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6.5 Neurones & Synapses

Hard

BIOLOGY

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EXAM PAPERS PRACTICE

6.5 Neurones & Synapses

Question Paper

Course	DP IB Biology
Section	6. Human Physiology
Topic	6.5 Neurones & Synapses
Difficulty	Hard

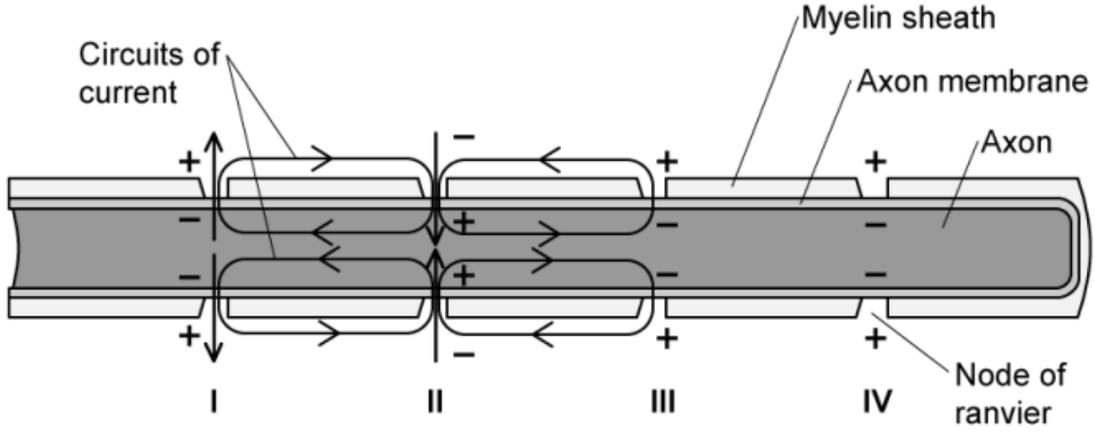
Time allowed: 10

Score: /5

Percentage: /100

Question 1

The diagram below shows the left to right transmission of an action potential in a myelinated axon by saltatory conduction.



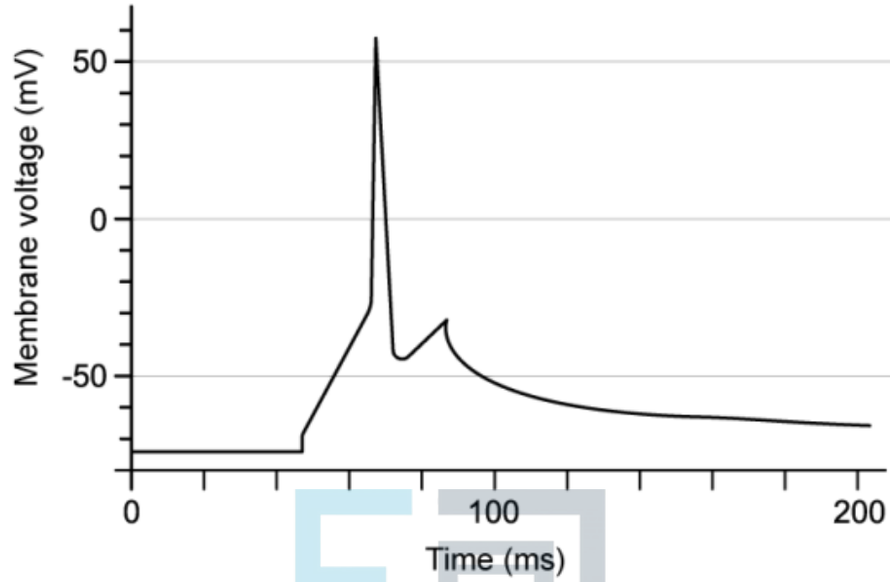
Which of the following rows correctly identifies **I – IV**?

	I	II	III	IV
A.	Node at resting potential	Node at action potential	Node at refractory period	Node becoming depolarised
B.	Node at refractory period	Node at action potential	Node becoming depolarised	Node at resting potential
C.	Node at action potential	Node at refractory period	Node becoming depolarised	Node at resting potential
D.	Node at refractory period	Node becoming depolarised	Node at action potential	Node at resting potential

[1 mark]

Question 2

The oscilloscope trace shown below was taken using a digital oscilloscope. It shows an action potential in a hippocampal pyramidal neurone of a potoroo (a small marsupial species) that occurred when the neurone was stimulated with a current pulse.



How many action potentials could be stimulated in this neurone every second?

A. 6

B. 60

C. 12

D. 7

[1 mark]

Question 3

Neonicotinoids are synthetic compounds similar to nicotine that are commonly found in pesticides. Neonicotinoids are considered to be especially suitable as pesticides because they're not toxic to humans and other mammals.

Which statements **I – IV** are the reasons for this?

I. A larger proportion of synapses in insects are cholinergic compared to mammals.

II. Neonicotinoids are more effective at preventing acetylcholinesterase from breaking down acetylcholine in insects compared to mammals.

