

**INDIRA PRIYADARSHINI GOVERNMENT DEGREE
COLLEGE FOR WOMEN, (AUTONOMOUS)**
Affiliated to Osmania University
Re-Accredited with NAAC 'A' Grade (3rd Cycle)
Nampally, Hyderabad – 500 001



DEPARTMENT OF BIOTECHNOLOGY

**Board of Studies Meeting for
Choice Based Credit System (CBCS)
B.Sc I year (Semesters I & II)
(2022-23)**


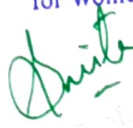

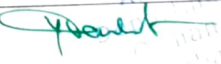
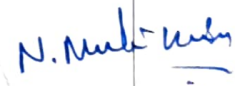

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Composition of Board of Studies

S.No	Name & Designation	Signature
1	Dr.K.Shanthi, Chairman, Assoc. Prof. & Head, Dept. Of Biotechnology, IPGDCW, Nampally	 Head & Chairman BoS Department of Bio-Technology Indira Priyadarshini Govt. Degree College for Women (A) Nampally, Hyderabad.
2	Professor Smita C. Pawar, University Nominee, Chairman, BOS, Dept. of Genetics & Biotechnology, Osmania University	 Prof. Smita C. Pawar
3	Subject expert Dr. A.Sandhya, Asst. Professor, Department of Genetics, Osmania University	 Dr. A. SANDHYA Assistant Professor Department of Genetics Osmania University
4	Subject expert Dr. Y. Venkateswarlu Department of Biotechnology Govt Degree College, Khairatabad	 Dr. Y. VENKATESWARLU, Assistant Professor Dept. of Biotechnology, Govt. Degree College, Khairatabad, Hyderabad-500 004, T.S.
5	Educationist or Industrialist Sri. Murali Krishna Managing Partner, Triton Biosolutions, AICWEHUB, Aleap, Gajularamaram, Hyderabad	 N. Murali Krishna
6	Alumna / student T. Shilpa Vardhan B.Sc Life Science (Biotechnology) IPGDCW, Nampally,	 T. Shilpa

Term : The term of the Nominated Members shall be three years.

Meetings : The Board of studies shall meet at least twice a year

Functions: The Board of Studies of a Department in the college shall

- Prepare syllabi for various courses keeping in view the objectives of the college, interest of the stakeholders and national requirement for consideration and approval of the Academic Council.
- Suggest methodologies for innovative teaching and evaluation techniques.
- Suggest panel of names to the Academic Council for appointment of examiners.
- Coordinate research, teaching, extension and other academic activities in the department / college.

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DEPARTMENT OF BIOTECHNOLOGY

Code	Paper/Title	Course Type	HPW	Credits
FIRST YEAR : SEMESTER-I				
BS	PAPER-I: Cell Biology and Genetics	DSC-1A	4T+2P=6	4+1=5
FIRST YEAR : SEMESTER-II				
BS	PAPER-II: Biological Chemistry and Microbiology	DSC-1B	4T+2P=6	4+1=5

DSC : Discipline Specific Course

[Signature]

Head & Chairman BoS

Department of Bio-Technology

**Indira Priyadarshini Govt. Degree College
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[Signature]

Prof. Smita C. Pawar

Professor
Chairperson- BoS in Biotechnology
Department of Genetics & Biotechnology
Osmania University, Hyd-500 007.

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Dr. A. SANDHYA

Assistant Professor
Department of Genetics
Osmania University
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Dr. Y. VENKATESWARLU,

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DEPARTMENT OF BIOTECHNOLOGY

DSC-1A Semester-I Course Title:-Cell Biology and Genetics

Credits: 4+1 = 5 (4 HPW – Credits -4 Theory : 60 Lectures)

Overall Course Objective: To give basic concepts of Cell Biology and Genetics

Course Objectives :

- To understand the structures and functions of basic components of Prokaryotic and Eukaryotic cells
- To learn about the process of - Cell Division, Cell Cycle, Senescence, Necrosis, Apoptosis
- To study Mendel's experiments, Multiple Alleles, X-Y chromosomes
- To understand linkage and recombination, Mitochondrial and Chloroplast inheritance

Course Title:-Cell Biology And Genetics (4 HPW- Credits-4 Theory : 60 Lectures)

UNIT-1: CELL STRUCTURE AND FUNCTIONS


No. of hours : 15

- Cell as basic unit of living organisms-bacterial, fungal, plant and animal cells
- Ultra structure of prokaryotic cell (cell membrane and plasmids, Nucleoid)
- Ultra structure of Eukaryotic cell (cell wall, cell membrane, nucleus, mitochondria, chloroplast, endoplasmic reticulum, Golgi apparatus, vacuoles)
- Fluid mosaic model, Sandwich model, Cell membrane permeability
- Structure of chromosome-morphology, components of chromosomes (histones and non-histones), specialized chromosomes (Polytene, Lampbrush)
- Chromosomal aberrations- structural and numerical
- Genetic Disorders


