

Semester	Course Code	Core Paper V Genetics	Total Marks: 100		Hours Per Week	Credits
			CIA: 25	ESE: 75		
III	17UAQCT302				4	4

Objectives:

- To have graduates with high knowledge in the field of Genetics
- To become familiar with the advents of genetic development.

Course Outcome:

On successful completion of the course, the students will be able to :

- CO1 Summarize the Basic concepts of Genetics
- CO2 Generate their perception with genetic interactions
- CO3 Develop their knowledge in chromosomal linkage and crossing over
- CO4 Outline on various chromosomal variations
- CO5 Understand the ideas in population genetics

UNIT I

Mendelian Principles: Definition, history and scope of Genetics, general areas of Genetics (Classical, Molecular and Evolutionary). Basic concept of Genetics - Allele, Locus, Gene, Genome, Haplotype, Genotype, Phenotype. Model organisms in Genetics. Mendel's Law: Law of Dominance - Monohybrid cross, Law of Independent Assortment - Dihybrid cross, Trihybrid cross, Test cross and Back cross.

UNIT II

Gene Interactions: Non allelic gene interaction: Epistasis (Dominant, Recessive, Duplicate recessive), complementation, polygeny. Sex determination - Chromosomal, Genetic, and environmental sex determining systems. Allelic gene interaction: complete dominance, partial or incomplete dominance, co-dominance, Multiple Alleles (ABO blood groups and Rh factor), Lethal alleles, penetrance and expressivity, pleiotropism.

UNIT III

Linkage and Crossing over: Linkage, kinds of linkage, linkage groups, types of Crossing over, mechanism of Meiotic Crossing over, significance of Crossing over Bateson & Punnet's Coupling and Repulsion hypothesis. Haploid mapping (2 point cross), Diploid mapping (Tetrad analysis), determination of map distance and gene order.

UNIT IV

Chromosomal variation in Number and Structure: Euploidy, Aneuploidy, Aneuploidy segregation in plants, Aneuploidy in Human, Polyploidy in Plants and Animals, Induced Polyploidy, applications of Polyploidy, Introduction to Chromosomal Mosaics. Deletion, Duplication, Inversion, Translocation, Position Effect, Centromeric and Non-centromeric breaks in chromosomes. Single gene disorders – Autosomal dominant (Huntington), Autosomal



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recessive (cystic fibrosis). X linked trait (muscular dystrophy).

UNIT V

Population Genetics: Genetic variation – Genotypic frequency, Allelic frequency, Random and Non-random mating, Hardy Weinberg law, calculating gene frequencies, changes in allelic frequency (Genetic drift, Natural Selection, Migration, Genome evolution). Pedigree Analysis – Symbols of Pedigree, Pedigrees of Autosomal recessive, Autosomal dominant, X linked recessive and X linked dominant traits. Twin studies, Genetic screening – prenatal and postnatal testing and Genetic counseling.

TEXT BOOK(S)

Dr. P.S. Verma and Dr. V.K. Agarwal, Cell Biology, Genetics, Molecular Biology, Evolution and Ecology I Multicolour Edition, S.Chand and Company, New Delhi, 2014

Benjamin A.Pierce, Genetics- A conceptual Approach, II Edition, W.H.Freeman and Company, New York, 2005.

REFERENCES

1. A.V.S.S. Sambamurty, Genetics, II Edition, Narosa Publication, New Delhi, 2005
2. L.D.Vijendra Das, Genetics and Plant Breeding, Revised II Edition, Newage International Pvt.Ltd, New Delhi, 2005.
3. S.B. Basu and M.Hossain, Principles of Genetics, Books and Allied Pvt. Ltd, Kolkatta, 2006.
4. Gardnar *et al.*, Principles of Genetics, VIII edition, Wiley India, New Delhi.2008
5. D. Peter Sunstad and Michael J.Simmons, Genetics, VI Edition, John Willey and Sons Inc, Singapore, 2012.

