ELECTRONIC MEASUREMENT & INSTRUMENTATION (BEC-29)

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UNIT-1
Lecture 7

Qualities, Measurements and Digital Display Devices

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Lecture 5 & 6:

- Limiting Errors
- LED

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- LCD
- Incandescent Display

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- LVD
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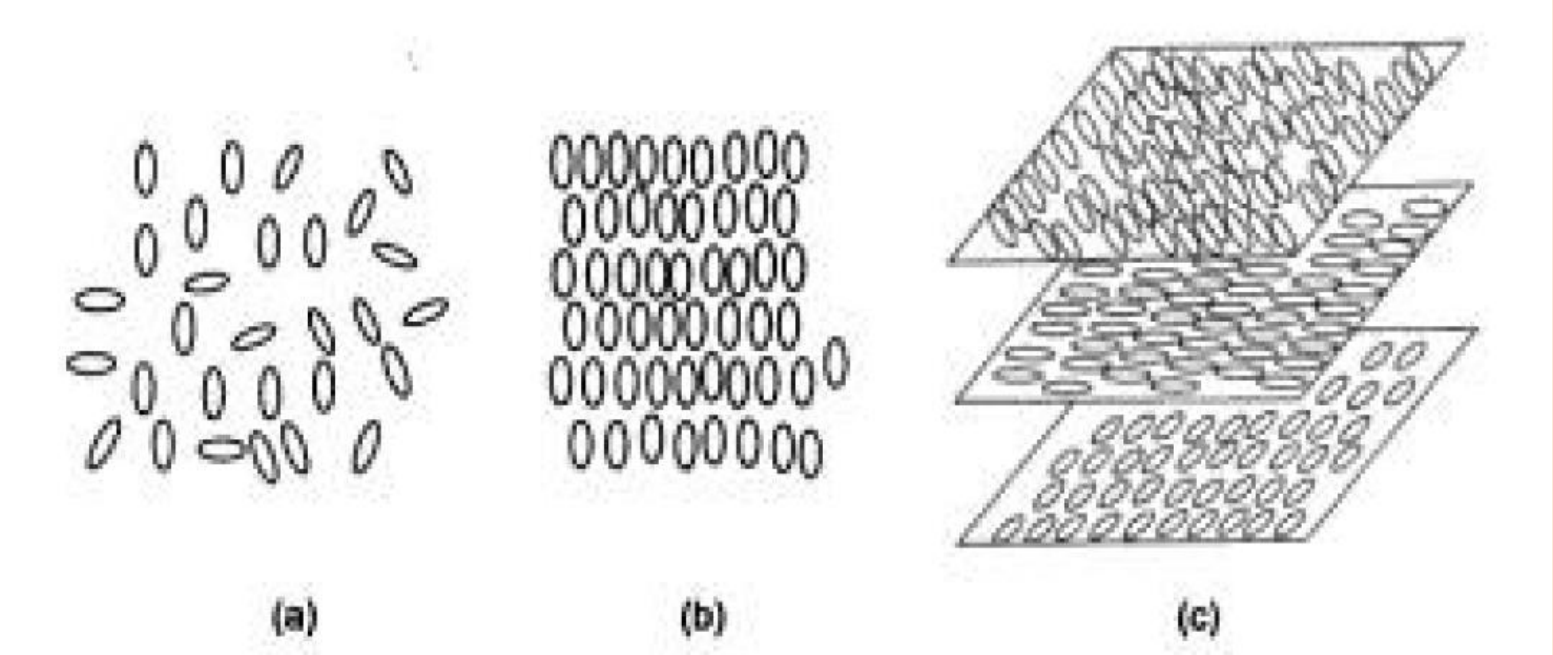
- Digital voltmeters
- Spectrum analyzer

Liquid Crystal Display(LCD)

- It is based on light scattering mechanism.
- It is operated in **Reflective** and **Transmissive** configuration.
- They do not generate light and depend for their operation on back lighting.
- The operation of LCDs is based upon a class of organic material which remain in the crystal-like structure even they have melted.
- LCDs used in display devices are of two types: **Pneumatic** and **Cholesteric**.



