Discourse

22GE004 – ODD - BASICS OF ELECTRONICS ENGINEERING

1. The following figure represents the basic communication system.

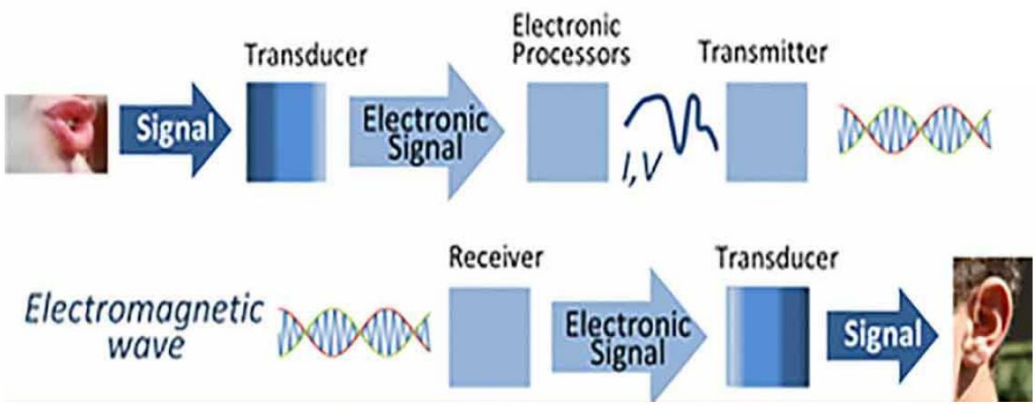

Figure : Basic Communication Blocks

(i) Compare the difference between wired and wireless communication with its advantages and disadvantages.

(ii) Interpret the need for each gadget used in the above figure in establishing effective communication.

2. Signal Transmission between two people by different mechanisms are given in Figure. Analyze the Figure carefully to answer the following questions.

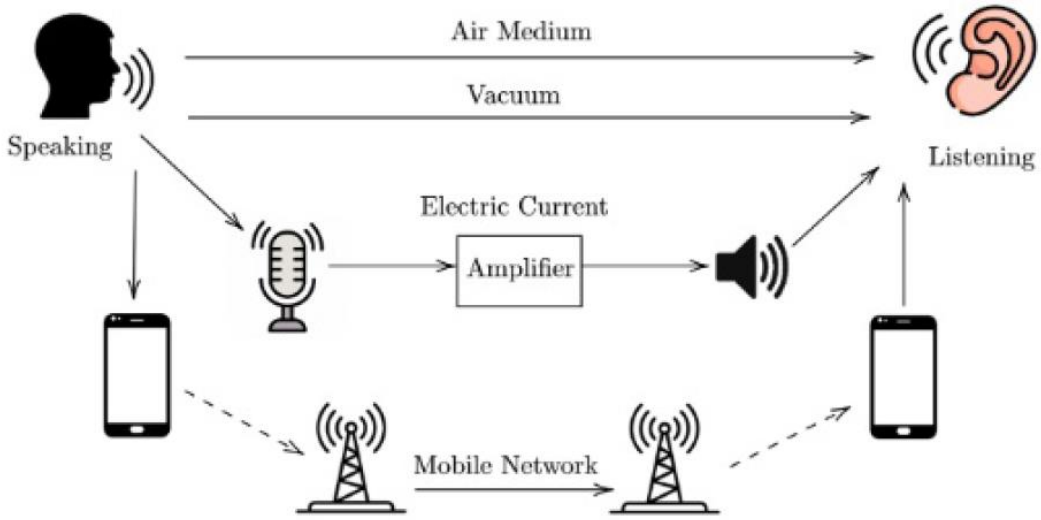

Figure: Different Means of Transmission

(i) Is sound travels in vacuum. Justify your answer.

(ii) In mobile communication, List out the functions takes place before and after transmission of the message signal through the mobile network.

3. Question

The Figure represents the different means of transmission, including Mechanical Transmission—Weightlifting process, Electrical Transmission—power Transmission, and Electromechanical Transmission—satellite communication.

