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Paper # Basic Electronics

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①

Q: NO. 1

(a) Part)

Answer

In 50 ohm internal power loss are less as compared to 600 ohm.

In 600 ohm internal power are fully loss

Therefore 50 Ω @ would be advantage as compared to 600 Ω .



(2)

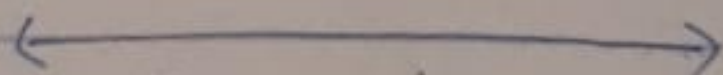
Q: No: 1

(b)

The third approximation does the technician normally use when performing initial troubleshooting procedures because technicians usually satisfies following equation.

ignore bulc: $R_B \ll 0.01 R_{th}$

This says to ignore to the bulc resistance when it is less than $1/100$ of the Thevenin resistance facing the diode. when this condition is satisfied, the error is less than 1 percent.



(Q: No: 1)

(c)

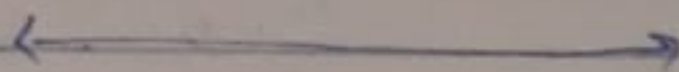
The reason for using a this
a) the voltage across the load terminal when the load resistor is open is called Thevenin voltage V_{th} . Because of this, the Thevenin voltage is sometimes called the open circuit voltage.
As a definition.

(3)

thevenin $V_{th} = V_{OC}$

b) the resistance that an ohmmeter measure across the load terminal when all sources are reduced to zero and the load resistor is open. As a def.

thevenin resistance $R_{th} = R_{OC}$



(6)

Q: no: 2.

(Part A)

Answer

Transformer turn ratios are directly proportional to the output voltage.

So

Turn ratio \propto output voltage
Therefore if turn ratios are large then output voltage also large or greater.

(5)

Q. NO. 2

(b) Part.

1) Center tapped rectifier :-

Center tapped rectifier is a type of full wave rectifier that uses two diodes connected to the secondary of a center tapped rectifier transformer. The input voltage is coupled through the transformer to the center tapped secondary. Half of the total secondary voltage appears between the center tap and each of the secondary winding.

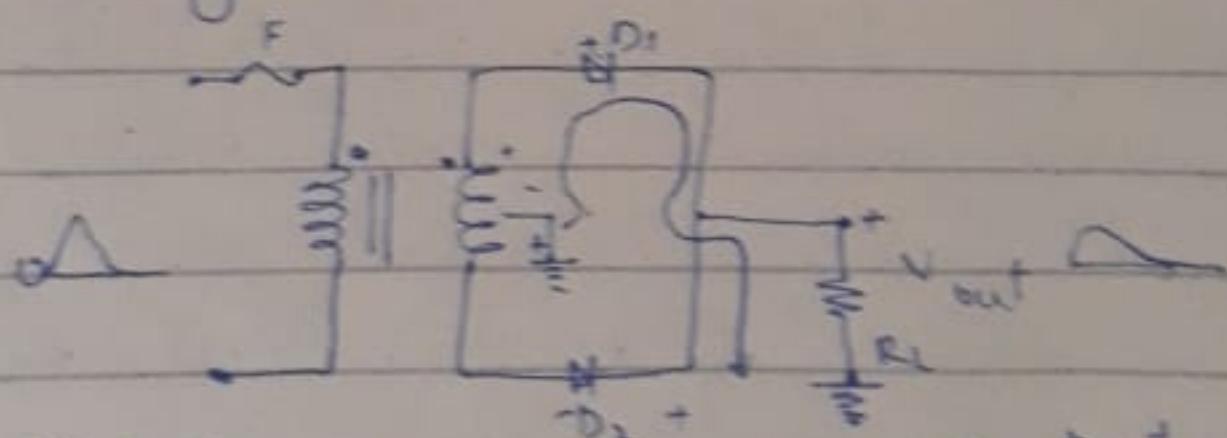
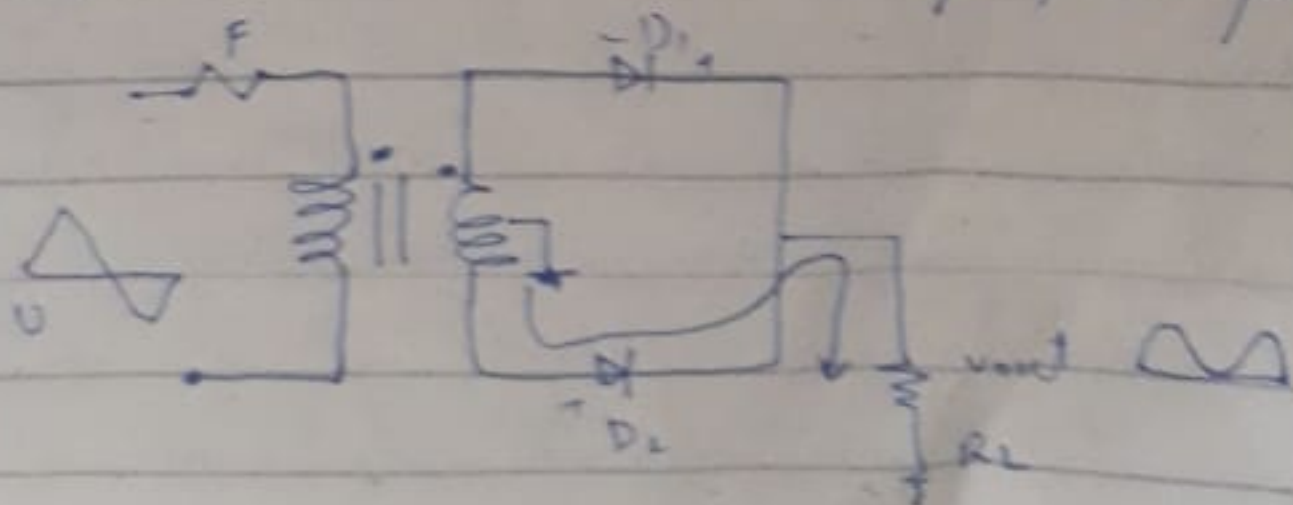


