

## VIII SEMESTER

S.No	SUBJECT NAME	L	P	M
<b>THEORY</b>				
01	Advanced Bioinformatics	4	0	100
02	Elective III	4	0	100
<b>PRACTICALS</b>				
01	Molecular modeling & drug design Lab	0	3	100
02	Mini project	0	3	100

### ELECTIVE III

Data structure and algorithm  
Energy engineering.  
Industrial Biotechnology  
Total Quality Management  
Process development and optimization.

## ADVANCED BIOINFORMATICS

### Aim and Objectives:

The students are made aware of the advanced technologies of various informatics applicable in biology. The fields like cheminformatics, metabolomics, pharmacogenomics, transcriptomics and interactomics the core applications in bioinformatics .

### **Unit I: Cheminformatics:**

Introduction, Role of computers in chemical research, Structure representation; Chemical Databases – Design, Storage & Retrieval methods, 2D and 3D structures, reaction databases, search techniques (Full, Sub and Super structure), similarity searches; Modeling of small molecules, Structure Activity Relationships; Analysis & Design of combinational libraries; Chemo informatics tools for drug discovery.

### **Unit II: Metabolomics and system modeling:**

Introduction to Metabolomics, Metabolome, metabolomics, System Modeling, Concepts, principles, practice and future of metabolomics and systems biology. Nutri – genomics: exploiting systems biology in the nutrition and health arena.

### **Unit III: Pharmacogenomics:**

Introduction to Pharmacogenomics, benefits of Pharmacogenomics, Genomes for medicine, cancer Pharmacogenomics: current and future applications, Pharmacogenomics – Drug Disposition, Drug targets, and side effects, The Pharmacogenomics of Alzheimer's disease.

### **Unit IV: Transcriptomics:**

Introduction, Definition of transcriptome, analysis of transcriptome – techniques used in Transcriptomics like DNA microarray. Cdna, mRNA, SiRNA, MiRNA – function, regulation and Application. Tools and databases for Si RNA, MiRNA.

### **Unit V: Interactomics:**

Introduction, types of interactomics – comparative interactomics, quantum interactomics, Data mining in protein interactomics – Databases in Interactomics

### **Prescribes Books:**

1. An introduction to cheminformatics By Andrew R. Leach, II Edition
2. Cheminformatics in Drug Discovery( Principles in Medicinal Chemistry) By Tudor P. Oprea, Raimund mannhold, Hugo Kuriryi and Gerd Folkers  
Anrew Leach

### **Reference:**

The handbook of meatabonomics and metabolomics by John Lindon, Jermy Nicholson, Elaine Holmes. ELSEVIER publications.

The Dictionary of Gene Technology: Genomics, Transcriptomics, proteomics, by KAHN Gunter, 2 **Volume set, 3<sup>rd</sup> edition**, WILEY – VCH publications

Interacomics.org/indes.php/main\_page

[Http://en.wikipedia.org/wiki/interactomics](http://en.wikipedia.org/wiki/interactomics)

<http://www.systembiology.nl/dataset/transcriptomics/transcriptomics.html>

<http://en.wikipedia.org/wiki/pharmacogenomics>  
[www.bmrw.wise.edu/metabolomics/](http://www.bmrw.wise.edu/metabolomics/)

## **DATA STRUCTURE AND ALGORITHM**

### **Aim**

To know about various data structure and algorithms in computer .

### **Objectives**

To have the thorough knowledge about

- ❖ Data types and data representation
- ❖ Types of list and Trees
- ❖ Sorting algorithms and sorting techniques
- ❖ Dynamic algorithm.

### **Syllabus**

#### **UNIT - I**

Basic concept : system cycle - object oriented design - data abstraction - encapsulation - C++ basics - Algorithm specification - performance analysis and measurements. Arrays: Abstract Data types(ADT) and C++ class - array as an ADT - polynomial ADT - sparse matrix - Array representation - string ADT.

