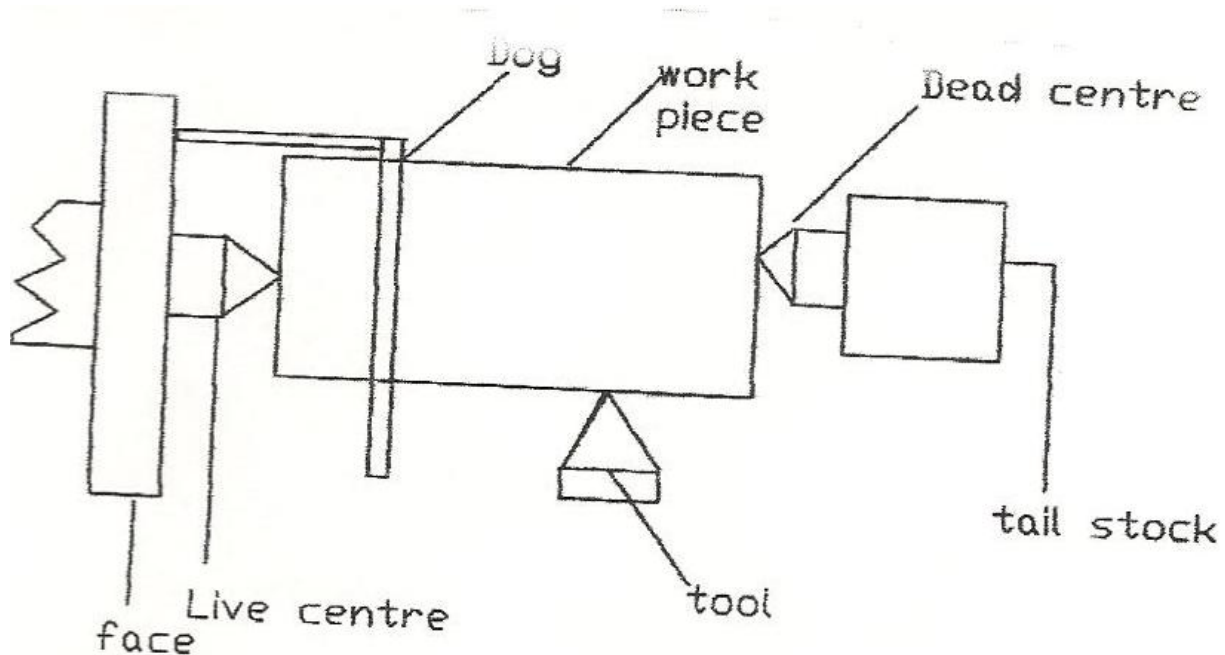


PAST QUESTIONS AND ANSWERS

GENERAL MENTAL WORK (191-1)

MAY/JUNE 2007

- 1a. With a neat sketch, describe turning between centres



TURNING BETWEEN CENTRES

The sketch above shows the operation of turning between centres. It involves mounting the work piece on two centres that is the live and dead centres.

The driving pin, projecting from the face plate or the lathe carrier with a bend leg into the slot, help to rotate the work against the cutting tool which transverse between the two centres in the case of turning a very long work piece, a travelling steady is used to prevent the job from deflection.

- b. List and describe all the necessary accessories needed to perform the operation in 1 (a) above.
- i. Carrier or lathe dog.

- ii. Steadies
- iii. Faceplate/driving plate
- iv. Driving pan
- v. The lathe centre
- vi. The cutting tool.

i. **THE LATHE CARRIER OR LATHE DOG.**

This is used to keep the work which is to be turned between centres from slipping; also help in turning or rotating the work piece.

ii. **STEADIES**

These are devices which help to keep the work from being deflected when turning long work piece mounted on the head stock or between centres.

iii. **FACEPLATE**

The faceplate is used instead of the lathe chuck on some work, such as straight turning between centres and such jobs that cannot be mounted on the chuck.

iv. **DRIVING PIN**

This is that part which protrude from the face plate which turns the carrier as the faceplate rotates.

v. **THE LATHE CENTRES**

These hold work when turning between centres. The centres attached to the headstock is known as the live centre while the one on the tailstock referred to as the dead centre.

vi. **THE CUTTING TOOLS**

These are lathe tools used for cutting on the centre lathe machines.

