

Master of Science – I (Genetics) Examination: Oct / Nov 2016
Semester – I (New CBCS)

SLR No.	Day & Date	Time	Subject Name	Paper No.	Seat No.
SLR – SQ-438	Wednesday 16/11/2016	10.30 AM to 01.00 PM	Concepts of Genetics	HCT-1.1	

- Instructions:**
- 1) Question 1 is compulsory.
 - 2) From Section II attempt any four.
 - 3) All questions carry equal marks.
 - 4) Figures to the right indicate full marks.
 - 5) Draw neat and labeled diagrams.

Total Marks: 70

Section – I

Q.1 A) Rewrite the following sentences by using correct alternative.

07

- 1) When the chiasmata occur at two points in the same chromosome, the phenomenon is known as _____
 - a) Double crossing over
 - b) Single crossing over
 - c) Multiple crossing over
 - d) Point crossing over
- 2) The genes which always occupy on same Loci of homologous chromosome are called as _____
 - a) Characters
 - b) Alleles
 - c) Dominant
 - d) Recessive
- 3) An ichthyosis hystrix gravis hypertrichosis is directly transmitted from father to son because _____
 - a) It is located on X chromosome
 - b) It is holandric genes
 - c) It is located on homologous part
 - d) It is located on autosomes
- 4) UV effect can be reversed by exposing the cells to visible light is known as _____
 - a) Mutation
 - b) Removal
 - c) Photo reactivation
 - d) Addition
- 5) Crossing over is advantageous because it brings about _____
 - a) Variation
 - b) Linkage
 - c) Inbreeding
 - d) Stability
- 6) In spermatogenesis cell division takes place by _____
 - a) Reduction division
 - b) Mitosis
 - c) Educational division
 - d) Meiosis
- 7) The name for a chromosome map unit is _____
 - a) Centimorgan
 - b) centistern
 - c) Millimendel
 - d) Decibarr

B) Answer the following terms:

07

- 1) Holandric genes
- 2) Multiple alleles
- 3) Synaptonemal complex
- 4) Linkage
- 5) Mutagen
- 6) Test cross
- 7) Polyploidy

Section–II
(Answer Any Four)

- Q.2** Explain Mendel's law of independent assortment with suitable examples and add a note on phenomenon of dominance. **14**
- Q.3** Explain Photo reactivation and Excision repair. **14**
- Q.4** Explain X-Linked inheritance in Human. **14**
- Q.5 Answer any TWO of the following: 14**
- 1) Explain sex influenced gene with an example.
 - 2) Describe life cycle of *S. cerevisiae*.
 - 3) Give difference between on mitosis and meiosis.
- Q.6 Answer any TWO of the following: 14**
- a) Add a note on multiple allele in ABO blood group.
 - b) Write a note ionizing and non-ionizing radiation as mutagens.
 - c) Explain gene entrance and expressivity

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SLR No.	Day & Date	Time	Subject Name	Paper No.	Seat No.
SLR – SQ 439	Friday 18/11/2016	10:30 AM to 01:00 PM	Biostatistics and Population Genetics	HCT 1.2	

- Instructions:**
- 1) All questions of Section I are compulsory.
 - 2) Answer any four questions from section II.
 - 3) Graph paper will be provided on request.
 - 4) Use of non – data storage calculator is allowed.

Total Marks: 70

Section – I

Q.1 A) Rewrite the following sentences by choosing the most correct alternative given below: 08

- 1) If both variables X and Y increase or decrease simultaneously, then the coefficient of correlation will be _____
 - a) Positive
 - b) Negative
 - c) Zero
 - d) One
- 2) If the critical region is located equally in both sides of the sampling distribution of test – statistics, the test is called _____
 - a) One tailed
 - b) Left tailed
 - c) Right
 - d) Tailed
- 3) A failing student is passed by an examiner, it is an example of _____
 - a) Type – I error
 - b) Type – II error
 - c) Unbiased decision
 - d) Difficult to tell
- 4) A set of all possible data values for a subject under consideration is called ____
 - a) Descriptive statistics
 - b) A sample
 - c) A population
 - d) Statistics
- 5) In _____ isolation the two populations are separated by some physical or location barrier, which must be present at the time of breeding.
 - a) Climate
 - b) Geographical
 - c) Ethological
 - d) Reproductive
- 6) _____ is the evolutionary strategy that favours the reproductive success of an organism's relatives, even at a cost to the organism's own survival and reproduction.
 - a) Group selection
 - b) Environmental selection
 - c) Kin selection
 - d) Adaptation
- 7) According to Neo – Darwinism, natural selection operates through _____
 - a) Fighting between organisms
 - b) Variations
 - c) Killing weaker organism
 - d) Differential reproduction

