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M.Sc. (Part – I) (Semester – II) Examination, 2015
GENETICS (Paper – I)
Regulation of Gene Expression and Developmental Genetics

Day and Date : Thursday, 16-4-2015
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

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

7

- i) Ara Operon is initiated when there is _____
a) Presence of Arabinase b) Absence of Arabinase
c) Presence of Arabinose d) Absence of Arabinose
- ii) _____ genes are responsible for routine metabolic function which is active all the time in all cells.
a) Regulatory b) Housekeeping
c) Inducer d) Repressor
- iii) _____ triggers apoptosis to prevent duplication of damaged cell.
a) Cyclins b) CDK c) P53 d) pRB
- iv) _____ promoter is used as a Model System for investigating gene expression in plants.
a) SV40 b) Gal gene c) 18s RNA d) CaMV 35 s
- v) The immediate structure produced after the fusion of 2 gamets is known as _____
a) Embryo b) Zygote c) Morula d) Blastula



- vi) The *Arabidopsis Thaliana* belongs to _____
- a) Gymnosperm b) Angiosperm
c) Pteridophytes d) Algae
- vii) Development of segments in *Drosophila* is controlled by _____
- a) Homeotic Genes b) Lethal Genes
c) Zygotic genes d) Maternal Gene

B) Define the following terms :

7

- i) Interferon
ii) Codon
iii) Heat Shock gene
iv) Cleavage
v) Embryogenesis
vi) Maternal Genes
vii) CaMV 35 s promoter.

SECTION – II

Answer **any four** :

2. Explain the control of lysis and lysogeny in Lambda phage. **14**
3. Describe the cell differentiation in *Dictostylium*. **14**
4. Write an essay on cell lineage and mosaic development in *Caenorhabditis elegans*. **14**
5. Explain the regulation of cell cycle in eukaryotes. **14**
6. Answer **any two** of the following : **14**
- a) Illustrate the embryogenesis and seed development in *Arabidopsis thaliana*.
b) Explain the structural changes in chromatin as a part of gene regulation in eukaryotes.
c) Write a note on homeotic genes specifying segment identity in *Drosophila*.
7. Answer **any two** of the following : **14**
- a) Explain the Lac Operon gene regulation in prokaryotes.
b) Discuss the genes involved in flower development of *Arabidopsis thaliana*.
c) Explain the post transcriptional gene regulation in Eukaryotes.



- iv) The nitrogen atoms of pyrimidine nucleotide are provided by _____
- a) glutamate
 - b) glutamate and aspartate
 - c) glutamine and aspartate
 - d) glutamine
- v) From stoichiometry of oxidative phosphorylation one NADH molecule produces _____ ATP.
- a) 3
 - b) 2.5
 - c) 2
 - d) 1.5
- vi) Keratin protein is an example of _____ protein.
- a) structural
 - b) contractile
 - c) catalytic
 - d) hormonal
- vii) The enzyme inhibition in which K_m increases and V_{max} remains constant is _____ inhibition.
- a) competitive
 - b) uncompetitive
 - c) non-competitive
 - d) mixed type
- B) Define the following terms :
- i) Vitamins
 - ii) Redox potential
 - iii) CAM pathway
 - iv) De Novo biosynthesis
 - v) Active site of enzyme
 - vi) Peptide bond
 - vii) Steroids.

7

SECTION – II

Answer **any four** :

2. Give the complete classification of amino acids with their structure. **14**
3. Describe the oxidative phosphorylation. Add a note on structure of ATPase. **14**



4. Explain the general reactions of amino acid metabolism. Add a note on urea cycle. **14**
5. What are fat soluble vitamins ? Give their structure and biological roles. **14**
6. Answer **any two** of the following : **14**
- a) Illustrate the relationship between standard free energy change and chemical equilibrium.
 - b) Discuss the tertiary structure of protein with an example.
 - c) Write a note on β -oxidation of fatty acid. Add a note on energetic of β -oxidation of palmitic acid.
7. Answer **any two** of the following : **14**
- a) Write a note on ATP as a energy rich compound.
 - b) Explain in detail TCA cycle.
 - c) Derive an equation of Michaelis-Menten for steady state kinetics.
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M.Sc. – I (Semester – II) Examination, 2015
GENETICS (Paper – III)
Advanced Microbial Genetics

