Practical No.9: Construct and Test the full wave Bridge rectifier on bread board using four diodes

I Practical Significance

Bridge Rectifier is a type of Full Wave Rectifier that uses four diodes to form a close-loop bridge. The diodes conduct in pairs through each positive and negative half cycle, leading to no wastage of power. It is used for converting an alternating current (AC) input into a direct current (DC) output. Bridge rectifier is widely used in power supply circuit.

II Industry / Employer Expected Outcome

This practical is expected to develop the following skill: **'Use electronic components and circuits in electrical equipment and systems'.**

III Course Level Learning Outcome

Use semiconductor transistors in different applications.

IV Laboratory Learning Outcomes

Test full wave bridge rectifier on Breadboard:

1. Construct the circuit for Full Wave Bridge Rectifier using PN junction Diodes.
2. Observe and draw input-output waveforms for sinusoidal wave.

V Relevant Affective Domain related Outcomes

1. Handle components and equipment with care.
2. Work in team.

VI Minimum Theoretical Background

A single-Phase Bridge Rectifier is constructed using four Diodes D1, D2, D3, and D4, connected in a closed loop configuration that forms a bridge. The four diodes labeled D1 to D4 are arranged in "series pairs" with only two diodes conducting current during each half cycle.

During the positive half cycle of the supply, diodes D1 and D2 conduct in series while diodes D3 and D4 are reverse biased and the current flows through the load as shown below.

During the negative half cycle of the supply, diodes D3 and D4 conduct in series, but diodes D1 and D2 switch "OFF" as they are now reverse biased. The current flowing through the load is the same direction as before.

As the current flowing through the load is unidirectional, so the voltage developed across the load is also unidirectional the same as for the previous two diode full-wave rectifier, therefore the average DC voltage across the load is 0.637 Vmax.

VII Practical setup in Laboratory

(a) Sample

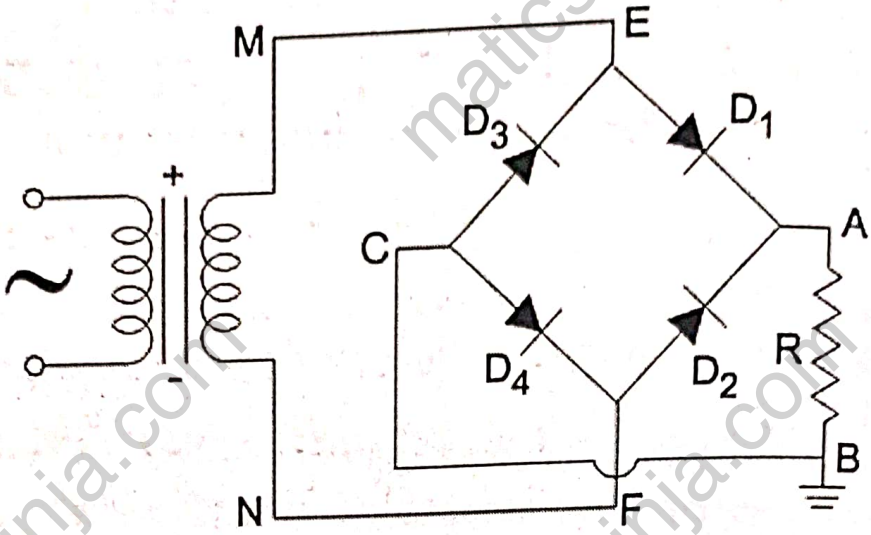
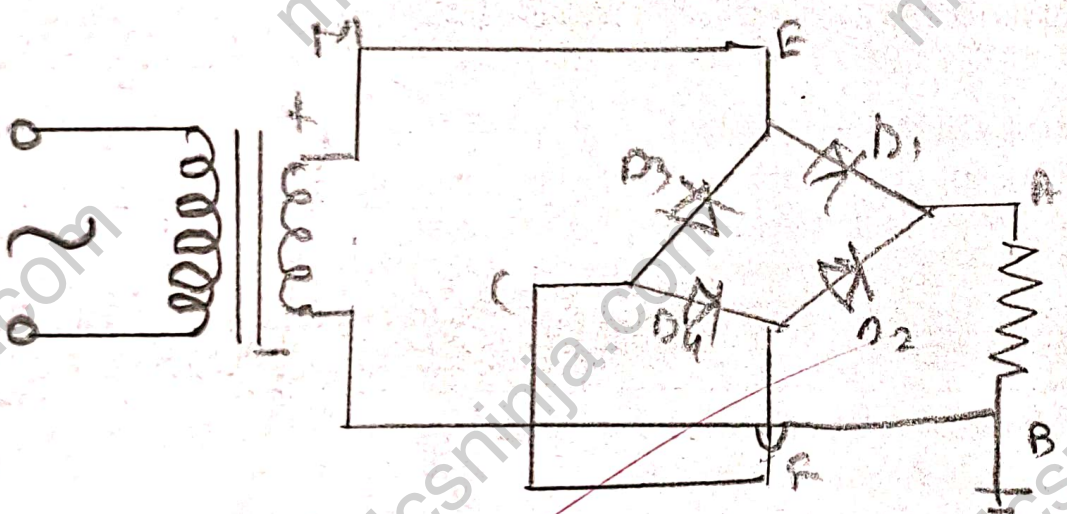


