**MTH 211.3 Engineering Mathematics III (3-2-0)**

**Evaluation:**

| Theory | Practical | Total | |
|---|---|---|---|
| Sessional | 50 | - | 50 |
| Final | 50 | - | 50 |
| Total | 100 | - | 100 |

**Course Objectives:**

The main objectives of this course is to provide the basic knowledge of linear algebra, vector calculus, Fourier series, linear programming by graphical and simplex methods. After the completion of this course, students can use their knowledge in their professional course.

**Course Contents:**

**1. Matrix and Determinant: (8 hrs)**

1.1 Review of Matrix and determinant with their properties
1.2 System of linear equation with their solutions by Gauss elimination methods
1.3 Rank of matrix
1.4 Consistency of system of linear equation
1.5 Vector space and sub space
1.6 Linear transformation
1.7 Eigen values and vectors, Cayley Hamilton theorem (statement only) and its application.

**2. Vector Calculus (16 hrs)**

2.1 Differentiation and integration of vectors
2.2 Gradient, divergence and curl with their properties (without proof)
2.3 Line integral: Definition of line integral, Evaluation of line integral, properties, Greens theorem, Area by Greens theorem
2.4 Surface integral: Surface integral, tangent planes, Gauss divergence theorem, Dirichelet integral
2.5 Stokes theorem

**3. Infinite series (8 hrs)**

3.1 Sequence and series
3.2 Necessary condition of convergence of infinite series
3.3 P-test (hyper-harmonic test)
3.4 Ratio test
3.5 Root test
3.6 Integral test
3.7 Leibnitz test and absolute convergence
3.8 Interval of convergence of power series.
3.9 Taylor and Maclaurin expansion (statement only) and its application

**4. Fourier Series (6 hrs)**

4.1 Periodic function, Trigonometric series, even and odd function
4.2 Fourier series of a function with period $2\pi$ and arbitrary period 2L
4.3 Fourier sine and cosine series representation of the half range function

**5. Linear Programming (7 hrs)**

- 5.1 System of Linear Inequalities
- 5.2 Linear Programming
  - 5.2.1 Model Formulation
  - 5.2.2 Graphical Solution
  - 5.2.3 Simplex method
  - 5.2.4 The Dual model
  - 5.2.5 Dual Simplex Method

**Text Books:**


1. Kreyszig, Erwin.*Advance Engineering Mathematics*(8th edition). New Delhi:Wiley-Easter Publication.
2. Paudel, Toya Narayan. *Engineering Mathematics III*, Bhotahity: Sukunda publication.


**References:**


1. Thomas, George B.& Finney,Ross L.*Calculus and Analytical Geometry.*
2. Swokoswski, E.W.*Calculus with Analytical Geometry.*
3. Singh, M.B.*Vector Analysis.*
4. Pant, G. D.*Algebra.*

## CMP 331.3 Data Structure and Algorithm (3-1-3)

**Evaluation:**

| | Theory | Practical | Total |
|---|---|---|---|
| Sessional | 30 | 20 | 50 |
| Final | 50 | - | 50 |
| Total | 80 | 20 | 100 |

**Course Objectives:**

The purpose of the course is to provide fundamental knowledge on data structure designing and implementation for storing information. Moreover, it provides the knowledge of various algorithms used in computer science.

**Course Contents:**

1. **Introduction to Data Structure and algorithms** **(3hrs)**
   - 1.1. Review of Array, Structure, Union, Class, Pointer
   - 1.2. Abstract data type
   - 1.3. Data Structure Concept

2. **The Stack** **(4hrs)**
   - 2.1. Definition and Primitive Operations
   - 2.2. Stack as an ADT, Stack operations
   - 2.3. Stack application
   - 2.4. Evaluation of Infix Postfix and prefix expressions.
   - 2.5. Expression Conversion

