(a) Define the following terms as applied to alternating Voltage.

(i) Root – mean – square value,

(ii) Peak Value.(02)

(b) (i) An alternating voltage is applied across a capacitor of capacitance, C. show that the current in the circuit leads the voltage by $\frac{\pi}{2}$. (04)

(ii) Find the expression for the capacitive reactance in terms of frequency, *f* and capacitance, *C. (03)*

(iii) A capacitor of 0.1μF is in series with an a.c. source of frequency 500Hz. If the r.m.s value of the current flowing is 6mA, calculate the voltage across the capacitor.(03)

iv) How a thermocouple can be used to measure a.c. (04)

(c) A bulb is connected in series with an inductive coil and a d.c source as shown in Figure **3.**

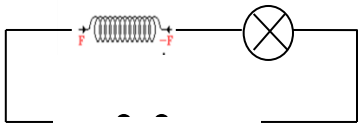


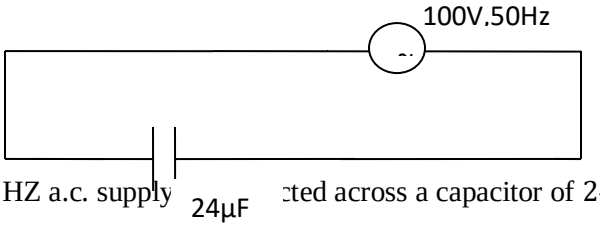
Figure 3

(i) What happens to the brightness of the bulb when an iron core is inserted in the coil? (01)

(ii) Explain what happens to the brightness of the bulb when the d.c. source is replaced with an iron core inserted in the coil.(03)

(d) How does an a.c transformer works. (05)

2 a) With the aid of a labeled diagram, describe how a repulsive to of moving iron ammeter works.(05)



b) A 100V, 50 HZ a.c. supply cted across a capacitor of $24\mu F$ as show in figure 3

i) Calculate the reactance of a the circuit (03)

ii) Sketch graphs to show the time dependence of the rap voltage and the current in the circuit.(02)

(c) An electric current flows through a coil of 4 Ω immersed in 200 g of water placed in a container. If the temperature of the water rises by 1K per minute, calculate the peak value of current supplied. *(03 marks)*

(d) What is meant by **resonance** in a circuit? *(01 mark)*

(e) A lamp of resistance 10 Ω, a capacitor of capacitance 0.4 μ F and an inductor of inductance 0.4 H are connected in series to an alternating voltage source of 0.01 V(r.m.s). The frequency f, is varied from low to high value while maintaining the amplitude of the applied voltage constant.

(i) Explain how the brightness of the lamp varies. *(03 marks)*
(ii) Calculate the resonant frequency. *(03 marks)*
(iii) Find the voltage across the capacitor. *(03 marks)*

(f) Explain why in an R - C circuit, power is only absorbed by the resistive part of the circuit. *(02 marks)*