Figure 9.1: Full wave bridge rectifier

(b) Actual Circuit Diagram used in Laboratory



(c) Actual practical set up used in Laboratory

VIII Required Resources/apparatus/equipment with specifications

Sr. No	Instruments/Components	Specification	Quantity
1	Transformer	12-0-12V AC, 500 mA	1
2.	Multimeter	3 ½-digit display with AC and DC voltage measurement and Current measurement facility and Diode testing facility.	1
3.	C.R.O.	25MHz, Dual trace, 15MΩ input impedance	1
4.	Function Generator	0-2 MHz with Sine, square and triangular output with variable frequency and amplitude.	1
5.	Resistor	10KΩ, 0.5 Watt.	1
6.	Diode	Silicon 1N4007	4
7.	Bread board	5.5 CM X 17CM	1
8.	Connecting wires	Single strand Teflon coating (0.6 mm diameter)	As per requirement

IX Precautions to be followed

1. Do not switch ON the power supply unless you have checked the circuit connections as per the circuit diagram.
2. While doing the practical do not exceed the input voltage of the diode beyond the rated voltage of diode as given in datasheet. This may lead to damaging of the diode.

X Procedure

1. Connect the circuit for Full wave bridge rectifier on breadboard as shown in Figure 9.1
2. Connect the primary side of the transformer to AC mains and the secondary side to rectifier input.
3. Before switching ON power supply, check the connection.
4. Switch ON the power supply and connect the CRO to the load resistor.
5. Measure the peak voltage Vm (peak voltage) across load resistor.

XI Observation Table

Table 1

Sr. No.	Rectified output across R (V_m)
1.	71.6
2.	72.8

Calculations:

XII Results

Across the load resistance R, the rectifier output obtained VM = 7.1 - 6V

XIII Interpretation of results

By performing full wave rectifier on bread board we determine the value of output DC voltage in CRO and DMM.

XIV Conclusions and Recommendation

Across the load resistance of the rectifier output obtained is VM = 7.1 - 6V

XV Practical related Questions

1. Write the formula of peak inverse voltage for center tapped full wave rectifier and bridge rectifier.
2. In a bridge rectifier circuit what happens if one of the diodes is shorted?
3. Compare between half wave rectifier, full wave rectifier and bridge rectifier on the basis of output waveform

[Space for answers]

(1) ----?

→ Peak inverse voltage (PIV) is 2V max in center taped full wave rectifire but it is we max in full wave bridge rectifire.

(2) -----?

→ But when you change the polarities it become reverse bais. Ex:- positive terminal of the source is connated to the negative of the diode and negative to positive of the diode it acts a open circuit and hence dosent alove current pass throw it. Hope it helps.