DEPARTMENT OF GENETICS
OSMANIA UNIVERSITY COLLEGE FOR WOMEN
KOTI, HYDERABAD.
SEMESTER I
PAPER – I

GENETIC ANALYSIS - I CODE: Gen 15101 C

AIMS: This paper focuses on Mendelian Genetics (classical or transmission) and the basis for inheritance of hereditary factors (genes). It widely explains Mendel's principles of inheritance, the different forms of inheritance patterns and describes cellular and chromosomal events that occur during the eukaryotic cell cycle and gamete formation.

OBJECTIVES:

- To understand the Principles of Inheritance as formulated by Mendel
- To lay the foundation for Cytogenetic studies
- To apply the principles of extension to Mendelian Inheritance.
- To describe the Chromosome number, structure and Behavior in human cells.

Unit 1: MENDELIAN PRINCIPLES

1.1. Mendel's laws of inheritance

1.1.1 .Phenotype, Genotype, Homozygote, Heterozygote

1.1.2 First and second filial generations

1.1.3 Reciprocal cross, Back cross, Test cross

1.2. 1 Law of segregation – Monohybrid cross

1.2.2 Law of independent Assortment – Dihybrid cross

1.3. Johansson's Pure line concept

Unit 2: CHROMOSOMAL BASIS OF INHERITANCE

2.1 Cell division and chromosomal segregation – Mitosis and meiosis

2.2 Significance of mitosis and meiosis

2.3 Eukaryotic cell cycle – G_1, G_0, S and G_2 phases

2.4 Cell cycle regulation- -Genes determining cell cycle (Cyclins and CDK proteins)

2.5 Meiosis in relation to Mendel laws

Unit 3: EXTENSION TO MENDELIAN SEGREGATION PATTERNS

3.1 Variation to dominance relations - Incomplete Dominance / Codominance

3.2 Gene Interaction – Epistasis

3.3 Multiple alleles,– egs. From animal / plant/ ABO, Rh systems in humans

3.4.1 Lethals – Dominant and Recessive egs. In Drosophila, mice, etc

3.4.2 Balanced lethal stocks – Drosophila (Cy /Pm, H / Sb)

3.4.3 Segregation distortion - Drosophila, mice

3.9.1 Environmental effects and gene expression – effect of light, nutrition, temperature, maternal relation, etc.

3.9.2 Twin studies – Concordance and Discordance

3.9.3 Penetrance and Expressivity – egs. In man and animals

3.9.4 Phenocopies – egs. In man and animals

Unit 4: CHROMOSOMAL STRUCTURE AND ORGANISATION

4.1 Structure of chromosomes- size and shape

4.2 Packing of DNA

4.3 Histones and Non- Histones

4.4 Euchromatin and Heterochromatin – constitutive & facultative heterochromatin

4.5 Specialized chromosomes – Lampbrush Chromosome and its importance

4.6 Polytene chromosomes- Puffing and genetic activity of puffs

PRACTICALS **CODE: Gen 15151 C**

1. Maintenance and culturing of drosophila stocks
2. Monohybrid segregation in drosophila / Maize
3. Dihybrid segregation in drosophila / Maize
4. Use of Probability in genetic segregation
5. Use of Chi square test in testing genetic ratios
6. Study of Mitosis in root tips of Onion / Trigonella / Barley
7. Study of Meiosis on Maize / Grasshopper
8. Testing of Blood groups.

TEXTS AND REFERENCES

1. Genetics by Strickberger
2. Genetics by Gardener
3. Genetics by Tamarin and Robert
4. Theory and problems in Genetics by Stansfield
5. Introduction to Genetic Analysis by Suzuki, Griffith, Richard Lewontin

DEPARTMENT OF GENETICS
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SEMESTER II
PAPER-II

GENETICS ANALYSIS II CODE: Gen 15201 C

AIMS: The paper aims in explaining more complex modes of inheritance and how sex influences the inheritance and expression of genes. The fundamental focus of this paper is to make the student understand a variety of chromosomal abnormalities and the molecular mechanism of their occurrence. It further enables them to construct Genetic maps that lay the foundation for molecular studies. The study of recombinational events enhances their.

