

## **B.E. 301 - ENGINEERING MATHEMATICS II**

### **Unit I**

Fourier Series: Introduction of Fourier series , Fourier series for Discontinuous functions, Fourier series for even and odd function, Half range series    Fourier Transform: Definition and properties of Fourier transform, Sine and Cosine transform.

### **Unit II**

Laplace Transform: Introduction of Laplace Transform, Laplace Transform of elementary functions, properties of Laplace Transform, Change of scale property, second shifting property, Laplace transform of the derivative, Inverse Laplace transform & its properties, Convolution theorem, Applications of L.T. to solve the ordinary differential equations

### **Unit III**

Second Order linear differential equation with variable coefficients : Methods one integral is known, removal of first derivative, changing of independent variable and variation of parameter, Solution by Series Method

### **Unit IV**

Linear and Non Linear partial differential equation of first order: Formulation of partial differential equations, solution of equation by direct integration, Lagrange's Linear equation, charpit's method. Linear partial differential equation of second and higher order: Linear homogeneous and Non homogeneous partial diff. equation of nth order with constant coefficients. Separation of variable method for the solution of wave and heat equations

### **Unit V**

Vector Calculus: Differentiation of vectors, scalar and vector point function, geometrical meaning of Gradient, unit normal vector and directional derivative, physical interpretation of divergence and Curl. Line integral, surface integral and volume integral, Green's, Stoke's and Gauss divergence theorem

### **References**

- (i) Advanced Engineering Mathematics by Erwin Kreyszig, Wiley India
- (ii) Higher Engineering Mathematics by BS Grewal, Khanna Publication
- (iii) Advance Engineering Mathematics by D.G.Guffy
- (iv) Mathematics for Engineers by S.Arumungam, SCITECH Publuication
- (v) Engineering Mathematics by S S Sastri. P.H.I.

## **BT- 302 Biomass Conversion Technology**

**Unit-I** Present strategy on biomass energy conversion technology-Historical review of alternative transportation bio-fuels, Factors influencing the utilization of bio-fuel, Advantages of biofuels, State of commercial and traditional energy sources in developing countries.

**Unit –II** Biomass Gasification: introduction, Pre-requirement condition for biomass, gasification, Gasification system components, Gasification process conditions, Type of gasifiers, Technical limitations, Gasifier applications.

**Unit-III** Biomass pyrolysis , Operational experiences, Types of pyrolysis.

**Unit –IV** Biomass liquefaction – introduction, basic liquefaction concepts, Process technology.

**Unit V** Biological hydrogen productions-Microbial biotechnology for hydrogen production, factors influencing hydrogen production, Methods for measuring biological hydrogen production , Hydrogen based bio-fuel cell. Fuel wood farming and Petrocrops, Biomass processing –fuel wood farming, short rotation forestry (Agro-forestry ), petrocrops, Aquatic petrocrops, Petrocrops processing as an emerging industry.

### **References:**

1. Young MM, Lamptey et al; Biomass Conversion Technology: Principles and Practice
2. Charles Y. , Wereko-Brobby and Essel B. Hagan; Biomass Conversion and Technology
3. David A. Tillman and Edwin C. Jahn; Progress in Biomass Conversion
4. Bridgwater AV; Advances in Thermochemical Biomass Conversion
5. David A. Tillman and Edwin C. Jahn; Progress in Biomass Conversion
6. Milne T, Brennan, et al; Sourcebook of Methods of Analysis for Biomass and Biomass

## **BT- 303 Bioprocess & Biomass Calculation**

**Unit-I** Units and dimension, Basic and derived Units, Conversion of Units, Dimensional analysis, Stoichiometric and composition relationship, Volumetric relationship Conversion of mass energy to single and multistage processes, basis of calculations, Limitations and excess reactants, Degree of completion.

**Unit-II** Behavior of ideal gases, Gaseous mixtures, Vapor pressure, Humidity and study of psychometric chart, Use of Antoni relation.

**Unit-III** Material Balance, Recycle by pass and purge calculations for reaction and non-reacting systems.

**Unit-IV** Energy Balance : Heat capacity Calculation of enthalpy changes, Actual and theoretical flame temperature, Adiabatic reaction temperature, heat of vaporization , Heat of formation, Heat of combustion Heat of reaction etc.

**Unit –V** With special reference to biotechnology based industries producing pharmaceutical compounds, Fruit processing Units, Biomass processing Units Single cell proteins production ,Specific protein produces etc.