Day and Date : Tuesday, 21-4-2015
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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 labelled diagrams.**

SECTION – I

1. A) Rewrite the following sentences by using correct alternative : 7
- 1) Which gene is responsible for the integration of λ phage into bacterial DNA ?
a) xis b) int c) pac d) gag
 - 2) The bacteriophage which packages specific portion of bacterial DNA is known as _____
a) prophage b) virulent phage
c) transducing phage d) avirulent phage
 - 3) Number of ascospores formed in *Saccharomyces cerevisiae* is _____
a) 4 b) 8 c) 16 d) 2
 - 4) The fluctuation test carried out by Luria and Delbruck showed that _____
a) mutations are spontaneous
b) mutations are induced by virus upon exposure
c) bacteria fluctuate between sensitivity and resistance
d) viruses are living entities
 - 5) Sex pilus in conjugation is produced by _____
a) donor bacteria
b) recipient bacteria
c) donor and recipient bacteria
d) None of these



- 6) Competency in bacteria is observed during _____
a) Lag b) Stationary c) Log d) Death
- 7) Certain E.coli strains can transfer bacterial chromosomal genes with greater efficiency are known as _____
a) Hfr b) F+ c) F– d) F'

B) Answer the following terms :

7

- 1) Electrotransformation
- 2) Virulent phage
- 3) Competency
- 4) Mutation
- 5) Mutagens
- 6) Episome
- 7) Abortive transduction.

SECTION – II

Attempt **any four** :

2. Write an essay on conjugation. 14
3. Explain the yeast mating-type switching mechanism. 14
4. Describe in detail transformation. 14
5. Explain in detail the importance of fungi in biotechnology. 14
6. Answer **any two** of the following : 14
 - 1) Describe the method for isolation of auxotrophic mutants.
 - 2) Describe life cycle of fungi.
 - 3) Explain the phage P1 mediated transduction.
7. Answer **any two** of the following : 14
 - 1) Describe interrupted mating technique.
 - 2) Write a note on fluctuation test.
 - 3) Explain chemical mediated transformation.



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M.Sc. – I (Semester – II) Examination, 2015
GENETICS (Paper – IV)
Plant Breeding and Tissue Culture

Day and Date : Thursday, 23-4-2015
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative. 7
- 1) A plant breeder wants to develop a disease resistant variety, what he should do first _____
 - a) mutation
 - b) selection
 - c) hybridization
 - d) production of crop
 - 2) Hybrids which are superior over parents are called _____
 - a) inbreeding
 - b) dominant
 - c) recessive
 - d) heterosis
 - 3) Major food crops have originated mainly from _____
 - a) ocean
 - b) mountain
 - c) desert
 - d) plain
 - 4) In micropropagation, virus free plants can be obtained through _____
 - a) shoot tip culture
 - b) haploid culture
 - c) protoplast culture
 - d) embryo culture
 - 5) Which is faster method of rapid clonal propagation _____ culture.
 - a) callus
 - b) suspension
 - c) embryo
 - d) anther



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M.Sc. – II (Semester – III) Examination, 2015
GENETICS
Paper – I : Immunology (Old)

Day and Date : Wednesday, 15-4-2015

Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

- Instructions :** 1) *Part I, Question No. I is compulsory.*
2) *Attempt any four questions from Part II.*
3) *Answers to Part I and Part II should be written in the same answer booklet.*
4) *Figures to the right indicate full marks.*

PART – I

1. A) Rewrite the following sentences by using correct alternative. **10**
- 1) Reaginic immunoglobulin is
A) IgG B) IgM C) IgD D) IgE
 - 2) The reaction of soluble antigen with antibody is known as
A) Agglutination B) Precipitation
C) Flocculation D) Complement fixation
 - 3) Interleukin-1 is produced by
A) T-helper cell B) B-lymphocyte
C) Monocyte D) Parietal cells
 - 4) Active immunity is not acquired by
A) Infection B) Vaccination
C) Subclinical infection D) Immunoglobulin transfer
 - 5) Arthus reaction is an example of _____ hypersensitivity reaction.
A) Type I B) Type II
C) Type III D) Type IV