OBJECTIVES:

- To understand the inheritance of sex related genes
- To understand the cause and effect of alteration in Chromosome number and structure.
- To enable calculation of Recombination frequency and construct Genetic map.
- To have a conceptual understanding of the recombination in Bacteria and Viruses.

Unit 1 GENETIC OF SEX DETERMINATION & SEX- LINKED INHERITANCE

1.1.1 Sex determining mechanisms – Genic, chromosomal, environmental with examples from Drosophila, birds, insects, animals, humans and plants
1.1.2 Sex chromatin and X-chromosome inactivation
1.2 Sex linked inheritance
1.2.1 X-linked inheritance
1.2.2 Y linked inheritance
1.2.3 Incompletely sex linked genes
1.3 Sex limited genes
1.4 Sex influenced genes

Unit 2 CHROMOSOMAL CHANGES

2.1 Changes in chromosome structure
2.1.1 Inversions egs.. In plant/ animal / human
2.1.2 Duplications ex. In plant/ animal/ human
2.1.3 Defiencies ex. In plant/ animal/ human
2.1.4 Translocations ex. In plant (oenothera)/ animal/ human
2.2 Changes in chromosome number
2.2.1 Euploids
2.2.1.1 Auto Polyploids

2.2.1.2 Allopolyploids
2.2.2.1 Aneuploids
2.2.2.2 Use of aneuploids in gene mapping

Unit 3 LINKAGE, RECOMBINATION AND GENE MAPPING

3.1.1 Discovery of linkage
3.1.2 Phases of Linkage
3.1.3 Complete and partial linkage
3.2.1 Chiasmata and crossing over
3.2.2 Cytological proof for crossing over and recombination
3.3.1 Two and three point crosses
3.3.2 Recombination frequencies and gene mapping
3.3.3 Gene mapping in Neurospora / Aspergillus – Tetrad analysis

Unit 4 LINKAGE AND RECOMBINATION IN BACTERIA AND PHAGES

4.1.1 Structure and Life cycle of Bacteria
4.1.2 Endospores
4.2 Recombination and mapping in Bacteria
4.2.1 Conjugation – use of conjugation in gene mapping
4.2.2 Transformation – Competent cells – Transformation with fragment and Plasmids
4.2.3 Transduction – Generalized and Specialized, Mapping the genes
4.3 Structure of virus
4.3.1 DNA viruses
4.3.2 RNA viruses
4.3.3 Retroviruses
4.4 Lytic and Lysogenic Life cycles

LAB-II CODE: Gen 15252 C

1. Study of Ring chromosomes in Rheo Discolor
2. Study of salivary gland chromosomes in Drosophila
3. Problems on Linkage and Crossing over in Eukaryotes
4. Tetrad Analysis in Neurospora and Aspergillus
5. Study of Polyploidy in plants
6. Barr body / drumstick identification
7. Gene mapping in prokaryotes- using transformation and conjugation data.

TEXT AND REFERENCES

1. Genetics by Stickberger
2. Genetics by Tamarin & Robert
3. Genetics by Gardner
4. Theory and Problems in Genetics by Stansfield
5. Introduction to Genetic Analysis by Suzuki, Griffith, Richard Lewontin
6. CytoGenetics - Swanson

DEPARTMENT OF GENETICS
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SEMESTER III
PAPER III

MOLECULAR GENETICS-I CODE: Gen 15301 C

AIMS: The theory is aimed at enlightening the students about the basics of molecular biology and the practical labs are aimed to explain major methods and techniques used in Molecular Genetics like isolation and analysis of genetic material.

OBJECTIVES:

- To understand the significance of DNA as Genetic material.
- To impart a broad understanding of basic molecular theories.
- To create a deeper understanding about Gene expression and its regulation.
- To describe Gene to its finest level.