#### **UNIT - II**

Stack and queue - linked list - singly linked list - doubly linked list - circular linked list - polynomial linked list - linked stack and queue - generalized and heterogenous list.

#### **UNIT - III**

Trees : Introduction - binary tree (BT)- BT traversal and tree iterator - additional BT operation - Threaded BT - Heaps - Binary search tree - selection tree - set representation - counting BT.

#### **UNIT - IV**

Graph : Graph ADT - elementary graph operation - minimum cost spanning tree - activity networking - Insertion sort - merge sort - quick sort - heap sort - list and table sort - external sorting.

#### **UNIT - V**

Hashing: dynamic and static hashing - Heap structure and Search structures. Dynamic algorithm, binomial coefficients, matrix chain multiplication, longest common subsequence, optimal triangulation.

### **TEXT BOOKS**

1. Data Structures and Algorithms by A.V. Aho, J.E. Hopcroft and J. Ullman.
2. Publisher : Addison-Wesley Publishing
3. Fundamentals of Data structure in C++, Ellis horowitz, Shani, Metha, Galgotia Press, 1995

4. Data Structure, algorithm and applications in C++, Sahni, McGraw-Hill, International edition.

#### **REFERENCES**

1. Database Design, Development and Deployment with Student CD by P. Rob and E. Semaan. Publisher : McGraw-Hill/Irwin
2. Introduction to Data Structures and Application by J. Tremblay and P.G. Sorensen. Publisher : McGraw Hill College Division
3. Schaum's Outline of Data Structures with C++ by J.R. Hubbard. Publisher : McGraw Hill Trade.
4. Data structure using C and C++, Tenenbaun, PHI publishers, 2<sup>nd</sup> edition

## PROCESS DEVELOPMENT AND OPTIMIZATION

### UNIT I:

Introduction to optimization; Formulation of objective function; Basic concepts-functions, regions, necessary and sufficient conditions for an extremum of an unconstrained function

### UNIT II:

One-dimensional Search: Scanning and bracketing; Newton, quasi-Newton and secant methods; Region elimination method; Polynomial approximation methods

### UNIT III:

Unconstrained multivariable optimization: Direct methods-random search, grid search, univariate search, simplex method, conjugate search direction and Powell's method; Indirect method-gradient and conjugate gradient methods, Newton's method, movement in search direction, secant method.

### UNIT IV:

Linear programming: Basic concepts in linear programming; Graphical solution; Simplex method; Standard LP form; Obtaining first feasible solution; Sensitivity analysis.

### UNIT V:

Non linear programming: Lagrange multiplier method; Quadratic programming; Penalty function and augmented Lagrangian methods; Successive quadratic programming; Optimization of dynamic processes.

### TEXT BOOKS

- 1 Sharma.J.G. Operation Research Theory and Application,
- 2 Paneerselvam, "Operations Research"

### REFERENCE BOOKS

1. Gupta.P.K. & Hira. D.S or S.Chand &
2. Kapoor.V.K.
3. Kalavathi.S.
4. Taha

## **TOTAL QUALITY MANAGEMENT**

<b>1. INTRODUCTION</b>	<b>9</b>
Definition of Quality, Dimensions of Quality, Quality Planning, Quality costs – Analysis Techniques for Quality Costs, Basic concepts of Total Quality Management, Historical Review, Principles of TQM, Leadership – Concepts, Role of Senior Management, Quality Council, Quality Statements, Strategic Planning, Deming Philosophy, Barriers to TQM Implementation.	
<b>2. TQM PRINCIPLES</b>	<b>9</b>
Customer satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment, Teams, Recognition and Reward, Performance Appraisal, Benefits, Continuous Process Improvement – Juran Trilogy, PDCA Cycle, 5S, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure.	
<b>3. STATISTICAL PROCESS CONTROL (SPC)</b>	<b>9</b>
The seven tools of quality, Statistical Fundamentals – Measures of central Tendency and Dispersion, Population and Sample, Normal Curve, Control Charts for variables and attributes, Process capability, Concept of six sigma, New seven Management tools.	
<b>4. TQM TOOLS</b>	<b>9</b>
Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA.	
<b>5. QUALITY SYSTEMS</b>	<b>9</b>
Need for ISO 9000 and Other Quality Systems, ISO 9000:2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits.	

