

OLLSCOIL NA hÉIREANN, GAILLIMH  
NATIONAL UNIVERSITY OF IRELAND, GALWAY

Semester 1, 1999

B.Sc. (Hons.)

**PHYSIOLOGY**

Examiners: Prof. J.V. McLoughlin, Prof. M.T. Kane, Dr. D. Colbert, Dr. A. Hynes,  
Dr. L. Quinlan

Time Allowed: **Three** hours. Answer **Section A** and **Section B**.

Please use a separate Answer Book for Section A (question number 1)

**SECTION A** (40%)

1. Consider that you have carried out an experiment on the effects of 2 drugs on glucose levels in diabetic rats and you have 2 levels of drug A (0, 5 mg/day) and 3 levels of drug B (0, 1 and 5 mg/day). The experiment is set up as a factorial: i.e. each level of each drug is tested with each level of the other drug, thus one has 6 different treatments. The experiment is carried out in two parts or blocks as follows. The first part is carried out in the month of May with 10 animals per treatment; it is repeated in August with the same number of animals per treatment. Set up the analysis of variance table from the results given below and answer the question "is there a significant main effect of either of the two drugs on blood glucose level" and also "is there a significant interaction effect of the drugs". How would you have carried out the analysis if the Blocks $\times$ Treatments interaction had been significant?

Necessary data

Corrected Sums of Square

Total 30,000; Blocks 3,000; Treatments 18,000, Blocks $\times$ Trts 800.

The Treatment Sum of Squares can be further subdivided into Drug A SS 4,000; Drug B SS 9,000 and Drug A  $\times$  Drug B Interaction ?.

Discuss the presence or absence of an interactive effect in the light of the treatment mean values below.

Mean values (mg glucose/100 ml)

A0 + B0, 160	A0 + B1, 130	A0 + B5, 100
A5 + B0 140	A5 + B1 125	A5 + B5 110

**SECTION B** (60%)

2. Compare transmission at the neuromuscular junction and the synapse.
3. Compare nerve and cardiac action potentials.
3. Discuss the role of antidiuretic hormone (ADH) in water retention and the formation of a concentrated urine.
4. Describe the control of the endocrine pituitary by the hypothalamus.
5. Describe the process of absorption of carbohydrates in the GIT.
6. Discuss the short term control of arterial blood pressure.
7. Write a short essay on compliance in the lungs.
8. Describe the response to an acute loss of 1.5 litres of blood.