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Beyond A Graduate

PAST PAPERS

Faculty	Department / Section/Division
Not Applicable	Learning Resource Centre

Past Papers

Faculty of Health Sciences

Master of Science in Biomedical Science

(Year 1 – Semester I)

Document Control & Approving Authority	Senior Director – Quality Management & Administration

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Faculty of Health Sciences
Master of Science in Biomedical Sciences
Proteomics - MBS1133
1st Year 1st Semester -End Examination SEQ
Batch 01

Date : 24.08.2024

Time : 9. 00 A.M – 12.00 P.M (3 HOURS)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink

QUESTION 01 **(100 Marks)**

1.1 Mention three different types of sites directed mutagenesis. (30 Marks)

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1.2 State basic principle of site directed mutagenesis. (30 Marks)

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1.3 Compare and contrast between site directed and random mutagenesis. (40 Marks)

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QUESTION 02 **(100 Marks)**

2.1. Name the different types of bonds stabilizing the tertiary structure of protein. (30 Marks)

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2.2. Differentiate between experimental and computational methods for determination of 3-dimensional structure of proteins. (30 Marks)

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2.3. What are the importance of regulation of proteins? (40 Marks)

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QUESTION 03 **(100 Marks)**

3.1. State different methods for protein separation. (30 Marks)

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3.2. Differentiate between salting in and salting out techniques. (30 Marks)

3.3. Discuss the importance of HPLC for protein isolation. (40 Marks)

QUESTION 04 **(100 Marks)**

4.1 Outline the basic process and key steps involved in a gene knockout experiment. (50 Marks)

4.2 Compare and contrast gene knockout and gene knockdown technologies.

(50 Marks)

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Question 05 **(100 Marks)**

5.1 Outline the sequential steps involved in constructing and expressing a recombinant protein. (50 Marks)

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5.2 Briefly explain the diverse applications and pivotal roles of recombinant proteins in medical, pharmaceutical, industrial, and scientific research fields. (50 Marks)

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QUESTION 06 **(100 Marks)**

6.1 Outline the basic steps involved in a typical mass spectrometry analysis (50 marks)

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6.2 Illustrate how mass spectrometry contributes to understanding protein structure and function. (50 marks)

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Faculty of Health Sciences
Master of Science in Biomedical Sciences
Transcriptomics - MBS1123
1st Year 1st Semester -End Examination SEQ
Batch 01

Date : 17.08.2024
Time : 9. 00 A.M – 12.00 P.M (3 HOURS)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink

QUESTION 01 **(100 Marks)**

1.1 State the levels of regulation of gene expression in eukaryotes. (50 Marks)

1.2 Briefly explain two post-transcriptional modifications and their processes. (50 Marks)

QUESTION 02 **(100 Marks)**

2.1 List the different techniques used in transcriptomics studies. (50 Marks)

2.2 Compare and contrast the advantages and the limitations of microarray technique. (50 Marks)

QUESTION 03 **(100 Marks)**

3.1 Define the term "gene transcription". (50 Marks)

3.2 Briefly explain the three phases of transcription. (50 marks)

QUESTION 04 **(100 Marks)**

4.1 Define the term "epigenetics" (50 Marks)

4.2 How genes turn on and off as a result of histone modification in epigenetics. (50 Marks)

QUESTION 05 **(100 Marks)**

5.1 Name the process involved in a cell to create proteins from messenger RNA (mRNA) (40 Marks)

5.2 Briefly elaborate the main steps of above-mentioned process. (60 Marks)

QUESTION 06 **(100 Marks)**

6.1 Briefly explain how multiple proteins act together to fold and condense prokaryotic DNA into smaller spaces. (50 Marks)

6.2 Differentiate introns and exons in eukaryotic genes. (50 Marks)

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Faculty of Health Sciences

Master of Science in Biomedical Sciences

Genome and Human Genetics - MBS1114

1st Year 1st Semester -End Examination SEQ

Batch 01

Date : 10.08.2024
Time : 9. 00 A.M – 12.00 P.M (3 HOURS)

INSTRUCTIONS TO CANDIDATES

- This question paper consists of **SIX** questions.
- Answer **ALL** questions.
- You should write legibly in black or blue ink

QUESTION 01 **(100 Marks)**

1.1 Define whole genome sequencing. (20 Marks)

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1.2 State two next-generation sequencing methods. (20 Marks)

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1.3 Write the major steps involved in next-generation sequencing. (20 Marks)

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1.4 The following diagram is a sequence pattern obtained from the Sanger sequence method. Identify the sequence and elaborate on how to get the sequence read using the Sanger sequencing method. (40 Marks)

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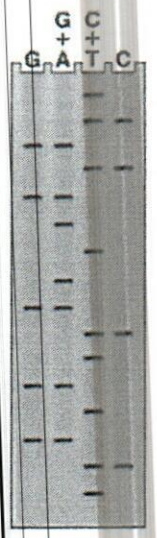

QUESTION 02 **(100 Marks)** 00010

2.1 Define de novo mutations with an example. (20 Marks)

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2.2 Define chromosomal aneuploidy, name one genetic disorder with chromosomal aneuploid. (25 Marks)

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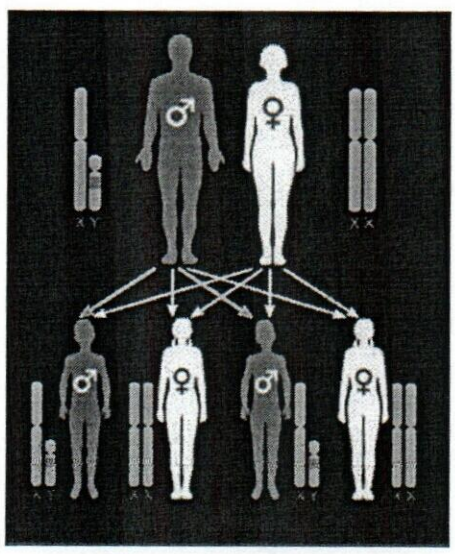
2.3 Identify the genetic condition given in the diagram and how you identify that. (20 Marks)



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2.4. Differentiate the Autosomal dominant condition from the autosomal recessive condition.