UNIT-1 NUCLEIC ACIDS

1.1 Evidence for RNA/DNA as genetic material
1.1.1 Transforming principle
1.1.2 Hershey and Chase Experiment
1.1.3 TMV Infectivity
1.2 Structure & function of DNA
1.2.1 Purines and Pyrimidines, Nucleosides and Nucleotides
1.2.2 Watson and Crick model
1.2.3 Types of DNA
1.3 Replication of DNA
1.3.1 Modes of Replication of DNA – Conservative, Semi conservative and dispersive; Messelson and Stahl Experiment,
1.3.2 Models of DNA replication- Circular and Linear DNA; Bidirectional replication (Leading & Lagging strand synthesis).
1.3.3 Enzymes involved in DNA replication
1.4 DNA replication inhibition

UNIT-2 GENE EXPRESSION

2.1 Structure and function of RNA
2.1.1 RNA types – m RNA , r- RNA, t- RNA
2.2 Structure and function of Ribosomes
2.3 Transcription
2.3.1 Sense and anti sense strands
2.3.2 RNA polymerase and Transcription factors
2.4 Reverse Transcription
2.5 Genetic code
2.6 Translation

UNIT-3 REGULATION OF GENE EXPRESSION

3.1 Regulation in bacteria-Operon
3.1.1 Lac Operon
3.1.2 Catabolite repression –c AMP and CRP
3.2.1 Tryptophan Regulation
3.2.2 Attenuation
3.3 Regulation of Lytic and Lysogenic cycle in phage
3.3.1 Lytic cascade in phage –anti termination
3.4 Regulation in eukaryotes
3.5 Gal locus regulation in yeast
3.6 Regulation of mating type in yeast- cassette model

UNIT-4 FINE STRUCTURE ANALYSIS OF THE GENE

4.1 Position and Dosage effect
4.2 Compound locus in Drosophila –Lozenge locus
4.3 One gene – One enzyme concept
4.4 Analysis of the r II locus
4.5 Collinearity between gene and polypeptide Tryptophan synthetase
4.6 Split genes, Openreading frames, overlapping genes

LAB III **CODE: GEN 15351 C**

1. Extraction and estimation of DNA.
2. Extraction and estimation of RNA.
3. Extraction and estimation of protein by Lowry / Biuret.
4. Separation of proteins by electrophoresis.
5. Chromatography – Paper Chromatography and Thin layer chromatography.

TEXT AND REFERENCES

1. Molecular biology of the Gene by Watson, Hopkins, Roberts, Steitz.
2. Genetics by stickberger
3. The biochemistry of Nucleic acids by Adams,et al. Edit by Davidson
4. Molecular Genetics by David Frifielder
5. Recombinant DNA by Watson
6. The gene by Lawrence Dillo
7. Genetics by Weaver and Hedrick.

Changes made: LAB III:

3. Estimation of Proteins by Biuret method is included instead of Bradford method.

DEPARTMENT OF GENETICS
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SEMESTER – IV
PAPER – IV
MOLECULAR GENETICS II **CODE: Gen 15401 C**

AIMS: The paper focuses on mechanistic and experimental approach in Genetics leading towards more advance topics like r-DNA technology.

OBJECTIVES:

- To familiarize the concept of gene at its organizational level.
- To study the damage of DNA by various methods and its repair mechanisms.
- To get a clear understanding about Transposable elements and their role in Medical Genetics.
- To describe the range of techniques developed over recent years to identify, locate and describe the presence and action of Genes and proteins in Biological material.

