**Practical No. 8: Demonstration of working of pulse transformer by observing input pulse and output pulse of pulse transformer on CRO.**

**I Practical Significance:**

Pulse transformers can be divide into two major types, power type and signal type. The power type pulse transformer applications include precise control of heating elements fed from fixed DC source or a series of pulses temperature control. The signal type pulse transformer delivers a pulse like signal or provide impedance matching The turns ratio of the pulse transformer can be used to adjust signal amplitude and provide impedance matching between the source and load. Pulse transformers are often used in the transmittal of signals and in the gate drive circuitry of transistors, FETs, SCRs etc. Pulse transformer is a very essential widely used device for low power circuits, high power switched mode power supplies and gate generation. Signal type of pulse transformers handle relatively low levels of power. The transformers are usually operated at high frequencies.

**II Industry/Employer Expected Outcome(s)**

Use Pulse Transformer to test its operation.

**III Course Level Learning Outcome(s)**

Select the Transformer and DC motor for the given application.

**IV Laboratory Learning Outcome(s)**

LLO Identify pin configuration of pulse transformer.

LLO Check electrical isolation between input and output of pulse transformer.

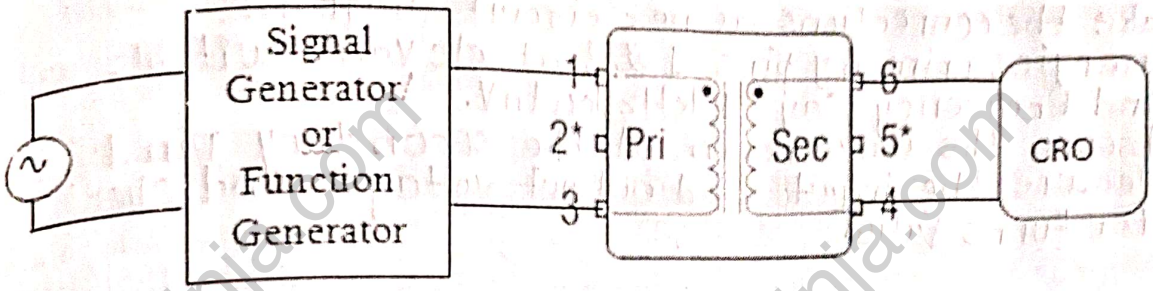
**V Relevant Affective Domain related outcome(s)**

Follow safety electrical rules for safe practices.

**VI Relevant Theoretical Background**

Pulse transformers are a diverse family of transformers designed to transfer a digital control signal control circuit to a load. They provide galvanic isolation to a circuit, whilst allowing fast control sig be transmitted without distorting the signal shape. The input and output signal is typically a recta wave of a few volts with a frequency above 100kHz, not a sinusoidal wave as with conve transformers. Pulse transformers have a low member of windings and low inter winding capacitar they operated with high frequency signals, the core material must be able to cope with repeated an magnetization and demagnetization. The turn's ratio is typically 1:1 as their main purpose is increase or transform the voltage, but to maintain it across the isolation barrier.

**VII Actual Circuit diagram used in laboratory with equipment Specifications:**




**VIII Required Resources/apparatus/equipment with specification:**

| S. No. | Name of Resource | Suggested Broad Specification | Quantity |
|---|---|---|---|
| 1 | Pulse transformer of suitable rating | Input voltage and frequency of relevant rating. 1 vpp signal at 1kHz | 1 |
| 2 | CRO | 10 Hz- 30 MHz | 1 |
| 3 | Function generator | 0.1 Hz – 11 MHz | 1 |

**IX Precautions to be followed:**

1. Follow safety practices.
2. Do not make any connections with the power supply is ON.

**X Procedure**

1. Make the connections as per circuit diagram.
2. Energies primary pins 1 & 3 at relevant suitable voltage and frequency say 1kHz, 100mV.
3. Observe the waveform at the secondary pin 4 & 6.
4. Measure the input and output voltage and check for turns ratio

**XI Required Resources/apparatus/equipment with specification:**

| S. No. | Name of Resource | Suggested Broad Specification | Quantity |
|---|---|---|---|
| 1 | Pluse transformer of suitable rating | Input voltage and frequency of relevant range. | 1 |
| 2 | CRO | 10Hz - 30 MHz | 1 |
| 3 | function generator | 0.1Hz - 11MHz | 1 |

**XII Actual Procedure followed:**

1. Make the connections as per circuit diagram
2. Energies primary pins 1 & 3 at relevant suitable voltage and frequency say 1 kHz, 100 mV.
3. Observe the waveform at the secondary pin 4 & 6
4. Measure the input and output voltage and check for turns ratio.

**XIII Observations:**

| Sr. No. | Input voltage(volt) | Output voltage (volt) | Nature of input waveform | Nature of output waveform |
|---|---|---|---|---|
| 1 | Pulse transformer of suitable rating | 1V | Square pulse | square pulse |
| 2 | ~~CRO~~ 200 mV | 2V | Square pulse | Square pulse |
| 3 | 300 mV | 3V | Square pulse | Square pulse |
| 4 | 400 mV | 3V | Square pulse | Square pulse |

**XIV Results:**

The output voltage of the pulse transformer increase proportionally with the i/p voltage.

**XV Interpretation of results:**

The input voltage applied to the primary winding of the pulse transformer is stepped up at the secondary voltage

**XVI Conclusion and recommendation:**

The pulse transformer successfully demonstrated its function by accurately transferring the input pulse to the output.

**XVII Practical related questions (Provide space for answers)**

1. Why the pulse transformer has less number of turns and low inter winding capacitance.
2. Compare between conventional transformer and pulse transformer.
3. List applications of pulse transformer.

1. Pulse transformer have turns to reduce inductance and allow the transfer of high-frequency singals without distortion. low inter-winding capacitance minimize capacitive coupling, ensuring clean pulse transfer and voltage waveforme distortion

2.

| Feature | Conventional Transformer | pulse transformer |
|---|---|---|
| Application | Power transmission | signal and pbise tranfer |
| frequency range | low-freq | High-frequency pulses |
| Turns | Typically higher | Relatively lower |
| Core material | Laminated iron core | ferrite or air core |
| Inter-winding capacitance | higher | lower |

3. • switching power supplies
• pulse generation circuits
• communication equipment
• Radar and telecommunication systems
• Isolation between control and power circuits

**XVIII References/Suggestions for further reading:**

1. www.electrical4u.com
2. www.howstuffworks.com
3. www.electricaltechnology.org