Unit Test Neuro: Core ( Topic 6.5) and Options E ( Topics 1,2,4) HL ( E.5- portions)

6.5.1 State that the nervous system consists of the central nervous system (CNS) and peripheral nerves and is composed of cells called neurons that can carry rapid electrical impulses. (1)

6.5.2 Draw and label a diagram of the structure of a motor neuron. (1)

6.5.3 State that nerve impulses are conducted from receptors to the CNS by sensory neurons, within the CNS by relay neurons and from the CNS to effectors by motor neurons. (1)

6.5.4 Define *resting potential* and *action potential* (depolarization and repolarization) (1)

6.5.5 Explain how a nerve impulse passes along a non-myelinated neuron. (3)

6.5.6 Explain the principles of synaptic transmission. (3)

Option Neurobiology: Paper III ( Options- SL/ HL E1.-4; additional for HL E.5-6)

**Option E: Neurobiology and behavior**

**E.1 Stimulus and Response**

E.1.1 Define the terms *stimulus, response,*  and *reflex* in the context of animal behavior. (1)

E.1.2 Explain the role of receptors, sensory neurons, relay neurons, motor neurons, synapses and effectors in the response of animals to stimuli. (3)

E.1.3 Draw and label a diagram of a reflex arc for a pain withdraw reflex including the spinal cord and its spinal nerves, the receptor cell, sensory neuron, relay neuron, motor neuron and effector. (1)

E.1.4 Explain how animal responses can be affected by natural selection, using two examples. (3)

**E.2 Perception of stimuli**

E.2.1 Outline the diversity of stimuli that can be detected by human sensory receptors, including mechanoreceptors, chemoreceptors, thermoreceptors and photoreceptors. (2)

E.2.2 Label a diagram of the structure of the human eye. (1)

E.2.3 Annotate a diagram of the retina to show the cell types and the direction in which light moves. (2)

E.2.4 Compare rod and cone cells. (3)

E.2.5 Explain the processing of visual stimuli including edge enhancement and contralateral processing. (3)

E.2.5 Label a diagram of the ear. (1)

E.2.6 Explain how sound is perceived by the ear, including the roles of the eardrum, bones of the middle ear, oval and round windows and the hair cells of the cochlea. (3)

**E.3 Innate and learned behavior**

E.3.1 Distinguish between *innate*  and *learned*  behavior. (2)

E.3.2 Design experiments to investigate innate behavior in invertebrates, including either a taxis or a kinesis. (3)

E.3.3 Analyse data from invertebrate behavior experiments in terms of the effect on chances of survival and reproduction. (3)

E.3.4 Discuss how the process of learning can improve the chance of survival. (3)

E.3.5 Outline Pavlov’s experiments into conditioning of dogs. (2)

E.3.6 Outline the role of inheritance and learning in the development of birdsong in young birds. (2)

**E.4 Neurotransmitters and synapses**

E.4.1 State that some presynaptic neurons excite postsynaptic transmission and others inhibit postsynaptic transmission. (1)

E.4.2 Explain how decision making in the CNS can result from the interaction between the activities of excitatory and inhibitory presynaptic neurons at synapses. (3)

E.4.3 Explain how psychoactive drugs affect the brain and personality by either increasing or decreasing postsynaptic transmission. (3)

E.4.4 List three examples of excitatory and three examples of inhibitory psychoactive drugs. (1)

E.4.5 Explain the effects of THC and cocaine in terms of their action at synapses in the brain. (3)

E.4.6 Discuss the causes of addiction, including genetic predisposition, social factors and dopamine secretion. (3)

***HIGHER LEVEL EXAM E.5 The Human Brain***

*Label, on a diagram of the brain, the medulla oblongata, cerebellum, hypothalamus, pituitary gland an cerebral hemispheres. (1)*

*Outline the functions of each of the following parts of the brain: the medulla oblongata, cerebellum, hypothalamus, pituitary gland an cerebral hemispheres. (2)*

*Explain how animal experiments, lesions and FMRI (functional magnetic resonance imaging) scanning can be used in the identification of the brain part involved in specific functions. (3)*

*Explain sympathetic and parasympathetic control of the heart rate, movements of the iris and flow of blood to the gut. (3)*

*Explain the pupil reflex. (3)*

*Discuss the concept of brain death and the use of the pupil reflex in testing for this. (3)*

*Outline how pain is perceived and how endorphins can act as painkillers. (2)*

***E 6 Further studies of behavior***

*Describe the social organization of honey bee colonies and one other non-human example. (2)*

*Outline how natural selection may act at the level of the colony in the case of social organisms. (2)*

*Discuss the evolution of altruistic behaviors using two non-human examples. (3)*

*Outline two examples of how foraging behavior optimizes food intake, including bluegill fish foraging for Daphnia (2)*

*Explain how mate selection can lead to exaggerated traits. (3)*

*State that animals show rhythmical variations in activity. (1)*

*Outline two examples illustrating the adaptive value of rhythmical behavior patterns. (2)*