

INSTRUCTIONS TO CANDIDATES:

This paper consists of **THREE** sections

SECTION A questions are worth 5 marks each. You must answer **three** questions from this section (15 marks in total)

SECTION B questions are worth 10 marks each. You must answer **four** questions from this section (40 marks in total)

SECTION C questions are worth 15 marks each. You must answer **three** questions from this section (45 marks in total)

Section A Answer **three** questions from this section

- 1.** Name five of the major internal features of a typical neuron.

Any five of the following:

Endoplasmic reticulum
Cytoplasm
Ribosomes
Golgi complex
Nucleus
Mitochondria
Microtubules
Synaptic vesicles
Neurotransmitters

5 marks

- 2.** Briefly explain the functions of the sub-divisions of the peripheral nervous system (PNS).

Somatic nervous system interacts with external environment. Afferent nerves take sensory signals to CNS, efferent nerves take motor signals from CNS to muscles. Autonomic nervous system interacts with internal environment, afferent nerves take signals from internal organs & efferent take signals to internal organs. Sympathetic nervous system produces fight or flight response, parasympathetic rest & restore, these two oppose at the target site.

5 marks

- 3.** Name five of the protective structures in the human brain.

Any five of:

Dura mater

Arachnoid membrane

5 marks

Subarachnoid space

- Meninges gets one mark if none of the above three have been given

Pia mater

Cerebrospinal fluid

Ventricles

Blood-brain barrier

4. List the five positive symptoms of schizophrenia.

Delusions

Hallucinations

Inappropriate affect

Incoherent speech or thought

Odd behaviour

5 marks

5. Briefly describe the duplexity theory of vision.

Rods & cones mediate different types of vision. Cones for photopic vision, needs good light, high acuity, fine detail, colour perception. Rods for scotopic vision, more sensitive but less fine detail, no colour, low light vision. More rods than cones but fovea made up of cones only.

5 marks

6. Why is neural regeneration in the peripheral nervous system (PNS) more likely than regeneration in the central nervous system (CNS)?

Schwann cells in the PNS clean up and guide & repair nerves if damage is not too extensive. Oligodendroglia (oligodendrocytes) in CNS (no schwann cells), these don't clean up so little damage repair.

5 marks

Section B Answer four questions from this section

- 7** Compare and contrast Positron Emission Tomography (PET) with functional Magnetic Resonance Imaging (fMRI) as techniques for studying the brain.

PET – brain activity shown using radioactive 2DG as imaging marker, backwards imaging of areas most active during an activity – produces coloured map of activity – estimated by superimposing scan on to brain image. FMRI – flow of blood to active brain areas using BOLD signal, no injections into body. Structure & function in same image. Better spatial resolution & 3D imaging.

10 marks

- 8** Briefly explain how the membrane resting potential is changed to activate an action potential.

Resting potential at -70mV, EPSPs and IPSPs working together through temporal and spatial summation to change potential to -65mV, when leading to action potential activation.

10 marks

- 9** Briefly describe the seven steps to neurotransmitter activation.

Synthesis molecules; store in vesicles; leakage destroyed by enzymes; AP sends vesicles to pre-synapse button & releases NT into synaptic cleft; NT binds to autoreceptors to stop other NT release; NT binds to post-synapse receptors; NT in synapse deactivated (reuptake or enzyme degradation).

10 marks

- 10** Briefly describe how the retina converts light into neural signals.

Light travels through lens etc., & outer four layers to activate receptors. Activation back out through cells (horizontal, bipolar & amacrine) to retinal ganglion cells.

10 marks

11 What effect does stress have on immune function?

Can use Segerstrom & Miller (2004) meta-analysis to define acute & chronic stress and cover main findings. Cytokines help body combat infection short-term, but long-term cytokine release bad for the body.

10 marks

12 What are the advantages and disadvantages of using laboratory animals for biopsychological research?

Can use a number of issues here to do with transgenics, similarities & differences in brain chemistry & structure and the implications of this for types of research, nature & complexity of disorder must be considered (e.g., testing language areas in mice may be useful, testing sentence structure on them isn't!).