2a. What is carburizing?

Carburizing is the process of adding carbon to the surface layer of a low carbon steel. Carburized component possess a tough core together with a hard case. There are about three methods of carburizing

- i. Surrounding with a carbonaceous material
- ii. Immersing in a carbon salt
- iii. Exposing to a carbon atmosphere.

The choice of the carburizing method will depend on several factors, which are:

- a. Depth of case

- b. Size of component
- c. Rate of production

b. Write short notes on the following

- i. Normalizing
- ii. Annealing
- iii. Tempering
- iv. hardening

i. **NORMALIZING**

Normalizing is a heat treatment process in which the steel heated to 30-50⁰c above the upper critical point and cooled freely in air. To bring to normal the internal structure.

ii. **ANNEALING**

The purpose of annealing is to make the metal softer and more ductile. It can then be cold worked without any danger of it breaking. The steel is heated to 30⁰ - 50⁰c above the upper critical point and held at this temperature for a time depending on the thickness of the meal. It is then cooled very slowly, usually in the furnace.

iii. **Tempering**

A steel which has been harden is very brittle and it is likely to crack in service it can be tempered by heating it to a temperature below the lower critical temperature and then quenching. This treatment takes away some of the brittleness and make the metal tougher and more ductile but less hard and strong.

iv. **Hardening**

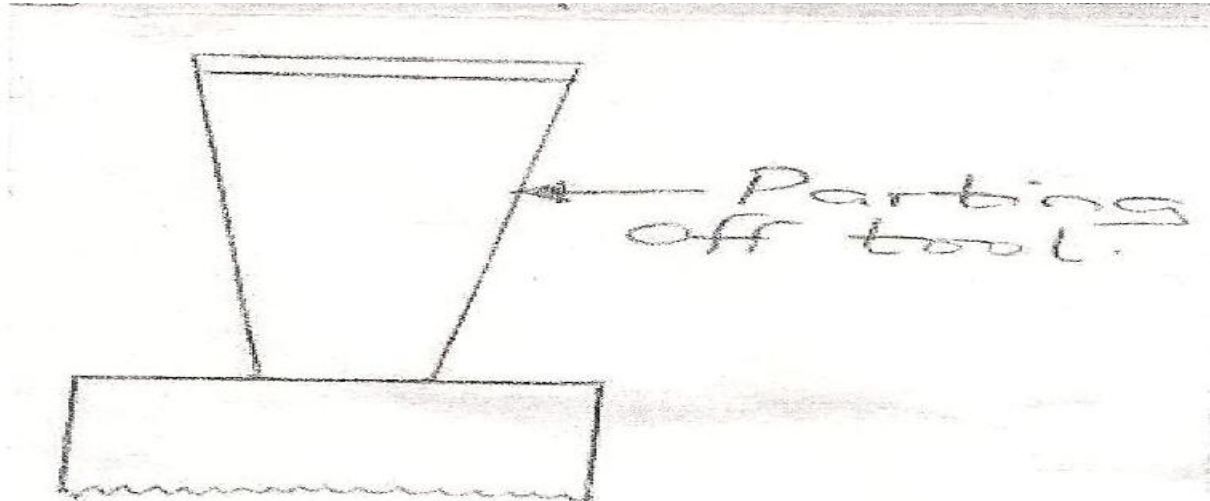
In the hardening process the steel is heated to 30⁰ - 50⁰ above the upper critical point and cooled rapidly by quenching in which water, brine or oil, water causes the steel to be harder than oil but with some work quenching in water causes it to crack and distort. The hardness produced depends upon the carbon content of the steel.

