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The University of Melbourne

Semester Two 2005

Department: Anatomy and Cell Biology
Subject Number: 516-305/512-975
Subject Title: Neuroscience: Systems and Higher Functions

Exam Duration: 2 hours

Reading Time: 15 minutes

This paper has 2 pages

Authorized materials:

None allowed

Instructions to Invigilators:

Script Books: 6 x 6 page
Exam paper may be removed from the exam room

Instructions to Students:

This exam has 6 questions
Each of the questions should take 20 minutes.
Each question is worth equal marks
YOU MUST ATTEMPT ALL QUESTIONS
Answer all questions in the script books provided.
BEGIN EACH QUESTION IN A NEW SCRIPT BOOK.

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BEGIN EACH QUESTION IN A NEW SCRIPT BOOK.

1. Critically evaluate the idea that it may be possible to encourage the regrowth of damaged axons in the CNS by interfering with the natural inhibitory effect of myelin and oligodendrocytes. (20 marks)

2. (a) Describe how photoreceptors respond to light. (5 marks)
(b) Describe the neural circuits that underpin transfer of information through the retina. (10 marks)
(c) Describe how ganglion cells respond to light. (5 marks)

3. A person takes a cold orange out of the refrigerator.
(a) What receptors in the skin are engaged and what sorts of information do they relay to the brain (10 marks).
(b) Briefly describe the pathways that relay the information to the cerebral cortex (10 marks).

4. Describe and discuss the evidence supporting the hypotheses that:
(a) Synaptic plasticity is involved in learning and memory in healthy individuals. (10 marks)
(b) Deficits of synaptic plasticity mediate learning and memory deficits (dementia) in specific brain disorders. (10 marks)

5. To illustrate the distinction between pain and nociception, describe conditions in which a normally innocuous stimulus can be experienced as painful, and in which noxious stimuli that might normally be painful do not give rise to pain. (20 marks)

6. Discuss the current views on ageing of the brain and dementia of the Alzheimer type. Include in your answer reference to structural, biochemical and functional changes as appropriate. (20 marks)

End of Examination