Viva-Voce

1. *What do you mean by dual channel of CRO ?*

Ans. An oscilloscope with two vertical inputs that are multiplexed to CRT.

2. *How CRO is used to measure time period ?*

Ans. By calculating time divisions for one cycle.

3. *What is the difference between TV and CRO ?*

Ans. The input signal for TV are from the air broadcast signal while an oscilloscope take any signal ac or dc and display it in real time.

4. *What is the purpose X-plates and Y-plates in CRO ?*

Ans. X-plates control the motion of beam horizontally across the screen and Y-plates control the motion of beam vertically across the screen.

5. *What is function generator ?*

Ans. It is a signal source that has capability of producing different waveforms of different frequencies. The control panels are provided on function generator to vary the amplitude and frequency of the waveforms.

6. *How frequency of the function generator is controlled ?*

Ans. By varying the magnitude of the current that drives the integrator.

7. *What is CRO ?*

Ans. A CRO is an equipment that gives graphical representation of alternating quantities under examinations.

8. *How do you achieve focusing ?*

Ans. Focusing is achieved by various sets of plates forming a sort of electronic lenses.

9. *What are various focusing techniques ?*

Ans. Two most commonly used focusing techniques are :

(*i*) Electrostatic focusing

(*ii*) Electromagnetic focusing

10. *What is time base signal ?*

Ans. A time base signal is one that has linear variation with time.

11. *Where do you apply a time base signal in CRO ?*

Ans. It is applied to the X-plates.

12. *Explain the purpose of applying a time base signal in CRO.*

Ans. It makes spot move from left to right and back and so on.

13. *Define fluorescence ?*

Ans. It is property of fluorescent materials by which they emit light when electrons are bombarded on them.

14. *What are commonly used fluorescent materials ?*

Ans. (*i*) Zinc sulphate + Mangnese

(*ii*) Zince sulphide + Silver

(*iii*) Zinc sulphide + Copper

15. *What is use of trace finder control ?*

Ans. It returns the display to the screen. When pressed by reducing horizontal and vertical deflection. It provides a means of locating a display that overcomes the viewing area either horizontally or vertically.

nts tester) button.
ground socket.
ng.
e CT push button.

ved are as under.

ction E-C

iodes in
parallel

n diode

diode
10 μF

switching

3. The continuity of connecting wires should be tested.

Viva-Voce

1. *Explain the importance of focus control panel.*

Ans. Focusing electrodes act like a lens whose focal length can be changed, by changing the potential of focusing anode.

2. *Explain the importance of positioning controls.*

Ans. Positioning of the trace is done by applying a small internal dc voltage to the deflecting plates and control can be done by varying voltage with the help of potentiometer.

3. *Explain the applications of CRO.*

Ans. Some important applications of CRO are :

(i) To study unknown alternating potential.
(ii) For measurement of voltage, frequency, phase etc.
(iii) For study of Lisajjou's figures.
(iv) For study of modulation.
(v) In medical science.
(vi) In television and radar.

4. *Explain the role of electron gun assembly in CRT.*

Ans. Electron gun assembly is used to provide a narrow and sharply focused electron beam.

5. *Explain the role of intensity control panel.*

Ans. Intensity control panel control the intensity of beam. Variation in intensity control basically changes the grid potential with respect to cathode.

6. *Define deflection sensitivity.*

Ans. Deflection sensitivity of a CRT is defined as the deflection of the screen per unit deflection voltage.

$$\text{Deflection sensitivity } S = \frac{D}{E_d}.$$

7. *What is deflection factor ?*

Ans. Deflection factor of a CRT is defined as reciprocal of deflection sensitivity.

$$\text{Defection factor } G = \frac{1}{S}.$$

8. *What are the basic components of regulated power supply ?*

Ans. A transformer, rectifier circuit, filtering circuit, voltage regulator.

9. *What is upper limiting frequency ?*

Ans. An upper limiting frequency is the frequency at which the transit time is equal to the one quarter of the period of the voltage applied to the vertical plates.

10. *What is the role of horizontal amplifier ?*

Ans. Horizontal amplifier is used for high amplitude signals with a slow rise time.

of Zener diode.

V_Z

$= \frac{AB}{CD}$

cteristics.

oltmeter of

n steps.

RESULT

1. The *V-I* characteristics of Zener diode is shown in Fig. E4.3.
2. The dynamic resistance of the diode, r_d = _____ Ω.

PRECAUTIONS

1. To avoid overheating of the diode, current should not passed for long duration.
2. Voltage applied should be well below the safety limit of diode.
3. Connections should be made carefully.

