



The Final Exam (الدور) / 2017-2018 (Model A)

**Note:** Answer only **Five** questions (Draw where you need that)

**Q1\A\** Define the following terms, choose only **five** items?

- 1) Materials science, 2) Advanced Materials, 3) Processing, 4) White iron, 5) Stainless steels, 6) Binary alloys

**B\** Give the reasons for the following statements? Answer only **five** items?

1. Modern Materials' Needs.
2. Pb-Sn alloys are the basis for a series of alloys used to produce filler materials.
3. Cast iron used for very intricate moldings.
4. Malleable iron stronger and much less brittle than ordinary cast iron.
5. Copper used where the highest electrical and thermal conductivities.
6. Germanium used extensively in the electronics industry.

A:10M, B:10M

**Q2\A\** Explain the Phase equilibrium diagram with presents the types of it.

**B\** Explain the effect of free electrons on the electrical and thermal properties of the material.

A:10M, B:10M

**Q3\A\** What is the Phase equilibrium diagram (Eutectic type)?

**B/** The following data were collected from a standard 12.5 mm diameter test specimen of magnesium: After fracture the gauge length is 56.125 mm and the diameter is 11.54 mm. Plot the data and calculate (a) find the 0.2 % proof stress, (b) the tensile strength, (c) the modulus of elasticity, (d) the % elongation, (e) the % reduction in area, (f) the engineering stress at fracture, and (g) the true stress at fracture.

Load (kN)	Gauge Length (mm)
0	0
5	50.045
10	50.090
15	50.135
20	50.175
22	50.195
23.9	50.350
26.4	51.250
27.2 (maximum)	53.250
26.4 (fracture)	56.375

A:5M, B:15M

**Q4\A\** A force of 200,000 N is applied to a 10 mm × 20 mm iron bar having a yield strength of 400 MPa and a tensile strength of 480 MPa. Determine (a) whether the bar will plastically deform and (b) whether the bar will experience necking.

**B\** Write a simple paragraph about the following items?

1. Composite materials (composites)
2. Metallic Bond

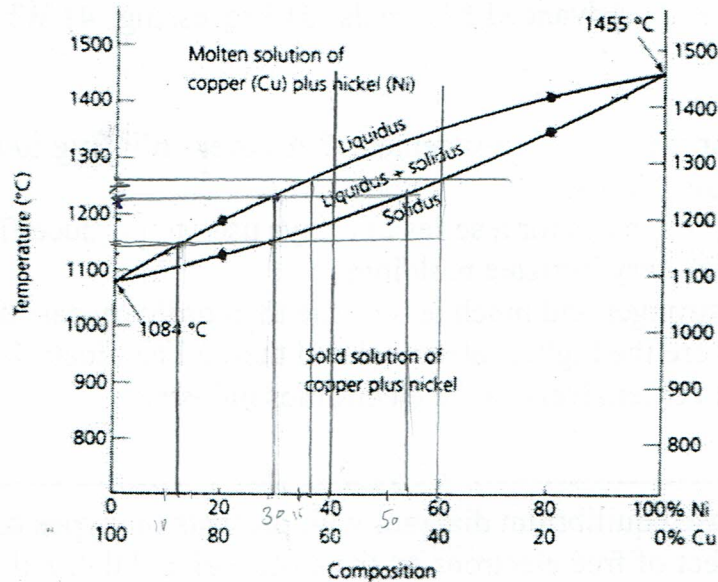
A:10M, B:10M

يتبع رجاء

Q5\A\ Classified the ferrous metals?

B\ Using the following phase diagram for the Cu-40% Ni alloy to find the following:

- 1) Determine the composition of each phase in a Cu-40% Ni alloy at 1400°C, 1230°C.
- 2) Determine the amount of each phase in a Cu-60% Ni alloy at 1150°C, 1260°C.
- 3)



5M for A, 15 for B

Q6/A/ Answer the following:

1. List the types of cast iron and explain one of them.
2. The typical examples of alloys and alloying systems.
3. List the Properties and uses of white cast iron.

B\ Compare between the following statements?

- 1) Elasticity and plasticity materials solid mechanism.
- 2) Slip and Twinning deformation of the materials process.
- 3) Brinell, Vickers and Rockwell hardness.

10M for A, 10 for B

رئيس القسم:  
أ.م. محمد صبري

مدرس المادة:  
د. كاظم عودة جحف