### **References:**

1. Young MM, Lamptey et al; Biomass Conversion Technology: Principles and Practice
2. Charles Y. , Wereko-Brobby and Essel B. Hagan; Biomass Conversion and Technology
3. David A. Tillman and Edwin C. Jahn; Progress in Biomass Conversion
4. Bridgwater AV; Advances in Thermochemical Biomass Conversion
5. David A. Tillman and Edwin C. Jahn; Progress in Biomass Conversion
6. Milne T, Brennan, et al; Sourcebook of Methods of Analysis for Biomass and Biomass

### **List of Experiments (expandable):**

1. To Study the use of different bacteria in composting the anaerobic decomposition of organic matter by micro organisms.
2. By using Conventional fermentation processes study the production of bioethanol by making use of the starch and sugar components of typically cereal or sugar (beet or cane) crops.
3. To study the production of bio diesel from jatropha seed.
4. Study of production of biogas by using waste.

## **BT -304 Cell Biology**

**Unit-I** Structure of prokaryotic and eukaryotic cells, Structural evolution of cells Starting from primitive gram positive and gram negative bacteria-cyanobacteria-yeast-fungi-higher plants)

**Unit-II** Cell division. Cell cycle, molecular basis of cell division, regulation of cell division, Artificial and synthetic inhibitors of cell- division and applications and commercialization, An overview of phase, Mitosis, Cytokinesis and meiosis.

**Unit-III** mammalian and animal cells structure and general function, Cell membrane , Membrane transport system (ER, Golgi apparatus, lysosomes), Mechanisms of vesicular transport and maintenance of compartmental diversity.

**Unit-IV** General Principles of cell signaling , Signaling via a- protein-linked cell surface receptor, Signaling via enzyme- linked cell surface receptors, Target cell adaptation.

**Unit-V** structure of nerve cells, The logic of intracellular signaling , natural networks ( Computer based) transmission and transduction of signal through neural network, mechanism of action and the – dependence in optical nerve.

### **References:**

1. Bruce Alberts, Johnson A, Lewis Julian, and Raff Martin; Molecular Biology of the Cell
2. Karp Gerald; Cell and Molecular Biology: Concepts and Experiments
3. Lodish Harvey, Berk Arnold, Kaiser CA. and Krieger Monty; Molecular Cell Biology
4. Wilson John and Hunt Tim; Molecular Biology of the Cell, The Problems Book
5. Allison Elizabeth A; Fundamental Molecular Biology
6. Clark David P; Molecular Biology Made Simple and Fun
7. Wilson K and Walker J; Principles and Techniques of Biochemistry and Molecular Biology

### **List of Experiments (expandable):**

1. Study of cell Physiology of plant cell.
2. Study of bacterial cell physiology.
3. Study of Cellular Energetics.
4. Study of Photosynthesis activity in plant cell( light and dark reaction).

## **BT- 305 Microbiology**

**Unit-I** Classification of microorganism, Microbial diversity, Bacterial classification General features and classification of some groups of microorganism Rickettsiae, Mycoplasma, Algae Archaeobacteria, Actinomycetes, Fungi, Protozoa.

**Unit-II** Microbial Cells: Morphology of microbial cells, Structure of bacterial cells, Cell wall structure and biochemistry of gram positive and gram negative bacteria, Archaeobacteria function of bacterial cell wall, Plasma membrane, Mesosomes, Cytoplasm, Ribosomes, cell structure of cyanobacteria Chemical composition of cyanobacteria (with some examples) Cyanobacteria in nutraceutical industry.

**Unit-III** Virus—discovery, Classification and structure of virus, strategies of infection, Replication and gene expression in viruses, virus like agents- viroids virusoids and prions.

**Unit-IV** Microbial Metabolites: Anabolism, Catabolism ATP production, Oxidative phosphorylation, Metabolic pathways: Glycolysis, Pentose phosphate pathway (PPP), Entner Doudoroff Pathway (EDP), TCA cycle, Glyoxalate cycle.

**Unit-V** Bacterial Photosynthesis Purple bacteria, purple sulphur bacteria, Green Bacteria, Purple non sulphur bacteria, Symbiotic nitrogen fixation, Metabolism of nitrogen fixation Genetics of nitrogen fixing microorganism.

