WORKSHOP TECHNOLOGY 2009 - NECTA FORM FOUR

Solutions from: Maktaba by TETEA

By Yohana Lazaro

1.

i	ii	iii	iv	v	vi	vii	viii	ix	x
A	D	D	A	C	B	D	A	E	A

2.Classification of metals are

-ferrous metals

-non ferrous metal.

3.Measurement is the process of assignment of a number to a characteristic of an object or an event,which can be compared to an object or a number While gauging is the process of taking measurements by using an instrument.

4Inputs in production of pig iron are:-

-coke as fuel

-limestone as flux

-iron ore as the source of iron.

5.Purposes of flutes in Taps and dies.

-allow passage of lubricants

-allow removal of chips

-enable to give a good threads.

6.The small elements found in pig iron are:-

-sulphur

-phosphorus

-silicon

-manganese

7.Fatigue is the tendency of the metal to be weakened due to the repeatedly stresses on that metal,as the load is applied and removed repeatedly.

8.consistuents of gun metal are

-coppet (88%)

-tin (10%)

-zinc (2%/)

9.(a) Malleability is the property of a material to be beaten into sheets without fracture.

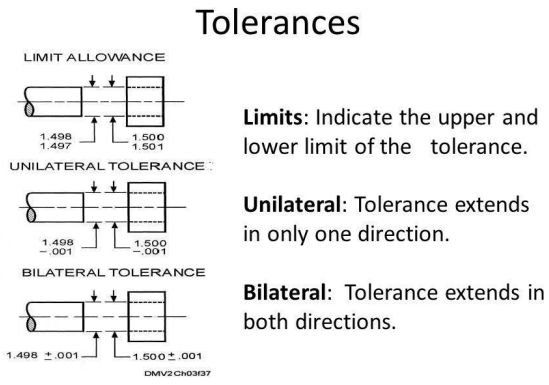
(a) Ductility is the property of a material to be drawn into wires without fracture.

(c) Hardness bisbthe tendency of the material to resist wear.

10.Types of tolerance are:-

(a) Unilateral tolerance, this tolerance, the upper and lower deviations are all negative or all positive.OR is the type of tolerance whereby the deviation/ tolerance extends to only one direction: if it is positive only or negative only.

(b) Bilateral tolerance,is when the tolerance Allowed to two sides of the basic size, i.e it has both positive and negative deviations.



11.medias for heat treatment are:-

-Air heat treatment

-water haet treatment

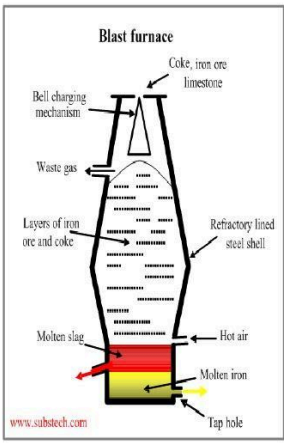
-brine heat treatment

-oil heat treatment.

12.PRODUCTION OF PIG IRON IN THE BLAST FURNACE.

Blast furnace

- It the shaft-type furnace consisting of a steel shell lined with refractory bricks.
- The top of the furnace is equipped with the bell-like or other system, providing correct charging and distribution of the raw materials (ore, coke, limestone).
- Air heated to 2200°F (1200°C) is blown through the tuyeres at the bottom.
- Oxigen containing in air reacts with the coke, producing carbon monoxide:
- $2C + O_2 = 2CO$
- Hot gases pass up through the descending materials, causing reduction of the iron oxides to iron according to the follwing reactions:
- $3Fe_2O_3 + CO = 2Fe_3O_4 + CO_2$
- $Fe_3O_4 + CO = 3FeO + CO_2$
- $FeO + CO = Fe + CO_2$



13.Given, Max. Size of the hole is 50.062mm

Min. Size of the hole is 50.000mm then,

Maximum size of the shaft = 50.062 - 0.04 = 50.022mm

Minimum size of the shaft = 50.000 - 0.04= 49.96mm

14.SAFETY PRECAUTIONS TO BE FOLLOW ED IN THE WORKSHOP.

1) Be sure that all machines have effective and properly working guards that are always in place where machines are operating.
2) Do not attempt to oil, clean, adjust or repair any machine while it is running.
3) Do not operate any machine unless authorized.
4) Do not try to stop the machine with your hand or body while running.
5) Always check whether the work and cutting tools properly clamped on the machine before starting.
6) Keep the floor clean of metal chips or curls and waste pieces.
7) When working with another, only one should operate machine or switches.
8) Concentrate on the work, avoid unnecessary talks while operating machine.
9) Get first aid immediately for any injury.
10) Wear safety shoes, if heavy work has done.
11) Wear clothing suited for the job, wear shoes with thick soles.
12) Do not wear rings, watches, bracelets or other jewellery that could get caught in moving machinery.
13) Do not wear neckties or loose turn clothing of any kind.
14) Wear shirts or uppers with sleeves cut off or rolled above the elbows.
15) Always remove gloves before turning on or operating a machine.
16) Keep the floor always clean.
17) Passage should be clear, at all time to avoid accident.
18) Do not leave tools or work on the table of a machine even if the machine in not turning. Tools or work may fall off and cause the fact of injury.
19) Switch off the machine immediately when supply fails.

15.

- **Table 2: Effects of Alloying elements**

Alloying element	Effect on the steel
Chromium	Increases hardness, without reducing ductility. Refines grain structure and increases toughness. Simplifies heat treatment requirements.
Nickel	Increases strength without reducing ductility. Refines grain structure and increases toughness. Simplifies heat treatment requirements.
Manganese	Added as a deoxidising and desulphurising agent. Considered as alloy when above 1 %. Enables oil quenching.
Silicon	Added as a deoxidising agent. Stabilises carbides formed by other alloying elements.
Molybdenum	Improves oil hardening and air hardening properties. Used with Chromium and Nickel to simplify heat treatment.
Vanadium	Widely used in tool steels. Steel retains its hardness at high temperatures.
Tungsten	Widely used in tool steels. Tool maintains its hardness even at red heat.

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16.Non destructive methods of metal testing are those which do not affect the chemical composition of the metal.

(a)Penetration method. This is used to reveal the discontinuities that are open to the surface of the solid and essential non-porous material.

(b) Magnetic crack detection method. Is used to detect the cracks present at the surface of the component made by magnetic materials.This method is based on the fact that the faces of the crack tends to form north and south poles, if a magnetic flux is established in the component.

(c)Electrical method.This is used to detect the gradual deterioration of electrical power equipment over it's service life.

(d)X-ray examination method.This is used to detect the subsurface discontinuities in metals. The process saturates the metal with radiations whichcreates area of preferential absorption based on material density and voids.

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