Viva-Voce

1. *What is a PN-junction ?*

Ans. A junction diode consists of a *P*-type crystal joined to an *N*-type crystal, so that they form one continuous crystal structure. The junction joining the two forms is called *PN*-junction.

2. *Which type of impurities are added in P-type semiconductor ?*

Ans. Impurities from group III elements like boron, aluminium *i.e.*, trivalent impurities are added in *P*-type semiconductor.

3. *What are the majority charge carriers in P-type semiconductor ?*

Ans. Majority charge carriers in *P*-type semiconductor are holes.

4. *Which type of impurities are added in N-type semiconductor ?*

Ans. Impurities from group *V* elements like arsenic and antimony *i.e.*, pentavalent impurities are added in *N*-type semiconductor.

5. *What are the majority charge carriers in N-type semiconductor ?*

Ans. Majority charge carriers in *N*-type semiconductor are electrons.

6. *What is meant by forward biasing the diode ?*

Ans. When positive end of the battery (or supply) is connected to the *P*-type crystal and negative end to the *N*-type crystal, then diode is said to be in forward biasing.

7. *What are the important parameters of PN junction diode to explain its characteristics ?*

Ans. Important parameters are : (*i*) cut-in voltage V_0, (*ii*) dynamic resistance r_d ; (*iii*) saturation current I_0

8. *How is the cut-in voltage determined from V-I characteristics ?*

Ans. The cut-in voltage is determined from the forward characteristics. The linear part of the forward characteristics is extended down to cut the voltage axis (*i.e.*, *x*-axis). The value of the voltage at the point where the straight line meets voltage axis is cut-in voltage.

9. *What is a Zener diode ?*

Ans. It is a heavily doped *PN*-junction diode which is designed to operate in the breakdown region under reverse bias condition.

10. *What are the other names of Zener diode ?*

Ans. Zener diode is also known as breakdown diode or avalanche diode.

11. *What is meant by Zener breakdown ?*

Ans. Due to the existence of the electric field at the junction, a sufficiently strong force may be exerted on a bound electron by the field to break the covalent bonds and produce new electron-hole pairs (EHP) which increased the reverse current abruptly. This process is called *Zener breakdown*.

12. *What is the main application of Zener diode ?*

Ans. Voltage regulation is the main applications of Zener diode.

13. *How does a Zener diode behave under forward bias condition ?*

Ans. Under forward bias condition, a Zener diode behave as normal *PN*-junction diode.

14. *Name the mechanisms that are responsible for sharp rise in current.*

Ans. (*i*) Avalanche multiplication (*ii*) Zener breakdown

1.			
2.			
3.			
4.			
5.			

RESULTS

The input and output waveform of half wave rectifier, centre-tap full wave rectifier a... full wave bridge rectifier has been plotted as shown Figs. E5.1(*b*), E5.2(*b*) and E5.3(*b*).

PRECAUTIONS

1. Switch on the power supply after completing the circuit.
2. Connections should be proper and tight.
3. Always connect the voltmeter in parallel and ammeter in series.
4. Reading of voltmeter and ammeter should be accurate.
5. Note down the input wave and output wave accurately.

Viva-Voce

1. *Define rectifier.*

Ans. Rectifier is a device which converts ac voltage into dc voltage.

2. *What is a half wave rectifier ?*

Ans. A half wave rectifier is an circuit arrangement used for converting a.c. voltage in pulsating d... voltage. Under this scheme only the positive half cycle of the input appears across the load.

3. *Define peak inverse voltage.*

Ans. The maximum reverse bias voltage that appears across the diode during the negative half cycle is called peak inverse voltage (PIV). For half wave rectifier $PIV = V_0$, for centre-tap full wave rectifier $PIV = 2V_0$ for bridge rectifier $PIV = V_0$.

4. *What type of output we get from half wave rectifier ?*

Ans. Unidirectional pulsating voltage.

5. *Write disadvantage of half wave rectifier.*

Ans. (*i*) Rectification efficiency is very low ($\eta = 0.406$),

(*ii*) Low TUF (0.287)

(*iii*) Since ripple factor > 1. Hence it is poor device for rectification.

6. *Define ripple factor.*

Ans. It is defined as ratio of rms value of ac component of load current to the average value of load current. It is measure of imperfection in the dc output.

