

B. E. Metallurgical and Material Engineering, 4thYr. First Sem. Examination, 2024

Materials Engineering (Hons.)

**Time : 3 hrs
Marks**

Full Marks: 100

Answer any five questions from the following. (Answer all parts of a question sequentially in a common place)

1. a) Discuss the mechanisms of polarizations.

b) Develop the Clausius – Mossetti Relationship for a dielectric material.
(CO1)

8+12

2. a) Classify different types of Magnetic Materials. What is curie temperature ?

b) Explain the Pauli's Exclusion principle. Describe the B-H loop for magnetic materials.

(
CO2)

10+ 6+ 4

3. a) Explain the extent and purpose of addition of the different alloying elements in different grades of alloy tool steels.

b) Discuss about the complete heat treatment schedule for a finished tool steel product.
(CO3)

[Turn over

a) Die materials b) Roll materials

4. a) What are the conditions necessary for precipitation hardening to take place in an alloy?

b) Explain the various changes in microstructure and hardness that takes place when a Al-4.5 wt% Cu alloy after solution treatment and quenching is aged at about 130 °C.(CO4)
20

or

Analyse the composition, microstructure, heat treatment schedule and applications of different industrially important heat treated Ti alloys. (CO4)
20

5. Write technical notes on the following: (CO5)

a) Piezoelectric materials and their applications

b) Superalloys and their applications

a) Materials used for biomedical applications
5*4=20

b) Intermetallics