### **References:**

1. Tortora GJ, Funke BR and Case CL; Microbiology: An Introduction
2. Prescott LM, Harley JP and Klein DA; Microbiology
3. White D, Hegeman GD; Microbial Physiology and Biochemistry Laboratory: A Quantitative Approach
4. Rhodes PM, Stanbury PF; Applied Microbial Physiology: A Practical Approach.

### **List of Experiments (expandable):**

1. Isolation of bacteria from following sources:
  - ☐ Air, Water, Soil, Sewage.
2. Preparation and optimization of different media used in microbial isolation and growth.
3. Isolation of fungi from rhizosphere, soil, and waste.
4. Identification and characterization of isolated fungi.
5. Study of bacteria by using gram staining process.

## **BT- 306 Java Technology**

**UNIT-I** Basic Java Features - C++ Vs JAVA, JAVA virtual machine, Constant & Variables, Data Types, Class, Methods, Objects, Strings and Arrays, Type Casting, Operators, Precedence relations, Control Statements, Exception Handling, File and Streams, Visibility, Constructors, Operator and Methods Overloading, Static Members, Inheritance: Polymorphism, Abstract methods and Classes

**UNIT-II** Java Collective Frame Work - Data Structures: Introduction, Type-Wrapper Classes for Primitive Types, Dynamic Memory Allocation, Linked List, Stack, Queues, Trees, Generics: Introduction, Overloading Generic Methods, Generic Classes, Collections: Interface Collection and Class Collections, Lists, Array List and Iterator, Linked List, Vector. Collections Algorithms: Algorithm sorts, Algorithm shuffle, Algorithms reverse, fill, copy, max and min Algorithm binary Search, Algorithms add All, Stack Class of Package java. Util, Class Priority Queue and Interface Queue, Maps, Properties Class, Un-modifiable Collections.

**UNIT-III** Advance Java Features - Multithreading: Thread States, Priorities and Thread Scheduling, Life Cycle of a Thread, Thread Synchronization, Creating and Executing Threads, Multithreading with GUI, Monitors and Monitor Locks. Networking: Manipulating URLs, Reading a file on a Web Server, Socket programming, Security and the Network, RMI, Networking, Accessing Databases with JDBC: Relational Database, SQL, MySQL, Oracle

**UNIT-IV** Advance Java Technologies - Servlets: Overview and Architecture, Setting Up the Apache Tomcat Server, Handling HTTP get Requests, Deploying a web Application, Multitier Applications, Using JDBC from a Servlet, Java Server Pages (JSP): Overview, First JSP Example, Implicit Objects, Scripting, Standard Actions, Directives, Multimedia: Applets and Application: Loading, Displaying and Scaling Images, Animating a Series of Images, Loading and playing Audio clips

**UNIT-V** Advance Web/Internet Programming (Overview): J2ME, J2EE, EJB, XML.

### **References:**

1. Deitel & Deitel, "JAVA, How to Program"; PHI, Pearson.
2. E. Balaguruswamy, "Programming In Java"; TMH Publications
3. The Complete Reference: Herbert Schildt, TMH
4. Peter Norton, "Peter Norton Guide To Java Programming", Techmedia.
5. Merlin Hughes, et al; [Java Network Programming](#) , Manning Publications/Prentice Hall

### **List of Program to be performed (Expandable):**

1. Installation of J2SDK
2. Write a program to show Concept of CLASS in JAVA
3. Write a program to show Type Casting in JAVA
4. Write a program to show How Exception Handling is in JAVA
5. Write Programs to show Inheritance and Polimorphism.
6. Write a program to show Interfacing between two classes
7. Write a program to Add a Class to a Package
8. Write a program to demonstrate AWT.
9. Write a program to Hide a Class
10. Write a Program to show Data Base Connectivity Using JAVA
11. Write a Program to show "HELLO JAVA " in Explorer using Applet

12. Write a Program to show Connectivity using JDBC
13. Write a program to demonstrate multithreading using Java.
14. Write a program to demonstrate applet life cycle.

### **BT-307 Self Study (Internal Assessment)**

**Objective of Self Study:** is to induce the student to explore and read technical aspects of his area of interest / hobby or new topics suggested by faculty.

**Evaluation** will be done by assigned faculty based on report/seminar presentation and viva.



### **BT-308 Seminar / Group Discussion(Internal Assessment)**

**Objective of GD and seminar** is to improve the MASS COMMUNICATION and CONVINCING/ understanding skills of students and it is to give student an opportunity to exercise their rights to express themselves.

**Evaluation** will be done by assigned faculty based on group discussion and power point presentation.