5. Write short answer of **any two** from the following : **20**
- 1) Discuss the theories of antibody formation.
 - 2) Describe the classical complement activation pathway.
 - 3) Compare and contrast between active and passive immunity.
6. Write short notes on **any four** of the following : **20**
- 1) Types of infections
 - 2) B-lymphocytes
 - 3) ELISA test
 - 4) Types of graft
 - 5) Applications of monoclonal antibodies
 - 6) Determination of avidity and affinity constants.
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SLR-QP – 312

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M.Sc. – II (Semester – IV) Examination, 2015
GENETICS
Paper – I : Genetic Engineering (Old)

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 100

- Instructions:** 1) *Section – I 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 labelled diagrams.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative. 10
- 1) Denaturation involves _____
- a) Heating between 90-98°C b) Heating between 40-60°C
c) Heating between 60-72°C d) Heating between 40-50°C
- 2) Interferons are _____
- a) Antiviral proteins b) Complex proteins
c) Antibacterial proteins d) Anticancer proteins
- 3) Transfer of protein from agarose gel to nylon membrane is _____
- a) Southern blotting b) Western blotting
c) Eastern blotting d) Northern blotting
- 4) A plasmid cloning vector should contain all of the following sequences except _____
- a) Origin of replication b) Inducible promoter
c) Selectable marker gene d) Multiple cloning site

P.T.O.



SECTION – II

Attempt **any four** :

2. What are vectors ? Explain in detail the properties and structure of plasmids as a vector. **20**
 3. Explain in detail Sanger's method of DNA sequencing. **20**
 4. What is gene library ? Describe construction of genomic and cDNA library. **20**
 5. Answer **any two** of the following : **20**
 - 1) Explain the method for designing of E. Coli expression vector.
 - 2) Describe the method for isolation of vector DNA.
 - 3) Describe in detail RFLP.
 6. Write short notes on **any four** : **20**
 - 1) Phagmids as a cloning vector.
 - 2) Electroporation.
 - 3) Production of recombinant insulin.
 - 4) Indirect screening of recombination.
 - 5) Amplification.
 - 6) DNA chips.
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SLR-QP– 313

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**M.Sc. (Part – II) (Semester – IV) Examination, 2015
GENETICS (Old) (Paper – II)
Molecular Medicine**

Day and Date : Saturday, 18-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 100

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

SECTION – 1

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

10

- 1) _____ cells have property of division and differentiation.
a) Cancer b) Germ c) Somatic d) Stem
- 2) _____ is the study of how people's genetic makeup affects their responses to drugs.
a) Nanomedicine b) Genomedicine
c) Pharmacogenetic d) Generic medicine
- 3) Epigenetic modification involves
a) Modification of DNA sequence
b) Modification of Histone proteins
c) Modification of transcription factors
d) Modification at translation machinery
- 4) _____ gene is damaged in Cystic Fibrosis.
a) CFTC b) CFRC c) CFTR d) CFRT
- 5) Osteogenesis Imperfecta is a disease caused due to defect in
a) Collagen b) Hemoglobin
c) Immunoglobulin d) Mitochondria

P.T.O.



- 6) _____ is a characteristic of Brutons syndrome.
- Weak Bones
 - Weak Immune system
 - Weak oxygen carrying capacity
 - Weak Muscle
- 7) In Genetics term, Ducene Muscular Dystrophy is _____ type of disease.
- Autosomal Dominant
 - Autosomal Recessive
 - X linked Dominant
 - X linked recessive
- 8) Cardiovascular disease involves problems in
- Nerves
 - Muscles
 - Arteries
 - Lungs
- 9) In Gene therapy retrovirus vectors can only be used for _____ cells.
- Dividing
 - Non Dividing
 - Stem
 - Cancer
- 10) Nerve cell is a type of _____ cell.
- Unipotent
 - Pluripotent
 - Multipotent
 - Totipotent

B) Answer in short :

10

- Define Embryonic Stem Cells.
- Define minisatellite.
- Explain the use of Adenoviruses in Gene therapy.
- Mention any 2 types of cardiovascular disease.
- Explain in short Osteogenesis Imperfecta disease.

SECTION – 2

Answer **any 4** of the following.

