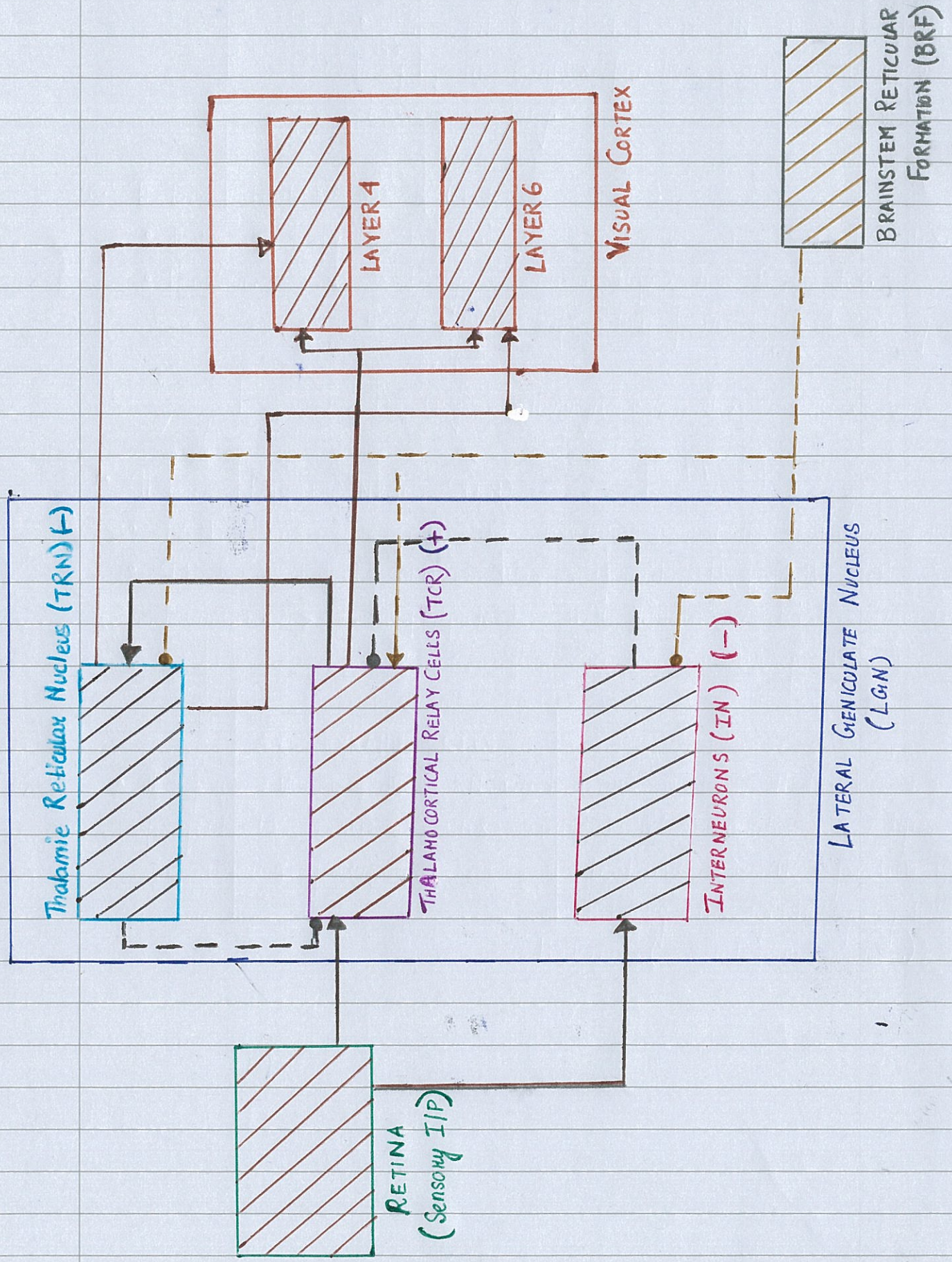
