

Nizam College (Autonomous)  
Faculty of Science  
B.SC. I- Semester Examinations, January - 2023  
Genetics : Paper-1  
(Transmission Genetics)

Time : 3 Hours

Max. Marks : 80

Section - A*Answer any EIGHT of the following questions.*

[8 x 4 = 32]

1. Brief Note on Chromosomal theory of Inheritance?
2. Rh Blood Group incompatibility? Explain the genetic behind incompatibility?
3. Explain the inheritance of poky mutation in Neurospora?
4. How does mitotic recombination take place in Aspergillus?
5. What is Linkage? Explain its discovery.
6. Chiasmata and its significance?
7. Role of P<sup>53</sup> in cell cycle?
8. Discuss the intrinsic pathway of apoptosis?
9. How does senescence take place?
10. Explain inversion and translocation with examples?
11. Distinguish constitutive and facultative heterochromatins?
12. Morphology variation in chromosomes?

Section - B*II. Answer the following questions using internal choice*

[4 x 12 = 48]

13. (a) Discuss the mechanism of sex determination in Drosophila and man?

[OR]

- (b) Define multifactorial inheritance. What are the features of quantitative inheritance? Explain the inheritance of kernel color in wheat and skin color in man?

14. (a) Describe the linkage analysis of three-point cross with an example?

[OR]

- (b) Discuss with an example tetrad analysis for gene mapping in Neurospora?

15. (a) Give a detailed account on necrosis characteristics and mechanisms?

[OR]

- (b) Describe the stages of eukaryotic cell cycle?

16. (a) Explain the structure of nucleosome and write an account on higher order organization?

[OR]

- (b) Discuss Numerical chromosomal aberration?

CODE NO: 23M125/NC/GEN-1  
NIZAM COLLEGE (AUTONOMOUS)  
FACULTY OF SCIENCE  
B.SC. I-SEMESTER EXAMINATIONS MAY - 2023  
GENETICS: PAPER-1  
(Transmission Genetics)

**TIME: 2 HOURS**

**SECTION-A**

**[Max.MARKS=40]**

**(Short Answer Questions)**

**[4x3=12]**

1. Define Phenotype , Genotype, Locus Alleles.
2. Phases of cell cycle.
3. Pleiotropism
4. Chiasmata and Crossing over.

**SECTION-B**

**[4x7=28]**

**(Essay Questions)**

- 5.(a) Explain law of independent Assortment with example.

**[OR]**

- (b) Draw a hypothetical pedigree depicting an autosomal dominant and X-Linked dominant disorder. Specify the differences between them.

6. (a) Discuss in detail the role of cell cycle determining genes.

**[OR]**

- (b) Describe Meiosis and its significance.

7. (a) Describe ABO blood grouping in man and its importance in transfusion.

**[OR]**

- (b) Discuss in detail multiple Allelic inheritance with suitable examples.

8. (a) Discuss about three point test cross and its importance in gene mapping.

**[OR]**

- (b) Write in detail about Mitotic recombination in *Aspergillus*.

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Code No. 23D/125/NC/GEN

Nizam College (Autonomous)

Faculty of Science

B.SC. I- Semester Examinations, December - 2023

Subject: Genetics

(Transmission Genetics)

Time: 3 Hours

Max. Marks : 80

Section – A

Answer any EIGHT of the following questions.

[8 x 4 = 32]

1. Explain the inheritance of self-incompatibility in plants.
2. Differentiate penetrance and expressivity.
3. What is Rh blood group incompatibility?
4. Define coincidence and interference.
5. Give an example of mitotic recombination.
6. Compare and contrast two-point and three-point crosses.
7. What are the characteristic features of G<sub>0</sub> phase?
8. Distinguish mitosis and meiosis.
9. Which stage of meiosis crossing over occurs? What is the significance of crossing over?
10. Give a brief note on components of chromatin.
11. Differentiate euchromatin and heterochromatin.
12. Explain with example translocation.

Section – B

Answer the following questions.

