WORKSHOP TECHNOLOGY 2016 - NECTA FORM FOUR

Solutions from: Maktaba by TETEA

By Yohana Lazaro

1.

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

2 .-conductivity.eg copper

-ligth in weight.eg aluminium

-heavy and soft,eg lead

3.Pig iron has much impurities like carbon,while wrought iron is almost the purest iron containing to about 99.9% of iron.

4.Alloying elements are added to steel in order to improve the specified properties like strength,wear and corrosion resistance.

5.Processes if carburizing are

-park carburizing

-liquid carburizing

-gas carburizing

6.This enables to improve the toughness of the material.

7.(a)white

(b)yellow

(c)reddish

8.(a) Deviation is the algebraic difference between size and corresponding basic size.

(b) Limit s are extreme permissible values of a dimension.

(c) Clearance is the gap that allows the relative movement between two components in an assembly.

9.-silicon reduces tensile strength

-sulphur increases brittleness

-phosphorus increases hardness

10.Uses of tin

-coated on metal to reduce rust

-used to make containers

-used to make soft solder with lead

11.types of pyrometer s

-optical pyrometer

-radiation pyrometer

12.(a)-slag used for cement production and treating acidic soil.

-Pig iron used as raw material to other types of steels

(b)-chromium improve hardness

-Manganese increase strength and wear resistance

-Nickel increases hardness and strength.

,(c)-brass = copper + zinc

bronze=copper +tin

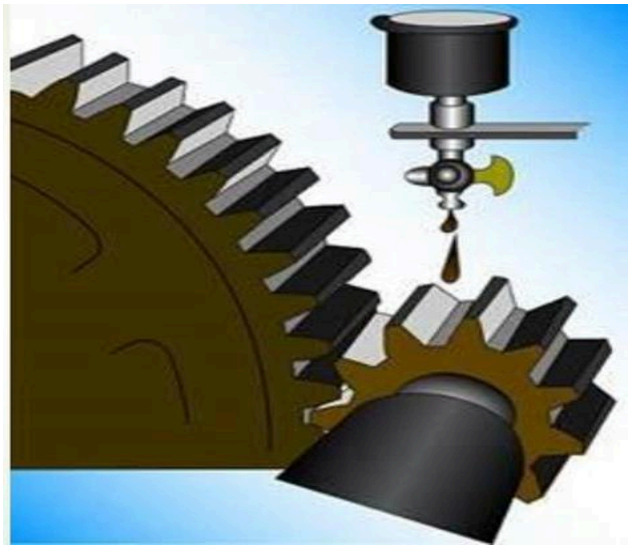
-gun metal = copper +zinc + tin

13.(a) Properties that make oil or grease to be used as lubricants.

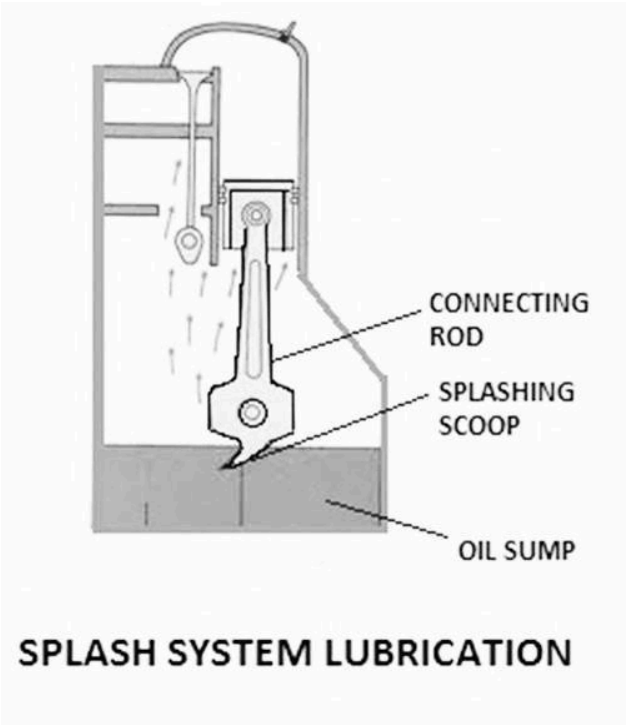
- Viscosity.
- Viscosity index (It is an index that measures the variation of oil viscosity with temperature). A high viscosity index means lesser changes with temperature). The lubricating oil should maintain sufficient viscosity at higher temperatures and still not to be too viscous for easy starting of the car at lower temperatures.
- Cloud and pour point. Is the temperature at which the oil will start to solidify if cooled. Pour point is the temperature just above which the oil sample will not flow under certain prescribed conditions.
- Flash point. Is the temperature at which the vapor of the oil will flash when subjected to flame.
- Fire point. Is the temperature at which the oil vapor will burn steadily for at least 5 seconds when lit by a flame.
- Specific gravity.

