# ELECTRONIC MEASUREMENT & INSTRUMENTATION (BEC-29)


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# UNIT-1
# Lecture 5 & 6

# Qualities, Measurements and Digital Display Devices

# CONTENTS

Lecture 5 & 6:

- Limiting Errors
- LED

Lecture 7:

- LCD
- Incandescent Display

Lecture 8:

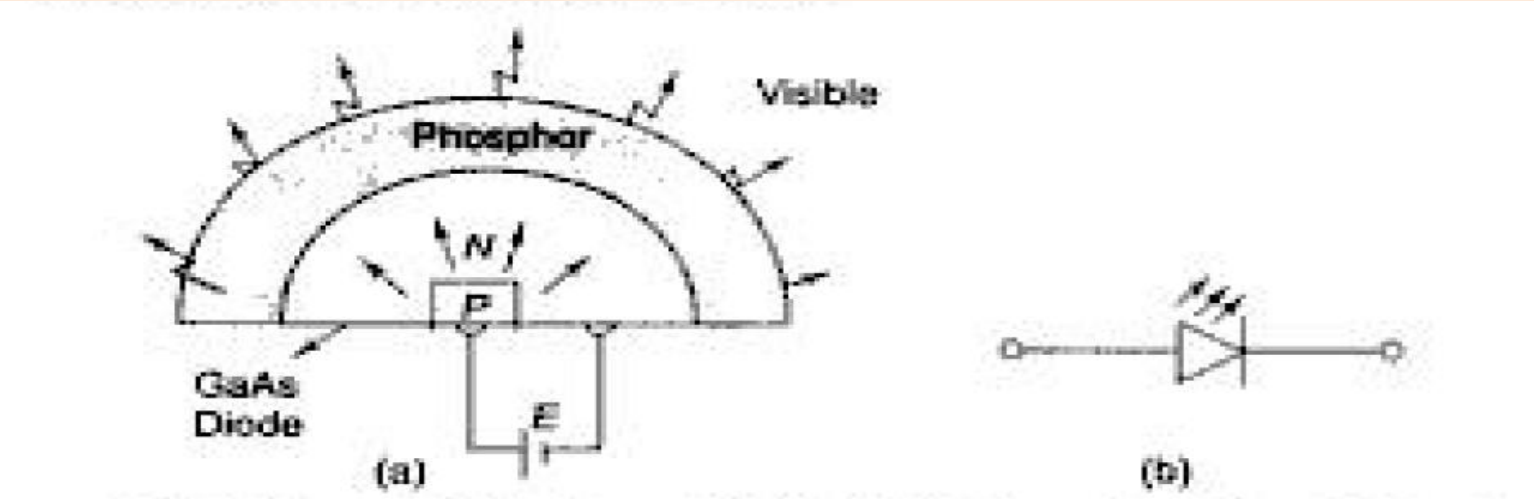
- LVD
- Printers

Lecture 9:

- Digital voltmeters
- Spectrum analyzer

**Limiting Errors**: Most manufacturers of measuring measurement specify accuracy within % of full-scale reading. This specification is called the limiting error.  For ex- manufacturer of a certain voltmeter may specify the instrument to be accurate within $\pm 2\%$ of the full-scale reading.

# Light Emitting Diode(LED)




- LED is basically a semiconductor p-n junction diode which can emit electromagnetic radiation under forward condition.
- The radiation can either be visible spectrum or infrared spectrum depending upon the type of semiconductor material used.
- LEDs are very small devices and are considered as point sources of light.
- The output of LED is the function of current flowing through it and can be controlled by smoothly varying the current through it.
- They are fast devices, so have turn ON-OFF time less than 1 ns.
- The low supply voltages and current requirement of LEDs make them compatible with DTL, TTL and Ics

## Contd..

- Different material used for doping emit different colors.
  - Gallium Arsenide (GaAs) – Red
  - Gallium Arsenide Phosphde (GaAsP) – Red or Yellow
  - Gallium Phosphde (GaP) – Red or Green
- In Gallium Phosphde and Gallium Arsenide most of the emitted photons have their wavelength in the visible spectrum and are used in construction of LEDs.

# Assignment Questions

- Draw the structure of LED and explain its operation.
- What are the conditions to be satisfied by the device for emission of visible light?
- State the advantages and disadvantages of using LED in electronic display.
- Explain with diagram the working principle of a spectrum analyzer.
- Explain with the help of a block diagram the operations of spectrum analyzer. State applications of spectrum analyzer.

# Conceptual Questions

- A light emitting diode is _____
  a) Heavily doped
  b) Lightly doped
  c) Intrinsic semiconductor
  d) Zener diode
- What should be the biasing of the LED?
  a) Forward bias
  b) Reverse bias
  c) Forward bias than Reverse bias
  d) No biasing required
- Which process of the Electron-hole pair is responsible for emitting of light?
  a) Generation
  b) Movement
  c) Recombination
  d) Diffusion

# Contd..

- What is the bandwidth of the emitted light in an LED?
  a) 1 nm to 10 nm
  b) 10 nm to 50 nm
  c) 50 nm to 100 nm
  d) 100 nm to 500 nm
- Which of the following is not a characteristic of LED?
  a) Fast action
  b) High Warm-up time
  c) Low operational voltage
  d) Long life
- What should be the band gap of the semiconductors to be used as LED?
  a) 0.5 eV
  b) 1 eV
  c) 1.5 eV
  d) 1.8 eV

# THANK YOU