[4 x 12 = 48]

13. (a) Show how F<sub>2</sub> ratio of 1:4:6:4:1 for kernel colour is obtained in wheat.  
[OR]  
(b) Explain the modification of 15:1 and 9:6:1 dihybrid ratio.
14. (a) Describe the experiment of Stern in Drosophila.  
[OR]  
(b) Explain the method of gene mapping in Neurospora.
15. (a) Describe the regulation of cell cycle.  
[OR]  
(b) Compare and contrast apoptotic intrinsic and extrinsic pathways
16. (a) Discuss the genetic consequences of aneuploidy.  
[OR]  
(b) Describe the higher order organization of chromosome structure.

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NIZAM COLLEGE (AUTONOMOUS)  
 FACULTY OF SCIENCE  
 B.SC. II- SEMESTER EXAMINATIONS, MAY – 2023  
 GENETICS : PAPER - 2

TIME: 3 HOURS

MAX. MARKS: 80

SECTION – A

Answer any EIGHT of the following questions.

[8 x 4 = 32]

1. DNA mediated transformation.
2. Differentiate between forms of DNA.
3. Possible modes of DNA replication.
4. Briefly explain Eukaryotic gene.
5. What is c-value.
6. Composition of RNA polymerase of prokaryotes.
7. What do you mean by restriction digestion.
8. Primase function in replication of lagging strand
9. Initiation of transcription in Prokaryotes.
10. Topo isomerases.
11. Cloning
12. Regulation of lactose gene

SECTION – B

Answer the following questions.

[4 x 12 = 48]

13. (a) Explain the chemical composition of DNA & its structure given by x-ray crystallography.  
 [OR]  
 (b) Define mutation. classify and explain different types of mutations.
14. (a) Describe in detail about transcriptional mechanism in prokaryotes.  
 [OR]  
 (b) Write about different enzymes that play important role in the Eukaryotic transcription.
15. (a) Explain in detail about post transcriptional modifications in Eukaryotic transcription.  
 [OR]  
 (b) What is an operon? Discuss in detail about Lac-Operon.
16. (a) Define splicing and also illustrate about the mechanism of splicing of rRNA & tRNA.  
 [OR]  
 (b) Explain in detail about glycosylation & ubiquitination.

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Code No. 23J/3S39/NC/Gen-SEC

Nizam College (Autonomous)  
Faculty of Science  
B.SC. III- Semester Examinations, January - 2023  
Genetics: SEC-2  
(Cytogenetic Analysis)

Time : 2 Hours

Max. Marks : 40

Section – A

I. Answer any FOUR of the following questions.

[4 x 4 = 16]

1. What are the different cell culture systems used in cytogenetic analysis?
2. What is Q band and G band? What is the use of Q banding and G banding?
3. Why is hypotonic treatment done on culture cells for chromosome preparation?
4. Give a brief note on human karyotyping.
5. How does inverted fluorescence microscope work? How the inverted microscope is set up?
6. Illustrate deletion and inversion abnormalities in humans with any one example of each.
7. Write a brief account on any two chromosome number abnormality conditions.
8. Give the differences between FISH and SKY techniques.

Section – B

II. Answer the following questions using internal choice

[3 x 8 = 24]

9. (a) Explain the technique of cryopreservation. How are cell cultures preserved and stored?  
[OR]  
(b) Describe the methods used in the preparation of cell cultures from solid tissue.
10. (a) Write the purpose and steps involved in a karyotype test.  
[OR]  
(b) Discuss the techniques used for detecting chromosomal translocations.
11. (a) What are the major contaminants and sources in cell cultures? How is cell contamination controlled?  
[OR]  
(b) Give an account on the working principle and applications of bright field microscopy.

