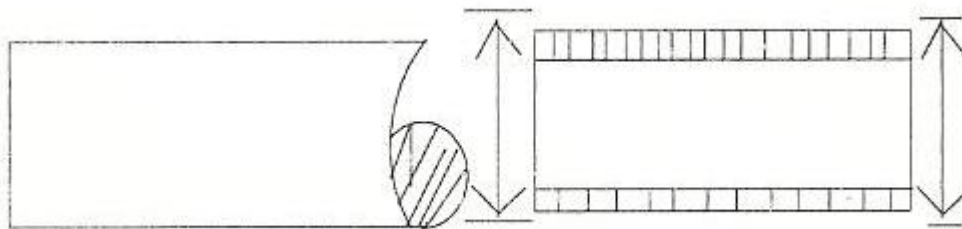
b. Explain the following terms;

- i. Clearance fit
- ii. Transitional fit

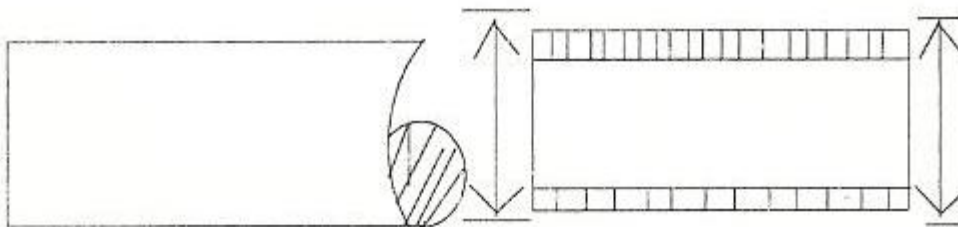
5. Interference fit

1. **Clearance Fit:** This type of fit exist in mating part coupled together in such a way that the shaft is able to turn or revolve in the hole, which means that there is a little allowance between the shaft and the hole.

2. **Transitional Fit:** This type of fit exist in a situation where the shaft and a hole to be couple are both having the same dimension.



3. **Interference Fit:** This is the type of fit which exist between the shaft and a hole in such a way that the dimension on the shaft is more than that on the hole, force is required to couple the two parts together.



c. List FOUR parts of the centre lathe machine and state their functions

- i. The Head Stock
- ii. The Tail Stock
- iii. The Carriage
- iv. The Lead Screw

- 1. **The head stock:** Accommodates the gearing arrangement of the lathe, it is the live centre of the centre lathe machine which holds and turns the work.
- 2. **The Tail Stock:** This part can moved to and fro on the bed. It is the part which is used to support long work mounted on the head stock. It can also be used for drilling, tapping.
- 3. **The Carriage:** is the part which moved between the head stock and the tail stock. It is the part on which the cutting tool is mounted. The carriage carries the compound and the cross slide.
- 4. **The lead screw:** This part enable screw cutting on the lathe machine.

4a. In the process of heat treatment of steel what do you understand by;

- 1. Case hardening
- 2. Tempering
- 3. Normalizing

- 1. **Case Hardening** is the process of making the outer part of a component to be hard while leaving the inner part soft.
- 2. **Tempering:** This is the process of making or reducing the hardness of a component to a tolerance or the require hardness.
- 3. **Normalizing:** This is the process of making or refining the internal structure of a distorted grain structure of any component i.e bringing a material back to its original structure after deformation by force.

b. **What is Forging?**

Forging is the process of bending, twisting and hammering of any component to desired or required shape.

c. With the aid of a good