

Summer Examinations, 1998

B.Sc. (Hons.)

PHYSIOLOGY

FIRST PAPER

Professor N.G. McHale

Professor M.T. Kane

Dr. A.C. Hynes

Time Allowed: **Three hours.** Answer **Question number 1** which is compulsory and three questions from Section B

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

SECTION A

1. Consider that you have carried out an experiment on the effects of 4 drugs on glucose levels in diabetic rats and you also have a control No Drug treatment. The experiment is carried out in three parts or blocks as follows. The first part is carried out in the month of September with 10 animals per treatment; it is repeated in October and again in November with the same number of animals per treatment in each month. Set up the analysis of variance table from the results given below and answer the question "is there a significant effect of drugs on blood glucose level". How would you have carried out the analysis if the Blocks \times Treatments interaction had been significant?

When you have carried out the above analysis then carry out a Tukey's HSD post hoc test to determine the significance of the differences between the treatment means and indicate either by subscript letters or lines the significant and non-significant differences between treatments. Is the Tukey's test the best test to use in the above experiment? If not what in your opinion is the best test to use? Why?

Necessary data

Corrected Sums of Square

Total 25000; Blocks 2000; Treatments 12000, Blocks \times Trts 1000.

Formula for "w" $w = q_a(p, n) \bar{Sx}$ and note that $\bar{Sx} = \sqrt{\frac{S^2}{r}}$

For the above data $q_a = 3.92$ (for the 0.05 level) and 4.71 (for the 0.01 level).

Means values

Control 150; Drug A 152; Drug B 138; Drug C 195, Drug D 120

SECTION B

2. Discuss the relative advantages and disadvantages of gel permeation, ion exchange and reverse phase chromatography in the separation of biological molecules. What is gradient elution and what are its specific advantages?
3. Monoclonal antibodies are often used in hormone assays. Describe the procedure for producing such antibodies. When might monoclonal antibodies have disadvantages as compared with polyclonal antibodies?
4. Discuss the questions of pH control (how is it done), osmolarity (how is it made up) and energy substrates for culture of tissue culture cells. Calculate the expected pH of a tissue culture medium containing 25 mM bicarbonate and having a 5% CO₂ atmosphere (assuming other buffers are not significant).
5. Write an essay on the use of ES cells from the points of view of their derivation, how continuous proliferation is maintained in tissue culture, their interesting properties and how they are been used to study gene function.
6. Discuss with examples the methods of immunohistochemical staining used for light microscopy