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Nizam College (Autonomous)  
Faculty of Science  
B.SC. III- Semester Examinations, May - 2023  
Genetics : Paper-III  
(Biostatistics and Bioinformatics)

Time : 3 Hours

Max. Marks : 80

Section - A

*I. Answer any EIGHT of the following questions.*

[8 x 4 = 32]

1. Write a brief note on different kinds of data.
2. Explain pie diagram with example. What is the use of pie diagram?
3. Give the merits and demerits of mean and median.
4. What is Type 2 statistical error? What causes Type 2 error?
5. What is goodness of fit in chi-square test?
6. What is the use of correlation? How is correlation measured?
7. Give a brief account on applications of bioinformatics.
8. Explain the online tools available for biological information repositories.
9. What is the use of KEGG database?
10. Explain the terminology used in sequence alignment.
11. What is the criterion for making phylogenetic tree using maximum parsimony method?
12. What is the difference between the pairwise and MSA?

Section - B

*II. Answer the following questions using internal choice.*

[4 x 12 = 48]

13. (a) Discuss the characteristics of binomial distribution. Give examples of binomial distribution.  
[OR]  
(b) Give an account on measures of dispersion with examples.
14. (a) Illustrate with example t-test two sample assuming equal variances.  
[OR]  
(b) Explain the use of one sample t-test with an example.
15. (a) Give a detailed description on EMBL-EBI web portal.  
[OR]  
(b) Discuss the format and use of PROSITE database.
16. (a) Write an account on BLAST pairwise alignment.  
[OR]  
(b) Discuss the dot matrix analysis of sequence alignment.

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Nizam College (Autonomous)  
Faculty of Science  
B.SC. III- Semester Examinations, May - 2023  
Genetics : Paper-III  
(Gene and Genome Structure, Organization and Expression)

Time : 2 Hours

Max. Marks : 40

Section – A

*I. Answer the following questions.*

[4 x 3 = 12]

1. Hershey and Chase experiment.
2. Reassociation and dissociation of DNA.
3. Globin gene family.
4. Sense and antisense strands.

Section – B

*II. Answer the following questions using internal choice.*

[4 x 7 = 28]

5. (a) Elaborate on the mechanism of replication of linear DNA and enzymes involved in the process.

[OR]

(b) Elucidate the structure of DNA by Watson and Crick model.

6. (a) Write a detailed note on kinetic classes of DNA.

[OR]

(b) Explain about the organization of eukaryotic gene with diagrammatic representation of the gene.

7. (a) Write on the organization of chloroplast genome.

[OR]

(b) What is one gene-one enzyme hypothesis? Explain with example from Neurospora.

8. (a) What is genetic code? What are the different properties of genetic code?

[OR]

(b) Write about the mechanism of protein synthesis (translation) in prokaryotes.

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CODE NO. 23M625/NC/GEN

NIZAM COLLEGE (AUTONOMOUS)  
FACULTY OF SCIENCE  
B.SC. VI- SEMESTER EXAMINATIONS, MAY – 2023  
GENETICS : PAPER - VI  
(HUMAN GENOME & HUMAN GENETICS)

TIME: 3 HOURS

MAX. MARKS: 80

SECTION – A

Answer any **EIGHT** of the following questions.

[8 x 4 = 32]

1. Explain histone gene family.
2. Write short note on LTR elements and microsatellites.
3. Write a note on gene duplications.
4. What is pharmacogenomics.?
5. Explain genomic imprinting.
6. Enlist the applications and ethics of human genome project.
7. Write short note on inborn errors of metabolism.
8. Note on Kearns-sayersyndrome.
9. Explain tumor suppressor genes.
10. Write brief note on traditional treatment modalities
11. Explain genetic counselling for autosomal dominant diseases.
12. Write a note on fetoscopy.

SECTION – B

II. Answer the following questions using internal choice.

[4 x 12 = 48]

13. (a) Discuss on human mitochondrial genome organization.  
[OR]  
(b) What are repetitive elements? Describe LINES and SINES and their advantages?
14. (a) What is RNA sequencing? Explain how does RNA sequencing works and applications?  
[OR]  
(b) What is Epigenomics? Explain DNA methylation and histone modifications?
15. (a) Explain in detailed about single gene disorder with suitable examples.  
[OR]  
(b) Discuss on mitochondrial inheritance and associated disorders in human.
16. (a) Explain in detailed about new born screening and preclinical screening with examples  
[OR]  
(b) What is prenatal diagnosis? Explain invasive and non-invasive approaches for prenatal diagnosis with suitable examples?