7. *Define rectification efficiency.*

Ans. The efficiency of rectification is defined as the ratio of dc output power to the input ac power i.e.,

$$\text{Rectification efficiency } (\eta) = \frac{P_{dc}}{P_{ac}}.$$

8. *Define transformer utilization factor (TUF).*

Ans. TUF is defined as the ratio of dc power delivered to the load, to the ac power rating of the transformer secondary.

9. *Define form factor.*

Ans. Form factor is defined as the ratio of r.m.s. value of the load to the d.c. components.

10. *Why bridge rectifier is preferred over centre tap full wave rectifier ?*

Ans. In the case of full wave rectifier using a centre-tap transformer, the centre tap cannot provide an exact centre tap, resulting unequal two input half waves. Hence the adjacent pulses in the output waveform will be of unequal size. This drawback is eliminated in bridge rectifier using four diodes.

4. Always connect the voltmeter in parallel and ammeter Fig E7.1(*a*).
5. Reading of voltmeter and ammeter should be accurate.
6. The parameters value (*e.g.*, I_E, V_{CB}, etc.) should not exceed the maximum rating as specified in the data sheet of the transistor used.

Viva-Voce

1. *Define emitter, base and collector.*

Ans. Emitter is one side of the transistor that supplies large number of majority carriers. The middle section which forms the two *PN*-junctions between emitter and collector is called base. Base is very lightly doped and thin region, so that it can pass most of the majority carriers supplied by the emitter to collector. The collector is moderately doped and in larger size so that it can collect most of the majority carriers supplied by the emitter.

2. *Define biasing of transistors.*

Ans. Transistor biasing is the process required to maintain faithfull amplification.

3. *Define operating point.*

Ans. The point obtained by the values of I_C and V_{CE} when no signal is applied at that input is known as operating point.

4. *What do you understand by input characteristics and output characteristics of CB configuration ?*

Ans. The input characteristic is the plotted curve between I_E versus V_{EB} at constant V_{CB}. The output characteristic is the plotted curve between I_C and V_{CB} at constant I_E.

5. *Define thermal runaway.*

Ans. The destruction of transistor by the cumulative effect of rise in temperature is known as thermal runaway.

6. *Define stability factor.*

Ans. The rate of change of collector current I_C with respect to the rate of change of collector leakage current I_{CBO} at constant I_B and S is called stability factor.

7. *Explain early effect.*

Ans. The modulation of effective base width by the collector voltage is called early effect.

8. *Explain the reasons for transistor unstabilisation.*

Ans. The transistor is said to be unstabilised when its operating point changes due to change in temperature, or due to inherent variations in transistor parameters.

9. *What is the value of d.c. current gain under CB configuration ?*

Ans. Less than unity (0.98).

10. *What is d.c. current gain in common base configuration ?*

Ans. It is the ratio of collector current to emitter current.

Viva-Voce

1. *Which transistor configuration is widely used ?*

Ans. Common emitter configuration (CE) is widely used transistor configuration.

2. *Which region is heavily doped ?*

Ans. Emitter region is heavily doped.

3. *Which configuration has highest voltage gain ?*

Ans. Common emitter configuration (CE) has the highest voltage gain.

4. *What is current amplification factor in CE configuration ?*

Ans. Current amplification factor

$$\beta = \frac{\Delta I_C}{\Delta I_B} = \frac{\alpha}{1-\alpha} \quad \text{or} \quad \alpha = \frac{\beta}{1+\beta}$$

5. *Define input characteristic and output characteristic under CE configuration.*

Ans. The plotted curve between I_B versus V_{BE} at constant V_{CE} is called input characteristic. The plotted curve between I_C and V_{CE} at constant I_B is called output characteristic.

6. *Define effective load resistance.*

Ans. The total load by the ac collector current is called the effective load resistance.

7. *Define current gain, voltage gain and power gain for CE configuration.*

Ans. Current gain is the ratio of change in collector current (ΔI_C) to the change in base current (ΔI_B)

$$\text{Current gain} \qquad \beta = \frac{\Delta I_C}{\Delta I_B}$$

Voltage gain is the ratio of change in output voltage (ΔV_{CE}) to change in input voltage (ΔV_{BE}), *i.e.*,

$$\text{Voltage gain} \qquad A_v = \frac{\Delta V_{CE}}{\Delta V_{BE}}$$

Power gain is the ratio of change in output signal power to the input signal power *i.e.*,

$$\text{Power gain} \qquad A_p = \text{Current gain} \times \text{Voltage gain}$$

$$= \frac{\Delta I_C}{\Delta I_B} \times \frac{\Delta V_{CE}}{\Delta V_{BE}} = \frac{\Delta I_C}{\Delta I_B} \times \frac{\Delta I_C R_{AC}}{\Delta I_B r_i}$$

8. *What is operating point ?*

Ans. The point obtained by the values of I_C and V_{CE} when no input signal is applied is termed as operating point.