QUESTION PAPER PATTERN

SECTION - A	SECTION - B	SECTION - C
10 x 1 = 10 Marks (Multiple Choice, Four options) Two questions from each unit	5 x 7 = 35 Marks (Either or choice) Two questions from each unit	3 x 10 = 30 Marks (Answer any three Questions) One Question from each unit



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Semester	Course Code	Skill Based Subject III Biofarming	Total Marks:75		Hours Per Week	Credits
			CIA: 20	ESE: 55		
V	20UAQST507				3	3

Objectives:

- To learn innovative ideas on entrepreneurship.
- To acquire knowledge about various business fields in advanced Biotechnology.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Get a generalized idea in the basics of farming
- CO2 Familiarized with the requirements of organic farming
- CO3 Formulate various approaches for developing mushrooms and Spirulina
- CO4 Compute the usage of Vermicompost and Biofertilizers
- CO5 Prepare a sericulture and aquaculture farm for economic up gradation

UNIT I

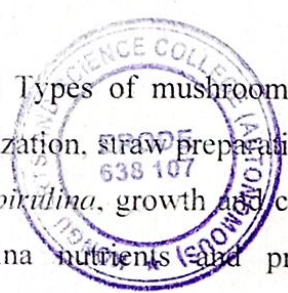
Introduction to Farming: Basic concept and principles of farming, Types of farming- Pure organic farming, Integrated farming, Mixed farming. Advantages and disadvantages of each system. Farming economics- Demand, supply, Economic Viability of a farm. Policies and incentives of organic production, Farm inspection and certification, Conversion to organic farming. Conventional farming v/s organic farming.

UNIT II

Requirements of Biofarming: Organic Production requirements, Biological Intensive Nutrition management, Green manuring, Liquid manuring, Recycling of organic manures, Soil improvement, Soil Fertility Management, Propagating Crops from seed and Greenhouse Management, Disease and Pest management. Process of organic farming.

UNIT III

Mushroom cultivation: Types of mushrooms – edible and toxic preparation of bed–sterilization, straw preparation, environmental preparation of bed, straw preparation, environmental
Spirulina: Biology of *Spirulina*, growth and culture conditions, nutritive value of spirulina, enhancement of spirulina nutrients and processing, commercial spirulina products, marketing.



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UNIT IV

Vermicompost: Earthworms used in vermicomposting, culture conditions and raw materials for compost, vermiwash, packaging.

Panchakavya – preparation, applications, importance and marketing.

Biofertilizers: Types, mass production of fertilizers (NPK), uses and applications of biofertilizers, constraints in biofertilizer technology.

UNIT V

Sericulture: Introduction, biology and characteristics of silkworm – types, nutrients, culture conditions. Quality of silk.

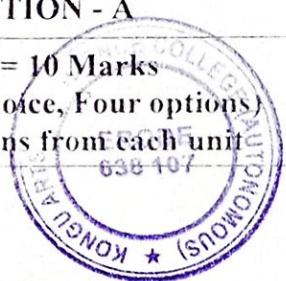
Apiculture: Types of honeybees, types of bee culture and environment factors, biological properties of honey and its health aspects.

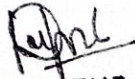
Aquaculture: Pearl culture – types, pearl enhancement conditions, harvesting, economical importance. Fisheries – shrimp culture, prawn culture, ornamental fishes, nutritive value of fish.