- 1) Sample
- 2) P – value
- 3) Artificial selection
- 4) Ecological species
- 5) Pedigree
- 6) Interval mapping
- 7) ANOVA

Section – II

Q.2 Explain the statistical methods for mapping QTL in experimental cross populations. **14**

Q.3 Calculate the arithmetic mean, median and mode form the following data. **14**

Seconds	51-55	56-60	61-65	66-70
Frequency	2	7	8	4

Q.4 Explain in detail about reproductive isolation mechanism **14**

Q.5 A) Data on waxy endospermic plants were recorded in maize. Calculate the standard deviation from the following data : **14**

Class	25-29	30-34	35-39	40-44	45-49	50-54
Frequency	1	4	9	6	3	1

B) Explain in detail about co-adapted gene complex.

C) Represent by percentage bar diagram from following data on ABO blood group in different city.

City	Blood Group			
	A	B	AB	O
Solapur	45	58	26	71
Kolhapur	50	32	20	98
Satara	32	48	33	87

Q.6 Write a short note on any two of the following: **14**

- A) Scatter plot used in studying correlation
- B) Population Genetics and Birth of Neo-Darwinism
- C) Molecular aspect of speciation

B) Define the following terms.

07

- 1) B chromosome
- 2) Euchromatin
- 3) LINEs
- 4) *In situ* hybridization
- 5) Chromosome
- 6) Microsatellite DNA
- 7) Alu family

SECTION II

Attempt any four.

- Q.2** Explain Types, detection, replication, incompatibility, partitioning, copy number control and transfer in Plasmids. **14**
- Q.3** Describe transposable elements in eukaryotes. **14**
- Q.4** Describe the organization of genome in animals. **14**
- Q.5** **Answer any two of the following.** **14**
- 1) Write a note on – Functional genomics.
 - 2) Explain sex determination in plants.
 - 3) Write on – Somatic cell hybridization.
- Q.6** **Answer any two of the following.** **14**
- 1) Write a note on – Somaclonal variation
 - 2) Write on – Multigene families
 - 3) Explain polytene chromosomes.

Master of Science – I (Genetics) Examination: Oct / Nov 2016
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SLR No.	Day & Date	Time	Subject Name	Paper No.	Seat No.
SLR – SQ – 441	Wednesday 23/11/2016	10.30 AM to 01.00 PM	Cellular and Molecular Biology	SCT 1.1	

- Instructions:**
- 1) Section I is compulsory.
 - 2) From section II attempt any four.
 - 3) Figures to the right indicate full marks.
 - 4) Draw neat and labeled diagrams.

Total Marks: 70

SECTION - I

Q.1 A) Rewrite the following sentences by choosing correct alternative 07

- 1) RNA polymerase I is located in _____
 - a) Cytoplasm
 - b) Nucleus
 - c) Nucleolus
 - d) Mitochondria

- 2) _____ is a common second messenger.
 - a) cAMP
 - b) cGTP
 - c) cMHC
 - d) cATP

- 3) Bacterial DNA primases are encoded by _____ Gene.
 - a) dnaC
 - b) dnaG
 - c) dnaB
 - d) dnaS

- 4) Transcription process in prokaryotes is terminated by _____ factor.
 - a) Alpha
 - b) Beta
 - c) Rho
 - d) Sigma

- 5) G-proteins are _____
 - a) Dimeric
 - b) Trimeric
 - c) Tetrameric
 - d) Pentameric

- 6) In extracellular space, all integral membrane proteins as well as membrane lipids bear carbohydrate projection known as _____
 - a) Glycocalyx
 - b) Fibronectin
 - c) Collagen
 - d) Integral

- 7) _____ cell organelle is known as sorting unit of cell.
 - a) Nucleus
 - b) Golgi apparatus
 - c) Endoplasmic reticulum
 - d) Mitochondria

B) Definitions:

07

- 1) DNA Polymerase
- 2) Osmosis
- 3) Translation
- 4) Paracrine signaling
- 5) Okazaki fragments
- 6) Signal transduction
- 7) Genetic code

SECTION - II

Answer any four of the following.

