



UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES

DEPARTMENT OF PHARMACY

FOURTH BPHARM PART II EXAMINATION – SEPTEMBER 2023

PH 4231 MOLECULAR GENETICS – SEQ PAPER

TIME: TWO HOURS

INSTRUCTIONS

- There are **four** questions in part A and B in this SEQ paper.
- Answer all questions.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

PART A

1.

1.1. In human, the ability to roll the tongue (R) is dominant over non-rolling (r) and brown eyes (B) are dominant over blue eyes (b). Suppose a woman who is heterozygous for tongue-rolling and has blue eyes marries a man who is heterozygous for both these characteristics.

1.1.1. State the genotypes of the mother and the father. (10 marks)

1.1.2. Draw a Punnett square and determine the possible offspring. (20 marks)

1.1.3. Mention the possible phenotypes of the offspring and probability of each phenotype. (20 marks)

1.2. Briefly describe the concept “polygenic trait” using examples where necessary.

(20 marks)

1.3.

1.3.1. What is a pedigree chart? (05 marks)

1.3.2. State a primary use of analyzing pedigree charts. (10 marks)

1.4. Briefly explain the significance of karyotyping in the medical field.

(15 marks)

2.

2.1. Mention two types of regulatory proteins involved in prokaryotic gene expression.

(10 marks)

2.2. Briefly describe the process by which pre-mRNA converts into mature mRNA.

(15 marks)

2.3. List five major differences between prokaryotic and eukaryotic transcription.

(25 marks)

PART B

2.4. Gene transfer contributes significantly to the adaptability and evolutionary success of microbes.

2.4.1. List three horizontal gene transfer mechanisms of prokaryotes. (05 marks)

2.4.2. Briefly describe each mechanism mentioned in 2.4.1. (15 marks)

2.4.3. Griffith's experiment was a ground-breaking study that provided key insights into bacterial gene transfer mechanisms. Briefly explain the Griffith's experiment. (30 marks)

3.

3.1. Mutations play a crucial role in enhancing genetic diversity in microbes.

3.1.1. List four types of bacterial mutants. (10 marks)

3.1.2. State the difference between small-scale and large-scale mutations. (10 marks)

3.1.3. Briefly describe the silent mutations. (10 marks)

3.1.4. Briefly describe two main DNA repair mechanisms that minimize mutations. (20 marks)

3.2.

3.2.1. Briefly describe four applications of recombinant DNA technology. (20 marks)

3.2.2. Explain the process of recombinant DNA technology. (30 marks)

4. Genetic disorders can lead to a wide range of physical, developmental, and biochemical abnormalities.

4.1. State the difference between Mendelian and non-mendelian disorders. (10 marks)

4.2. Briefly describe the autosomal recessive disorders and give two examples. (20 marks)

4.3. Mention five chromosomal disorders and briefly describe two of them. (30 marks)

4.4. Write short notes on the following topics. (40 marks)

4.4.1. Structure of chromosome

4.4.2. Sex chromosomes

4.4.3. X-linked disorders

4.4.4. Oncogenes

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