Unit 1: GENOME ORGANISATION

1.1 Genes and Gene numbers
1.2 C value paradox
1.3 Denaturation and Renaturation of DNA- Tm values and Cot curves
1.4 Repetitive and non-repetitive DNA
1.5 Inverted and Tandem repeats
1.6 Satellite DNA
1.7 Gene clusters-Histone, rRNA
1.8 Orgenellar Genomes- Mitochondrial and chloroplast DNA

Unit 2: GENE MUTATION AND REPAIR MECHANISMS

2.1 Spontaneous and Induced mutations
2.2 Chemical and physical mutagens
2.2.1 Alkylating agents, Base analogues, intercalating agents & nitrous acid
2.3.1 Radiations- UV, X-ray, Gamma rays, fast neutrons
2.4 Mode of action of mutagens
2.4.1 Point mutations,Transitions and transversions, Frame shift mutations
2.5 Repair of mutations
2.5.1 Photoreactivation, Excision repair,SOS repair,Recombinational repair
2.6 Detection of mutations
2.6.1 Bacteria- Ames test
2.6.2 Mice- Russels test
2.6.3 Drosophila- CLB, M-5, BASC & Attached –X chromosome

Unit 3: TRANSPOSABLE ELEMENTS

3.1 Transposable elements in different organisms
3.1.1 Bacteria- IS elements, Transposons
3.1.2 Maize Ac-Dc systems, mechanism of transposition

3.1.3 Drosophila- P element, Hybrid Dysgenesis
3.1.4 Yeast Ty transposon
3.2 Transposon- structure, movement and physical characteristics
3.2.1 Transposon Replication and Recombination
3.3 Gene Switiching- Antigenic changes in Trypanosomes

Unit 4: RECOMBINANT DNA

4.1 Basic aspects of Gene cloning
4.1.1 Enzymes used in molecular cloning–RE, ligases, polymerases, kinases
4.1.2 Vectors- plasmids, Cosmids, Phagemids
Bacterial and Yeast artificial chromosomes.
4.1.3 Host (E.coli, Yeast)
4.1.4 Techniques- Electrophoresis- Blotting, Labelling, Hybridisation
4.2 Strategies for gene cloning
4.2.1 Gene libraries- Genomic library, c DNA library
4.2.2 Screening of gene library and isolation of genes
4.3 Polymerase chain reaction and applications
4.4 Molecular mapping RFLP,RAPD, Chromosome walking, Finger printing.

LAB- IV **CODE: GEN 15451 C**

1. Problems based on Reassociation Kinetics
2. Study of Chemical and UV induced mutations in Onion root tips.
3. Restriction Digestion
4. Ligation
5. RFLP
6. PCR (Demonstration)

TEXT AND REFERENCES

1. Molecular Biology of the Gene by Watson, Hopkins, Roberts,Seitz
2. Genes by Lewin
3. Recombinant DNA – James D.Watson
4. Molecular Genetics by David Freifielder
5. The Gene by Lawrence Dillon
6. Genetics by Weaver and Hedrick
7. Biochemistry by Voet & Voet

Note: Changes proposed: LAB- IV
Practical Added:
2. Study of Chemical and UV induced mutations in Onion root tips.
3. Restriction Digestion
4. Ligation
5. RFLP
6. PCR (Demonstration)

Practicals shifted to Paper- Industrial Microbiology

2. Basic Techniques
    A) Sterilization methods
    B) Isolation of bacteria from different sources
    C) Principle and technique of bacterial staining- Flagella staining
3. Replica plating and identification of mutants
4. Effect of Mutagens on bacterial growth
    A) Effect of UV on bacterial growth
    B) Disinfectant and drugs on bacterial growth
5. Calculation of generation time (Growth curve)

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SEMESTER V
PAPER VI
PLANT AND ANIMAL BIOTECHNOLOGY CODE: Gen 15502C

AIMS: This paper aims at giving the students an exposure to the fundamentals of plant and animal breeding, various cell/tissue culture techniques for *in vitro* manipulations and transgenic technology for crop and livestock improvement.

OBJECTIVES:

- To impart theoretical knowledge about plant and animal breeding objectives, modes of reproduction and genetic consequences, breeding methods for crop/animal improvement
- To introduce to the basic concepts of plant tissue culture, clonal propagation of plants, their genetic significance and methods of foreign gene introduction into plant cells.
- To help the student understand the basic concepts of animal cell culture, its importance and expression of cloned genes in animal cells
- To focus on the development of transgenic plants and animals, and their application in medicine, agriculture and industry.