- Give detailed account on haemoglobinopathies. 20
- Write a note on gene therapy. Explain its importance compared to traditional therapies. 20
- Write a note on Genetic Mutation. Compare and Explain Loss of function mutation and gain of function mutation. 20



5. Write short answers (**any 2**). **20**
- 1) Explain Fluorescent In-situ Hybridization.
 - 2) Explain Stem cells and their classification.
 - 3) Write a note on Collagen and explain the diseases associated with it.
6. Write short notes (**any 4**). **20**
- 1) Epigenetics
 - 2) Outcome of Human Genome Project
 - 3) Agammaglobulinaemia
 - 4) Severe combined immune deficiency syndrome
 - 5) DNA profiling
 - 6) Pharmacogenetics.
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M.Sc. II (Semester – IV) Examination, 2015
GENETICS
Paper – III : Animal and Environmental Biotechnology (Old)

Day and Date : Tuesday, 21-4-2015

Total Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

- 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 labelled diagrams.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative : **10**
- 1) The temperature of trypsin in cold trypsinization is _____ °C
a) 2 b) 4 c) 6 d) 8
 - 2) _____ is the bioremediation process takes place by use of plant constituents.
a) Land forming b) Composting
c) Phytoremediation d) All of the above
 - 3) _____ is use of living organism to degrade environmental pollutants.
a) Bioaugmentation b) Biofiltration
c) Bioremediation d) Bioaccumulation
 - 4) Which of the following is the method for the mechanical disaggregation of the animal tissue ?
a) Sieving b) Syringing
c) Pippetting d) All of the above
 - 5) Hydrogen production is carried out by
a) *Clostridium* b) *Synechococcus*
c) Halobacterium d) All of the above



- 6) Hybridoma technology is discovered by
a) Wilmut
b) Mc Klintock
c) Kohler and Milstein
d) Campbell
- 7) Acid hydrolysis of lignocelluloses is carried out by _____ acid.
a) Dil. Sulphuric
b) Dil. Hydrochloric
c) Conc. Sulphuric
d) Conc. Hydrochloric
- 8) Which of the following are used to introduce foreign DNA into animal cells ?
a) Liposomes
b) Electroporation
c) Microinjection
d) All of the above
- 9) Which of the following is an animal tissue culture media ?
a) MEM
b) RPMI 1640
c) CMRL
d) All of the above
- 10) _____ is burning of solid waste at very high temperature.
a) Bioleaching
b) Pyrolysis
c) Composting
d) Bioremediation
- B) Answer the following terms : **10**
- 1) Bioremediation
 - 2) Cell strain
 - 3) Fermentation
 - 4) Bioleaching
 - 5) Culture media.

SECTION – II

Attempt **any four** :

2. Explain in detail different techniques of DNA transfection. Add a note on HAT selection. **20**
3. Describe in detail the treatment of municipal waste and industrial effluents. **20**
4. Write an essay on composition of animal tissue culture media. **20**



5. Answer **any two** of the following : **20**
- 1) Explain chemical disaggregation of animal tissue.
 - 2) Write a note on phytoremediation.
 - 3) Describe in detail biogas production.
6. Write short notes on **any four** : **20**
- 1) Transgenic mice.
 - 2) Downstream processing of expressed proteins.
 - 3) Bioleaching of copper ores by microorganisms.
 - 4) Environmental significance of GMO's in bioleaching.
 - 5) Conversion of sugar to alcohol.
 - 6) Hybridoma technology.
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Seat No.	
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M.Sc. – II (Semester – IV) Examination, 2015
GENETICS (Paper – I)
Genetic Engineering (New-CGPA Pattern)

Day and Date : Thursday, 16-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Total Marks : 70

- Instructions:** 1) *Section – I 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.*

SECTION – I

1. A) Rewrite the following sentences by using correct alternative : 7
- 1) _____ analysis has been successfully applied for epidemiology of *Listera monocytogens*.
 - a) RAPD
 - b) Spectroscopic
 - c) DNA sequencing
 - d) Protein Blotting
 - 2) Lac Z gene encodes for _____ enzyme.
 - a) Galactosidase
 - b) β -Galactosidase
 - c) Gluconase
 - d) Glucoronidase
 - 3) _____ DNA sequencing method is known as chemical degradation method.
 - a) Sanger's
 - b) Carrel's
 - c) Maxam's and Gilbert's
 - d) Smith's
 - 4) Colony hybridization technique has been developed by _____.
 - a) Murashigue and Skoog
 - b) Hugh and Birnstil
 - c) Mertz and Davis
 - d) M. Grustein and D. S. Hogness
 - 5) Pfu DNA polymerase isolated from _____.
 - a) *Pyrococcus furiosus*
 - b) *Pyrococcus litolaris*
 - c) *Thermococcus furiosus*
 - d) *Thermococcus litolaris*



