4. Mn is added to manganese steel to oxide sulpher.
5. As (Ni)% increase, the melting point of steel decrease.
6. Permanent magnatic alloy is Fe-Cr where soft magnatic alloy is Al-Si.
7. Energy gap of Al is equal to 3 eV so it is bad conductor
8. Insulators have electrical conductivity of order 10^{10} m/s.
9. Martensite forms when there is more time for carbon to diffuse.
10. Gamma iron forms at temp. of (1394-1538)°C.
11. Al. wrought alloys are (Al+Cu or Ni).

Q3/ B. Abridge has been in use for ten years and during that time it has been Estmated that.

For first five years, it has carried twenty million cars and three hundered thousand lorriès.

for second five years, it has carried ten million cars and one hundered thousand lorries.

Each car and lorry over the bridge give aload cycle of stress amplitude for which fatique life is 10^8 cycle and 10^6 respectivly. **Compute the remaining fatique life time of a bridge.**

Q4/A Which types of Engeneering Material would most suitable for :

1. Milk bottle caps.
2. Higth speed aircraft.
3. Domestic water pipe.
4. Bars for concreate.
5. Machine tool bed.
6. Grinding mill parts.
7. Toothbrush handle
8. Gas turbine plads.
9. Electrical cables.
10. Air tube for cars.

Q4/ B. The diffusions of Iron in (Ni) are given as follow:

T (k)	D(m/s^2)
1273	9.4×10^{-16}
1473	2.4×10^{-14}

Determine:
1. The value of the activation energy.
2. The value of D_o
3. The value of (D) at 1100°C.

Note: Assume $K=1.38\times10^{-23}$ J/k

Q5/A. Copper has F.C.C. structure and an atomic radius of (0.1278 nm), the atomic mass of cu is (63.54g/mol),and Avagadro number of 6.022 * 10^{23} atoms/ mol

*A . **Determine** the theoritical value density*

B .In all times the theoritical value density is more than practical density. ***why***

Q5/B. **Determine** the ($\Delta V\%$) (expansion or contraction) of iron when it changes:
1. From (F.c.c) to (B.c.c)
2. From (B.c.c) to (F.c.c)

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