OPERATING INSTRUCTIONS

MEASUREMENT OF CURIE TEMPERATURE FERROMAGNETIC MATERIAL

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DETERMINATION OF CURIE TEMPERATURE IN FE-mag MATEIRIAL

Introduction :- The ferromagnetic materials available todays extensively used in high frequency applications. The phase transition bevahiour of such materials in low frequency applications (below 1000 KHz) is intresting in regard of temperatrure. The ferromagnetic materials show the phenomenon of changing the nature(ferromagnetic to simple material) due to temperature is the main object of such practical.

The set up and procedure of experiment : The set up for this practical consists the furnance to heat up the specimen ferromagnetic material (the commercial ferrite 130 mm, used as wound coil with few turns of 22 SWG copper enemelled wire (L)) used in this practical. Since the frequency bevahiour of ferrites is oriented to high frequency applications thus a L - C resonent circuit is made at the secondary which produce a peak at 70~100 KHz approx at room temperature, which drop outs at the curie temperature where the bevahiour of ferrite material is changed to paramagnetic. As the temperarure rise the resonanace deploite from the original frequency to higher side, where at curie temperature no resonance occurs. A plot between the output of specimen in regard of resonate freqiency is plotted to fond the curie point. The practical aspects are simple as given in steps.

The set up for curie temp : It consists of an A.F. (sine) generator more than 1000 KHz . An A.F. voltmeter (-3dB bandwidth < 5KHz to > 1000 KHz) ranges 5V rms, with amplitude adjust to zero - full scale (approx). A ferromagnetic specimen with wound coil.

Experiment procedure :

1. Conect the given source with main.

3. Place given specimen (L wound upon ferrite material) in the OVEN. Connect its terminals with box across'TEST COIL ' marked sockets,(no polarity matters).

4. Note ambient temperature. Switch on set up, select 10 KHz range. Keep amplitude control of oscillator at midway (approx).

5. Now adjust generator frequency to obtain resonanace. At resonanace the A.F. voltmeter indicate maximum reading. If it overshoot then bring amplitude low to read about 4Vrms. Note resonate frequency as fr1.

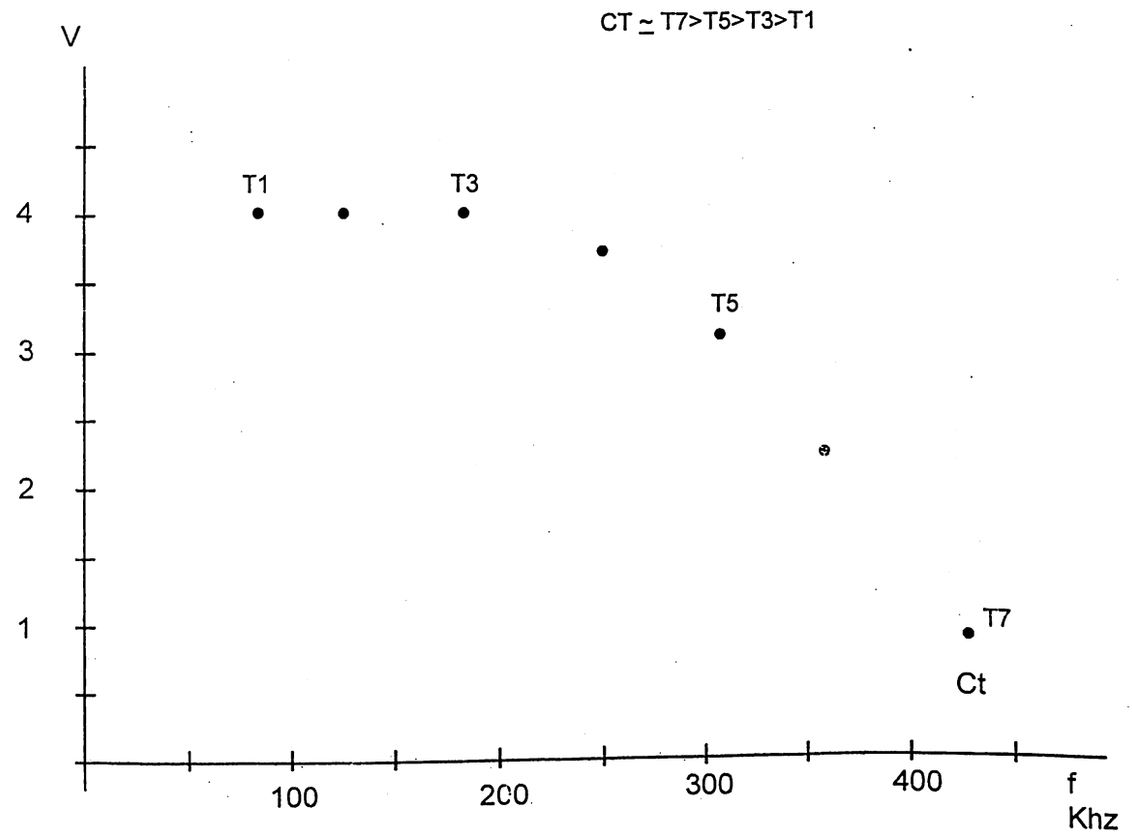
6. Now switch on the OVEN. As the some dip occurs at the voltmeter, note the temperature T2, and adjust the oscillator for peak resonance. Note this freq as fr2.

Note : The amplitude control of A.F generator and voltmeter should not be disturbed.

8. Repeat the step 7, for temperature at 200, 300, 350 and 400^0 C. Plot the

observed results in graph. At the critical temperature the curie temperature (between 350 ~ 400^{0}C) the resonance peak will be goes very down.

Note : As the temperature rise, the ferromagnetic specimen shifts its nature and cause to shift resonanace point at higher frequency. At critical temperature it lost its magnetic property hence 'L' behaves as air core coil and resosnance dipped due to 'Q' loss.



Ct = Curie temperature range with tolrence of ∓ 20^{0}C.