THE UNIVERSITY OF ZAMBIA

SCHOOL OF ENGINEERING

DEPARTMENT OF MECHANICAL ENGINEERING

MEC 2309 TUTORIAL SHEET 2

PHASE DIAGRAMS

Question 1

The phase diagram for a binary alloy system is shown in Figure 1 below.

a) Label all the missing phase fields.
b) Estimate the liquidus and solidus temperatures for the alloy containing 20 per cent B.
c) For the alloy containing 40 per cent B, state what phases are present, and in what relative proportions, at **(i)** 600 ^{o}C, **(ii)** 300 ^{o}C and **(iii)** 100 ^{o}C.
d) What percentage of the microstructure is eutectic mixture in the alloy containing 70 per cent of B at room temperature?

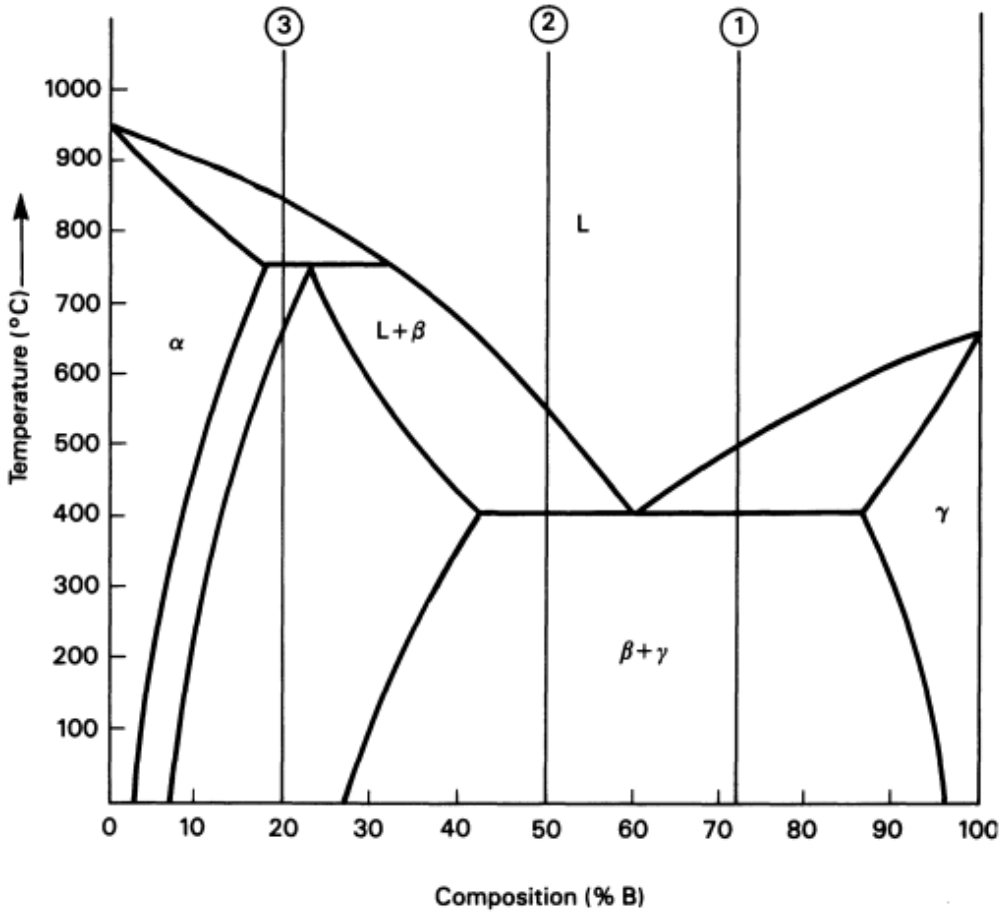

Figure 1

Question 2

A range of alloys is made from the two pure metals A, of melting point 750 ^{o}C, and B, of melting point 1110^{o}C, and the alloys are allowed to cool from the molten state to room temperature. During the cooling process, thermal arrest points are noted for each alloy. These are given in the table below.

Per cent B in alloy	8	30	45	55	78	90
1st arrest temperature (°C)	810	910	980	1010	1060	1090
2nd arrest temperature (°C)	760	830	910	910	940	1030
3rd arrest temperature (°C)	–	720	–	–	800	–

Using these data draw and fully label the phase diagram for the alloy system of metals A and B