

M5X00908 – Brian, Behaviour, and Cognition: Biological Psychology
Indicative Exam Answers 2015/2016 (May)

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

Q1: What are the similarities and differences between somatosensory pain and neuropathic pain?
Neuropathic is severe chronic in absence of stimulus, somatosensory is picked up by sensation in free nerve endings. (5 marks)

Q2: Name five of the major internal features of a typical neuron.

Any 5 of the following: Mitochondria, Nucleus, Endoplasmic reticulum, Cytoplasm, Ribosomes, Golgi complex, Microtubules, Synaptic vesicles, Neurotransmitters. (5 marks)

Q3: Name the four main routes of drug administration.

Ingestion (orally), Injection, Inhalation, Absorption through mucus membrane. (5 marks)

Q4: What are the five major classes of anxiety disorders?

Generalised; Phobic; Panic; Obsessive Compulsive Disorder; Post Traumatic Stress Disorder. (5 marks)

Q5: Briefly describe the process for the three phases of clinical trials required for testing a new drug.
Basic research – development of methods & testing animals; Human Clinical trials – 3 phases: screening for safety, establish effective dose, demonstration of therapeutic action; Selling to public: recover costs & monitor safety. (5 marks)

Q6: What are the five levels of hierarchical organisation in the human sensory system?

Specificity; Sensation; Perception; Functional Segregation; Parallel Processing.
Would also have accepted Receptors; Thalamic Relay Nuclei, Primary sensory cortex, Secondary sensory cortex, Association Cortex (but students should be aware that this is the former model). (5 marks)

SECTION B: Answer FOUR questions from this section

Q7: Compare and contrast x-ray Computed Tomography (CT) with functional Magnetic Resonance Imaging (fMRI) as techniques for studying the brain.

CT shows structure of the brain, creates x-ray scan of one horizontal section of brain – 8/9 sections per patient.

fMRI provides structure and function – BOLD signal of blood in brain, good/better spatial resolution, 3D images of entire brain. Higher marks if discussed in comparison. (10 marks)

Q8: Briefly describe the **neuropathology** of Alzheimer's disease.

Discuss gross changes in various structures of the brain – e.g., medial temporal lobe structures, such as entorhinal cortex, amygdala and hippocampus (i.e., structures involved in various aspects of memory) and structures such as inferior temporal cortex, posterior parietal cortex, and prefrontal cortex (areas that mediate complex cognitive function). Discuss cellular and neurotransmitter disturbances (e.g., levels of acetylcholine). (10 marks)

Q9: 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)

Q10: Explain how drug tolerance and drug sensitisation work upon the brain.

Dose-response curves; dose has less effect or higher dose needed for same effect. Sensitisation works in the other direction. Can lead to cross-tolerance to other drugs. Can be metabolic/functional (psychoactive drugs); contingency can play a role in tolerance.

Q11: What effect does stress have on immune function?

Acute stressors leading to improvement of immune function (eustress), Chronic stressors harming (distress); Short/Long-term cytokine release. Effect of glucocorticoids. (10 marks)

Q12: Briefly describe the characteristics and causes of epileptic seizures, and the methods used to diagnose the condition.

Preceded by an aura, smell or hallucination, Convulsions, changes in thought, mood and behaviour. Discuss brain damage, genes and faults in inhibitory synapses. The answer can include a discussion of the difference between partial and generalised epileptic seizures. (10 marks)

Q13: How is the brain damaged by cerebrovascular disorders?

Stroke/haemorrhage/Ischemia/ basics of how they happen (clots/bleeds etc). Main issue – is apoptosis cell death and the release of cytokines at infarct site. (10 marks)

Q14: Briefly describe the main memory locations identified in the human brain and explain why the brain may have developed these separate locations for memory storage.

Different locations for different types of information: inferior temporal cortex for visual information; amygdala for emotionally significant memories, prefrontal cortex for working memory, cerebellum for sensorimotor skills.

Important to answer second part – why? Linked to other brain facets such as amygdala being important for emotion, and also as a protection to prevent devastating effects of damage to one particular area (some memory items will be damaged but others preserved). (10 marks)

SECTION C: Answer **THREE** questions from this section

Q15: Briefly **evaluate the bio-psychological evidence** for fear conditioning.

Discuss **neural mechanisms** of fear conditioning and pathways in the brain. Discuss **brain areas** (e.g., amygdala, hippocampus) associated with fear and contextual fear conditioning, and provide evidence from lesion studies. (15 marks)

Q16: Briefly **evaluate** the evidence for genetic and neurodevelopmental causal factors of schizophrenia.

Genetics – need to focus on concordance rates 10% familial rate, 45% in MZ twins. Raise issue of <100% and what this suggests. Comment on failure to find specific genes for higher marks and report study (Hall et al.); genetic susceptibility for neurodevelopmental disorder for higher marks; discuss dopamine theory and limitations. Good answers will draw these all together in evaluation. (15 marks)

Q17: 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)

Q18: Briefly evaluate the evidence for long-term potentiation as a mechanism for learning.

Strengthening of synapses by repeated stimulation. Link to work of Hebb. Examinations of brain areas associated with learning. Evidence from brain chemistry. (15 marks)

Q19: Briefly **evaluate the causal factors** of affective disorders.

The answer should discuss the role of genetics; stressful experiences, with a link to PTSD; and seasonal affective disorder. The strengths and weakness of each causal factor should be provided with reference to relevant empirical studies to support discussion. (15 marks)

Q20: Explain, giving specific examples of test items, why a Common Neuropsychological Test Battery is of use when examining patients with suspected neurological disorders.

Wide-ranging variety of tests to ascertain neuropsychological functioning; IQ (e.g., WAIS), Memory (e.g., digit span), Language (token test) Language Lateralisation (dichotic listening/sodium amytal). Answer MUST explain at least two examples of specific tests to some extent to score higher marks). (15 marks)

Overall Comments

Generally a good set of exam papers. Most people picked up marks on Section A (although there were some 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. Question 11 (Stress), question 12 (epileptic seizures), and question 13 (cerebrovascular disorders) were answered very well by most. However, the main error made in this section by a number of people was not answering the specifics of the question. A number of people missed out answering the comparison element of Q7 and instead just described the 2 techniques. Similarly with Q8 (Alzheimer's disease), most people described the characteristics of the disease instead of answering the specific question, which asked about the neuropathology of the disease.

Section C – the indicative answers given here are brief because there are so many ways that the questions can be answered – therefore the direction of what should have been covered has been noted. There were a number of good answers on question 16 (Schizophrenia). However, again the main error made in this section was not answering the specific question being asked. This was particularly prevalent for the following questions:

Q15 (fear-conditioning) – instead of evaluating the bio-psychological evidence, many people were describing the behavioural process of fear condition.

Q17 (theories of emotion) – many people described the James-Lange and Cannon-Bard physiological theories but offered no evaluation or research evidence.

Q19 (Affective disorders) – for this question most people described the different affective disorders and mentioned the characteristics, whereas the question was specifically asking for an evaluation of the causal factors, which requires critique and inclusion of research evidence.