9. *Write different region of operation for a transistor*

Ans. The different region of operation for a transistor are :

(*i*) Active region (*ii*) Saturation region (*iii*) Cut off region (*iv*) Inverted region

10. *What is impact of temperature on leakage current ?*

Ans. As temperature increases leakage current increases.

3. The power supply ... the data-sheet.
4. The unused input acts as high, so due to noise sensitivity it is good not to leave unused input unconnected (or open).

Viva-Voce

1. *Differentiate between analog and digital signals. Give examples.*

Ans. A continuous time signal is termed as analog signal. It may have infinite number of different magnitudes at different instant of time. For example, sine wave, triangular wave etc. A signal is termed as digital signal if it has only a finite number of predetermined distinct magnitudes. For example, binary signal, octal signal, hexadecimal signal.

2. *What are the advantages of digital systems ?*

Ans. The advantages of digital systems are as follows :

- Easy to design
- High speed
- Reliability and reproducibility of results
- Flexible
- Easy to program
- Accuracy
- Low cost.

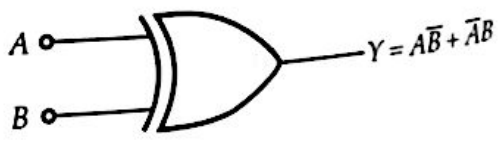
3. *What is gray code ? What is its special feature ?*

Ans. Gray code is one of the most important non-weighted code. In this coding scheme two adjacent code numbers differs from each other by only one bit this code finds its application in A/D converters, error detection and correction schemes etc.

4. *Draw the symbol of two input EX-OR gate and write its truth table.*

Ans.

Input		Output
A	*B*	*Y*
0	0	0
0	1	1
1	0	1
1	1	0



$$Y = A\overline{B} + \overline{A}B$$

5. *What is meant by POS and SOP form of logic equations ?*

Ans. POS stands for product of sum. It is basically boolean expression in the form of ORed term ANDed together.

SOP stands for sum of product. It is basically boolean expression in the form of ANDed term ORed together.

6. *What is min-terms and max-terms ?*

Ans. A term containing literals corresponding to all the variables in ANDed form is known as a min-term.
A term containing literals corresponding to all the variables in ORed form is known as a max-term.

7. *Differentiate between SSI, LSI, MSI and VLSI.*

Ans. (*i*) **SSI.** Small Scale Integration. Gates < 10.

(*ii*) **MSI.** Medium Scale Integration. Gates < 1000.

(*iii*) **LSI.** Large Scale Integration. Gates > 1000.

(*iv*) **VLSI.** Very Large Scale Integration. Gates > 10,000

8. *What is Karnaugh map ? Why is it used ?*

Ans. Karnaugh map is a graphical approach used in simplification of boolean expressions. It is a geometrical patterns of squares that carry the labels of logic variables in normal and complemented forms. For *n*-variable boolean expression, total square in k-map will be 2^n.

9. *What is difference between LED and LCD ?*

Ans. LED stands for light emitting diodes. It is an electronic device that emits light when an electrical current is based through it. The color produced by LED depends on the type of semiconductor material used for its fabrication.

LCD stands for liquid crystal display. LCDs are super thin displays that are used in laptops, computer screen etc. the image on an LCD screen is created by sandwiching an electrically reactive substance between two electrodes.

10. *Name the various TTL sub families.*

Ans. Various TTL sub-families are as under :

(*i*) Standard TTL

(*ii*) Low power TTL (L)

(*iii*) High speed TTL (H)

(*iv*) Schottky TTL (S)

(*v*) Low power Schottky TTL (LS)

(*vi*) Advanced low power Schottky TTL (ASL)

11. *Name the logic gates being used now a day.*

Ans. The logic gates used now a days are :

(*i*) RTL (Resistor Transistor Logic)

(*ii*) DTL (Diode Transistor Logic)

(*iii*) IIL (Integrated Injection Logic)

(*iv*) HTL (High Threshold Logic)

(*v*) ECL (Emitter Coupled Logic)

(*vi*) CMOS (Complementary MOSFET)

12. *Explain the difference between half adder and half subtractor.*

Ans. Half adder is a logic circuit that perform addition of two binary bits and produces sum and carr
Half subtractor is a logic circuit that perform subtraction of two binary bits and produces difference a
borrow taken.