Figure a

for positive cycle



for negative cycle

(6)

Q: NO: 2

(b Part)

ii) Bridge Rectifier:

A Bridge rectifier is an alternating current to Direct Current Converter that rectifies main AC input to DC output. Bridge rectifier are widely used in power supplies that provide necessary DC voltage for the electronic components or devices. They can be constructed with four or more diodes or any other controlled solid state switches. Depending on the load current, requirements ranges, transient current rating, forward current rating and specification breakdown voltage (temperature ranges). Forward current rating mounting requirements and other consideration are taken into account while selecting a rectifier power supply for an appropriate electronic circuit's application.

(07)

Q: NO: 2.

(Part C)

Disadvantage of RC Filter?

The disadvantage of RC filter is the loss of dc voltage across each other resistor. Because RC filter are suitable only for light loads small current or large load resistance.

Advantage of RC filter?

An RC filter allows the peak of the rectified signal to pass through the load resistor. R is much greater than the X_c at the ripple of frequency. Therefore the ripple is reduced before it reaches to the load.

Typically R is 10 times larger than X_c .

Therefore at each section attenuates the ripple by a factor 10

(8)

Q: No. 2.

(Part C)

Advantage of LC Filter.

i) Ripple content at the output is low.

ii) It is less dependent on the load current.

iii) Dc voltage drop across L is much smaller because its dc resistance R is very small.

iv) In choke input filter current flows continuously. Therefore transformer is used more efficiently.

Disadvantage of LC filter.

1) Large size and weight of inductor.

2) More cost.

3) External field is produced by inductor.

(9)

(QNO3)

(e) - (Part)

What is Surface leakage current?

A leakage current is an electric current in an unwanted conductive path under normal operating condition. If the conductors are separated by a material with a small conductivity rather than a perfect dielectric then a small leakage current flows directly b/w them.

A small leakage current flows through the sensor even when the output is off.

A leakage current is an electric current in an unwanted conductive path under normal operating condition.

In alloy P-n junction diodes the surface leakage current through the inversion layer is dependent on the size of the semiconductor wafer and on the allowed pellet diameter.



Q. NO. 3

(Part D)

In a pure silicon crystal, the thermal energy creates an equal number of free electrons and holes. The free electrons move randomly throughout the crystal. Occasionally a free electron will approach a hole, feel its attraction and fall into it. This is known as recombination. Because of this recombination energy is released.

Thus following figure shows.



Another answer.

There is continuous transition of electrons b/w the two bands when an electron falls from the conduction band into the valence band into a hole a recombination process occurs and an electron hole pair disappears.

(10)

The recombination is always present and sets up an equilibrium in steady state.



(Q: no: 3 (b) part)

LED is an optical semiconductor device that converts electrical energy into light energy. When light emitting diode is forward biased free electrons in the conduction band recombine with the holes in the valence band and releases energy in the form of light.

Q: no: 3

(a)

Current exists in reverse biased due to surface leakage and agitation etc.

(12)

Q: No: 3

(C Part.)

Due to electron displacement
hole are not flowing.

But conventionally we say
hole flowing because they
understand easily.