III. Acetylcholinesterase in insects cannot break down neonicotinoids.

IV. Neonicotinoids bind more strongly to acetylcholine receptors in insects.

A. I and IV

B. I, II and IV

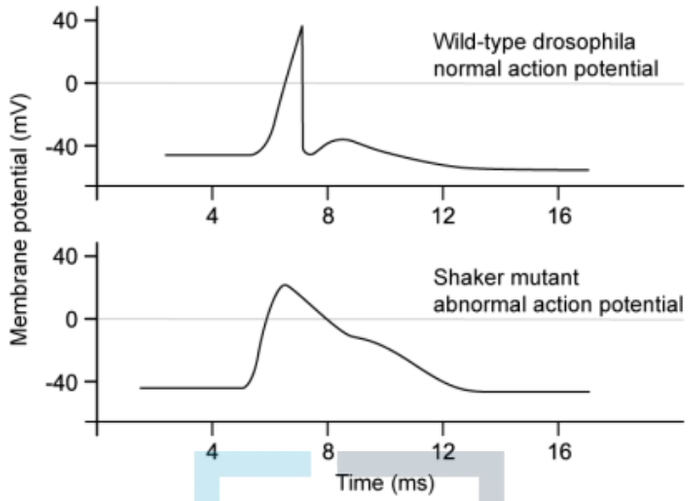
C. II and III

D. II only

[1 mark]

Question 4

A research group of geneticists found a fruit fly mutant that shakes vigorously when anaesthetized with ether. Their studies showed that the shaker mutant has K^+ channels that do not function properly. An action potential of a normal fruit fly and a shaker mutant is shown below.



Which of the following statements (**I – IV**) could be possible explanations for the differences between the action potentials?

I. The faulty K^+ channels don't open for as long so there is slower diffusion of K^+ ions.

II. The faulty K^+ channels may be opening early, preventing maximum depolarisation.

III. The faulty K^+ channels cause K^+ ions to diffuse back into the axon more slowly, resulting in slower repolarisation.

IV. In wild-type drosophila, the functioning K^+ channels allow for a faster rate of depolarisation.

A. I only

B. II and III

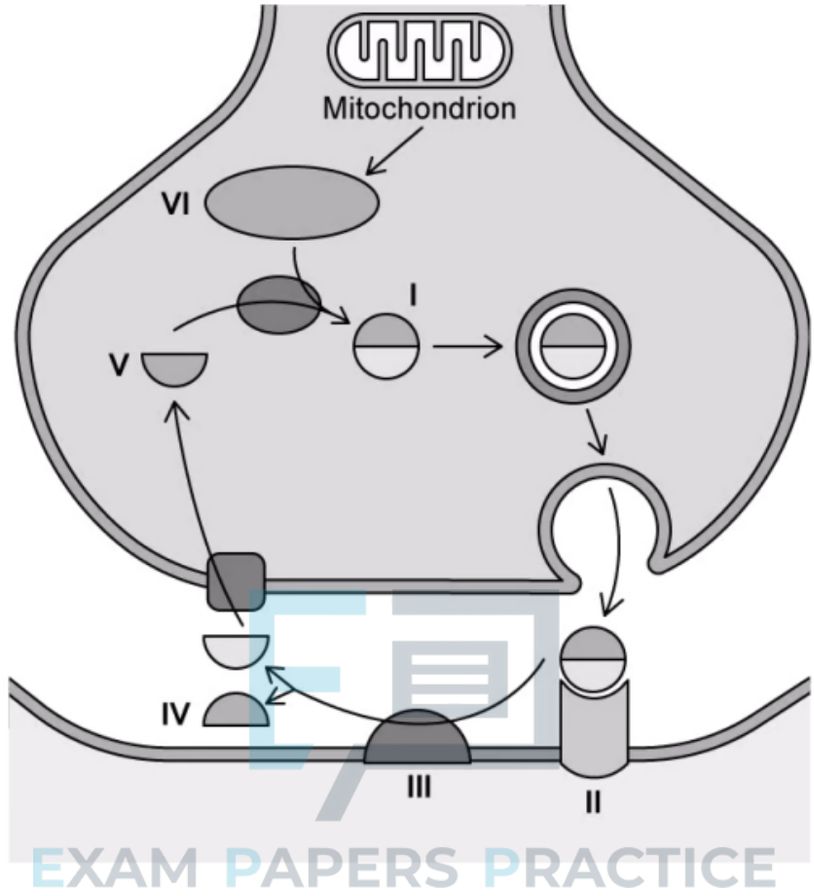
C. I, II and IV

D. I and II

[1 mark]

Question 5

Study the diagram below.



Which of the following table rows correctly identifies **I – VI**?

	I	II	III	IV	V	VI
A.	Acetylcholine	Acetyl-cholinesterase	Cholinergic receptor	Choline	Acetyl group	Acetyl-CoA
B.	Acetyl-cholinesterase	Acetyl-CoA	Acetylcholine	Cholinergic receptor	Choline	Acetyl group
C.	Acetylcholine	Cholinergic receptor	Acetyl-cholinesterase	Acetyl group	Choline	Acetyl-CoA
D.	Acetylcholine	Cholinergic receptor	Acetyl-CoA	Choline	Acetyl group	Acetyl-cholinesterase

[1 mark]