

Enrollment No.....



Faculty of Science
End Sem Examination Dec 2024
FS3EL05 Forensic Genetics

Programme: B.Sc. Branch/Specialisation: Forensic Science

Duration: 3 Hrs.**Maximum Marks: 60**

Note: All questions are compulsory. Internal choices, if any, are indicated. Answers of Q.1 (MCQs) should be written in full instead of only a, b, c or d. Assume suitable data if necessary. Notations and symbols have their usual meaning.

		Marks	BL	PO	CO	PSO
Q.1	i. Which of the following components make up a DNA nucleotide?	1	01	03	01	
	(a) Sugar, phosphate, nitrogenous base					
	(b) Sugar, amino acid, phosphate					
	(c) Fatty acid, sugar, nitrogenous base					
	(d) Amino acid, nitrogenous base, glucose					
	ii. Which of the following is NOT a recognized form of DNA?	1	02	01	01	
	(a) B-DNA					
	(b) A-DNA					
	(c) Z-DNA					
	(d) F-DNA					
	iii. How is mitochondrial DNA inherited?	1	02	03	02	
	(a) From both parents					
	(b) Only from the father					
	(c) Only from the mother					
	(d) Randomly from either parent					
	iv. In a slot blot assay, what type of membrane is typically used for immobilization of samples?	1	01	02	02	
	(a) Polycarbonate membrane					
	(b) Nitrocellulose membrane					
	(c) Agarose gel					
	(d) Cellulose acetate					

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v.	Why is proteinase K often used in DNA extraction?	1	02	02	03
	(a) To precipitate DNA				
	(b) To digest proteins that may contaminate the DNA				
	(c) To break down lipids				
	(d) To enhance lysis of cells				
vi.	Which sample type is often analyzed for DNA?	1	02	03	03
	(a) Semen (b) Saliva				
	(c) Skin cells (d) All of these				
vii.	In the RFLP technique, what is the role of restriction enzymes?	1	01	02	04
	(a) To amplify DNA				
	(b) To cut DNA at specific sequences				
	(c) To separate DNA fragments by size				
	(d) To label DNA fragments				
viii.	What does VNTR stand for?	1	01	01	04
	(a) Variable Number of Tandem Repeats				
	(b) Variable Nucleotide Tandem Repeats				
	(c) Variable Nucleotide Tract Repeats				
	(d) Variable Number of Transcribed Repeats				
ix.	What is the primary purpose of PCR?	1	02	04	05
	(a) To sequence DNA				
	(b) To amplify specific DNA sequences				
	(c) To digest DNA				
	(d) To visualize DNA				
x.	What does NCBI stand for?	1	01	03	05
	(a) National Center for Bioinformatics				
	(b) National Center for Biology Information				
	(c) National Center for Biotechnology Information				
	(d) National Center for Biological Data				
Q.2	i. What is DNA? Explain Watson and Cricks double helical model of DNA.	4	02	01	01
	ii. Write a note on-	6	02	04	01
	(a) Genetic code (b) Chargaff's rule				
OR	iii. Write a note on -	6	02	02	01

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	(a) Types of DNA				
	(b) Mendels law of segregation				
Q.3	i. What is gel electrophoresis? Write its forensic importance.	3	02	02	02
	ii. What is mitochondrial DNA? Explain how mitochondrial DNA is different from nuclear DNA?	7	02	03	02
OR	iii. What is slot blot technique? Explain its principle and working procedure.	7	03	04	02
Q.4	i. Write the basic principle of DNA extraction from organic method.	3	02	04	03
	ii. Explain two inorganic methods for DNA extraction in detail.	7	02	04	03
OR	iii. Write the collection and preservation methods of different biological samples for DNA testing.	7	01	02	03
Q.5	i. Write the forensic importance of DNA in wildlife crime investigation.	2	02	02	04
	ii. Write a note on-	8	02	03	04
	(a) Short tandem repeat				
	(b) Southern blotting				
OR	iii. Explain the procedure of RFLP technique and write its limitations and advantages.	8	02	04	04
Q.6	Attempt any two:				
	i. What is PCR technique. Explain the key steps of PCR technique.	5	02	03	05
	ii. Define touch DNA. Explain sequence polymorphism in detail.	5	02	01	05
	iii. Give brief introduction of NCBI database and Y-STR.	5	02	02	02

Marking Scheme
FS3EL05 (T) Forensic Genetics (T)

Q.1	i)	(a) Sugar, phosphate, nitrogenous base	1
	ii)	(d) F-DNA	1
	iii)	(c) Only from the mother	1
	iv)	(b) Nitrocellulose membrane	1
	v)	(b) To digest proteins that may contaminate the DNA	1
	vi)	(d) All of the above	1
	vii)	(b) To cut DNA at specific sequences	1
	viii)	(a) Variable Number of Tandem Repeats	1
	ix)	(b) To amplify specific DNA sequences	1
	x)	(c) National Center for Biotechnology Information	1
Q.2	i.	What is DNA? Explain Watson and Cricks double helical model of DNA.	4
		Definition	- 1 mark
		Structure and composition according to model	- 2 marks
		Diagram	- 1 mark
	ii.	Write a note on	6
		(a) Genetic code	
		Definition	- 1 mark
		Properties	- 2 marks
		(b) Chargaff's rule	
		Statement	- 2 marks
		Example	- 1 mark
OR	iii.	Write a note on	6
		(a) Types of DNA	
		A DNA	- 1 mark
		B DNA	- 1 mark
		Z DNA	- 1 mark
		(b) Mendels Law of Segregation	
		Statement	- 1 mark
		Experimental example	- 2 marks
Q.3	i.	What is gel electrophoresis? Write its forensic importance.	3
		Definition	- 1 mark
		Principle	- 1 mark
		Forensic importance	- 1 mark

	ii.	What is Mitochondrial DNA. Explain how Mitochondrial DNA is different from nuclear DNA?	7
		Defination of mDNA	- 1 mark
		Properties	- 2 marks
		Diagram	- 1 mark
		Difference between mDNA and Ndna.	-3 marks
OR	iii.	What is slot blot technique? Explain its principle and working procedure.	7
		Definition and principle	- 1 mark
		Diagram	- 1.5 marks
		Working procedure	- 4 marks
		Application	- 0.5 mark
Q.4	i.	Write the basic principle of DNA extraction from organic method.	3
		DNA extraction	- 1 mark
		Principle	- 2 marks
	ii.	Explain two inorganic methods for DNA extraction in detail.	7
		Principle and procedure of 1 st inorganic method	- 3.5 marks
OR	iii.	Write the collection and preservation methods of different biological samples for DNA testing.	7
		Collection methods of samples (blood, semen, saliva etc.)	- 3.5 marks
		Preservation	- 3.5 marks
Q.5	i.	Write the forensic importance of DNA in wildlife crime investigation.	2
	ii.	Write a note on	8
		(a) Short Tendem Repeat	
		Explanation	- 1.5 marks
		Example	- 1.5 marks
		Importance	- 1 marks
		(b)Southern Blotting	
		Define	- 1 marks
		Procedure	- 2 marks
		Diagram	- 1 mark

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- 1 mark
- 3 marks
- 2 marks
- 1 mark
- 1 mark

5

- 1 mark
- 2.5 marks
- 1.5 marks

5

- 1 mark
- 1 mark
- 1 mark
- 2 mark

5

-2.5 marks

P.T.O.