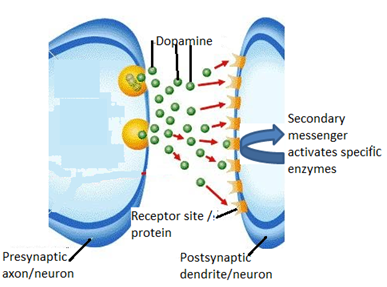
**38. ANSWER KEY [Sem I Exam 2017 WATP/BCC] (13 marks)**

* 1. The neurotransmitter, dopamine stimulates target neurones in the same manner as an amine hormone would affect a target cell. It can have an excitatory or inhibitory effect on the action potential of the target neuron, depending on whether it has D1 or D2 receptors. If the neuron has D1 receptors, sodium ion (Na+) channels are stimulated to be opened and if the neuron has D2 receptors, potassium ion (K+) channels are stimulated to open.

1. Using a labelled diagram, describe how dopamine would move from the presynaptic neuron, across the synapse, to enter and activate a specific target neuron.

 (5 marks)

* *MUST HAVE. Complete diagram, as labelled above. (1 mark)*

*ANY FOUR OF THE FOLLOWING for 1 mark each, MAX OF 4 marks.*

* *Dopamine released from vesicles, (1 mark)*
* *and diffuses across gap. (1 mark)*
* *Dopamine attaches to receptor protein/site in the membrane of the postsynaptic dendrite/ neuron (1 mark)*
* *Dopamine can only bind with a specific receptor. (1 mark)*
* *Binding with the receptor causes changes in post synaptic membrane potential (1 mark)*
* *A new action potential is propagated in the post synaptic neuron (1 mark)*

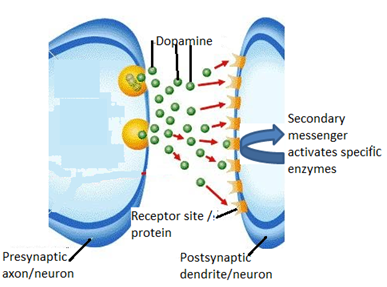
(ii) State whether the D2 receptors would cause an excitatory or inhibitory effect on the action potential of the target neuron and describe why this response would occur. (5 marks)

* *D2 receptors = inhibitory effect because, (1 mark)*
* *The sodium ion gated channels are not stimulated and remain closed (1 mark)*
* *If D2 receptors are stimulated, potassium ion gated channels are stimulated to open, which causes the inside of the cell to become electrically negative. (1 mark)*
* *If there is a negative charge inside the cell and a positive charge outside the cell, then the neuron remains polarised OR becomes hyperpolarised) (1 mark)*
* *and an action potential cannot be stimulated (1 mark)*

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