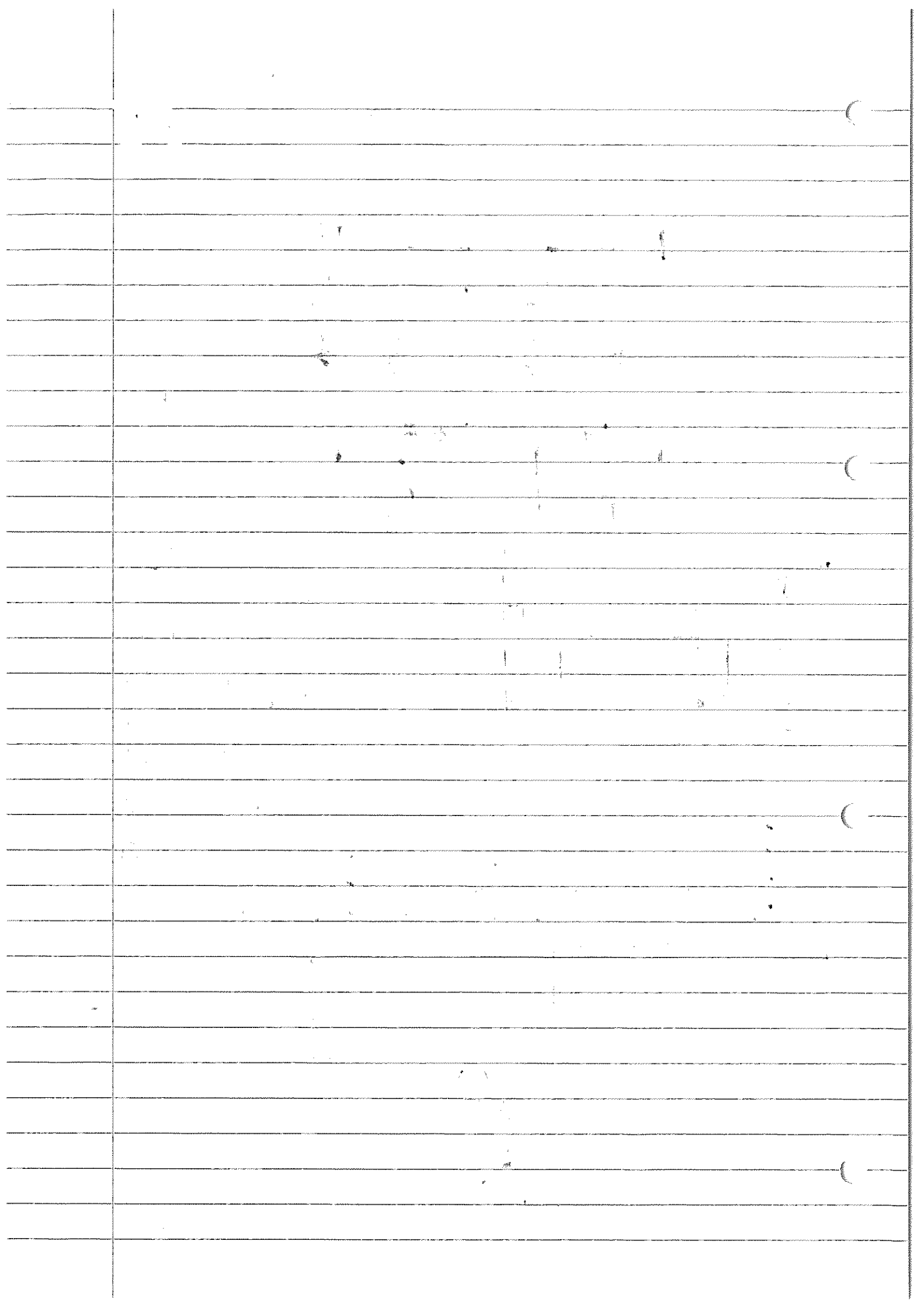