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**M.Sc. (Part – II) (Semester – IV) Examination, 2015
(Paper – III) GENETICS
(New CGPA Pattern)
Agriculture Science and Seed Technology**

Day and Date : Tuesday, 21-4-2015
Time : 3.00 p.m. to 6.00 p.m.

Max. Marks : 70

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

SECTION – I

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

7

- i) The diffusion of solvent molecules into the solution through a semipermeable membrane is called _____
a) Turger pressure b) Wall pressure
c) Osmosis d) Plasmolysis
- ii) The chief function of Xylem vessels in the plant body is _____
a) To translocate food materials manufactured in the leaves to other parts of plant
b) To eliminate excess of water through the root at night when there is no transpiration
c) To conduct water and mineral salts
d) None of these
- iii) Auxin-B was extracted from _____
a) Corn and Malt grain oil b) Human urine
c) Castor seed d) Porphyrin palmate



- iv) During seed germination, seed coat ruptures due to _____
- a) Differentiation of cotyledons
 - b) Massive glycolysis in endosperm and cotyledons
 - c) Sudden increase in cell division
 - d) Massive imbibitions of water
- v) An asymbiotic blue-green algae is _____
- a) Anabaena
 - b) Azolla
 - c) Nostoc
 - d) All of these
- vi) 95 to 99.5% portion of plant tissues are made up of _____
- a) N, P and K
 - b) C, H, O
 - c) Ca, Mg, Fe
 - d) None of these
- vii) The water holding capacity is highest in _____
- a) Sandy soil
 - b) Clayey soil
 - c) Loamy soil
 - d) Mixture of sand and loam
- B) Define the following terms :
- i) Photoperiodism.
 - ii) Examples of plant growth hormones.
 - iii) Define biofertilizers and give its examples.
 - iv) Define heat and cold stress in plants.
 - v) Give names of phosphorous and iron deficiency diseases in plant.
 - vi) Role of National Seeds Corporation (NSC).
 - vii) Applications of Animal Husbandry in agriculture.



SECTION – II

Answer **any four** :

2. Write an account on physical, chemical properties of protoplasm of plant cell. **14**
 3. Write an account on mechanism of transpiration in plant. **14**
 4. Give an account on mechanism of fruit ripening process and its control. **14**
 5. Explain physiological and molecular basis of plant responses to pathogen and herbivores. **14**
 6. Answer **any two** of the following : **14**
 - a) Write a note on properties of water.
 - b) Application of Gibberellins.
 - c) Role of biofertilizers in plant growth.
 - d) Factors affecting of seed germination.
 7. Answer **any two** of the following : **14**
 - a) Cytokinins in plant
 - b) Seed certification
 - c) Poultry farming.
-



- 13) The objective of mixing in fermentor are to
- a) Disperse the air bubbles
 - b) To suspend the micro organism
 - c) To entrance heat and mass transfer
 - d) All of the above
- 14) _____ year's amendments to the Indian parent law allows the protection of biological material.
- a) 2003
 - b) 2005
 - c) 1919
 - d) 1990

PART – II

2. Describe in detail the basic design of fermentor. 14
3. Describe stepwise the different methods with their mechanisms used in Effluent Treatment Plant (ETP) and its significance. 14
4. Describe the various criteria used when a process of formulation media is going on and add a note on rheology. 14
5. Attempt **any two** of the following : 14
- a) Patenting of Biological Materials
 - b) Give the characteristics of biosensors.
 - c) Principles of Bioaugmentation with suitable example.
6. Attempt **any two** of the following : 14
- a) Give the characteristics of biosensors.
 - b) Computer control systems in fermentors.
 - c) Energy crisis and non conventional energy sources.
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