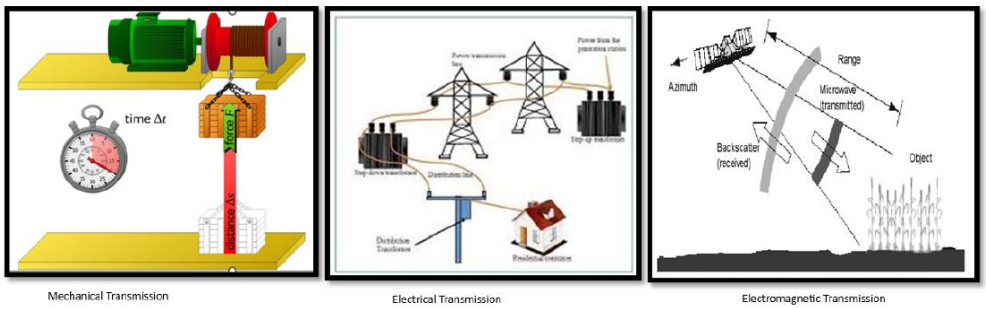

Figure : Different Transmission Means

a) Interpret how the energy transmission takes from the renewable energy sources like wind mill and solar cell.

b) Illustrate the steps and the components involved in transferring the electrical energy from main station to substation and to our home.

c) Identify the ways of communication used in the above figure as one way or two-way communication.

4. Question

A Microphone Output Waveform is shown in the figure.

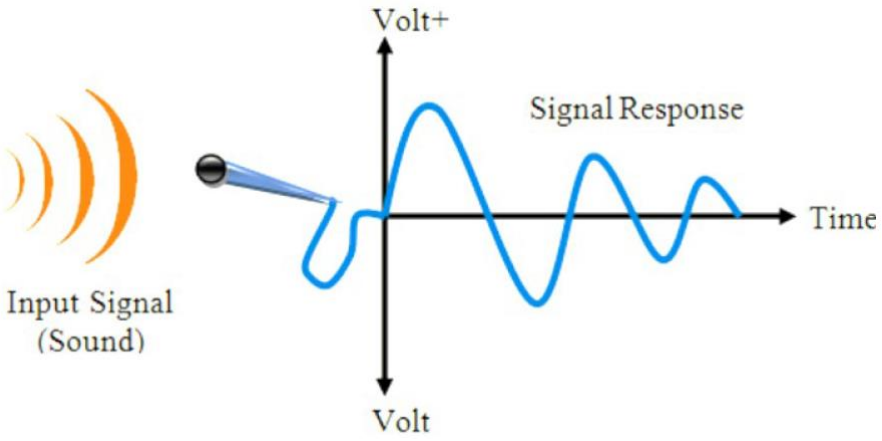

Figure: Microphone Output Waveform

Predict the output waveform response for the continuous and discrete signals at constant and varying frequencies.

5. Question

Energy transmission refers to the process of transferring energy from one location to another. This can occur in various forms and through different mediums, and it plays a critical role in numerous applications

a) Illustrate the forms in which the energy transmission takes place from one location to another.

b) Identify the way by which the energy conversion takes place in the microwave oven.

6. Question

In optical fibers communication, information transmission medium is shown in figure.

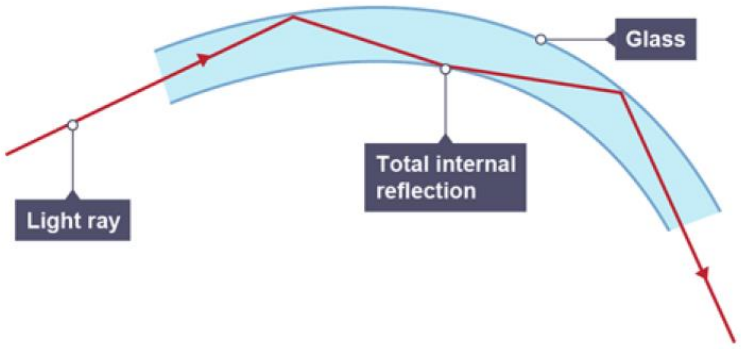

Figure: Optical fibre communication

a) Illustrate the need for optical fibre communication with its advantages and disadvantages.

b) Find the form of energy in which the optical fibre transmits the input signal from the transmitter to the receiver.

c) Infer whether Videos can transmitted through the optical fibres.