(b)methods used to apply lubricants to machines

-gravity method



-oil splash method.



-oil forced systm.

(c)the oil will dry away and this can lead to brokage of machine parts due to increase in friction as oil will dry.

14.(a) Precautions during quenching.

1. Wear heat-resistant protective clothing, gloves, safety glasses, and a face shield to prevent exposure to hot oils, which can burn skin.

2. Before lighting the furnace, make sure that air switches, exhaust fans, automatic shut-off valves, and other safety precautions are in place.

3. Make sure that there is enough coolant for the job. Coolant will absorb heat given off by the metal as it is cooling, but if there is insufficient coolant, the metal will not cool at the optimal speed.

4. Make sure that there is sufficient ventilation in the quenching areas in order to maintain desired oil mist levels.

5. When lighting the furnace, obey the instructions that have been provided by the manufacturer.

6. During the process of lighting an oil or gas-fired furnace, do NOT stand directly in front of it.

7. Make sure that the quenching oil is not contaminated by water. Explosions can be results of moisture coming into contact with the quenching oil.

8. Before taking materials out of the liquid carburizing pot, make sure that the tongs are not wet and that they are the correct tongs for the job.

9. Make sure that an appropriate fungicide or bacterial inhibitor has been mixed into the quenching liquid.

10. When quench tanks are not being used, always cover them.

11. Use a nonflammable absorbent to clean leaks and oil spills. This should be done immediately.

12. If possible, keep tools, baskets, jigs, and work areas free from oil contamination.

(b).

- **Distinguish between annealing &Normalising.**
  (At least 4 points 1 Mark for each point – 4 Marks)

ANNEALING	NORMALISING
Main purpose of annealing is to relieve internal stresses	Main purpose of normalizing is to improve mechanical properties of steel.
Less hardness, more T.S. & toughness	Slightly more hardness, less T.S. and toughness
Pearlite is coarse and usually gets	Pearlite is fine and usually appears unresolved with optical microscope
Grain size distribution is more	Grain size distribution is

15.(a)Hole shaft bases system, clearance fit.