Practicals: The laboratory teaching of this paper will provide students an opportunity to get hands on training with some of the most basic, yet widely utilized techniques in plant tissue culture and some animal cell culture techniques.

UNIT 1: POPULATION IMPROVEMENT IN PLANTS AND ANIMALS

1.1. Out lines of breeding methods for autogamous and allogamaous plants
1.1.1. Pure line selection, mass selection, pedigree method, bulk method, back cross Method
1.1.2. Clonal selection and recurrent selection methods.
1.2 Heterosis and inbreeding depression.
1.3. Principles of animal selection.
1.3.1. Individual, pedigree and progeny selections.
1.3.2. Selection for single or multiple traits.
1.3.3. Selection methods (Tandem, Independent culling and selection index.)
1.4. Mating systems (Inbreeding, linebreeding, out crossing and out breeding)

UNIT 2: BASICS OF PLANT TISSUE CULTURE.

2.1 Concept of totipotency of plant cells – initiation and regeneration.
2.2. Clonal propagation of plants *in vitro*.

2.2.1 Seed, embryo, organ and cell cultures.
2.2.2 Callus and cell suspension cultures
2.3 Protoplast isolation, culture and fusion - genetic consequences.
2.4 Genetics transformation of plants – by different methods.

UNIT 3: BASICS OF ANIMAL BIOTECHNOLOGY.

3.1 Primary cell culture and cell lines.
3.1.1.Disaggregation and Isolation of tissues in primary cell culture.
3.1.2.Culture Media – Natural and defined.
3.1.3.Established cell lines:- Types, Immortalization and selection of cell lines and maintenance.
3.2. Techniques of tissue and organ culture
3.2.1.Slide cultures, Carrel flask culture, Roller test tube cultures.
3.2.2.Organs culture using solid and liquid media.
3.3 Expression of cloned genes in animal cells:- Expression systems and vectors in mammals.

UNIT 4: TRANSGENICS.

4.1 Transgenic plants for biotic and abiotic stress tolerance.
4.2 Transgenic plants for nutritional improvement, production of pharmaceuticals and secondary metabolites.
4.3 Transgenic animals – sheep, cattle, fish, pig, chicken.
4.4 Application of animal Biotechnology in production of pharmaceuticals and secondary metabolites – Insulin, Growth hormone, Factor VIII and tissue plasminogen activator.

PRACTICALS: **CODE: Gen 15552 C**

1. In vitro germination of seeds on water agar medium
2. Preparation of plant tissue culture media and sterilization
3. Inoculation of explants for callus induction
4. Preparation and sterilization of media used in Animal cell culture
5. Primary cell culture
6. Disaggregation and Isolation of tissues in primary cell culture

REFERENCES:

1. "An Introduction to Plant Biotechnology" by H.S. Chawla
2. "Biotechnology" by R.C.Dubey.
3. "Plant breeding" by B.D.Singh
4. "Plant Tissue Culture Theory and Applications" by Bhojwani SS and Razdan
5. "A text book of animal biotechnology" by Ramdas.
6. "Animal cell culture" by Ian Frehney.
7. "Animal biotechnology" by Ranga.

DEPARTMENT OF GENETICS
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SEMESTER – VI
Interdisciplinary Elective Paper: BIOPHYSICAL TECHNIQUES

CODE: Gen15503C

Unit 1: Colorimetry and Spectroscopy

1.1 Units of measurement of solutes in solution. Eg. Normality, molality, molarity

1.2 Measurement of pH; Henderson-Hasselbatch equation

1.3 Basic principles of Colorimetry- Beer Lambert's law

1.4 Spectrophotometer

1.5 U.V and Visible absorption spectra

Unit 2: Chromatography

2.1 Basic Principle, Instrumentation and applications of -

2.2 Paper chromatography

2.3 Thin layer chromatography,

2.4 Ion exchange chromatography,

2.5 Gel Filtration Chromatography

Unit 3: Electrophoretic techniques

3.1 Introduction to Electrophoresis- Migration of an ion in field, principle factors affecting Rate of Electrophoretic mobility