7. Question

The Figures represent the different means of transmission, including Mechanical Transmission—Weightlifting process, Electrical Transmission—power Transmission, and Electromechanical Transmission—satellite communication.

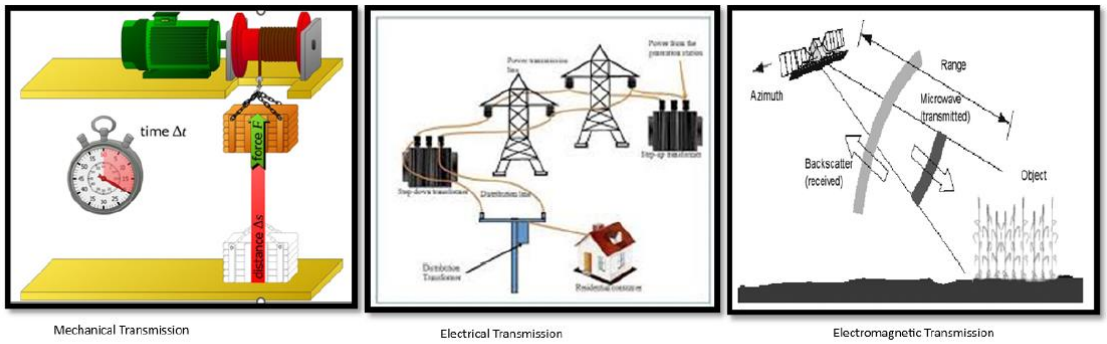

Figure : Different Transmission Means

By considering the above example in different transmission means,

List out the steps and energy conversion takes place in transmitting the mechanical sound waves from the human to microphone and to the speaker.

8. Question

The process of data transmission in a wired network, from device to server through cables, and in a wireless network, from device to server via radio waves, is shown in the figure.

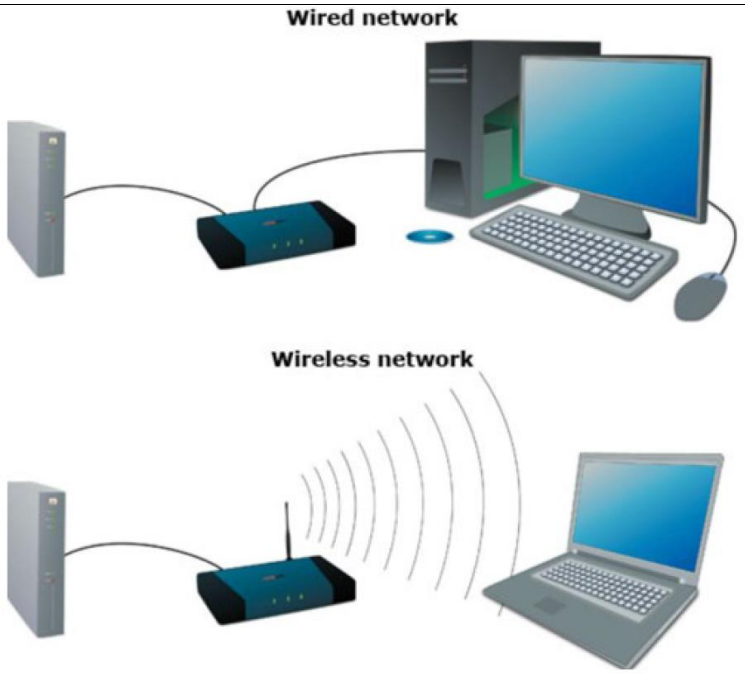

Figure: Wired and Wireless Network

Compare the wired and wireless communication and suggest the suitable one for effective long distance communication without any interference and explain about the concept of signal interference.

