Mark schemes

Q1.

[AO1 = 1]

D – Sensory neuron

[1]

Q2.

[AO1 = 4]

Award **1 mark** for **each** of the following:

	Component
A	Cell body/soma
B	Dendrites
C	Node of Ranvier/axon
D	Terminal button/presynaptic terminal/axon terminal

[4]

Q3.

[AO1 = 4]

Level	Marks	Description
2	3-4	There is a clear description of **two or more** functions of the peripheral nervous system with some accurate detail. The answer is generally coherent with effective use of appropriate terminology.
1	1-2	There is limited or partial description of **two or more** functions of the peripheral nervous system. The answer lacks coherence and use of appropriate terminology. **OR** one function of the peripheral nervous system at Level 1/2.
	0	No relevant content.

Possible content:

- the peripheral nervous system (consists of the autonomic nervous system and somatic nervous system and) is responsible for transmitting messages to and from the central nervous system
- the somatic nervous system is responsible for transmitting information from sense organs to the central nervous system and transmitting information from the central nervous system to effectors such as muscles
- the autonomic nervous system (consists of the sympathetic nervous system and the parasympathetic nervous system and) is responsible for

transmitting information to and from internal bodily organs
- the sympathetic nervous system works alongside the endocrine system to bring about physiological arousal in the fight or flight response
- the parasympathetic nervous system works alongside the endocrine system to return the body to its resting state in the rest and digest response.

[4]

Q4.

[AO1 = 4]

Level	Marks	Description
2	3-4	Explanation of the process of synaptic transmission is detailed, clear and mostly accurate with use of appropriate scientific terminology.
1	1-2	Explanation of the process of synaptic transmission is incomplete/muddled. Scientific terminology is either absent or inappropriately used.
	0	No relevant content.

Possible content:
- electrical impulses (action potentials) reach the presynaptic terminal
- electrical impulses (action potentials) trigger release of neurotransmitters (or named example) from synapse vesicles
- neurotransmitters diffuse across the synaptic cleft
- neurotransmitters bind to receptors on the postsynaptic membrane.

Credit other relevant material (eg; labelled diagram – direction of transmission should be made clear; excitation/inhibition).

[4]

Q5.

[AO1 = 6]

Level	Marks	Description
3	5-6	Knowledge of the divisions of the nervous system is accurate and detailed. The answer is clear and coherent with effective use of terminology.
2	3-4	Knowledge of the divisions of the nervous system is evident but there may be some detail missing. The answer lacks clarity and/or accuracy in places. Use of terminology is inappropriate on occasions.
1	1-2	Knowledge of the divisions of the nervous system is limited or muddled. Use of terminology is either absent or inappropriate.
	0	No relevant content.

Possible content:

- the nervous system is divided into the central and peripheral nervous systems
- the CNS comprises the brain and spinal cord
- the peripheral nervous system is further divided into the somatic nervous system and the autonomic nervous system (ANS)
- the somatic nervous system consists of sensory and motor neurons to carry sensory and motor information to and from the CNS and also enables reflex actions
- the ANS acts largely unconsciously/involuntary
- the ANS is divided into the sympathetic nervous system (SNS) and the parasympathetic nervous system (PNS)
- the SNS prepares us for flight or fight
- the PNS balances the sympathetic nervous system providing 'rest and digest' functions.

Note: content presented in diagrams can be credited.

Credit other relevant material.

[6]

Q6.

[AO1 = 6]

Level	Mark	Description
3	5-6	Description is clear, accurate and detailed. Specialist terminology is used effectively.
2	3-4	Description is mostly clear but lacks detail in places. There is some appropriate use of specialist terminology. OR only structure/only function of a neuron at level 3.
1	1-2	Description is limited/muddled. The answer lacks clarity and accuracy. Specialist terminology is either absent or inappropriately used. OR only structure/only function of a neuron at level 1/2.
	0	No relevant content.

Possible content:

- Neurons enable communication within the nervous system
- the cell body (soma) contains the genetic material
- branch-like dendrites extend from the cell body (often with dendritic spines)
- dendrites carry functional information towards the cell body
- dendrites can receive information from other neurons
- axons carry messages away from the cell body
- axons can be myelinated to increase speed of nerve transmission (saltatory conduction between nodes of Ranvier)
- terminal boutons are at the end of axons, these make synaptic connections with other cells
- axon terminals contain neurotransmitters.

Credit other relevant material.

Note: credit references to structure and function of specific neurons (sensory, motor and relay).

Note: information presented in a diagram can be credited.

[6]

Q7.

(a) **[AO1 = 1]**

Autonomic nervous system.

1

(b) **[AO1 = 3]**

1 mark for identifying the somatic nervous system.

PLUS

2 marks for a clear and coherent explanation of the action of the somatic nervous system.

1 mark for a muddled or limited explanation of the action of the somatic nervous system.

Possible content:

- transmits sensory information from the body/sense receptors to the brain/central nervous system
- transmits information from the brain (via the spinal cord) to muscles/effectors to produce (voluntary) movements
- the somatic nervous system integrates the brain with the outside world
- some movements are involuntary such as in the reflex arc.

Credit other relevant information.

3

[4]

Q8.

[AO2 = 4]

Level	Mark	Description
2	3-4	The explanation of how Zapurpain might affect the process of synaptic transmission through inhibition is clear and coherent with effective use of terminology.
1	1-2	The explanation of how Zapurpain might affect the process of synaptic transmission through inhibition is partial/limited/muddled. Terminology may be absent or inappropriately used.
	0	No relevant content.

Possible content:

- Zapurpain mimics the effect of inhibitory neurotransmitters**,** stimulation of postsynaptic receptors by an inhibitory neurotransmitter result in inhibition (hyperpolarisation) of the postsynaptic membrane
- when an inhibitory neurotransmitter binds to the post-synaptic receptors it makes the post-synaptic cell less likely to fire (IPSP)
- Summation – if inhibitory inputs are higher than excitatory they can cancel out excitation and inhibit an action potential occurring/Zapurpain would decrease the overall activity
- Zapurpain would make the post-synaptic cell less likely to fire
- reducing brain activity may lead to reduced pain.

Credit other relevant material, eg information embedded in a labelled diagram – direction of transmission should be made clear.

[4]