

M.Sc. Sem.-3 Examination

504 (EA)

Human Genetics

November-2025

Time : 2-30 Hours]

[Max. Marks : 70

Q-I	1	Discuss the different types of receptors and their characteristics.	(14)
	2	Explain autophosphorylation; its mechanism and significance in signaling.	
	OR		
	1	Describe briefly the stages of cell signaling with an example.	
	2	Write a short note on the cAMP pathway and its role in cellular signaling.	
Q-II	1	Discuss the types of nanoparticles and their applications.	(14)
	2	What is the importance of liposomes in the first FDA-approved nanodrug?	
	OR		
	1	Briefly describe the principle, mechanism and applications of DLS.	
	2	Describe the factors influencing zeta potential along with its advantages.	
Q-III	1	Which are the techniques used for stem cell isolation? Write down SELEX and microfluidics stem cell isolation techniques in detail.	(14)
	2	Write a note: iPSCs and their applications as regenerative medicine in different diseases.	
	OR		
	1	Write down the principle, application, advantages, and disadvantages of magnetic-activated cell sorting and fluorescence-activated cell sorting techniques.	
	2	What is BMSC? Write down different sources and their applications as regenerative medicine for blood and heart diseases.	
Q-IV	1	Discuss the main factors or criteria necessary for effective gene therapy.	(14)
	2	Write the advantages and limitations of DNA vaccines.	
	OR		
	1	Describe the various non-viral methods for delivering DNA into target cells.	
	2	Explain the various PCR variants and their applications in molecular biology.	
Q-V	Answer any SEVEN out of TWELVE.		(14)
	1	Define an antagonist and its primary role in receptor activity.	02
	2	Give the full form of "Hsp90" and mention its role.	02
	3	What are eicosanoids and their primary function?	02
	4	List the key features of the MinION.	02
	5	What are the classes of nanopores?	02
	6	What was Richard Feynman's contribution?	02
	7	Define: Ovarian stem cells.	02
	8	Write down the advantages and limitations of filtration technique of stem cell separation.	02
	9	Write down any two applications of adipose-derived stem cells.	02
	10	Give the names of four commonly used gene therapy strategies.	02
	11	Mention the full forms of SMART and ZMW as applied in PacBio NGS technology.	02
12	Name the four major platforms used in second-generation sequencing.	02	

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Candidate's Seat No : _____

M.Sc. Sem.-3 Examination

504 (EC)

Human Genetics

November-2025

Time : 2-30 Hours]

[Max. Marks : 70

Q-I	1	Explain the technique of amniocentesis.	(14)
	2	Write a note on the use of ultrasound in prenatal diagnosis.	
	OR		
	1	Write a detailed note on NIPT.	
	2	What are the goals & indications of invasive prenatal testing? Discuss.	
Q-II	1	Write a note on the techniques used in direct testing for known mutations.	(14)
	2	Discuss the use of linkage analysis in genetic diagnosis.	
	OR		
	1	Discuss: the criteria, importance, advantages & limitations of population screening.	
	2	Write a note on the techniques used in DNA profiling.	
Q-III	1	What are the different reasons for couples seeking reproductive counseling? Discuss.	(14)
	2	Giving examples of late onset diseases, write a note on genetic counseling.	
	OR		
	1	What are the medico-legal issues in paternity testing? Discuss.	
	2	Explain the risk factors, types and diagnostic challenges of rare diseases.	
Q-IV	1	What is the importance of providing supervision to a new genetic counselor? Explain.	(14)
	2	What are ELSI in clinical trials? Discuss.	
	OR		
	1	What is the impact of genetic disease on patients & families? Discuss.	
	2	Explain therapeutic cloning and the ethical issues raised in the process.	
Q-V	Answer any SEVEN out of TWELVE.		(14)
	1	What is newborn screening?	02
	2	When is the ideal time for CVS?	02
	3	What is chordocentesis?	02
	4	Define: exome sequencing.	02
	5	What is optical genome mapping?	02
	6	Differentiate between biochemical & molecular tests.	02
	7	What is secondary infertility?	02
	8	Give two examples of congenital disorders.	02
	9	Define: PGT	02
	10	What are direct to consumer tests?	02
	11	Define: bioethics.	02
	12	Define: transgenic models	02

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Candidate's Seat No : _____

M.Sc. Sem.-3 Examination

504 (ED)

Human Genetics

November-2025

Time : 2-30 Hours]

[Max. Marks : 70

Date: _____			
Q-I	1	Write an account on the comet assay and its applications, advantages and disadvantages.	(14)
	2	Describe the principle, method, significance, pros and cons of the LPO assay.	
	OR		
	1	What is the SRB assay? Write about its methodology, significance, advantages and disadvantages for evaluating cytotoxicity.	
	2	Describe the principle, procedure, and applications of the SCE assay.	
Q-II	1	Explain in detail about the principles of Toxicology.	(14)
	2	Enlist and explain the diseases caused by exposure to contaminated food.	
	OR		
	1	Write a detailed note on ecotoxicogenomics along with the conceptual framework.	
	2	Explain in detail the role of AhR in the field of ecotoxicology.	
Q-III	1	What is soil pollution? Write down the types of soil pollutants, sources, environmental impact, tests, prevention, and treatment of it.	(14)
	2	What is heavy metal toxicity? Explain arsenic, lead and mercury toxicity in detail.	
	OR		
	1	What are cyanotoxins, and briefly explain their different types, environmental risk factors, health risks of exposure, and monitoring and detection methods.	
	2	Write a note: Outdoor air pollutants	
Q-IV	1	Give a note on "ICH Guidelines".	(14)
	2	Explain briefly: importance of guidelines and standards in toxicology.	
	OR		
	1	Give a note on one occupational disease with its cause and prevention.	
	2	Describe the preparation and purpose of a regulatory dossier.	
Q-V	Answer any SEVEN out of TWELVE.		(14)
	1	Distinguish between apoptosis and necrosis.	02
	2	Expand the HPRT and TFT abbreviations used in mutagenicity studies.	02
	3	How is percentage cytotoxicity calculated in the LDH assay? Write the formula.	02
	4	What is the common name of the disease Coccidioidomycosis? What is the route of exposure of Coccidioidomycosis?	02
	5	Write the full form of (i) AhR and (ii) PAH.	02
	6	The book 'Silent Spring' was written by _____. The author is also known as the _____ of Environmental toxicology.	02
	7	What is photochemical smog?	02
	8	Which are the methods used for measurement of trace metals?	02
	9	Define: Bioaccumulation	02
	10	Define a "teratogen" and give its effect.	02
	11	What is the role of VICH GL23 (R) guideline in veterinary drug safety?	02
12	Give the full form of 'GAP' and describe its role in farming operations.	02	