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**UNIVERSITY OF RUHUNA – FACULTY OF ALLIED HEALTH SCIENCES**

**DEPARTMENT OF PHARMACY**

**FOURTH BPHARM PART II EXAMINATION – JUNE/AUGUST 2020**

**PH 4231 MOLECULAR GENETICS (SEQ)**

**TIME: TWO HOURS**

**INSTRUCTIONS**

- There are **four (04)** questions in Part A and B of SEQ paper.
- Answer **each part** in separate booklet provided.
- No paper should be removed from the examination hall.
- Do not use any correction fluid.
- Use illustrations where necessary.

## Part A

**1.**

1.1. Define the terms given below.

1.1.1. Dominant allele 1.1.2. Recessive allele (***10 marks***)

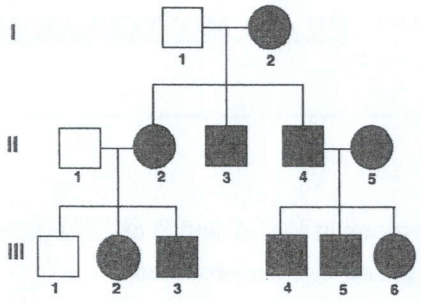
1.2. In humans, presence of dimple (D) is dominant over absence of dimple (d).

1.2.1. Draw a Punnett square to show the possible offspring, when a heterozygous male with dimples marry a homozygous recessive female with no dimple. In this Punnett square the female alleles should be placed in the top row and the male alleles should be placed in the left-hand column. (***25 marks***)

1.2.2. Fill the below table with the possible genotypes and phenotypes of their offspring and the chance for each. (*30 marks*)

| Genotype | Phenotype | Chance (%) |
|---|---|---|
| | | |
| | | |

1.3. The inheritance of freckles is an autosomal dominant trait. Analyze the following human pedigree which shows the presence of freckles through the generations of a family and answer the below questions.




1.3.1. What is the phenotype of individual III-6? (*05 marks*)

1.3.2. What is the genotype of the individual I-1? (*10 marks*)

1.3.3. If individual III-3 married a woman who was heterozygous for freckles, what is the percentage their children will have freckles? (*10 marks*)

1.3.4. If individual II-1 and II-2 have fourth child, what is the probability (percentage) that child will have freckles? (*10 marks*)

**2.**

2.1. List the **three** different RNA polymerases seen in eukaryotic cells. (*05 marks*)

2.2. Draw the general structure of mRNA found in both bacterial and eukaryotic cells. (*10 marks*)

2.3. Describe the "Initiation stage" of the transcription that occurs in prokaryotes. (*25 marks*)

2.4. List **five** characteristics of the "Genetic Code". (*10 marks*)

## Part B

2.5. Most of the genetic disorders are inherited from one generation to another generation.

2.5.1. State different types of genetic disorders. (*10 marks*)

2.5.2. What is a mutation? (*10 marks*)

2.5.3. State different types of mutations. (*10 marks*)

2.5.4. What is Down syndrome? (*10 marks*)

2.5.5. State a genetic test to diagnose the Down syndrome. (*10 marks*)

3. Bacterial cultures are used in most of the laboratory techniques.

3.1. State different types of bacterial culture techniques. (*10 marks*)

3.2. Briefly describe the advantages and disadvantages of each technique. (*20 marks*)

3.3. What is a bacterial mutant? (*10 marks*)

3.4. Briefly describe the different types of bacterial mutants. (*20 marks*)

3.5. Briefly describe the replica plating. (*25 marks*)

3.6. What is Ames test? (*15 marks*)

4. Bacterial sexual processes are not regular as eukaryotes, however, they serve the same aim to mix the genes from two different organisms together.

4.1. Name **three** different types of bacterial sexual processes. (*15 marks*)

4.2. What is Hfr conjugation? (*20 marks*)

4.3. What is interrupted mating? (*20 marks*)

4.4. What is F prime? (*20 marks*)

4.5. State the differences between generalized and specialized transduction. (*25 marks*)

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