9. Question

The figure shows an LED circuit.

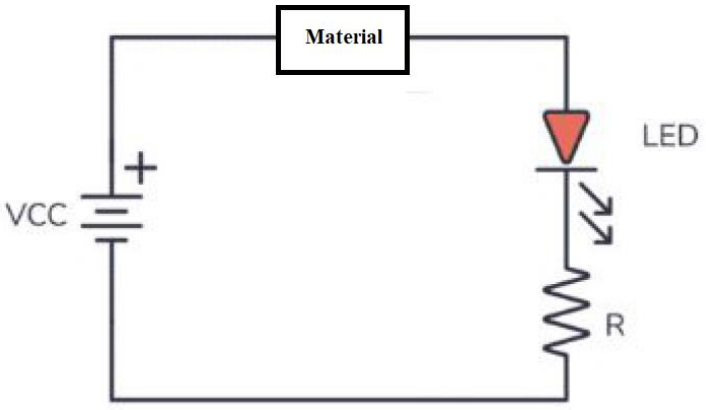

Figure: LED circuit

Observe the figure and write the status of the LED based on the material used in the below table.

S.NO	Material	LED status (ON/OFF)
1	Insulator	
2	Conductor	
3	P type material	
4	N type material	
5	PN junction diode in forward bias	
6	PN junction diode in reverse bias	

10. Question

The figure shows the energy band structure of materials (conductors, semiconductors and insulators).