29th Sep

SCHEMATIC DIAGRAM OF CIRCUITRY FOR LATERAL GENICULATE NUCLEUS:-







NOTES CORRESPONDING TO DIAGRAM:-

1. Different colours of shades represent different types of neurotransmitter.


↓ [Chemical messengers that enable neurotransmission; they transmit signals across a chemical synapse, from one neuron to another target neuron.]


 → Glutamic acid (Glu). Glutamate is the most abundant excitatory neurotransmitter in vertebrate nervous system.


→ (gamma-aminobutyric acid)

 → GABA. It is an inhibitory neurotransmitter which is widely distributed in the neurons of the cortex.

→ (Acetylcholine)

 → Ach. This neurotransmitter used at neuromuscular junction. It can be either excitatory or inhibitory depending upon the type of receptor on the adjoining cell.

2.  → represents 'driver'. Drivers represent the main information to be relayed.

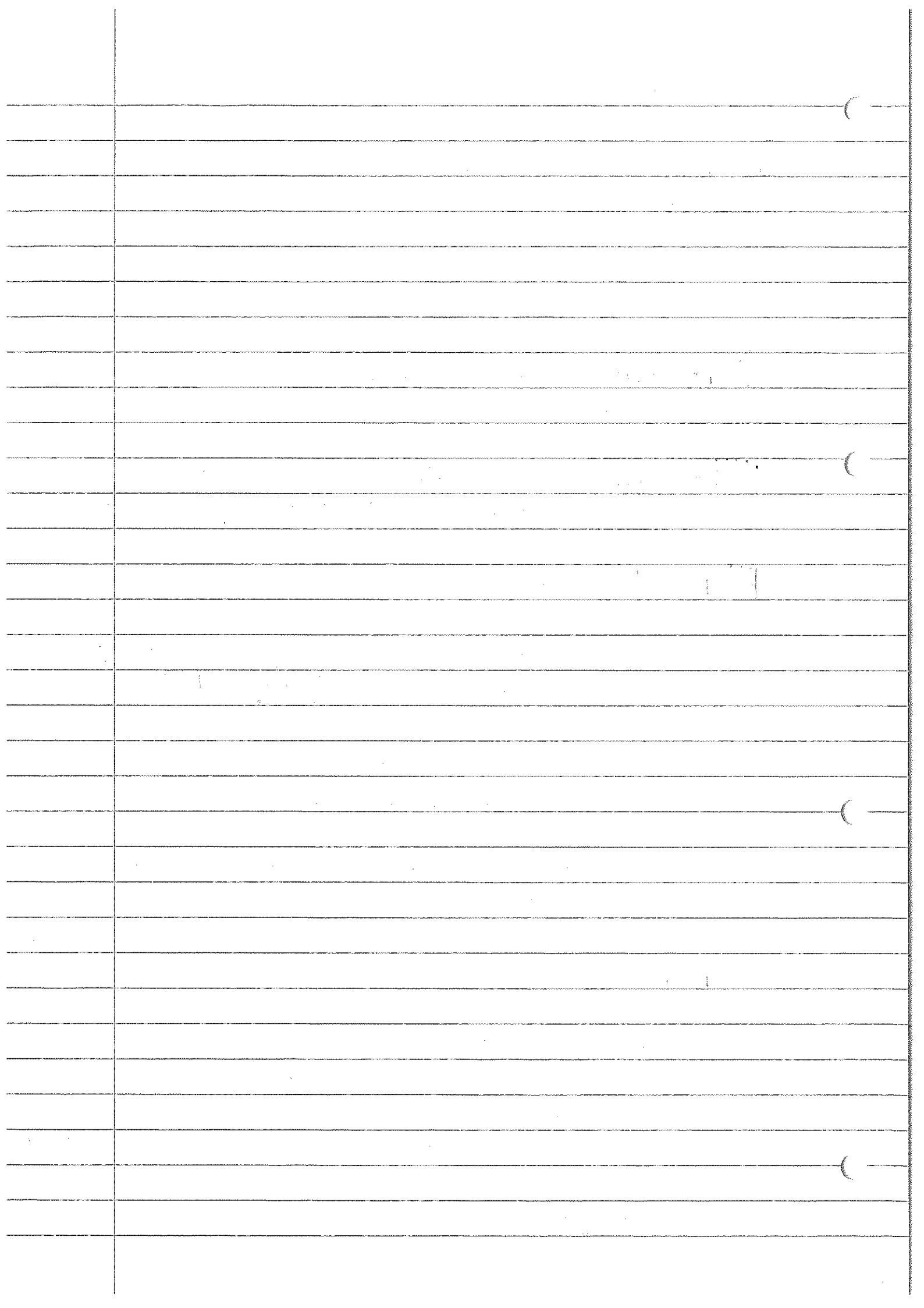
 → represents 'modulator'. Modulators modify thalamocortical relay.

3. Brainstem Reticular Formation (BRF) :-

- It is a set of interconnected nuclei located throughout the brainstem i.e., posterior part of the brain.