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- The most popular liquid crystal is Nematic Liquid Crystal(NLC). When an electric field is applied through the crystal the ions blow through it and disrupt the structure and the liquid to polarize hence turns out opaque.
- The removal of applied electric field allows the crystal structure to reform and hence, material regain its transparency.

Important features of LCDs:

- The electric field required to activate LCDs is of the order of 10^{-4}V/cm.
- NLC materials possess high resistivity > $10^{10}\Omega$ so current required for scattering light is very marginal.
- Low cost, low power, large area and low operating speed.
- The light source for reflective type LCDs is backlight for itself, the only power required is that needed to cause turbulence in the cell which is very small , 1 $\frac{\mu}{cm}$

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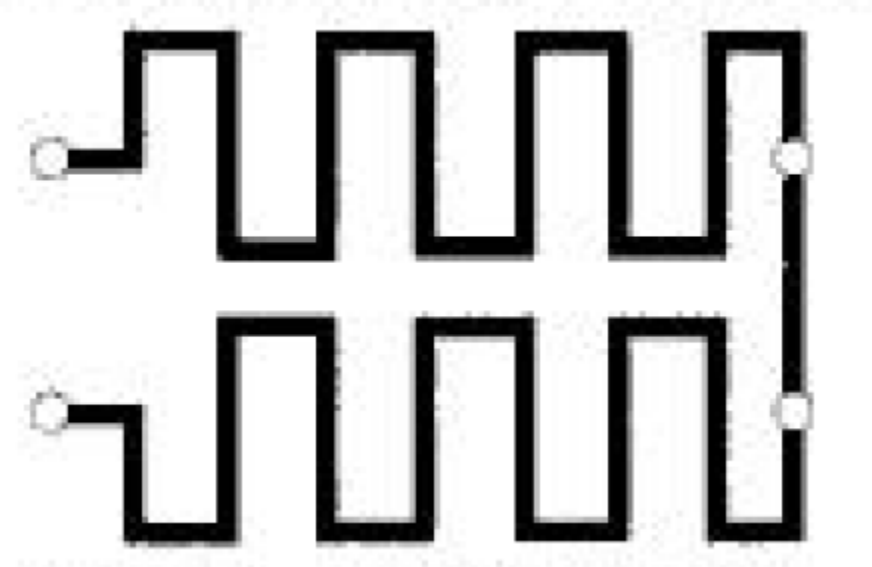
Incandescent Lamp Displays(ILD)

- Using 16 segment and 5*7 dot matrix formats using fabricated using thin film microelectronics are now available for alphanumeric displays.
- Simple technology, bright output, compatible with ICs but low operating speed.
- A thin film of tungsten is made to emit light if the temperature is increased beyond 1200degree C by electrical excitation. A 5*7 array is formed on a ceramic substrate in a matrix form and is used as a electronic display unit.



Assignment Questions

- State the operating principle of LCD display.
- State different types of liquid crystal used for LCD display.
- Explain with diagram the operation of a Nematic liquid crystal (NLC).
- Explain the basic difference between transmissive and reflective type LCD.
- Explain with diagram the operation of a reflective display using NLC.
- State the important features of LCDs.

Conceptual Questions

- The LCD digital display that is based on
  A. Radiation of light
  B. Reflection of light
  C. Emission of light
  D. Transmission of light
- Which of the following liquid crystal layers are used in LCD's?
  A. Heavy water
  B. Nematic
  C. Hydro sulphuric acid
  D. Hydrochloric acid
- The contrast of liquid crystal display (LCD)
  A. Will increase if the back plate is more reflective
  B. Will decrease if the back plate is more reflective
  C. Will increase if the back plate is less reflective
  D. Will decrease if the back plate is less reflective

Contd..

- Which of the following consumes less power?
  A. Incandescent lamp
  B. LCD
  C. Fluorescent tube
  D. LED
- The typical value of thickness of liquid layer of LCD's is ..... Mm
  A. 0.22
  B. 2.2
  C. 0.025
  D. 0.035

THANK YOU