3. Sketch and describe the following lathe tools and state the purpose for which each is used:

- i. Parting off tool
- ii. Driving dog
- iii. Travelling steady
- iv. Boring tool

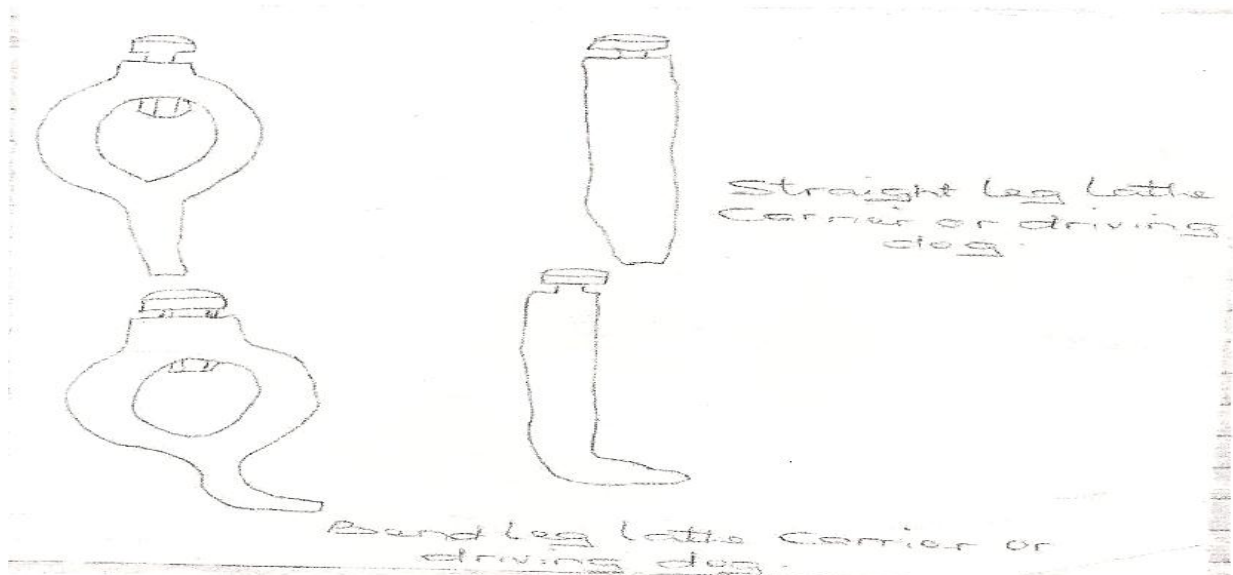
i. Parting off Tool

This is a lathe cutting tool use of cutting across the bed or for cutting, shearing or dividing work piece into two or more parts.