3. **Queue** **(3hrs)**
   - 3.1. Definition, Queue as an ADT and Primitive operations in queue
   - 3.2. Linear and circular queue and their application
   - 3.3. Double Ended Queue
   - 3.4. Priority queue

4. **Static and Dynamic List** **(8hrs)**
   - 4.1. Definition and Array implementation of lists
   - 4.2. Queues as a list
   - 4.3. Link List Definition and link list as an ADT
   - 4.4. Dynamic implementation
   - 4.5. Basic operations in linked list
   - 4.6. Doubly linked lists and its advantages
   - 4.7. Implementation of Doubly Linked List
   - 4.8. Linked Implementation of stacks and Queues,

5. **Recursion** **(2hrs)**
   - 5.1. Principle of recursion and Comparison between recursion and iteration
   - 5.2. Factorial, TOH and Fibonacci sequence
   - 5.3. Applications of recursion and Validity of an Expression

**6. Trees** **(7hrs)**

6.1. Concept and definitions
6.2. Basic operation in binary tree
6.3. Binary search tree and insertion /deletions
6.4. Binary tree traversals (preorder, post order and in order ) tree height level and depth
6.5. Balanced trees
6.6. AVL balanced trees
6.7. Balancing algorithm
6.8. The Huffman algorithm
6.9. Game tree
6.10. B- Tree.

**7. Sorting** **(5hrs)**

7.1. Internal and external sort
7.2. Insertion and selection sort
7.3. Exchange sort
7.4. Bubble and quick sort
7.5. Merge and Radix sort
7.6. Shell sort
7.7. Heap sort as priority queue
7.8. Efficiency of sorting.

**8. Searching** **(3hrs)**

8.1. Search technique essential of search
8.2. Sequential search
8.3. Binary search
8.4. Hashing :
8.5. Hash function and hash tables ,
8.6. Collision resolution technique ,
8.7. Efficiency comparisons of different search technique.

**9. Graphs** **(8hrs)**

9.1. Representation and applications
9.2. Graphs as an ADT
9.3. Transitive closure and Wars hall's algorithm
9.4. Graphs types
9.5. Graphs traversal and spanning forests
9.6. Kruskal 's and Round Robin algorithms
9.7. Shortest-path algorithm
9.8. Greedy algorithm
9.9. Dijkstra's Algorithm

**10. Algorithms** **(2hrs)**

10.1. Deterministic and no-deterministic algorithm
10.2. Divide and conquer algorithm
10.3. Series and Parallel algorithm

10.4. Heuristic and Approximate algorithm.
10.5. Big O Notation

**Laboratory:**

There shall be lab exercises based on C or C++

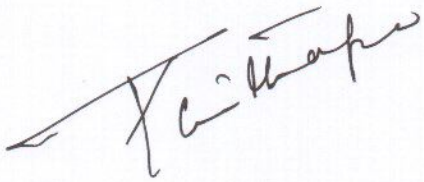
1. Implementations of stack
2. Implementations of linear and circular queues
3. Solutions of TOH and Fibonacci Recursion
4. Implementation of linked list: singly and double linked
5. Implementation of trees; AVL tree Balancing of ALV
6. Implementation of merge sort
7. Implementation of search: sequential tree and binary
8. Implementation of Graphs: Graph traversals
9. Implementation of hashing
10. Implementation of heap

**Text Books:**


1. Y Langsam, MJ, Augenstein and A.M , Tenenbaum Data Structures using C and C++ , Prentice Hall India
2. G.W Rowe, Introduction to Data Structure and Algroithms with C and C++ , prentice Hall India


**Reference Books:**


1. R.L Kruse, B.P. Leung, C.L. Tondo, data structure and program Design in C Prentice hall India
2. G. Brassard and P. Bratley fundamentals of Algroithms, prentice hall India

**Software Engineering Fundamentals (3-0-3)**

**Evaluation:**

| | Theory | Practical | Total |
|---|---|---|---|
| Sessional | 30 | 20 | 50 |
| Final | 50 | - | 50 |
| Total | 80 | 20 | 100 |

**Course Objectives:**

The purpose of the course is to introduce the concepts and techniques required to direct and control the development of medium to large-scale software, including project management, quality assurance, software process improvement and software metrics. It aims to broaden student's understanding of possible software development paradigms (e. g., structured analysis and design, object-oriented approaches). Moreover, it enables to explore some of the problems of software maintenance.