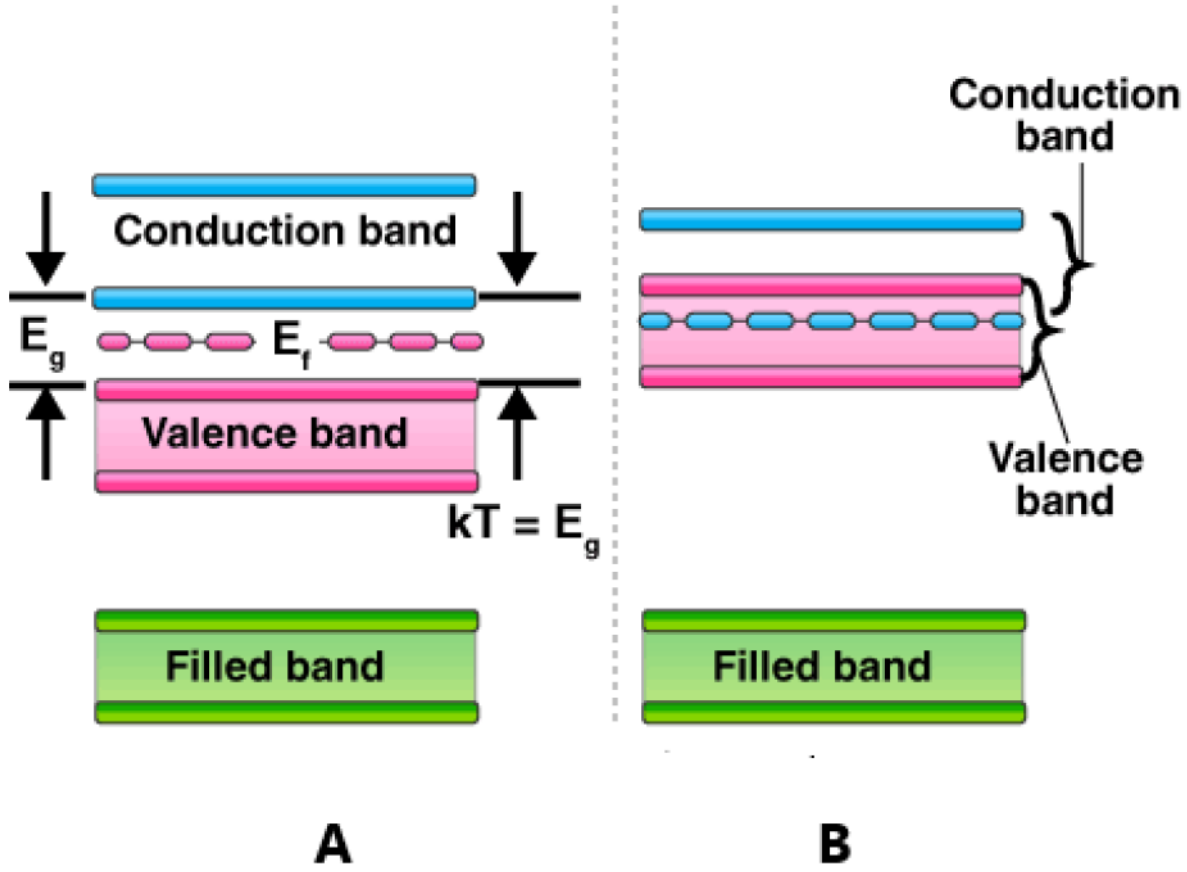

Figure: Energy Band Structure of Materials

(i) Conductor has positive temperature co efficient of resistance but semiconductor has negative temperature co efficient of resistance. Justify the above statement.

(ii) Find the condition of semiconductor at very low temperature (conductor / insulator). Justify.

11. Question

The scenario shows the working of a PN junction diode in the LED circuits.

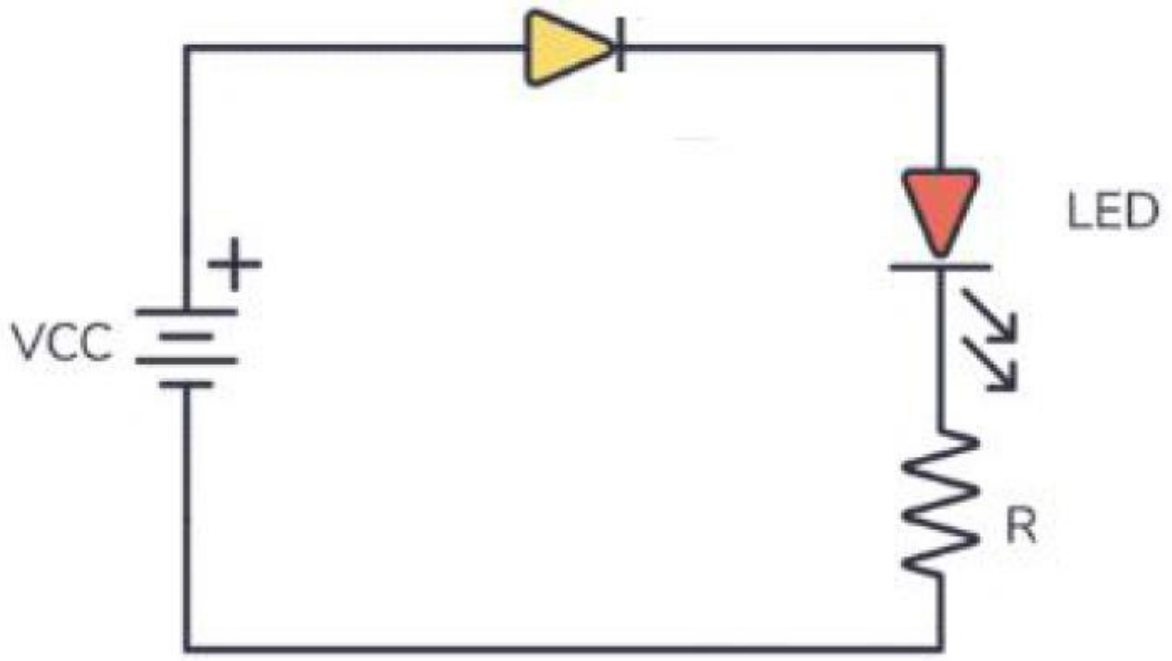

Figure: PN junction diode in LED circuit

a) Find the state of the LED (ON/OFF) based on the configuration of the diode.

b) If you are asked to turn ON and turn OFF the LED in a regular interval automatically, what change you need to do in this above circuit.