- Q.2** Give detail account on Ras-MAP kinase signaling pathway. **14**
- Q.3** Describe mechanism of replication in prokaryotes **14**
- Q.4** Explain different type of passive transport with suitable example. **14**
- Q.5** **Answers any two of the following** **14**
- a) Write a note on RNA polymerase
 - b) Describe initiation of translation in Eukaryotes.
 - c) Describe antisense RNA technology
- Q.7** **Write short note on any two of the following** **14**
- a) Fluid mosaic model of plasma membrane.
 - b) Properties of genetic code
 - c) GPCR signaling.

B) Definitions:

07

- 1) Pathogen
- 2) Neurodegenerative disorders
- 3) Metabolites
- 4) Clinical trial
- 5) Mapviewer
- 6) Epigenomics
- 7) Annotation

PART II

Answer any four of the following.

- Q.2** Define NGS. Add a note on its tools and techniques. **14**
- Q.3** Write a detailed note on pathology informatics with examples. **14**
- Q.4** Explain the different challenges and applications of pharmacogenomics. **14**
- Q.5** **Answers any two :** **14**
- a) Add a note on microarray with types
 - b) Write a note on medical coding with applications.
 - c) Explain the implications of genome projects in human health & disease.
- Q.7** **Write short note on any two** **14**
- a) Transcriptomics
 - b) System Biology
 - c) Pharmacovigilance

- B) Answer the following.** **07**
- 1) What is B chromosome?
 - 2) What are telomeres?
 - 3) What is karyotyping?
 - 4) What is Q banding?
 - 5) What are plasmids?
 - 6) What is C – Value paradox?
 - 7) What are transposons?

SECTION II

Attempt any four.

- Q.2** Describe mechanism of transposition & different types of transposable elements. **14**
- Q.3** Describe maternal inheritance with suitable example. **14**
- Q.4** Explain in-situ hybridization and add a note on its applications. **14**
- Q.5** **Answer any two of the following.** **14**
- 1) Describe structure of polytene chromosome.
 - 2) Explain P elements in drosophila.
 - 3) Describe structure of typical X & Y chromosome.
- Q.6** **Answer any two of the following.** **14**
- 1) Explain G banding of chromosomes.
 - 2) What are multigene families?
 - 3) Describe organization of eukaryotic chromosome.

SECTION II

- Q.2** Explain the complement activation pathway. **14**
- Q.3** Explain various agglutination tests. **14**
- Q.4** Explain different types of antigens and factors affecting antigenicity. **14**
- Q.5 Write Short notes on any TWO of the following:** **14**
- 1) Write an account on T cell maturation, activation and differentiation.
 - 2) Write in brief on mechanism of allograft rejection.
 - 3) Explain mechanism of inflammation.
- Q.6 Answer any TWO of the following:** **14**
- 1) Explain mechanism of anaphylaxis.
 - 2) Write short note on recombinant vaccines.
 - 3) Write short note on natural killer cells.
- Q.7 Answer any TWO of the following:** **14**
- 1) Write in brief on mechanism of autoimmunity.
 - 2) Explain SLE
 - 3) Write an essay on humoral immunity.

Master of Science – II (Genetics) Examination: Oct /Nov 2016
Semester – III (New CBCS)

SLR No.	Day & Date	Time	Subject Name	Paper No.	Seat No.
SLR – SQ 459	Wednesday 16/11/2016	02:30 PM to 05:00 PM	Immunology & Immunotechnology	IX	

- Instructions:**
- 1) All questions of Section I are compulsory.
 - 2) Answer any Four questions from section II.
 - 3) All questions carry equal marks.
 - 4) Draw neat and labeled diagrams wherever necessary.