**Course Contents**:

**l. Software Project Management Concepts** **(2 hrs)**

1.1 Software: Crisis and Myths, Software Process and Process Models

1.2 Process technology, Product and Process. People, Product, Process, Project

**2. Software Metrics** **(3 hrs)**

2.1 Measures, Metrics, and Indicators: Software Measurement

2.2 Metrics for software quality, Statistical Quality Control

2.3 Metrics for Small Organizations

**3. Software Project Planning and Risk** **(3 hrs)**

3.1 Objectives, Scope, Resources, Project Estimation, Decomposition Techniques

3.2 Empirical Estimation Models, Risk Management Strategies

3.3 Software Risks, Risk Identification, Risk Projection

**4. Software Quality Assurance** **(5 hrs)**

4.1 Concepts, Software Quality Assurance

4.2 Software Reviews, Formal Technical Reviews

4.3 Formal Approaches to SQA

4.4 Statistical Quality Assurance. Software Reliability

4.5 ISO 9000 Quality Standards, SQA Plan

**5. Software Configuration Management** **(4 hrs)**

5.1 Software Configuration Management, SCM Process

5.2 Identification of Objects in the Software Configuration, Version Control
5.3 Change Control, Configuration Audit
5.4 Status Reporting, SCM Standards

**6. Analysis Concepts and Principles** **(5 hrs)**

6.1 Requirements Analysis, Analysis Principles
6.2 Software Prototyping. Specification and Specification Review
6.3 Analysis Modeling: Elements of Analysis Model
6.4 Data Modeling Functional Modeling and Information Flow
6.5 Behavioral Modeling, Structured Analysis- Data Dictionary

**7. Design Concepts and Principles** **(6 hrs)**

7.1 Design Process, Principles and Concepts
7.2 Architectural and Component Level Design
7.3 Software Architecture, Data Design, Architectural Styles
7.4 Mapping Requirements into a Software Architecture
7.5 Transform Mapping, Transaction Mapping
7.6 Structured Programming, Comparison of Design Notation

**8. Software Testing Techniques and Strategies** **(7 hrs)**

8.1 Testing Fundamentals,
8.2 Test Case Design.
8.3 White Box Testing. Basis Path Testing,
8.4 Control Structure Testing.
8.5 Black-Box Testing. Unit Testing,
8.6 Integration Testing,
8.7 Validation Testing, System Testing

**9. Object-Oriented Concepts and Principles** **(4 hrs)**

9.1 Object-Oriented Paradigm
9.2 Object-Oriented Concepts
9.3 Identifying the Elements of an Object Model
9.4 Management of Object-Oriented Software Projects

**10. Object-Oriented Analysis and Design** **(6 hrs)**

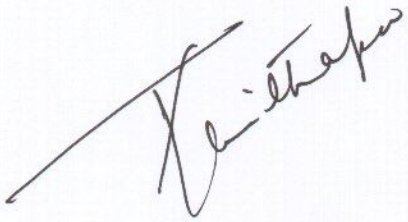
10.1 Domain Analysis
10.2 Components of the OO Analysis Model
10.3 The OOA Process, Design for Object-Oriented Systems
10.4 The System Design Process
10.5 The Object Design Process
10.6 Design Patterns

**Laboratory:**

The Laboratory Exercise includes System Analysis, Design, Development, and Testing. Debugging of a small Real Life problem and then attempting to visualize various Software Engineering activities, like Revision Control System, Version Management, Library Building, etc. using some of the Software Engineering Tool or CASE Tool.