(b)-hole allowance is 110.010mm

-shaft allowance is 110.000mm

(c)-tolerance of hole = 110.010 - (110-0.035)=0.045mm

-tolerance of shaft=110.000-(110-0.035)=0.035mm

(c)-Limit of hole = 0.010mm

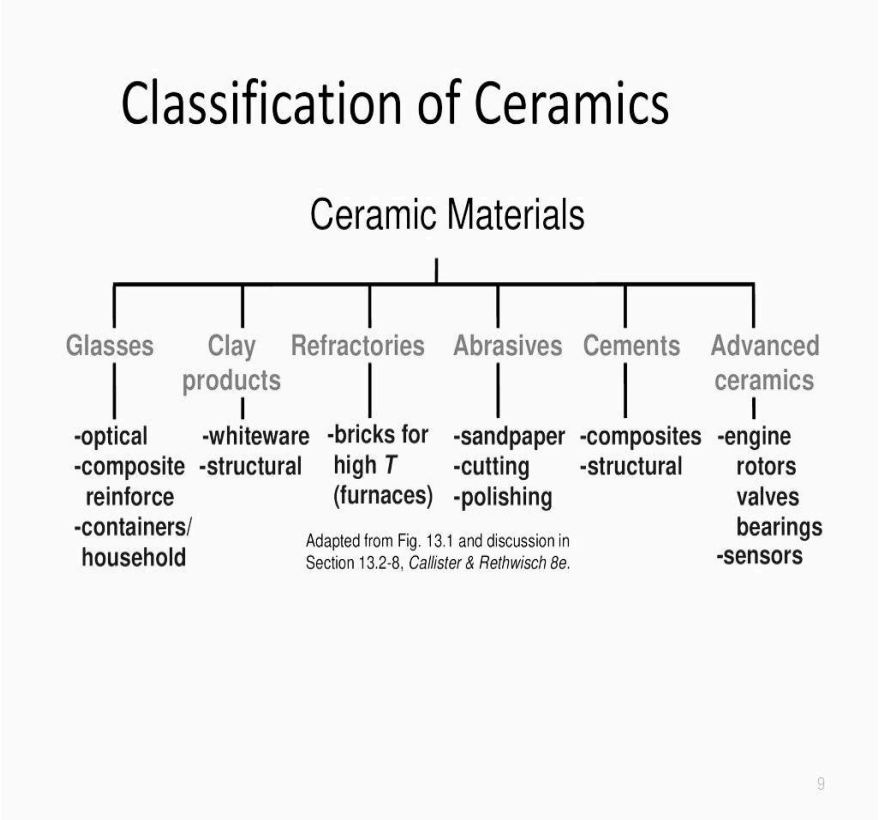
-limit of shaft = 0.000mm

(d)max.clearance =110.010-110.000=0.01mm

-interference fit =110.025 - 110.035= -0.01mm

16.(a) metals are good conductor of heat and electricity because they have free electrons while polymers have no.

(b) classification of ceramic materials.



(c)(i)-power-saw blades

-drill bits

-taps and dies

(ii) Mechanical properties of metals are

-plasticity

-Elasticity

-ductility

-brittleness

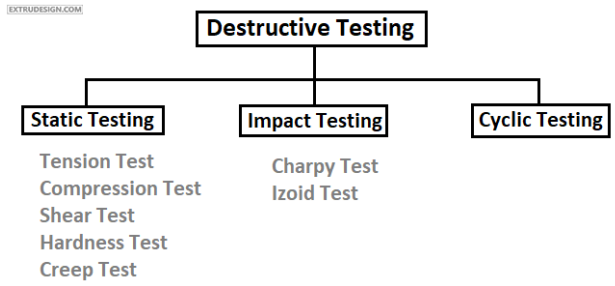
-hardness

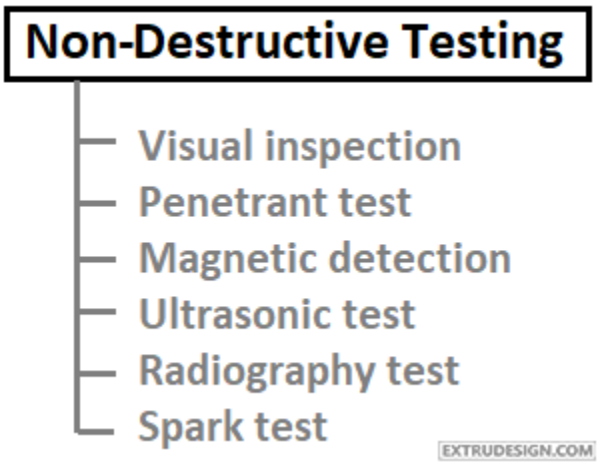
-toughness

(d) categories of metal testing methods are:-

(i) destructive method

(ii)non destructive method.





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