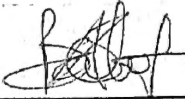




FACULTY: ENGINEERING

FIRST SEMESTER EXAMINATIONS

2016/ 2017 ACADEMIC SESSION


HOD'S SIGNATURE

COURSE CODE: MEE 311

COURSE TITLE: PHYSICAL METTALLURGY – 3 UNITS

DURATION: 2 HOURS 30 MINUTES

INSTRUCTIONS

1. ATTEMPT ANY FIVE QUESTIONS OF YOUR CHOICE
2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAM
3. YOU ARE NOT ALLOWED TO BORROW CALCULATORS AND ANY OTHER WRITING MATERIALS

Question One

1. a. (i) Define Metallurgy.
(ii) Write short notes on the following three main divisions of metallurgy;
 - Chemical Metallurgy.
 - Mechanical Metallurgy.
 - Physical Metallurgy.
- b. Differentiate between ferrous and non-ferrous materials.
- c. Write short note on the following Mechanical and Physical Properties of metals and alloys;
 - Density.
 - Hardness.
 - Thermal conductivity.
 - Malleability.

Question Two

2. a. Write short note on the following hardening processes
 - i. Induction Hardening.
 - ii. Flame Hardening.
 - iii. Case Hardening.
 - iv. Carburising.
- b. (i) What is tempering?
(ii) In 2 steps write tempering procedure.
- c. (i) What is normalising?
(ii) In 2 steps write normalising procedure.

Question Three

3. a. (i) What is corrosion?
(ii) State three methods which may be used to prevent the rusting of iron.
(iii) State one example of metal for each method mentioned in ii above.
- b. With the aid of a sketch, explain the electrolytic action or wet corrosion involving two dissimilar elements in the simple cell.
- c. Write short note on the following protection by metallic coatings
 - (i) Cladding.
 - (ii) Hot – dip metal coating.

Question Four

4. a. (i) What are microstructures?
(ii) What is an alloy?
- b. With the aid of a suitable sketch, explain arrangement of atoms in metals.
- c. Write short notes on the following metals and alloy
 - (i) Pig iron.
 - (ii) Alloy Cast Irons.
 - (iii) High Duty Cast Iron.
 - (iv) Wrought iron; and

(v) Alloy Steel.

Question Five

5. a. (i) Write five important characteristics of aluminium.
(ii) Explain the usefulness of duralumin.
- b. (i) Write five principal properties of copper.
(ii) Write short notes on
- Brass.
 - Bronze.
 - Manganese.
 - Chromium.

Question Six

6. a. Discuss the use of the following in heat treatment processes.
- (i) Quenching tank.
 - (ii) Temperature control.
- b. With the aid of sketch, explain
- (i) The use of thermo-electric pyrometer.
 - (ii) The principle of optical pyrometer.
 - (iii) Segar cones.
- c. The service life of a component is determined to a large extent on the surface finish. Discuss.