**Reference Books:**


1. Mall. R.. Foundations of Software Engineering. PH1. 2000. ISBN: 81-203-1445-
2. Pressman. R. S., Software Engineering a practitioners Approach. 5th Edition. McGraw Hill. 2001. ISBN: 0-07-118458-9
3. Somnterville. I .Software Engineering, 5th Edition. Addison -Wesley. 1995. ISBN: 0-201-43579 -9

**CMP 203.3 Programming in Java**

**Evaluation:**

| | Theory | Practical | Total |
|---|---|---|---|
| Sessional | 30 | 20 | 50 |
| Final | 50 | - | 50 |
| Total | 80 | 20 | 100 |

**Course Objectives:**

The purpose of the course is to provide the concept of objective oriented programming using Java. It provides sound understanding of network programming and database connectivity. Moreover, it provides front end platform for development of applications.

**Course Contents:**

**1. Elements Of Java Language** **(3 hrs)**

1.1 Java as a Programming tools, Benefits of Java, Historical Background of Java
1.2 A simple Java Program, Data type, Variable, Assignment and Initialization, Operator, String, Control Flow
1.3 Class Method (User Defined Function), Array

**2. Object Oriented Programming In Java** **(9 hrs)**

2.1 Introduction to object oriented programming in Java
2.2 Reusability using Existing classes
2.3 Building User defined class, Package
2.4 Inheritance
2.5 Casting Abstract classes
2.6 Access Protection Mechanism
2.7 Reflection
2.8 Designing Inheritance
2.9 Interface, Inner Classes

**3. Exception, Stream and I/O** **(3 hrs)**

3.1 Handling Error and Exception, catching Exception, tips on handling Exception, Debugging techniques
3.2 Stream, Zip files Stream, Object Stream
3.3 Handling Files

**4. Applets and Application** **(4 hrs)**

4.1 Fundamental concept of Applet, Simple Applet
4.2 Testing Applets, Converting Application to Applets
4.3 Applets HTML tags and Attribute. Pop –UP Windows in Applet
4.4 Multimedia Applets context

**5. Events, Handling Events and AWT/Swing** **(6 hrs)**

5.1 Basic of Event handling, AWT Event hierarchy
5.2 Semantics and low level Events in AWT, Event Handling
5.3 Individual Events. Separating GUI and Application code
5.4 Multicasting, Advance Event Handling
5.5 An Introduction of layout management, Text input choice, scroll Bar
5.6 Complex layout management, Menus, Dialog Box

**6. Graphics and Images / Animation / Multimedia** **(5 hrs)**

6.1 Introduction to Graphics Programming, creating Closable frames
6.2 Terminating graphics program. Frame layout displaying information in a frame
6.3 Graphics object. Text and fonts, color
6.4 Drawing shapes from lines drawing rectangle and Ovals
6.5 Filling shapes paint mode images

**7. Network Programming** **(8 hrs)**

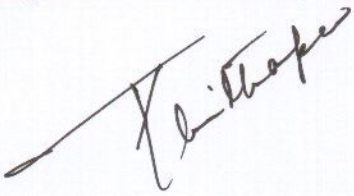
7.1 Networking Basics
7.2 Introduction to Socket
7.3 Socket Programming
7.4 Understanding Port
7.5 Networking Classes in Java
7.6 Creating Own Server and Client in Java
7.7 Creating Multithread Java Server
7.8 URL and URL connection Class

**8. Java Database Connectivity (JDBC)** **(7 hrs)**

8.1 Understanding JDBC
8.2 Database Driver
8.3 JDBC-ODBC bridge
8.4 Java Native Driver
8.5 Intermediate Database Access Server
8.6 JDBC API
8.7 Making a JDBC Application
8.8 Using Prepared Statement

**References:**


1. Dietel H.M and Dietel P.J., Java: How to Program, Third Edition, Pearson Education Asia
2. Naughton Java 2: The Complete Reference, Tata McGraw Hill
3. Balagurusamy E., Programming in Java: 2nd Edition, Tata McGraw Hill

**MTH 213.2 Probability and Queuing Theory (2-2-0)**

**Evaluation:**

| | Theory | Practical | Total |
|---|---|---|---|
| Sessional | 50 | - | 50 |
| Final | 50 | - | 50 |
| Total | 100 | - | 100 |

**Course Objectives:**
The purpose of the course is to provide sound knowledge of the probability, probability distributions and queuing theory.