12. Question

The figure shows the energy band structure of materials (conductors, semiconductors and insulators).

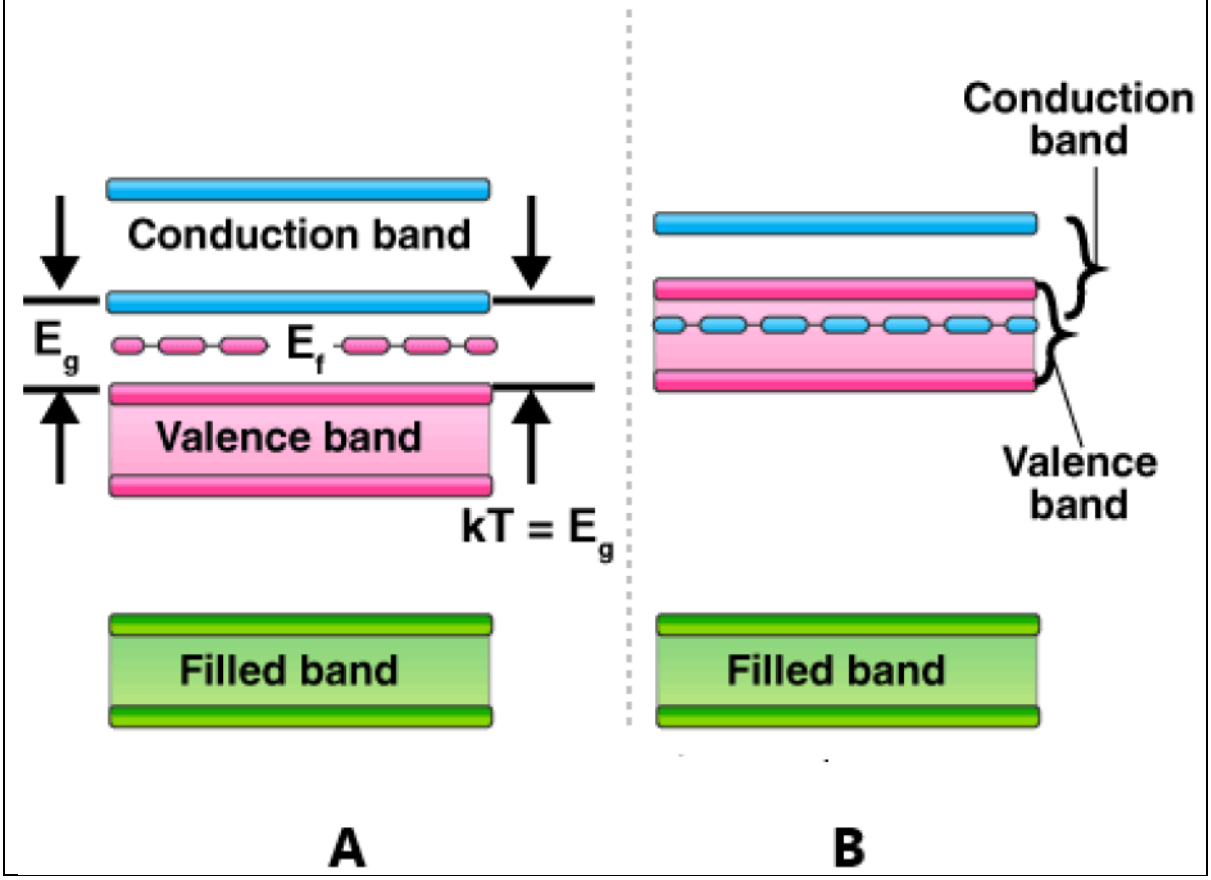

Figure: Energy Band Structure of Materials

(i) Indicate the impurities needed to create n type and p type materials from a normal semiconductor.

(ii) Identify the property of co-valence bond.