Total Marks: 70

SECTION – I

Q.1 A) Multiple choice questions **07**

- i) _____ lymphocytes is involved in the humoral immune response.
a) T
b) T or B
c) B
d) T and B
- ii) Eye lens protein is an example of _____.
a) Isoantigen
b) Autoantigen
c) Heterophile antigen
d) Organ specific antigen
- iii) _____ is not live attenuated vaccine.
a) Anthrax
b) Cholera
c) Measles
d) Tuberculosis
- iv) _____ blood group persons are universally acceptors.
a) A
b) AB
c) O
d) B
- v) In cell mediated immunity _____ will perform role in target cell killing.
a) Perforins
b) Granzymes
c) Fragmentins
d) All of these
- vi) _____ will make iron unavailable which is required for the growth of microbes.
a) Transferrin
b) Lactoferrin
c) Ferritin
d) All of these
- vii) Vit. B12 deficiency is observed in _____ autoimmune disease.
a) Pernicious anemia
b) Phaconaphylaxis
c) Myasthenia gravis
d) SLE

B) Define the following terms:

07

- 1) Graft
- 2) Autoimmunity
- 3) Allergen
- 4) Vaccine
- 5) Agglutination
- 6) Epitope
- 7) Immunogenicity

SECTION II

- Q.2** Explain humoral immune response in detail. **14**
- Q.3** Explain the cytokine receptors with examples. **14**
- Q.4** Write an account on primary lymphoid organs. **14**
- Q.5** **Answer any TWO of the following:** **14**
- 1) Write an account on second line of defence.
 - 2) Explain mechanism of anaphylaxis.
 - 3) Write short note on secondary immune response.
- Q.6** **Write short notes on any TWO of the following:** **14**
- 1) Write short note on natural killer cells.
 - 2) Write an account on monoclonal antibody synthesis
 - 3) Explain SLE

**Master of Science – II (Genetics) Examination: Oct /Nov 2016
Semester – III (New CBCS)**

SLR No.	Day & Date	Time	Subject Name	Paper No.	Seat No.
SLR – SQ 460	Friday 18/11/2016	02:30 PM to 05:00 PM	Cancer Genetics and Stem Cell Research	X	

- Instructions:**
- 1) Section I is compulsory
 - 2) From section II attempt any four
 - 3) All questions carry equal marks
 - 4) Figures to right indicate full marks.
 - 5) Draw neat and labeled diagrams.

Total Marks: 70

Section – I

Q.1 Rewrite the following sentences by using correct alternative.

07

- 1) _____ proteins act like a spool that DNA can be wound around to become more compact.

a) Histone	b) Nuclease
c) Protease	d) Helicase

- 2) Hematopoietic stem cells are _____ cell

a) Unipotent	b) Totipotent
c) Pluripotent	d) Embryonic

- 3) Regulation of epithelial and mesenchymal interactions is carried out by ____

a) Platelet Derived Growth Factor –	b) Goblet growth factor
c) Zymogenic factor	d) Tumor Necrotic factor

- 4) The ability to invade surrounding tissue and _____ is main hallmark of cancer.

a) Regeneration	b) Replication
c) Metastasis	d) Motility

- 5) The protease system involved in apoptosis pathway is called as _____

a) Caspases	b) CD molecules
c) P ⁵³	d) TGF-B

- 6) _____ are totipotent cells.

a) Mesenchymal stem cells	b) Hematopoietic stem cells
c) Liver stem cells	d) Embryonic stem cells

- 7) The underlying principle of _____ is to kill cancer cells – or stop them growing – by treating them with drugs.
- a) Immunotherapy
 - b) Hormone therapy
 - c) Chemotherapy
 - d) Gene therapy

B) Answer the following terms:

07

- 1) Epigenetics
- 2) Oncogene
- 3) Embryonic stem cell.
- 4) Benign tumor
- 5) Hematopoietic Stem Cells
- 6) Carcinogens
- 7) Extra Cellular Matrices

Section – II
(Attempt any four)

- Q.2** Discuss in detail Tumor suppressor gene. **14**
- Q.3** Explain in detail isolation of stem cells from tissue. **14**
- Q.4** Explain in detail event of angiogenesis. **14**
- Q.5 Answer any two of the following :** **14**
- a) Write on Mesenchymal Stem Cells.
 - b) Give details mechanism of Metastatic cascade.
 - c) Discuss Radiation Therapy.
- Q.6 Answer any two of the following** **14**
- a) Write a short note on Transplantation Technique.
 - b) Explain Epigenetic in cancer.
 - c) Add a note on physical carcinogens.