TEXT BOOKS

1. Kristensen, P., Taji, A. and Reganold, J. Organic Agriculture: A Global Perspective. CSIRO Press, 2006 (UNIT I)
2. Philip G. Miles, Shu-Ting Chang, Mushrooms: Cultivation, Nutritional Value, Medicinal Effect, and Environmental Impact, 2nd edition, 2004 (UNIT III)
3. M. E. Gershwin, Amha Belay, Spirulina in Human Nutrition and Health, I edition, CRC Press, 2007 (UNIT III)
4. U. Sathyanarayana, Biotechnology, Books and Allied Pvt. Ltd, 2007. (Unit IV)
5. Ganga, J. Sulochana Chetty, An Introduction to Sericulture, II Edition Oxford and IBH Publishing Company, 2008 (UNIT V)
6. R A Dunham, Aquaculture and Fisheries Biotechnology. Genetic approaches, I edition, CABI Publishing, 2004 (UNIT V)
7. SS Rana, Organic farming, India organic, 2016 (UNIT II)

QUESTION PAPER PATTERN		
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Semester	Course Code	Core Paper X Industrial Biotechnology	Total Marks:100		Hours Per Week	Credits
			CIA:25	ESE: 75		
VI	20UAQCT601				5	4

Objectives:

- To acquire knowledge about various business fields in advanced Biotechnology.
- To enrich students about the current status of development of enzymes and economic importance of biotech products.

Course Outcome:

On successful completion of the course, the students will be able to:

- CO1 Identify the requirements for fermentation technology
- CO2 Understand the different types of reactors
- CO3 Describe the process of down streaming and various techniques for product recovery
- CO4 Understand the production and use of industrially important enzymes
- CO5 Get a contented knowledge related to industrial chemicals

UNIT I

General requirements of fermentation processes: Introduction to fermentation. Isolation, screening, strain improvement and preservation of industrially important microorganisms. Types of media for fermentation processes. Development of inocula for industrial fermentations. Methods to achieve sterility- physical and chemical methods. Thermal death kinetics of microorganisms.

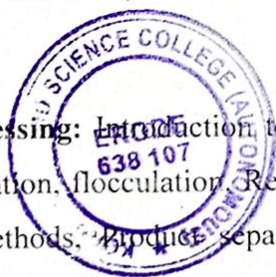
UNIT II

Bioreactor parts and design: Parts of a bioreactor, control systems (speed, temperature, gas supply, pH, dissolved oxygen, antifoam control), manual and automatic control. Types of reactor – Stirred Tank, Airlift, Bubble column, packed bed, Trickle bed and Fluidized bed. Types of fermentation- submerged fermentation (batch, fed-batch, continuous), Solid state fermentation (tower and drum).

UNIT III

Downstream processing: Introduction to downstream processing. Removal of insolubles - centrifugation, filtration, flocculation. Release of intracellular components, mechanical and non-mechanical methods. Bioprocess separation – distillation, liquid liquid extraction and evaporation. Product purification - membrane filtration, precipitation and chromatography.

Product formulation – Crystallization and drying



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UNIT IV

Industrial enzymes: Industrial applications of enzymes (food, paper, beverage and detergent industry), Enzymatic bioanalysis, Enzyme production – amylase, protease and lipase. Enzyme immobilization- Covalent linkage, adsorption, micro encapsulation, entrapment. Immobilization of cells.

UNIT V

Production of fuels and industrial products: Production of alkanes (Methane), industrial ethanol, amino acids – L-Glutamic acid and L-Lysine, Organic acid- citric acid and lactic acid, alcoholic beverages – Beer and Wine. Production of vitamin B12 and Single cell protein. Dairy products – cheese and yogurt. Process wastes - whey, molasses, starch substrates and other food wastes for bioconversion to useful products.

TEXT BOOK

1. Nooralabettu Krishna Prasad, Downstream Process Technology – A New Horizon in Biotechnology, I Edition PHI Learning Private Limited, 2012.
2. Michael. J. Waites *et al.*, Industrial Microbiology- An Introduction, I Edition Blackwell Publishing, 2007.

REFERENCES

1. Wulf Crueger and Anneliese Crueger, Biotechnology A Textbook of Industrial Microbiology- II Edition, Sinauer Associates. Inc., 1990.
2. U. Sathyanarayana, Biotechnology, Books and Allied Pvt. Ltd, 2007.

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