13. Question

(i) Draw the circuit of a negative biased positive clipper by using an AC voltage source of 5V and bias voltage of 2V DC.

(ii) Draw the waveform of the circuit drawn.

14.

Question

Indicate the correctness of assertion and reason statement.

Assertion: Clipper circuit uses capacitor.

Reason: Positive clipper output is obtained across the capacitor.

15. Question

The Working Principle of a Vacuum Diode is illustrated in Figure. Carefully Analyze the Figure to answer the following Questions.

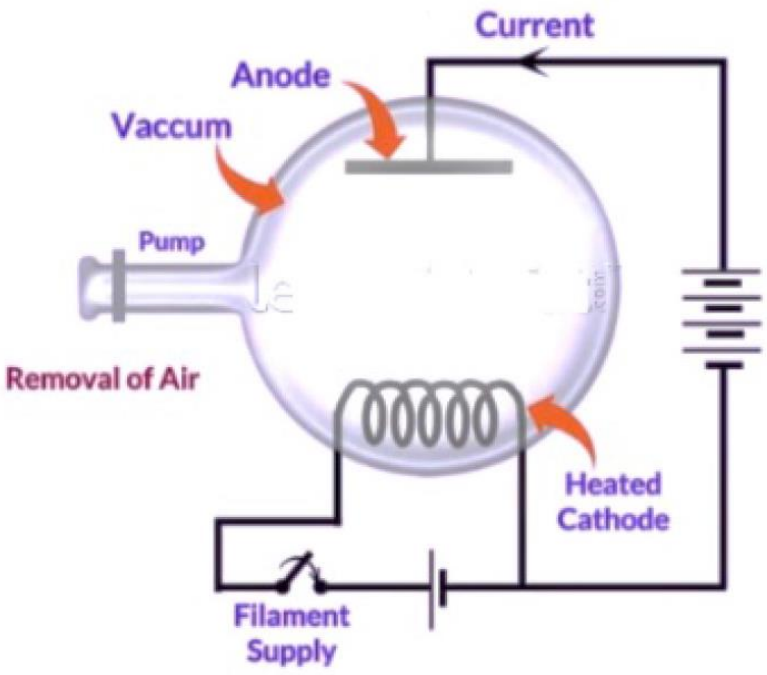

Figure 1 : Working of a Vacuum Diode

(i) Draw the equivalent circuit of the vacuum diode given in the figure by using N type and P type materials.

(ii) Identify the reason why the heated cathode is used.

16.

Question

From the given figure of the vacuum diode:

(i) Identify the need of vacuum in this vacuum diode.

(ii) Justify how this vacuum diode works as a switch.

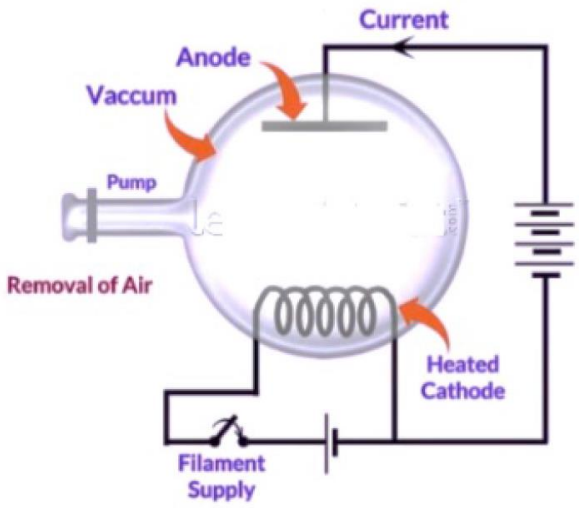

Figure. Vacuum diode

17. Question

Based on the below given conditions, how can you design suitable Switching Circuits using NPN and PNP transistors according to the transistor types and switching states shown in the diagram.

Transistor	INPUT SWITCH	OUTPUT LED
NPN	ON	OFF
	OFF	ON
PNP	ON	OFF
	OFF	ON

18. Question

Junction field-effect transistors have the ability to perform some functions that are impossible with (single) bipolar junction transistors as shown in the figure.