- B) Define the following:** **07**
- 1) Convex lens
 - 2) Isotope
 - 3) Electrophoresis
 - 4) Isocratic elution
 - 5) Lambert's law
 - 6) Eyepiece
 - 7) Curie

Section – II

Answer Any four of the following:

- Q.2** Define microscopy and give details of fluorescence microscope. **14**
- Q.3** Discuss in detail interaction of radioactivity with matter. **14**
- Q.4** Describe in detail visible spectroscopy. **14**
- Q.5 Answer any two of the following:** **14**
- 1) Discuss factors affecting electrophoretic mobility.
 - 2) Explain starch gel electrophoresis
 - 3) Write a note on ionization chamber.
- Q.6 Answer any two of the following:** **14**
- 1) Discuss general column chromatographic technique.
 - 2) Explain applications of Colorimetry.
 - 3) Describe thin layer chromatography.

Master of Science – II (Genetics) Examination: Oct / Nov 2016
Semester – III (New CBCS)

SLR No.	Day & Date	Time	Subject Name	Paper No.	Seat No.
SLR – SQ - 462	Wednesday 23/11/2016	02:30 PM To 05:00 PM	Bioinformatics, Research Methodology and Scientific Report writing	XII	

- Instructions:**
- 1) Section I is compulsory
 - 2) From Section II attempt any four
 - 3) All questions carry equal marks.
 - 4) Figures to right indicate full marks.
 - 5) Draw neat and labeled diagrams

Total Marks:70

Section - I

Q.1 A) Multiple choice questions.

07

- 1) _____ is supplemented database of MIPS containing unverified sequence.
 - a) Tr-EMBL
 - b) PATCHx
 - c) OWL
 - d) NRDB

- 2) In _____ similarity across the full extent of the section is considered.
 - a) Local alignment
 - b) Global alignment
 - c) Gapped alignment
 - d) Ungapped alignment

- 3) The pseudo sequence that summarizes the residue information contained in a multiple alignment is _____.
 - a) First sequence
 - b) Consensus sequence
 - c) Second sequence
 - d) Same as first sequence

- 4) The principle of _____ searches for a tree that requires the smallest number of changes to explain the differences observed among the taxa under study.
 - a) Parsimony method
 - b) Maximum likelihood method
 - c) Neighbor joining method
 - d) Compatibility method

- 5) _____ tool is used for the phylogenetic analysis
 - a) AMBER
 - b) PHYLIP
 - c) BLAST
 - d) FASTA

- 6) Action research means _____.
 - a) A longitudinal research
 - b) An applied research
 - c) A research initiated to solve an immediate problem
 - d) A research with socioeconomic objective

- 7) In the process of conducting research ‘Formulation of Hypothesis’ is followed by _____.
 - a) Statement of objective
 - b) Analysis of data
 - c) Selection of Research Tools
 - d) Collection of data

B) Define the following terms.

- a) Three dimensional structure
- b) Force field
- c) Phylogenetic analysis
- d) SRS
- e) Query sequence
- f) Research
- g) IMRAD system

Section – II

- Q.2** Discuss about the prediction of protein structures from sequences. Add a note on secondary structure prediction. **14**
- Q.3** Briefly describe the different steps involved in thesis writing. **14**
- Q.4** Describe in detail the methods, algorithms and tools of pairwise alignment. **14**
- Q.5** **Answer any TWO of the following.** **14**
- a) Write a note on elements of phylogenetics
 - b) Write a note on SRS
 - c) Describe in detail GenBank and its file format.
- Q.6** **Write short notes on any TWO of the following** **14**
- a) Hypothesis and its testing
 - b) Research method and research methodology
 - c) Qualities of researcher

B) Define the following terms.

- a) Monogenic traits
- b) Molecular pathology
- c) Thalassemia
- d) Anomalies of genital duct
- e) Ultrasound
- f) Genetic testing
- g) Chimerism

Section – II

- Q.2** Explain in detail mitochondrial inheritance. **14**
- Q.3** Describe the complex polygenic syndrome with suitable example. **14**
- Q.4** Discuss genetic basis of male infertility. **14**
- Q.5** Answer any **TWO** of the following. **14**
- a) Explain in detail mechanism of sex linked inheritance
 - b) Describe in detail loss of function mutations in diseases.
 - c) Discuss in brief genetics basis on phenylketonuria
- Q.6** Write short notes on any **TWO** of the following **14**
- a) Pre-implantation genetic diagnosis.
 - b) Recurrent pregnancy loss
 - c) Alzheimer's disease