

Paper 2

Section B : Biopsychology

1 With reference to the sleep—wake cycle, distinguish between endogenous pacemakers and exogenous zeitgebers. [4 marks]

Ans.

- endogenous pacemakers = internal regulators of biological rhythms; exogenous zeitgebers = external regulators of biological rhythms
- e.g. suprachiasmatic nucleus (SCN) in the hypothalamus regulates the sleep-cycle as an endogenous pacemaker; sunlight acts as an exogenous zeitgeber for the same

2 Paul does not like rollercoasters. His mouth goes dry, his heart beats fast and he sweats in the queue while waiting for the ride. With reference to the fight-or-flight response, explain why his body reacts this way. [4 marks]

Ans.

- hypothalamus detects threat in the rollercoaster ride;
- signals the pituitary gland to activate the adrenal medulla;
- in turn releases adrenaline which causes symptoms like dry mouth, heart mouth;
- by activating the sympathetic nervous system that arouses the body

3 (a) Which of the following areas of the brain is being defined in each of the examples below? Choose one area of the brain that matches each function. Use each letter once only.

- **A - Broca's area**
- **B - Motor area**
- **C - Somatosensory area**
- **D - Wernicke's area**

- **(i) Area of the brain responsible for the production of speech.**
- **(ii) Area of the brain responsible for comprehension of speech.**
- **(iii) Area of the brain responsible for processing inputs from touch. [3 marks]**

Ans.

- **A-i; C-iii; D-ii**

(b) Explain what the function of a neuron is. [2 marks]

Ans.

- **transmit messages between brain and spinal cord; and rest of the body;**
- **transmission is done through electrochemical messages**

(c) Explain the process of synaptic transmission. [3 marks]

Ans.

- **presynaptic axon releases neurotransmitter**
- **released into the synaptic cleft**
- **received by the postsynaptic dendrite**

5 Describe and evaluate any two ways of investigating the brain. [8]

Ans.

- **AO1**

- **one way = fMRI** - functional scanning = shows activity of brain areas;
 - works on BOLD principle - detects increased oxygen being drawn by active areas in the brain;
 - *used in many studies in psychology to investigate areas active for cognitive processing e.g. frontal lobe activation for planning and decision-making*
- **second way = EEG** - temporal detection of neuronal activity = detects neurons generating nerve impulses
 - electrodes detect neuronal activity and transmit onto a monitor that outputs as brain waves
 - frequency and amplitude of the waves can be assessed for gauging degree of arousal in different brain areas
 - *used in many studies in psychology to investigate stages of sleep and dreaming e.g. association between REM and dreaming*

- **AO3**

- **P = strength of fMRI = high resolution of the brain**
- E = detailed images of even small parts of the brain e.g. amygdala during fear response
- E = precise localisation = exactly which brain areas contribute to which behaviour
- L = increases usefulness and application of technique
- C = however, time lag
 - slight delay in producing output once brain activity has occurred
 - could result in non-detection of some minute fluctuations in brain activity
- **P = strength of EEG = real time output of neuronal activity**
- E = immediately as activity occurs in the brain, waves are produced continuously on the monitor e.g. stage 2 - spindles occasionally - outputted immediately
- E = this enables precise detection of correspondence between activity in a particular region of the brain and a certain behaviour
- L = increases validity of the technique
- C = however, no detailed images of the brain outputted
 - so precise visual assessment of specific brain areas active during a behaviour not possible to detect

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