10 marks

13 What are the primary storage areas of human memory and why may it have been that the brain evolved in this way?

Info on a few of the following – hippocampus (spatial memory), perirhinal cortex (object memory), mediodorsal nucleus, basal forebrain, IT cortex (sensory memory), amygdala (emotional significance), PF cortex (episodic & working memory), cerebellum (learned sensorimotor skills), striatum (SR). Storage linked to immediate areas of usefulness, diffusion across brain prevents catastrophic damage to all at one site.

10 marks

14 Briefly explain one of the biopsychological theories of drug addiction.

One from:

10 marks

Physical dependence – requirements of using drug to avoid physiological withdrawal. Use evidence from e.g., Gawin, Leshner –

detox therapy & general failure suggests theory does not explain addiction very well.

Positive-incentive theory – craving of pleasure responsible for addiction. Hedonic effects, differences between PI & Hedonic value, discrepancy over time, fails to explain why some become addicted & others don't, use Cardinal & Everitt, Ahmed, Redish in support.

Incentive-sensitisation – sensitised PI value in addiction-prone people – anticipated pleasure over liking of drug & supporting evidence.

Section C Answer three questions from this section

- 15** Describe the cascade theory of cerebral ischemia and explain why it is so problematic for detection and treatment of stroke.

Must cover apoptosis, glutamate release, etc., and how this creates difficulties for fast identification of initial site, danger of alteplase use, all supported by evidence from studies.

15 marks

- 16** Briefly describe the case of amnesia in patient H. M., and explain what findings from the study of H. M. suggest regarding the biological structure of human memory.

Brief description of HMs main issues (amnesia, inability to transfer info from STM to LTM, intact areas – the main focus should then be

15 marks

on the research and how it has informed our understanding of STM – LTM transfer, working memory, implicit/explicit dissociation, procedural/semantic etc. along with research authors.

- 17** Briefly describe the monoamine and diathesis-stress theories of depression and evaluate which provides the better explanation.

Brief descriptions of both theories required, monoamine focusing upon the brain-chemistry issue and diathesis-stress focusing on the issue of susceptibility (backed up by the research studies) – evaluation the most important part here and must set out and justify why the one you choose is a better explanation.

15 marks

- 18** Briefly explain and evaluate the James-Lange and Cannon-Bard physiological theories of emotion.

Brief explanation of each of the theories – main focus here should be on the evaluation of each of them – against each other using research evidence (e.g., animal cortex studies, Schacter, studies of paralysed patients) but also incorporating additional theories e.g., appraisal etc.

15 marks

- 19** Briefly evaluate the evidence for a structural dissociation in language production and comprehension.

Explain what is meant by structural dissociation and present the research evidence e.g., Broca, Warrington, etc. to come to a conclusion re: dissociation.

15 marks

- 20** Briefly evaluate the evidence for a 'gate theory' of pain.

Briefly set out gate theory, Melzack & Wall, then evaluate research and criticisms of the theory.

15 marks

Overall Comments

Generally a good set of exam papers.

Most people picked up marks on Section A (although there were a number of people who gave external features of a neuron instead of internal features).

Section B – again, for most questions people picked up a good number of marks – some marks lost by people in over-explaining basics when time and space would have been better spent providing simple supporting research evidence to back up what they were saying. The main error made in this section by a number of people was on the primary storage areas question (Q13) – focusing upon STM and LTM – that is wrong, STM & LTM are cognitive theories not storage areas – this is Biological Psychology, the focus is upon the structure and function of the brain not the cog theories.

Section C – the answers I have given here are brief because there are so many ways that the questions can be answered depending upon the sources used for revision – therefore I have just pointed in the direction of what should have been covered. Overall some good answers, the focus of the HM question sometimes didn't cover enough on what HMs case had shown us about biological structure of human memory, but where this was done it was also done very well by some. A number of good answers on the cerebral ischemia and gate theory questions as well.