Ref. No.: Ex/Met/PE/B/T/423A/2025

B.E. METALLURGICAL ENGINEERING FOURTH YEAR SECOND SEMESTER EXAM - 2025

Subject: Light Metals and Alloys **Time: 3 hours** **Full Marks: 100**

Answer the following Questions **(Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 and Q8 are compulsory)**

8+8+4

CO-1 Q1 (a) What are the light metals and alloys? What are the main characteristics that give the light metals and alloys the edge over other materials?

(b) Discuss the key applications and future opportunities of light alloys.

© What are the limitations of light metals and alloys?.

OR

4+8+8

CO-1 Q2 (a) What type of metals and alloys are included under the general heading, light metals and alloys with examples.?

(b) What alloying elements are commonly used and what is the effect of alloying elements in the commercial light metal alloys?

©. Discuss the various common light alloys.

6+14

CO-2 Q3 (a). Describe the Serpeck's process in Aluminium extraction.

(b) Explain the alloy and temper designations for Aluminium alloys.

OR

10+10

CO-2 Q4 (a) Discuss the Age hardening of Al-4%Cu Alloy showing the microstructures that are produced.

(b) Explain the various requirements for age hardening with taking a suitable hypothetical phase diagram.

6+8+6

CO-3 Q5 (a) Describe the extraction of Magnesium from MgO.

(b) Discuss the properties and various application of Magnesium.

© Explain the designation system for magnesium alloys with an example.

OR

8+8+4

CO-3 Q6 (a) What are the various difficulty in the extraction of Magnesium from $MgCl_2$? How these difficulty have been overcome in the modern electrolytic method ?

(b). Draw and describe the phase diagram of Mg-Al

(c). What would be the designation for a magnesium alloy containing 2.8%Th and 1.2% Mn?

8+6+6

CO-4 Q7 (a) Describe the extraction of very pure Titanium from Ilemenite ore.

(b). Define the Alpha-Beta Titanium alloys with examples.

Explain the Heat treatment and microstructure of alpha-beta titanium alloys

(a) Write the various properties and applications of Titanium.

10+10

CO-5 Q8 Short notes on the following: (a). Light Metal Matrix Composites (b). Light Ceramic Matrix composites