

University of SargodhaBS 1<sup>st</sup> Term Examination 2019

Subject: CS/IT/SE Paper: Basic Electronics (PHY-2210)

Time Allowed: 2:30 Hours

Maximum Marks: 80

Note: Objective part is compulsory. Attempt any three questions from subjective part.

Objective Part (Compulsory) 11

Q.1. Write short answers of the following in 2-3 lines each. (2\*16)

- 1. (i) Define a linear resistor? Draw its V-I curve?
- (ii) Why electrons have greater mobility than holes in a semiconductor material?
- (iii) What is the effect of doping on width of depletion layer?
- (iv) Draw schematic energy band diagram of a P-type extrinsic semiconductor?
- 2. (v) What is Zener breakdown in reverse biased P-N junction?
- (vi) Do pure semiconductors obey ohms law?
- (vii) Draw symbols of an air-core and an iron-core inductor.
- (viii) Why optical fibres are better than metallic wires?
- (ix) What are thermally generated charge carriers?
- (x) In a transistor why emitter is heavily doped? and collector is lightly doped.
- (xi) Describe a circuit which provides continuously varying potentials?
- 3. (xii) Differentiate between primary and secondary cells.
- (xiii) Define capacitance of a capacitor and its unit.
- (xiv) What should be the features of outside protection provided to an optical fiber?
- 4. (xv) Ten resistors each having resistance 10 ohm are connected in parallel. What is their equivalent resistance?
- 5. (xvi) What is LED?

## Subjective Part (16\*3)

- Q.2. (a) How P-N junction diode is forward and reverse biased? Draw VI characteristic curve for PN junction diode  
 (b) What are intrinsic semiconductors? What is their behaviour at 0K and at room temperature (i.e 300K) What is their response to electric field
- Q.3. (a) What is photomultiplier tube? Write theory involved in photomultiplier tube.  
 (b) A 12 volt battery of negligible internal resistance is connected across a parallel combination of 4K, 6K and 12K resistors. Compute  
 i) Combined circuit resistance  $\sim$  2  
 ii) Current supplied by the battery 6  
 iii) Power supplied by the battery 72
- Q.4. (a) What is rectification? Which characteristic of a diode is used in rectification? Explain its types.  
 (b) How pulsating dc can be converted in to pure dc by using an inductor filter?
- Q.5. (a) Define modulation, Demodulation and carrier wave? There are how many methods of Modulation? Why frequency modulation is advantageous as compared to amplitude modulation?  
 (b) Explain structure of an optical fibre with the help of a diagram.
- Q.6. (a) What is a transformer? How it works (core type transformer)? what is voltage transformation ratio? What is condition for ideal transformer?  
 (b) A power transformer has 100 primary turns and 600 secondary turns. If primary voltage is 120 volt and full load primary current is  $I_1$  Amp, find secondary voltage  $V_2$  and Secondary current  $I_2$

(2019)

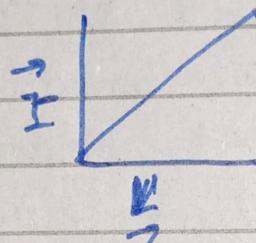
(i)

Linear Resistor :-

A linear Resistor is defined as two terminal circuit element which obeys Ohm's law

→ Voltage across resistor is directly proportional to current flowing through it

→ Also known as ohmic Resistor



graph = Linear

(ii)

Electron have greater mobility than holes.

→ Mobility of electron and holes depends on their effective masses. Effective mass of electrons is less than that of holes hence electrons have higher mobility than holes.

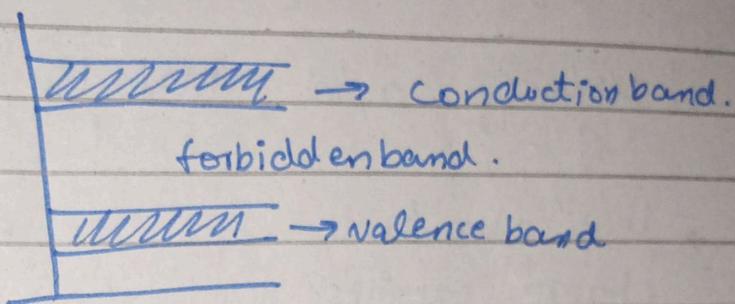
→ In semiconductor, conduction band electron effective mass is usually smaller than valence band hole effective mass.

(iii)  
Effect of doping  
"

" Pichly wala.

(iv)

Schematic energy band diagram of  
P-Type extrinsic semiconductor



(v)

Zener Breakdown in P-N Junction (reverse)  
(Definition)

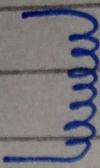
→ The Breakdown that occurs in reverse biased condition in narrow junction diode.

(Pichly wala)

(vi)

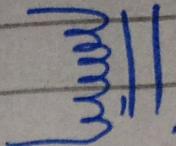
Semiconductor do not obey ohm's law  
It is non-linear devices.

Air core



(vi)

Iron core .



(vi)

Thermally generated charge carriers.

→ Minority and Majority carriers.

↓  
→ less abundant  
charge carriers

→ Large abundant  
charge carriers

→ N-Type → They are  
holes

→ N-Type → They are  
electrons

→ P-Type - They are  
electrons.

→ P-Type → They are  
holes.

(X)

Why emitter is heavily doped (In transistor)

→ So that it can inject large  
number of charge carriers into  
base.

→ Collector is lightly doped as it only  
carries least current. and  
Number of density of majority carriers  
are low

(xi)

circuit which provides continuously varied potentials.

→ A Potentiometer is circuit which provides continuously varied potential

$$I = \frac{E}{R}$$

$$V = \gamma I$$

$$V = \frac{E\gamma}{R}$$

→ Working — ?

(xii)

Primary cells

→ Chemical reaction are irreversible

→ After discharge, cells cannot be recharge back to their original condition

→ Low cost  
Small size  
Small life

Secondary cells

→ Chemical reaction are reversible.

→ " " "  
" can be "  
" ...  
".

→ Expensive  
resonable small.  
long life.

L(Xiii)

Capacitance of capacitor.

- It measures ability of capacitor to store charge
- It is amount of charge required to create a unit potential difference between its plates.

$$C = \frac{Q}{V}$$

→ Unit → Farad

(xiv)

features of outside protection provided to an optical fibre

- It gives mechanical strength to fibre structure.
- It protects fibre against damage.
- It protects fibre from excessive bending.
- It provides abrasion protection.
- It protects from moisture.

(Xv)

ten resistors. each =  $10\Omega$ .

$$R_{eq} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} + \dots - \frac{1}{R_{10}}$$

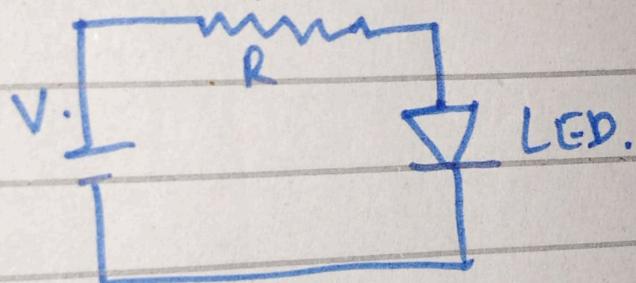
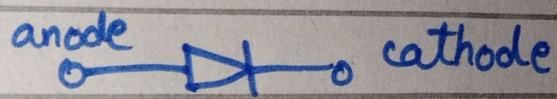
(xvi)

## LED

Light emitting diode

- One of important light source
- LED emits light when electric energy is supplied to it.

- Symbol



- Basically PN Junction diode.