- It includes neurons located in diverse parts of the brain;
 - ↳ the neurons play a vital role in maintaining behavioral arousal & consciousness.

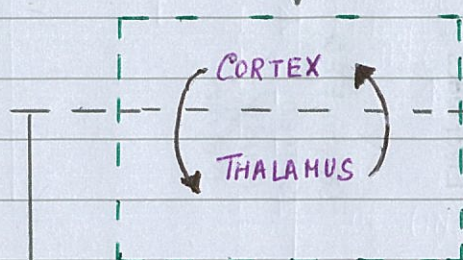
- The functions of RF are modulatory & premotor.



NOTES CORRESPONDING TO MEETING & EXPLANATION ON 23rd SEP, 2016 :- ①

1. Electroencephalography (EEG) [on scalp]

MIMIC OF THE FOLLOWING :-

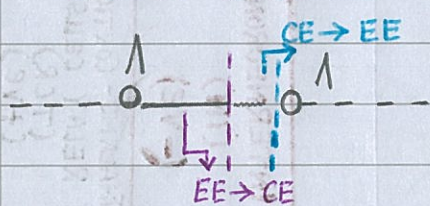


(i.e. Depiction of the coordination between Cortex and Thalamus.)

⇒ This is 'Biologically inspired Neural Networks' (BINN)

2. This means 'Deconnect the Thalamus' which means having had Cortex separated / removed from Thalamus. (i.e. cutting connection between Cortex & Thalamus)

3. Neurons communicate with each other in the following pattern :-



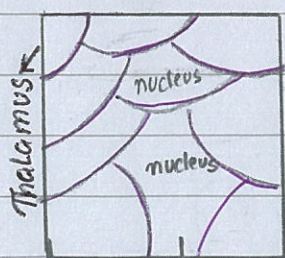
NB:- Neuron (a nerve cell) is an electrically excitable cell that processes & transmits information thru' electrical & chemical signals. These signals betⁿ neurons occur via 'synapses'.

- EE gets converted to CE and then gets transmitted.
- Before reaching next neuron, CE again gets converted to EE.
- Chain goes on.

↳ In the nervous system, a synapse is a structure that permits a neuron to pass an electrical or chemical signal to another neuron.

→ This is called 'synapse'. In this process there is loss of information.

4.



Thalamic Nuclei

Thalamic Reticular Nucleus (TRN)

NB:- Thalamus consists of different nuclei (Thalamic nuclei); however, we will be dealing only with (LGN), Lateral Geniculate Nucleus, since it receives major sensory I/P from the retina.

5. NB:- $\alpha \rightarrow$ No THINKING
 $\beta \rightarrow$ CONCENTRATE
 $\Delta \rightarrow$ DEEP SLEEP
 $\theta \rightarrow$ DROWSY