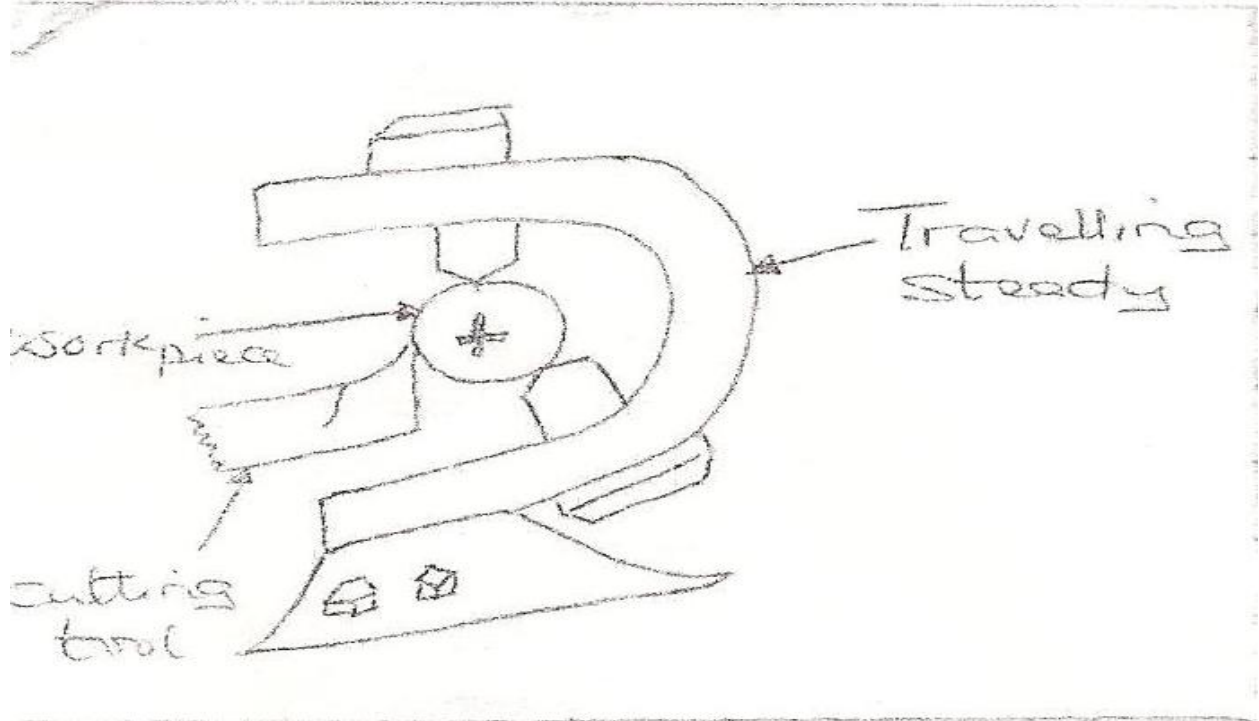
ii. Driving Dog

Lathe dog or carrier is used to keep work which is to be turned between centre from slipping and also help in driving or rotating the work piece.



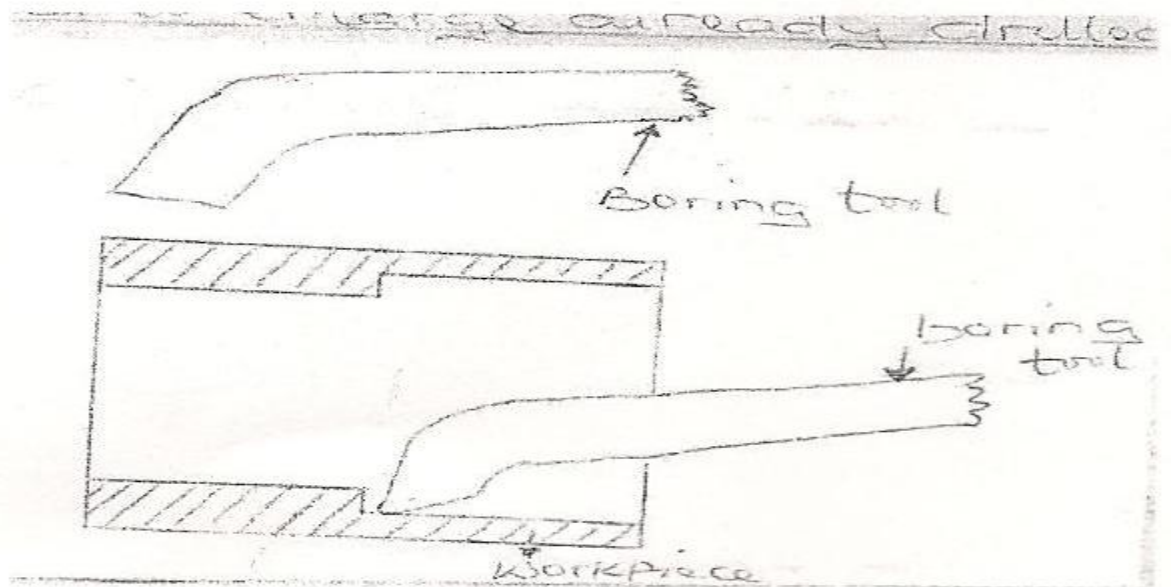
iii. **Travelling Steady**

This is used to prevent the work detecting when turning a long work piece on the lathe machines. Commonly I use when turning long tiny work piece between centres.

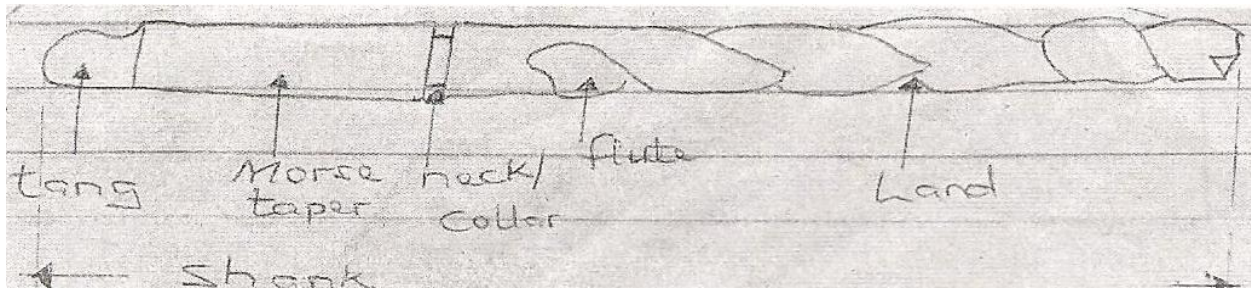


iii. **Boring Tool**

Lathe boring tool is internal turning tool used to enlarge already drilled hole.