3.2 Types of Electrophoresis-Basic Principles and experimental procedures

3.3 Paper Electrophoresis

3.4 Agarose Gel Electrophoresis

3.5 PAGE

Unit 4: **Centrifugation techniques**

4.1 Centrifugation-Basic Principle

4.2 Concept of RCF

4.3 Types of Instruments and rotors

4.4 Preparative Centrifugation: Differential and density gradient centrifugation

4.5. Analytical Centrifugation (Isolation of cell components)

Practicals: **Code: Gen 15553C**

1. Verification of Beer Lambert's law

2. Absorption spectra of Proteins and Nucleic acids

3. Thin Layer chromatography

4. Gelfitration chromatography

5. SDS-PAGE

6. Agarose gel electrophoresis

Books recommended:

1. Principles and Techniques of Practical Biochemistry-Bryan L. Williams and Keith Wilson
2. Practical Biochemistry- Shawney
3. Physical Biochemistry-David Friefelder

DEPARTMENT OF GENETICS
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SEMESTER – VI
PAPER – VIII
BIOINFORMATICS

CODE: Gen 15601 C

AIM: The paper provides a strong foundation for the development of essential Bioinformatics knowledge and skills within the context of academic research, as well as an introduction to the emerging field of systems biology.

Objectives:

- To help in understanding fundamental biological concepts, including genomes, DNA, protein structure and function.
- To understand the statistical foundations of Bioinformatics, including sequence analysis.
- To provide an introduction to growth areas in Bioinformatics research, such as systems biology and Next-Generation Sequencing.

UNIT 1: Introduction to Bioinformatics and Biological Databases

1.1 Definition, Scope and applications
1.2 Application of Bioinformatics in Agriculture and Animal Biotechnology
1.3 Role of Bioinformatics in Pharmacogenomics and Drug designing
1.4 The Human genome project
1.5 Biological Databases – NCBI, EBI, DDBJ, KEGG and Uniprot

UNIT 2: GENOMIC ANALYSIS

2.1 Overview of prokaryotic and Eukaryotic genome organization
2.2 Transcriptomics and Metabolomics
2.3 Interrupted genes, DNA- Protein interactions and Protein-Protein interactions
2.4 Basics of Gene prediction, Gene content, Gene signals

UNIT 3: SEQUENCE ANALYSIS

4.1 Concepts of sequence alignments – pairwise and multiple sequences
4.2 Sequence similarity search by BLAST and FASTA
4.3 Concepts of Phylogeny –Maximum parsimony
4.4 Structural analysis of proteins – Protparm, GOR, Swiss model
4.5 DNA and protein sequence formats – Gen bank, FASTA, PIR

UNIT 4: PROTEIN ANALYSIS

3.1 Introduction to amino acids and single letter notations
3.2 Structural classification of amino acids
3.3 Structural organization of proteins – primary, secondary and tertiary
3.4 Protein sequence and structural databases –PDB, Swissprot, SCOP and CATH
3.5 Micro array and Mass spectroscopy
3.6 Catalytic and binding site prediction and identifications

PRACTICALS **CODE: Gen 15651 C**

1. Computer operation – Input & Output Devices; and Downloading and installing softwares.
2. Sequence analysis – a) Biological Database, b) Sequence retrieval
3. Pairwise sequence analysis (EBI) – Homology search by BLAST & FASTA
4. Multiple sequence alignment by CLUSTAL-W; Phylogenetic trees
5. Gene prediction by ORF finder
6. Protein structure visualization by Rasmol or Pymol, Identification of Alpha helix, coils, beta strands

DEPARTMENT OF GENETICS
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SEMESTER – VI

PAPER: INDUSTRIAL AND ENVIROMENTAL BIOTECHNOLOGY
CODE: Gen15602 C

AIMS: The paper aims at training students on how microbiological techniques are carried out in industrial processes and providing them with the fundamentals of microbiological practices that are exclusive to industry.