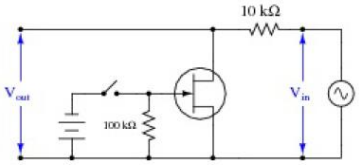

Figure: JFET

Interpret the changes in the AC output waveform corresponding to the toggle switch operation.

19. Question

The given circuit represents a single-stage common-emitter amplifier using a BJT transistor (Q1). The circuit is powered by a12V supply and amplifies an AC input signal, which is then fed to a speaker as output.

a) Identify the Input and output of the transistor (CE Configuration) in this circuit.
b) By considering the figure, Redraw the circuit as Single stage common base amplifier.

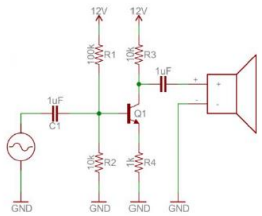

Figure: Single-stage common-emitter amplifier using a BJT transistor

20. Question

The given circuit uses a "mechanical switch" to control a bulb. Design an alternative circuit using BC547 Bipolar Junction Transistor to replace the switch. Redraw the circuit and justify why BC547 transistor configuration is more efficient for this application.

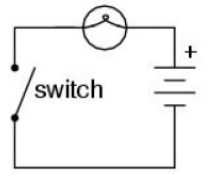

Figure:Mechanical switch

21. Question

A student claim that the circuit given in the Figure is a Dark Activated Flasher Circuit. The Q1 Transistor is a Phototransistor which will be turned ON when light hits on it.

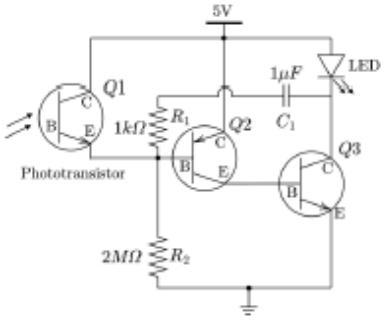

Figure: LED Flasher Circuit using Transistors

(a) Carefully analyse the circuit and identify the transistor types of Q1,Q2 and Q3 as either PNP or NPN based on the circuit diagram (2 Marks)

(b) Identify the role of the Phototransistor in the Circuit (2 Marks)

22. Question

Draw the connecting wires to form a circuit where the transistor turns the LED on whenever the push button switch is actuated. If the switch is opened, identify whether the given transistor is operated in forward biased or reverse biased?

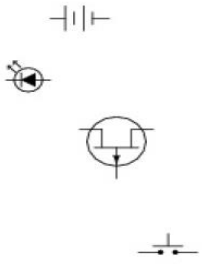

Figure: Transistor, LED, switch and battery

23. Question

Analyze the below attached symbols and identify, which schematic symbols is n channel JFET and which schematic symbols is P channel is JFET and what is the difference between this two schematic symbols in FET diagram.

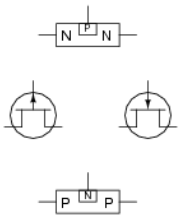

Figure: FET

24. Question

Bipolar junction transistors are definitely unidirectional ("polarized") devices, able to handle electric currents in one particular direction through each terminal:

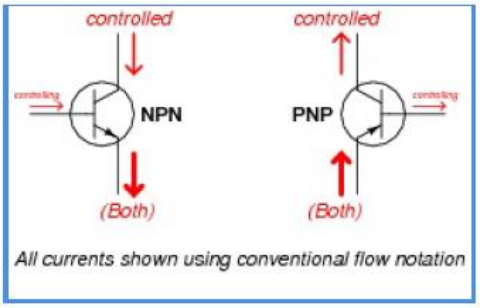

Figure: BJT

Justify that a BJT is a current controlled device, whereas an FET is a voltage controlled device, how can you differentiate the P-channel and N-channel JFET in terms of the transistor current flow.