UNIT 2: CELL DIVISION AND CELL CYCLE

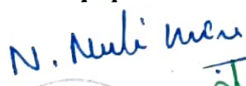

No. of hours: 15

- Bacterial cell division
- Eukaryotic cell cycle - phases
- Mitosis - Stages (spindle assembly) - significance
- Meiosis- Stages (synaptonemal complex) - significance
- Senescence and necrosis
- Apoptosis


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UNIT 3 : PRINCIPLES AND MECHANISM OF INHERITANCE

No. of hours: 15

- Mendel's experiments - factors contributing to success of Mendel's experiments
- Law of segregation - Monohybrid Ratio; Law of independent assortment- Dihybrid ratio, Trihybrid ratio
- Deviation from Mendel's laws- partial or incomplete dominance (eg: Flower Color in *Mirabilis jalapa*), Co-dominance (eg: MN Blood groups), Non allelic interactions - types of epistasis, modification of dihybrid ratios
- Penetrance and Expressivity (eg: Polydactyly, Waardenburg syndrome). pleiotropism, phenocopy- microcephaly, cleft lip.
- Multiple alleles (eg: Coat color in Rabbits, eye color in *Drosophila* and ABO Blood groups)
- X-Y chromosomes - Sex determination in *Drosophila*, Man, X-linked inheritance Hemophilia and Color blindness; X-inactivation.


UNIT 4 : LINKAGE, RECOMBINATION AND EXTENSION TO MENDEL'S LAWS

No. of hours: 15

- Linkage and recombination - Cytological proof of crossing over, phases of linkage, recombination frequency, Gene mapping and map distance
- Non-Mendelian Inheritance - Maternal effect (Shell coiling in snail), variegation in leaves of *Mirabilis jalapa*
- Cytoplasmic male sterility in Maize.
- Mitochondrial inheritance in human and poky in *Neurospora crassa*
- Chloroplast inheritance in *Chlamydomonas*
- Hardy-Weinberg Equilibrium, Allelic and genotypic distribution

References:

- Cell & Molecular Biology. E.D.D De Robertis & E.M.F De Robertis, Waverly publication
- An introduction to Genetic Analysis by Anthony, J.F. J.A. Miller, D.T. Suzuki, R.C. Richard Lewontin, W. M-Gilbert, W.H. Freeman publication
- Principles of Genetics by E.J. Gardner and D.P. Snusted. John Wiley & Sons, New York
- The science of Genetics, by A.G. Atherly J. Girton, J.F. McDonald, Saundern College publication
- Principles of Genetics by .H. Tamarin McGrawhill
- Theory & problems in Genetics by Stansfield, Schaum out line series McGrawhill
- Molecular Cell Biology Lodish, H., Baltimore, D; fesk, A., Zipursky S.L., Matsudaride, P. and Darnel. American Scientific Books. W.H. Freeman, New York
- The cell: A molecular approach. Geoffrey M Cooper, Robert E Hausman, ASM press
- Cell and Molecular Biology, Concepts and Experiments - Gerald Karp, John Wiley & Sons, Inc.
- Cell Biology And Genetics by P.K. GUPTA

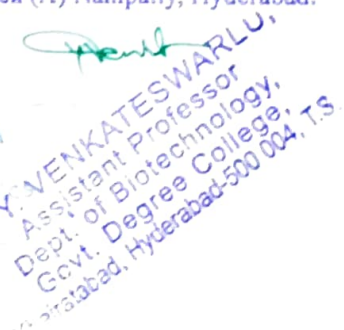

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I Semester
DSC-1A Cell Biology and Genetics

Paper I

PRACTICALS

2HPW-Credits-1

1. Microscopic observation of cells: bacteria, fungi, plant and animal
2. Preparation of different stages of Mitosis (onion root tips)
3. Preparation of different stages of Meiosis (grasshopper testis)
4. Preparation of Polytene chromosome from *Drosophila* salivary gland
5. Monohybrid and dihybrid ratio in *Drosophila*
6. Monohybrid and dihybrid ratio in Maize
7. Problems on co-dominance, epistasis, two point and three-point test cross
8. Gene mapping.
9. Statistical applications of Hardy-Weinberg Equilibrium

Course Outcomes:

The student will be able to

- Acquire knowledge on functional aspects of cell organelles
- Understand cell division and cell cycle
- Understand Mendel's experiments, Multiple Alleles, X-Y chromosomes
- Acquire knowledge about Linkage and recombination, Mitochondrial and Chloroplast inheritance



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DSC-1B Semester-I I Course Title:- Biological Chemistry And Microbiology

Credits: 4+1 = 5 (4 HPW – Credits -4 Theory : 60 Lectures)

Overall course objective: To understand the basic concepts of Biological Chemistry and Microbiology

Course objectives :