OBJECTIVES:

- To give an insight about industrially useful microorganisms and their development.
- To explain the design and functioning of bioreactors
- To develop understanding of industrial processes for production of commercially produced microbial products.
- To emphasize on the applications of microorganisms to generate alternative energy (or 'bioenergy') and their role in environmental cleanup.

Unit 1: INDUSTRIALLY IMPORTANT MICROBES

1.1 Microbial screening – primary and secondary
1.2 Microbial strain improvement-Fungal strain improvement, Bacterial strain improvement,
1.3 Feedback controls
1.4 Recombinant DNA in industrial microbiology
1.5 Selection and Screening Procedures after Strain improvement

Unit 2: TECHNOLOGY BEHIND INDUSTRIAL MICROBIOLOGY

2.1 Small scale, laboratory scale process in industrial production-Scaling up
2.2 Large scale industrial production-Bioreactors;
2.3 Process development and implementation-Design and power requirement of Bioreactors, Reynolds number.
2.4 Downstream processing-Methods of extraction

Unit 3: MICROBIAL PRODUCTS OF INDUSTRIAL IMPORTANCE

3.1 Microbial enzymes – amylases ,proteases, pectinases
3.2 Antibiotics- Penicillin, Streptomycin
3.3 Vaccines - Hepatitis
3.4 Vitamins – B_{12}
3.5 Organic solvents and acids – alcohol, citric acid, acetic acid

Unit 4: ENVIRONMENTAL IMPORTANCE OF INDUSTRIAL MICROBES

4.1 Conventional and Non-conventional energy sources & their impact on environment
4.2 Microbial fuels-Bioethanol, Biological Hydrogen, Biogas Production.
4.3 Microbial leaching of ore.
4.4. Microbes in waste treatment

4.4.1 Waste water treatment-Sewage treatment (Small Scale and Large Scale)
4.4.2 Organic waste treatment-Composting & Vermicomposting
4.4.3 Bioremediation of petroleum
4.4.4 Bioremediation of xenobiotics

PRACTICALS-LAB V1 **CODE: Gen15652 C**

1. Microscopic observation, Staining and identification of bacteria, fungi and algae.
2. Preparation of routine microbiological media and their Sterilization methods.
3. Culturing of microorganisms: Tube culture (slant/broth), plate culture, flask culture
4. Calculation of generation time (Growth curve)
5. Production of ethanol by yeast fermentation.
6. Production of citric acid
7. Testing water quality

TEXT AND REFERENCES

1. Industrial Microbiology (1999) by Casida. LE, New age International (P) Limited, Publishers.
2. Industrial Microbiology (2000) by A.H. Patel. Macmillan Publishers India, ISBN 9780333908426
3. Principles of Fermentation Technology by P.F. Stanbury, A. Whitaker and S.J. Hall, Butterworth Heineman, Aditya Books (P) Ltd.
4. A text book of Industrial Microbiology (1989) by Wulf Crueger and Anneliese Crueger, Panimam Publishing Corporation.
5. Biology of Industrial microorganisms (1981) by Arnold L. Demain. Benjamin/Cummings Pub. Co., Advanced Book Program.
6. Biotechnology: a text book of industrial microbiology (1990); Wulf Crueger, Anneliese Crueger, Thomas D. Brock

Changes proposed:
Theory added:
4.4.3 Microbial bioremediation of Oil spills
4.4.4 Bioremediation of xenobiotics
Theory removed:
3.6 Vaccines – B.C.G

Practicals added:
1. Microscopic observation, Staining and identification of bacteria, fungi and algae.
2. Preparation of routine microbiological media and their Sterilization methods.
3. Culturing of microorganisms: Tube culture (slant/broth), plate culture, flask culture
4. Calculation of generation time (Growth curve)

Practical removed:
1-Production of amylases
2-Wine Production