PH 242 *Electromagnetism*
Worksheet 2

GENERAL QUIZ

First, so as you get at least one mark, here is an easy question

a) What is your name? My name is .....

b) Write down in vector form Coulomb's law for the force between two charges Q_1 and Q_2 separated by a distance r. $\boldsymbol{F}$ = ...

c) What is the relationship between the electric field $\boldsymbol{E}$ and the electric potential V? $\boldsymbol{E}$ = ...

d) Consider a scalar field V. Write down an expression for the change in V between two points separated by an infinitessimal vector d$\boldsymbol{l}$. dV = ...

e) Complete the statement of Gauss's law:
The flux of $\boldsymbol{E}$ out of a closed surface is equal to the total .....

.....

f) Write down Gauss's law in terms of a surface integral. .....

g) Write down Poisson's equation. .....

h) Under what conditions does this reduce to Laplace's equation? .....

Now complete the following syatements:

i) The electric field inside a conductor is .....

j) The electric potential insode a conductor is .....

k) The field outside a conductor points ..... to the surface and is

equal to ..... where σ is the surface charge density.

l) The field inside a cavity in a conductor is .....

Now some questions on magnetism:

m) Write down the law of force between two current elements $d\boldsymbol{l}_1$ and $d\boldsymbol{l}_2$ carrying currents I_1 and I_2 $d\boldsymbol{F}$ = ...

n) What is the magnetic field $\boldsymbol{B}$ at a point P a displacement $\boldsymbol{r}$ away from a small element $d\boldsymbol{l}$ carrying a current I? $\boldsymbol{B}$ = ...

o) What is the divergence of $\boldsymbol{B}$? $\text{div}\boldsymbol{B}$ = ...

p) What is the field B a distance a away from a long wire carrying a current I in the z direction? B = ...

q) What shape do the lines of $\boldsymbol{B}$ trace out? .....

r) Write down in integral form Ampère's law $\oint \boldsymbol{B}.d\boldsymbol{l}$ = ...

s) Write this in terms of a curl .....

t) For Linear Isotropic Homogeneous conductors $\boldsymbol{j}$ and $\boldsymbol{E}$ are related by $\boldsymbol{j}$ = ...

Give the units of the following quantities:

u) Electric charge Q .....

v) Electric potential V .....

w) Capacity C .....

x) Magnetic field B .....

y) Electric permittivity ε_0 .....

z) Magnetic permeability μ_0 .....