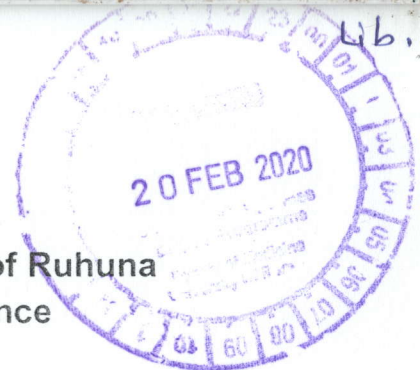




Faculty of Allied Health Sciences, University of Ruhuna
Department of Medical Laboratory Science
Year End Examination Year 2, 8th Batch,



MLS 3102: Basic Genetics, Molecular Genetics &
Molecular Biology - Paper II

12th July 2018

Time: 10.00 am to 12.00 noon.

Duration: Two hours

Answer all four questions.

Index Number.....

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1. An important principle in biology is that the structure determines function.
- 1.1 State **three** key characteristics/functions of genetic material. (15 marks)
- 1.2 Describe the essential features of the Watson and Crick model of the structure of the DNA (30 marks)
- 1.3 Explain how the structure of DNA facilitates functions mentioned in 1.1 (30 marks)
- 1.4 Briefly describe how point mutations can affect protein structure and function (25 marks)
- 2.
- 2.1 Briefly describe the Hardy-Weinberg Principle (15 marks)
- 2.2 How can one determine whether or not a population is in Hardy-Weinberg equilibrium? What factors need to be considered? (20 marks)
- 2.3 About one child in 2,500 is born with phenylketonuria; an inability to metabolize the amino acid phenylalanine.
- 2.3.1 State the pattern of inheritance of the disease condition. (05marks)
- 2.3.2 If the population is in Hardy-Weinberg equilibrium for this trait, what is the frequency of the phenylketonuria allele? (15 marks)
- 2.3.3 What proportion of the population are carriers of the phenylketonuria allele (that is, what proportion are heterozygous)? (10 marks)
- 2.4 Prepare a table to explain the types of chromosomes; including information on its arms, centromere position, labelled diagrams. (12 marks)
- 2.5 List **four** methods used in diagnosis of genetic diseases. (08 marks)
- 2.6 Briefly describe the importance of SRY gene. (15 marks)
3. Briefly describe the following topics
- 3.1 Use of plasmids as vectors for gene cloning (30 marks)
- 3.2 Process of DNA sequencing (40 marks)
- 3.3 Gene therapy (30 marks)

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- 4.
- 4.1 State **two** congenital disease conditions which have the pattern of autosomal recessive inheritance. (10 marks)
- 4.2 List **four** characteristics of the autosomal recessive inheritance stated in 4.1 (20 marks)
- 4.3 Neurofibromatosis is a genetic disorder characterized by skin pigmentation and growth of tumours under skin and nerves.
- 4.3.1 What is the genetic etiology of the above condition? (10 marks)
- 4.3.2 Briefly describe the action of the tumor predisposing gene related to the above condition. (20 marks)

- 4.4
- 4.4.1 List **four** structural abnormalities of chromosomes leading to hereditary disorders (20 marks)
- 4.4.2 State **two** diseases which have a predisposing risk of developing cancers? (20 marks)