6. NB:- 2 main types of neurons:-

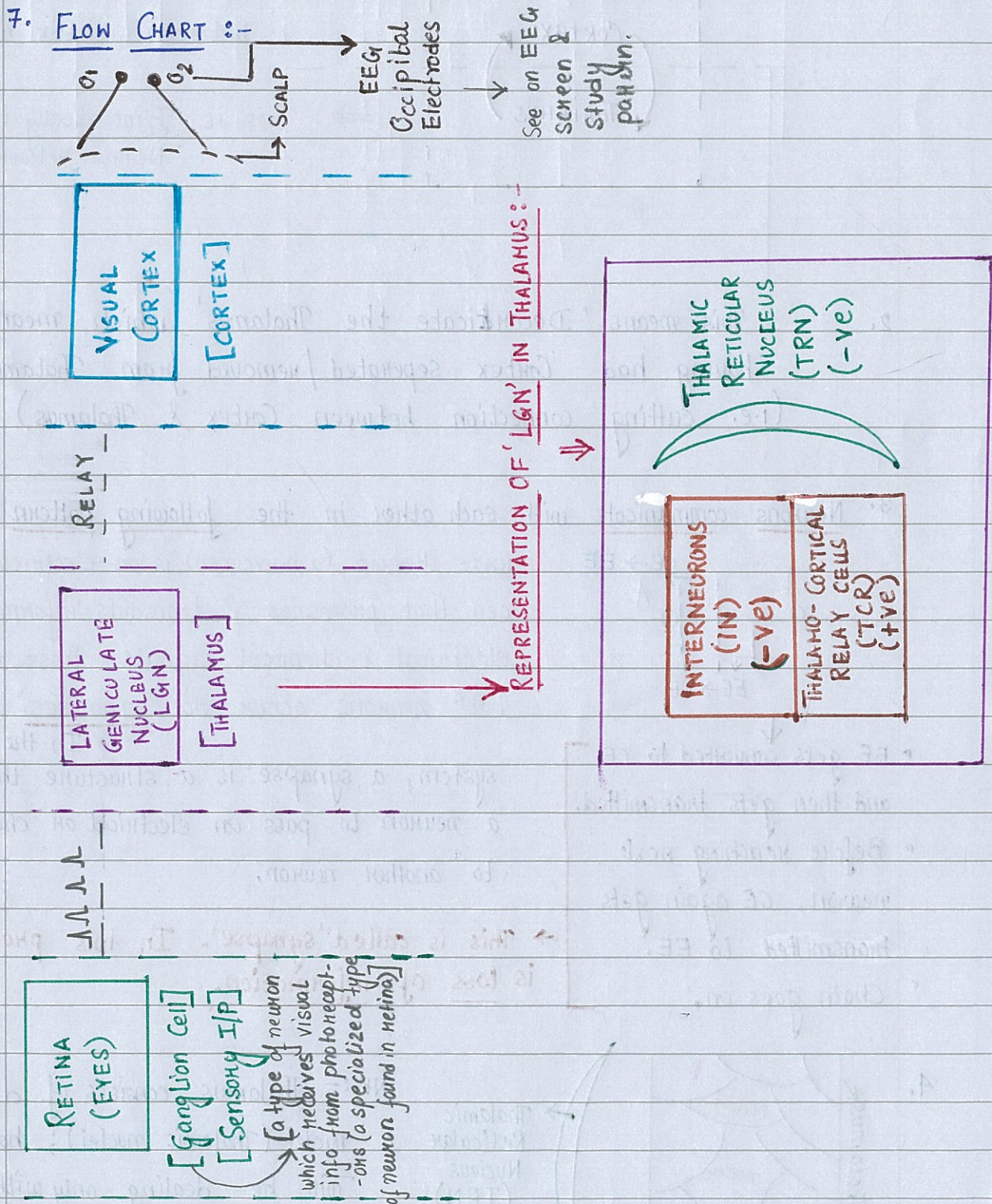
a) Inhibitory Neurons:-

(+ve) Λ o - - - \rightarrow • V (-ve)

b) Excitatory Neurons:-

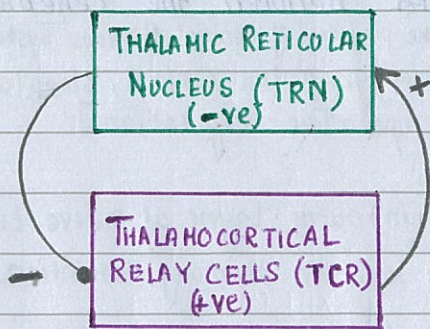
(+ve) Λ o - - - \rightarrow o Λ (+ve)