**Course Contents:**

1. **Review of Probability** **(4 hrs)**
   - 1.1 Probability Theory and Sample Space
   - 1.2 Events and Probability Approaches
   - 1.3 Probability Laws; Addition Law and Multiplication law
   - 1.4 Conditional Probability and Bayes' Rule

2. **Theory of Distribution** **(14 hrs)**
   - 2.1 Concept of Random Variable, Types of Random Variable
   - 2.2 Probability distribution of discrete random variable and continuous random variable
   - 2.3 Function of random variable
   - 2.4 Mathematical expectation and variance of continuous and discrete random variable
   - 2.5 Moments of continuous random variable, uses of moments
   - 2.6 Binomial distribution, Poisson distribution
   - 2.7 Normal distribution, t-distribution, chi-square distribution, F-distribution, Beta distribution, Gamma distribution, Exponential distribution
   - 2.8 Expectations and Higher order moments
   - 2.9 characteristic function
   - 2.10 Chebyshev inequality for continuous random variable
   - 2.11 Laws of large numbers: Weak Laws and Strong Laws of Large Numbers
   - 2.12 Central Limit Theorem and its application

3. **Queuing Theory** **(12 hrs)**
   - 3.1 Stochastic Process
     - 3.1.1 Introduction
     - 3.1.2 Classification of Stochastic Processes
     - 3.1.3 The Bernoulli Process

3.1.4 The Poisson Process

3.2 Discrete Parameter Markov Chain

3.2.1 Introduction

3.2.2 Transition Probabilities and its computation

3.2.3 State Classification

3.2.4 Distribution of Time between state changes

3.2.5 Discrete parameter Birth-Death Process

3.3 Continuous Parameter Markov Chain

3.3.1 Introduction

3.3.2 Chapman-Kolmogorov Equation

3.3.3 Continuous Parameter Birth-Death Process

3.4 Queuing Systems:

3.4.1 Essential Features of Queuing System

3.4.2 Specification and Measure of Queuing System

3.4.3 Probability Distribution of Arrival, Inter arrival time, Departure, and Service time

3.4.4 The Classical System: Operating Characteristics ( Transient and Steady State behavior, Line Length, Queue Length, Relationship among System Characteristics)

3.4.5 Solutions of Queuing Models: The M/M/1 : α/FCFS Model, M/M/1: α/SIRO model, M/M/1:N/FCFS Model, M/M/s : α/FCFS model, M/M/s: N/FCFS model, M/M/s:M/G/D model, M/Ek/1: α/FCFS model, Application of Queuing Theory in Computer Science (Examples and numerical problems)

**References:**


1. Trivedi, K.S., Probability & Statistics with Reliability Queuing, and Computer Science Application, PHI 2000, ISBN 81-203-0508-6
2. Johnson Richard A., Miller & Freund's Probability and Statistics for Engineers, PHI, Fifth Edition, ISBN: 81-203-0892-1
3. Sharma, J.K., Operation Research-Theory and Applications, McMilan India Ltd. 2000, ISBN 033-923944
4. V. Sundarapandain, Probability, Statistics and Queuing Theory, PHI Learning PVT, ISBN 978-203-3844-9


**Microprocessors and Assembly Language Programming (3-1-3)**

**Evaluation:**

| | Theory | Practical | Total |
|---|---|---|---|
| Sessional | 30 | 20 | 50 |
| Final | 50 | - | 50 |
| Total | 80 | 20 | 100 |

**Course Objectives**:
The purpose of the course is to provide the basics fundamentals and operations of microprocessor. It provides knowledge to program microprocessor using assembly language and design microprocessor based systems and interfaces.