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Nizam College (Autonomous)  
Faculty of Science  
B.SC. V- Semester Examinations, December - 2023  
Subject: Genetics  
(Plant Genetics & Biotechnology)

Time: 3 Hours

Max. Marks : 80

Section – AI. Answer any **EIGHT** of the following questions.

[8 x 4 = 32]

1. Fruit development
2. Fine structure of plant gene
3. Gibberellins
4. Media and culture conditions
5. Synthetic seeds
6. Somaclonal variation
7. Single-seed descent method
8. Recurrent selection
9. Apomixis
10. Nanofiber arrays
11. Phytoalexins
12. Golden rice

Section – B

II. Answer the following questions.

[4 x 12 = 48]

13. (a) Describe in detail organization of plant nuclear genome. Add a note on variation of genome size among plants.  
[OR]  
(b) Discuss in detail about different plant growth regulators and their role in plant life cycle.
14. (a) Describe in detail about the various methods of plant regeneration in tissue culture  
[OR]  
(b) What are protoplasts? Discuss in detail about protoplast culture and its applications.
15. (a) Write about hybrid seed production by genetic male sterility.  
[OR]  
(b) Write about breeding methods in self-pollinated species:  
i) Pedigree breeding; ii) Bulk breeding.
16. (a) Write about transgenic plants? Write details of Agrobacterium mediated transformation of plants.  
[OR]  
(b) Describe the gene responsible for bacterial and fungal resistance in plants. Enumerate Few pathogen resistant transgenic plants.

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Code No. 23J525/NC/GEN

Nizam College (Autonomous)  
Faculty of Science  
B.SC. V- Semester Examinations, January - 2023  
Genetics : Paper-V  
(Plant Genetics & Biotechnology)

Time : 3 Hours

Max. Marks : 80

Section – A

*I. Answer any EIGHT of the following questions.*

[8 x 4 = 32]

1. Pollination
2. Root apical meristem
3. Mitochondrial genome of plant
4. Somatic hybrids
5. Anther culture
6. MS Media composition
7. Cross fertilization
8. Cytoplasmic male sterility
9. Apomixis
10. Silicon carbide whiskers
11. Coat protein mediated viral resistance in plants
12. Golden rice

Section – B

*II. Answer the following questions using internal choice*

[4 x 12 = 48]

13. a) Describe in detail about plant organellar genome.

[OR]

b) Write in detail about sporogenesis and gametogenesis in plant life cycle.

14. a) Describe the regeneration of plants in culture via organogenesis. Add a note on somaclonal variations.

[OR]

b) Describe the plant tissue culture types (i) callus culture (ii) cell suspension culture.

15. a) Describe in detail about breeding methods of cross-pollinating species

[OR]

b) Describe the hybrid seed production by functional male sterile system.

16. a) Discuss different genetic engineering-based strategies for the development of insect resistance in crops.

[OR]

b) Write any four direct gene transfer methods in transgenic plant production.

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Nizam College (Autonomous)  
Faculty of Science  
B.SC. III- Semester Examinations, December - 2023  
Subject: Genetics  
(Biostatistics and Bioinformatics)

Time: 3 Hours

Max. Marks : 80

Section – AI. Answer any *EIGHT* of the following questions.

[8 x 4 = 32]

1. Binomial distribution.
2. variance.
3. constuction of HISTOGRAM.
4. Null hypothesis.
5. Karl pearson's coefficient of correlation.
6. Degrees of freedom.
7. Swissprot.
8. Applications of Bioinformatics.
9. NCBI.
10. BLAST.
11. DOT matrixes.
12. Phylogenetic tree.