### **TEXT BOOK:**

1. Dale H. Besterfield, et al., Total Quality Management, Pearson Education Asia, 1999. (Indian reprint 2002).

### **REFERENCES:**

1. James R. Evans & William M. Lindsay, The Management and Control of Quality, (5<sup>th</sup> Edition), South-Western (Thomson Learning), 2002 (ISBN 0-324-06680-5).
2. Feigenbaum, A.V. "Total Quality Management, McGraw-Hill, 1991.
3. Oakland, J.S. "Total Quality Management Butterworth – Heinemann Ltd., Oxford. 1989.
4. Narayana V. and Sreenivasan, N.S. Quality Management – Concepts and Tasks, New Age International 1996.

## ENERGY ENGINEERING

### **Unit I: Introduction**

Energy, types, sources, Conventional and non-conventional energy sources, energy conservation and management, energy scenario in World and India in 21<sup>st</sup> century

### **Unit II: Conventional energy sources**

Formation of fossil fuels and resources, coal, oil, natural gas, hydropower, coal gasification and liquefaction, synthetic fuels, hydrogen, methods and application of cogeneration, fluidized bed combustion, combined cycle plants, role of coal in energy crisis

### **Unit III: Non conventional energy sources**

Study of power plants using energy sources like solar, wind, geothermal, ocean thermal, tide

### **Unit IV: Direct energy conversion**

Solar cells, photovoltaic cells, fuel cells, nuclear reactors

### **Unit V: Biogas plant**

Biomass energy, Pyrolysis, combustion, fuels from biomass, design of biogas plant from various sources

References:

1. Jerrold H.Krentz; " Energy Conservation and Utilisation ", Allyn and Bacur Inc., 1976.
2. Gemand M.Gramlay; " Energy ", Macmillon Publishing Co., New York, 1975.
3. Rused C.K., " Elements of Energy Conservation ", McGraw-Hill Book Co., 1985.
4. Judson King; " Separation Processes ", McGraw-Hill Book Co., 1985.

## INDUSTRIAL BIOTECHNOLOGY

### **Unit I:**

Introduction to industrial biotechnology: Technology and its components – From Biology to Biotechnology, Technology and science, Technology and Engineering, Advent of Biotechnology, need of R&D, current global scenario, university Vs private enterprise, pilot scale production

### **Unit II:**

Fermentation Biotechnology: Fermentation as a biochemical process, microbial processing and raw material, Bioconversions, Fermentor operation, downstream processing; Environmental Biotechnology, Biodegradation, Bioremediation

### **Unit III:**

Modern applications; Genetically Manipulated Organisms and products: Uses in process biotechnology, GM Foods in current global situation, Applications of Industrial Biotechnology in medicine

**Unit IV:**

Biotechnology in developed and developing countries: Current applications, the promises and potential of Biotechnology, patent issues, Biotechnology and Information Technology (BT & IT) interdependence: need of latest information, IT applications in high-tech industry;

**Unit V:**

Management of biotech related industries: Compatible management and financial issues, marketing aspects, need of compatible management & working practices; Industrial safety: Rules and regulations; Potential biotech industries in India, Status of other developing countries, current status and future.

Text books:

1. Biotechnology - demystifying the concepts, Bourgaize, Jewell, Buiser, Pearsopn Education, New Delhi, 2003
2. Biotechnology, Keshav Trehan, New Age international (P) Ltd., New Delhi, 2002
3. Biotechnology - Expanding horizons, B. D. Singh, Kalyani Publishers, Ludhiana, 2003