Name and surname:

No:

QUIZ –2

Q.1 The diffusion coefficients for zinc in aluminum at 500 and 600°C are $5*10^{-14}$ and $6*10^{-13}$ m^2/s, respectively. Determine the approximate time at 500°C that will produce the same diffusion result (in terms of concentration of Zn at some specific point in Al) as a 10 h heat treatment at 600°C.

Q.2 Determine the carburizing time necessary to achieve a carbon concentration of 0.40 wt % at a position 1 mm into an iron-carbon alloy that initially contains 0.10 wt %C. The surface concentration is to be maintained at 1.2 wt C, and the treatment is to be conducted at 1000°C.

Do= $2.3*10^{-5}$ m^2/s,   Q=148 000 J/mol   R=8.31 J/mol K

Table 5.1   Tabulation of Error Function Values

z	$erf(z)$	z	$erf(z)$	z	$erf(z)$
0	0	0.55	0.5633	1.3	0.9340
0.025	0.0282	0.60	0.6039	1.4	0.9523
0.05	0.0564	0.65	0.6420	1.5	0.9661
0.10	0.1125	0.70	0.6778	1.6	0.9763
0.15	0.1680	0.75	0.7112	1.7	0.9838
0.20	0.2227	0.80	0.7421	1.8	0.9891
0.25	0.2763	0.85	0.7707	1.9	0.9928
0.30	0.3286	0.90	0.7970	2.0	0.9953
0.35	0.3794	0.95	0.8209	2.2	0.9981
0.40	0.4284	1.0	0.8427	2.4	0.9993
0.45	0.4755	1.1	0.8802	2.6	0.9998
0.50	0.5205	1.2	0.9103	2.8	0.9999

Q.3 A photomicrograph was taken of some metal at a magnification of 100X and it was determined that the average number of grains per square inch is 20. Compute the ASTM grain size number for this alloy.

Q.4 What is the composition, in weight percent, of an alloy that consists of 6 at % Pb and 94 at % Sn.?   Atomic Number of Pb 82   Atomic Number of Sn 50
                 Atomic Weight of Pb 207.2   Atomic Weight of Sn 118.69

Q.5 A large tower is to be supported by a series of steel wires. It is estimated that the load on each wire will be 11,100 N . Determine the minimum required wire diameter assuming a factor of safety of 2 and a yield strength of 1030 MPa.