4a. Draw a taper shank drill and label FIVE parts.



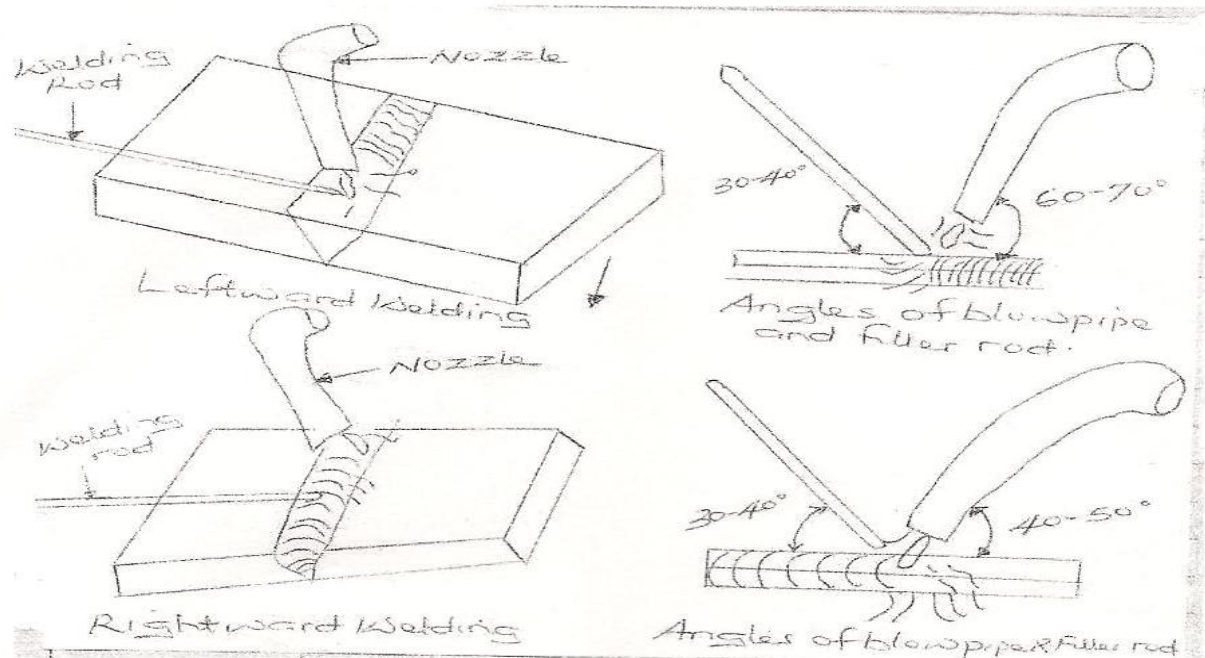
b. Explain the term "Sensitive" as referred to the drilling machine.

The term sensitive as referred to the drilling machine simple implies that one can feel all the strains on the drill in the feed handle of the drilling machine.

5a. Distinguished between ferrous and non-ferrous metals

Ferrous Metal	Non-Ferrous Metals
1. Cast iron	Aluminium
2. Wrought iron	copper
3. Steel	brass

6a. With the aid of sketch, describe rightward and leftward gas welding methods.



LEFTWARD WELDING TECHNIQUE

This is a welding technique in which the flame directed towards the unwelded part and the filler rod, when used is directed towards the welded part of the joint

RIGHTWARD WELDING TECHNIQUE

This is a welding technique in which the flame is directed towards the welded part, and the filler rod, when used is directed towards the unwelded part of the joint.

- b. State THREE safety precautions to be observed when using oxy-acetylene gas.
 - i. Always put on your protective goggles when welding
 - ii. Always test for leakages with soapy water
 - iii. Cylinder should be used upright and safety secured away from direct arcing on the cylinder or a naked flame.