**Course Contents:**

**1. Introduction to microprocessor** **(3 hrs)**
- 1.1 Brief description: Microprocessor, Microcontroller, Microcomputer
- 1.2 Application of microprocessor
- 1.3 Evolution of microprocessor: INTEL series

**2. Architectural Details and Instruction set of 8085 and 8086 microprocessor (10 hrs)**
- 2.1 Internal architecture and description
- 2.2 Instruction set
- 2.3 Addressing modes
- 2.4 Instruction cycle, Machine cycle, t-states
- 2.5 Timing Diagram

**3. Assembly Language Programming** **(12 hrs)**
- 3.1 Introduction
- 3.2 Format of an assembly language instruction
- 3.3 Basic assembly language programs of 8085
- 3.4 ALP development tools:Editor,Assembler,Linker,Debuger,Locator,Emulator
- 3.5 Macro Assembler and Assembler Directives
- 3.6 8086 Assembly Language Programs in MASM/TASM
- 3.7 Modular Programming
  - 3.7.1 Linking and Relocation
  - 3.7.2 Stacks Procedures
  - 3.7.3 Macros Program Design
  - 3.7.4 String Manipulation

**4. Bus Structure and Memory Devices** **(4 hrs)**
- 4.1 Introduction: Data/Address/Control bus
- 4.2 Synchronous and Asynchronous bus
- 4.3 Memory Classification

4.4 Memory Interfacing and Addressing Decoding

**5. Interrupt** **(6 hrs)**

5.1 Introduction
5.2 Interrupt Sources: Hardware, Software, Processor
5.3 Interrupt Types: Maskable, Non-Maskable Interrupt
5.4 8086 Interrupts
5.5 Interrupt Vector Table
5.6 Vector Chain and Polled Interrupt
5.7 Interrupt Processing

**6. Input / Output Interfaces** **(10 hrs)**

6.1 Serial I/O standards: 8251A USART
6.2 8259A Programmable Interrupt Controller(PIC)
6.3 8255A Programmable Peripheral Interface(PPI)
6.4 8254 Programmable Interrupt Timer(PIT) and its application
6.5 DMA and DMA controller

**Laboratory:**

1. A minimum of 10 laboratory exercises shall be done with the use of SDK-85/SDK-86 or equivalent microprocessor trainer kit and Simulators.
2. Numerous assembly language programming exercises are to be done both with the help of microprocessor trainer kit and Macro-Assemblers in PC.

**Text Books:**


1. Liu. Yu-cheng and Gibson Glenn A., Microprocessor Systems: The 8080 8088 family Architecture. Programming and Design.PHI, 1998. ISBN: 81-203-0409-8
2. Brey. Barry B..Intel Microprocessors.PHI. 1998. ISBN:


**References:**


1. Antonakos. J. L. An Introduction to the Intel family of microprocessors, 3rd ed, Pearson Education Asia. ISBN: 81-7808-312-4
2. Triebel, Walter A. and Singh Avvbtar, The 8088 and 8086 microprocessors: Programming Interfacing, Software, Hardware, and Applications PHI. 1998, ISBN
3. L.A Leventhal, Introduction to Microprocessor software, Hardware & Programming Prentice Hall of India. Pvt. Ltd., 1995.
4. A.P. Malvino, An Introduction to Microcomputers. Prentice Hall of India. Pvt. Ltd 1995
5. P.K. Ghosh, P.R. Sridhar, 0000 to 8085;Introduction to Microprocessor for Engineers and Scientists, Prentice Hall of India Pvt. Ltd 1997
6. Rajaraman, V. and Radhakrishnan T., Essentials of Assembly Language Programming for the IBM PC, PHI, 1998. ISBN: 81-203-1425-5