(35 Marks)

QUESTION 03 **(100 marks)**

3.1 State the Hardy-Weinberg formula with its components. (20 Marks)

3.2 Write the assumptions applied for the Hardy-Weinberg equilibrium. (30 Marks)

3.3 In a population of beetles, a particular gene locus has two alleles, A and a. The frequency of allele A is 0.7, and allele a is 0.3.

Assuming the population is in Hardy-Weinberg equilibrium:

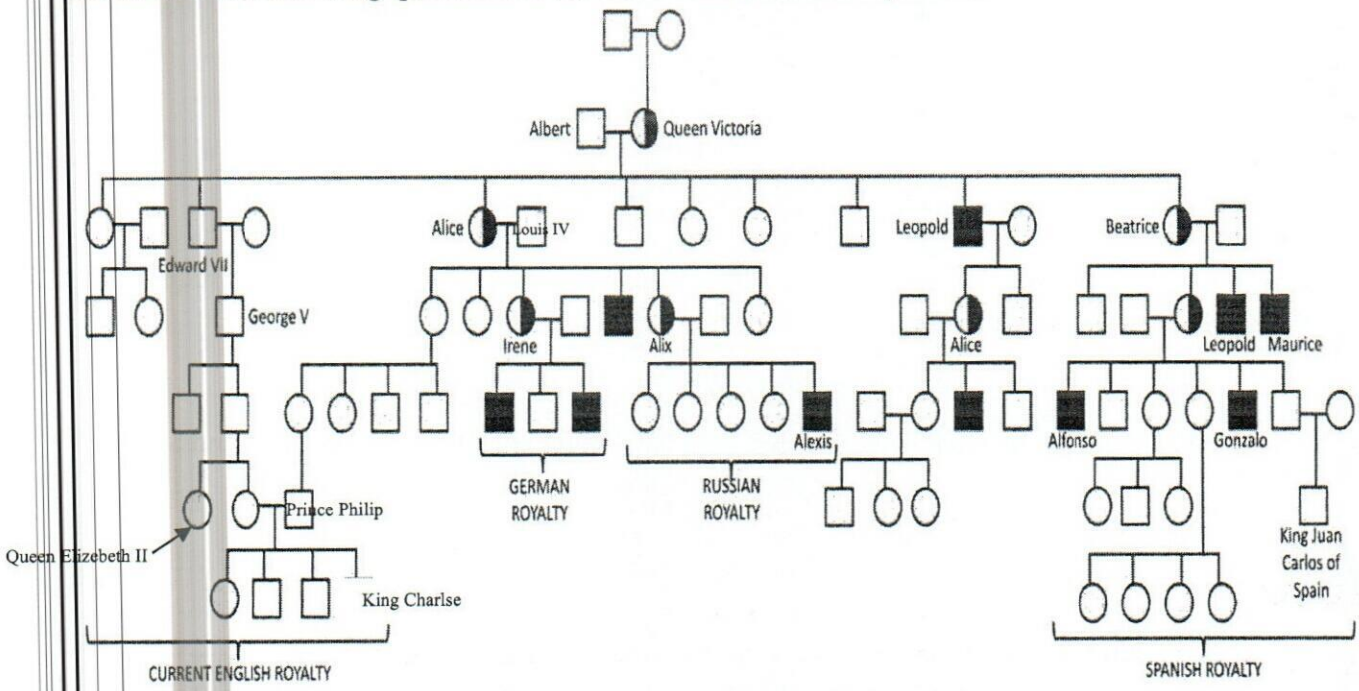
a) Calculate the frequencies of this population's three genotypes (AA, Aa, and aa).

(25 Marks)

b) If the population size is 1000 beetles, how many individuals would you expect to be homozygous dominant (AA), heterozygous (Aa), and homozygous recessive (aa)? (25 Marks)

QUESTION 04 **(100 marks)** 00010

Study the pedigree of hemophilia inheritance in queen Victoria's descendants (1800s-1900s) and answer the following questions about its X-linked recessive pattern.



4.1 State the characteristics of the above pedigree that support the identified inheritance pattern. (30 Marks)

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4.2 Queen Victoria's daughter Alice mated with Louis IV and produced seven children. Mention the percentages of carrier daughters and sons with haemophilia separately. (30 Marks)

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4.3 If a male haemophiliac (such as Leopold) marries a normal female, elaborate with a punnet chart whether there is any possibility of having sons with haemophilia.

(40Marks)

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QUESTION 05 **(100 marks)**

5.1 List the hierarchical organization of chromatin into chromosomes, detailing the size of condensation, involvement of histones, and other aspects of DNA packaging.(20 Marks)

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5.2 State the structural components of a metaphase chromosome. (30 Marks)

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5.3. Explain how chromosome condensation impacts the frequency and types of chromosomal aberrations in eukaryotic cells. (50 Marks)

QUESTION 06 **(100 Marks)**

6.1 State two sequence alignment tools available to analyze the genome. (15 Marks)

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6.2 Define medical ethics and mention four pillars. (20 Marks)

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6.3 Elaborate justice in medical ethics with an example. (30 Marks)

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6.4 Mention how current trends in genomic medicine involve routine healthcare. (35 Marks)

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