Section – B

II. Answer the following questions.

[4 x 12 = 48]

13. (a) Define and explain about the measures of dispersion with reference to variance and standard deviation.  
[OR]  
(b) Discuss about the probability rules, law of addition and the law of multiplication.
14. (a) What is correlation. Explain the correlation co-efficient and its significance.  
[OR]  
(b) Discuss about ANOVA analysis of variance.
15. (a) Discuss the different tools and resources of Bioinformatics.  
[OR]  
(b) Protien sequence databases (swissport and PROSITE).
16. (a) Explain phylogenetic tree based on maximum likelihood method.  
[OR]  
(b) How do you compare nucleotide sequences dased on dot matrix

Code No. 23M525/NC/GEN

Nizam College (Autonomous)  
Faculty of Science  
B.SC. V- Semester Examinations, May - 2023  
Genetics : Paper-V  
(Plant Genetics & Biotechnology)

TIME: 3 HOURS

MAX. MARKS : 80

Section – A

I. Answer any EIGHT of the following questions.

[8 x 4 = 32]

1. Fruit development
2. Fine structure of plant gene
3. Gibberellins
4. Media and culture conditions
5. Synthetic seeds
6. Somaclonal variation
7. Single-seed descent method
8. Recurrent selection
9. Apomixis
10. Nanofiber arrays
11. Phytoalexins
12. Golden rice

Section – B

II. Answer the following questions using internal choice

[4 x12 =48]

13. a) Describe in detail organization of plant nuclear genome. Add a note on variation of genome size among plants.

[OR]

b) Discuss in detail about different plant growth regulators and their role in plant life cycle.

14. a) Describe in detail about the various methods of plant regeneration in tissue culture.

[OR]

b) What are protoplasts? Discuss in detail about protoplast culture and its applications.

15. a) Write about hybrid seed production by genetic male sterility.

[OR]

b) Write about breeding methods in self-pollinated species: i) Pedigree breeding; ii) Bulk breeding.

16. a) Write about transgenic plants? Write details of Agrobacterium mediated Transformation of plants.

[OR]

b) Describe the gene responsible for bacterial and fungal resistance in plants. Enumerate few pathogen resistant transgenic plants.

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CODE NO. 23M425/NC/GEN

NIZAM COLLEGE (AUTONOMOUS)  
FACULTY OF SCIENCE  
B.SC. IV- SEMESTER EXAMINATIONS, MAY – 2023  
GENETICS : PAPER - IV  
(POPULATION GENETICS & EVOLUTION)

TIME: 3 HOURS

MAX. MARKS: 80

SECTION – A

I. Answer any *EIGHT* of the following questions.

[8 x 4 = 32]

1. Explain gene pool with example.
2. Distinguish genotypic and phenotypic variation.
3. Enlist the limitations of Hardy Weinberg principle.
4. Illustrate on general selection equation.
5. Explain sickle cell anemia.
6. What is Mutation.
7. Difference between Quantitative and qualitative traits.
8. What is inbreeding coefficient?
9. Sketch on UPGMA
10. Explain gene duplication.
11. Sketch on NJ (Neighbor Joining) method.
12. What are Introns?

SECTION – B

II. Answer the following questions using internal choice.

[4 x 12 = 48]

13. (a) What is Hardy Weinberg principle? Discuss on establishment of Hardy Weinberg law for X-linked genes?  
[OR]  
(b) What is linkage disequilibrium? Explain in detailed about haplotypes and coefficient of linkage disequilibrium.?
14. (a) What is selection? Explain fitness and pattern of natural selection in a population?  
[OR]  
(b) What is gene flow? Elaborate migration, wahlund effect ?
15. (a) What is Genetic drift? Explain in detailed about bottle neck and founder effect with an example?  
[OR]  
(b) Elaborate on Raw and Forked methods of construction of pedigrees.
16. (a) What are molecular clock? Explain how molecular clocks are helped in establishment of evolutionary relationship?  
[OR]  
(b) What is molecular evolution? Explain in detailed about Neutral theory.?

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