- To learn the importance and classification of Carbohydrates, Amino acids, Proteins, Lipids and Enzymes
- To understand various aspects of Bioenergetics - Glycolysis, Electron Transport, Gluconeogenesis
- To discuss history of Microbiology, Microscopy and classification of micro organisms
- To discuss Sterilization methods and Bacterial growth curve

Unit 1 : Biomolecules

No. of hours: 15

- Carbohydrates - importance, classification; structure and functions of monosaccharides (glucose & fructose), disaccharides (sucrose, lactose & maltose) and polysaccharides (starch, glycogen & insulin)
- Amino acids - importance, classification, structure, physical and chemical properties of amino acids; peptide bond formation
- Proteins - importance, structure of proteins- primary, secondary, tertiary and quaternary
- Lipids - importance, classification- simple lipids (triacyl glycerides & waxes), complex lipids (phospholipids & glycolipids), derived lipids (steroids, terpenes & carotenoids)
- Nucleic acids: structure and chemistry of DNA (Watson and crick) and RNA(TMV) structure and forms of DNA (A, B and Z)
- Enzymes - importance, classification and nomenclature; Michaelis-Menton Equation, factors influencing the enzyme reactions; enzyme inhibition (competitive, uncompetitive & mixed), co-enzymes.

Unit 2 : Bioenergetics

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No. of hours: 15

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- Glycolysis, Tricarboxylic Acid (TCA) Cycle,
- Electron Transport, Oxidative Phosphorylation
- Gluconeogenesis and its significance
- Transamination and Oxidative deamination reactions of amino acids
- β -Oxidation of Fatty acids
- Glyoxalate cycle.

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Unit 3 : Fundamentals of Microbiology

No. of hours: 15

- Historical development of microbiology and contributors of microbiology
- Microscopy: Bright field microscopy, Dark field microscopy, Phase contrast microscopy, fluorescent microscopy, Scanning and Transmission electron microscopy
- Outlines of classification of microorganisms
- Structure and general characteristics of bacteria and virus
- Disease causing pathogens and symptoms (eg: Mycobacterium, Hepatitis)
- Structure and general characteristics of micro-algae and fungi


Unit 4 : Culture and identification of microorganisms

No. of hours: 15

- Methods of sterilization - physical and chemical methods
- Bacterial nutrition - nutritional types of bacteria, essential macro, micro nutrients and growth factors.
- Bacterial growth curve - batch and continuous cultures, synchronous cultures measurement of bacterial growth-measurement of cell number and cell mass
- factors affecting bacterial growth
- Culturing of anaerobic bacteria and viruses
- Pure culture and its characteristics
- Beneficial microorganisms – Biofertilizers and Biopesticides

References:

1. Lehninger Principles of Biochemistry By: David L. Nelson and Cox
2. Biochemistry By: Rex Montgomery
3. Harper's Biochemistry By: Robert K. Murray
4. Enzymes By: Trevor Palmer
5. Enzyme structure and mechanism By: Alan Fersht
6. Principles of Biochemistry By: Donald J. Voet, Judith G. Voet, Charlotte W. Pratt
7. Analytical Biochemistry By: Cooper
8. Principles and techniques of Biochemistry and Molecular Biology Edited By: Keith Wilson and John Walker
9. Practical Biochemistry By: Plummer
10. Biology of Microorganisms by: Brock, T.D. and Madigan, M.T.
11. Microbiology by: Prescott, L.M., Harley, J.P. Klein, D.A.
12. Microbiology by: Pelezar, M.J, Chan, E.C.S, Ereig, N.R.
13. Microbiological applications by: Benson


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II Semester
DSC-1B Biological Chemistry And Microbiology
Paper II

PRACTICALS

2HPW-Credits-1

1. Preparation of normal, molar & molal solutions.
2. Preparation of buffers (acidic, basic & neutral)
3. Qualitative tests of sugars, amino acids & lipids
4. Estimation of total sugars by anthrone method
5. Separation of amino acids by paper chromatography
6. Estimation of proteins by biuret method
7. Sterilization methods
8. Preparation of microbiological media (bacterial, algal & fungal)
9. Isolation of bacteria by streak, spread and pour plate methods
10. Isolation of bacteria from soil
11. Simple staining and differential staining (gram's staining)
12. Bacterial growth curve
13. Technique of micrometry (ocular and stage)

Course Outcomes:

The student will be able to

- Acquire knowledge on importance and classification of Carbohydrates, Amino acids, Proteins, Lipids and Enzymes
- Understand various aspects of Bioenergetics like Glycolysis, Electron Transport, and Gluconeogenesis
- Acquire knowledge on Microscopy and classification of Micro organisms
- Understand different methods of Sterilization and Bacterial growth curve

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Titles of new topics included are

1. *Beneficial microorganisms*
2. *Biofertilizers*
3. *Biopesticides*
4. *Genetic Disorders*