7. FLOW CHART :-

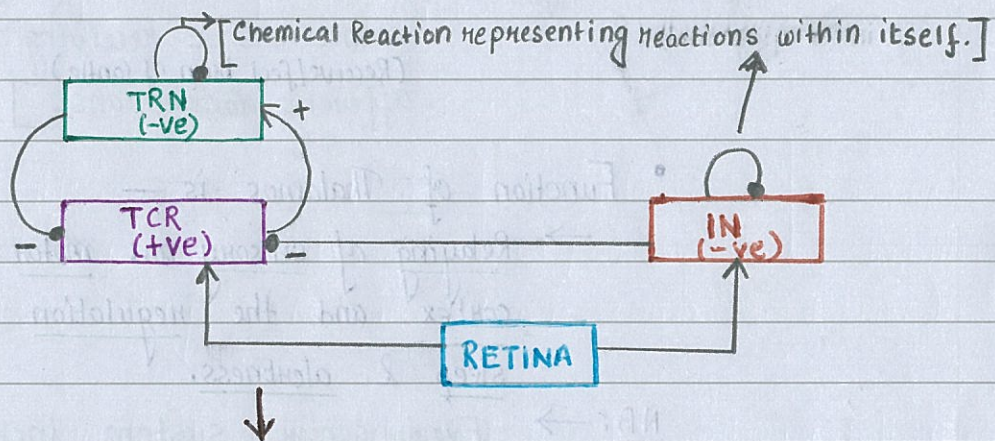


8. SIMULINK MODELS & ITS TRANSFORMATION:-

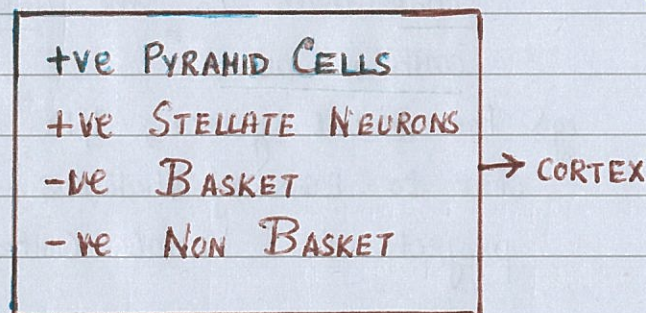
(i)



(ii)



(iii) Introduction of Kinetic Nodes \rightarrow Representing Cortex consisting of the following:-



BRIEF UNDERSTANDING OF SOME BIOLOGICAL TERMS:-

1. Retina:- It is the third and inner coat of the eye which is light sensitive layer of tissue.
 - Retina is a layered structure with several layers of neurons interconnected by synapses.
 - Light striking the Retina initiates a cascade of chemical & electrical events that ultimately trigger nerve impulses, which are sent to various visual centres of the brain.

(divides in 2 halves that are mirror images of each other)
2. Thalamus :- • Thalamus is a midline symmetrical structure of two halves situated between the cerebral cortex & midbrain. → [is the portion of Central Nervous System associated with vision, hearing, motor control, sleep/wake, arousal, alertness, temperature regulation]
↓ [is the cerebrum's (brain) outer layer of nerve tissue. It plays a key role in memory, attention, perception, awareness, thought, language & consciousness. Most sensory info. is routed to the cerebral cortex via thalamus. (ACT)]
{ Cerebral Cortex consists of 3 parts:- Sensory, motor, associated areas. We are dealing with sensory esp. senses of vision } It deals with sending info to them along efferent connections & receiving info. from them via afferent connections. [Receive/feel burn of candle]

• Function of Thalamus is —

→ Relaying of sensory and motor signals to the cerebral cortex and the regulation of consciousness, sleep & alertness.

NB:- → Every sensory system includes a thalamic nucleus that receives sensory signals & sends them to the associated primary cortical area

eg> For visual system, I/Ps from retina are sent to LGN of thalamus → which in turn projects to Visual Cortex.

3. Visual Cortex :- It is the part of cerebral cortex responsible for processing visual information.

4. Lateral Geniculate nucleus (LGN) :-

• LGN is a relay center in thalamus for the visual pathway.

• LGN receives information from ganglion cells in retina & forms direct pathway to Visual Cortex.

LGN also receives many strong feedback connections from Visual Cortex.

5. Interneurons (IN) :-
- 'IN' create neural circuits enabling communication between sensory or motor neurons and CNS.
 - The interactions between IN allow the brain to perform complex functions such as learning & decision making.

6. Thalamocortical Relay Cells (TCR) :-

- TCR are fibers between the thalamus and cerebral cortex.
- Functions :-
 - a) Relays sensory information to cortex.
 - b) Integrates information from different sensory modes
 - c) Projects throughout cortex.

7. Thalamic Reticular Nucleus (TRN) :-

- TRN forms a capsule like structure around the thalamus laterally.
- It is said that TRN receives afferent I/P from the reticular formation → then projects to other thalamic nuclei → regulating flow of information through these to Cortex.

↓ (it is a set of interconnected nuclei located throughout the brainstem i.e., posterior part of the brain.)

- Therefore, it is the ONLY Thalamic nucleus that does not project to cerebral cortex, instead it modulates & modifies information from other nuclei in thalamus ⇒ its function is modulatory on signals going thr' thalamus (& reticular nucleus).

