Programming Technology (3-1-2)

Evaluation:

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

Course Objectives:

- To provide the knowledge of object oriented and component-based programming frameworks for enterprise application development.
- To provide the basis for study and research in programming technologies and framework tools.

Course Contents:

1. **Introduction** **(5 hrs)**
   - 1.1 Concepts of procedure, object, event oriented language, aspect-oriented programming, subject oriented programming
   - 1.2 Integrated development environment, components of visual programming
   - 1.3 Application object, main window object, view object, document object
   - 1.4 Document-view architecture and its advantages
   - 1.5 Virtual machines and runtime environments

2. **Programming Architectures** **(3 hrs)**
   - 2.1 MVC
   - 2.2 N-tier architecture
   - 2.3 Client Server Traditional model
   - 2.4 Comparison amongst 2-tier, 3-tier and N-tier architectures
   - 2.5 Thin and Thick Clients

3. **Elements of .net languages** **(4 hrs)**
   - 3.1 Introduction and Data type, identifiers, variable and constants
   - 3.2 C# statements, object and classes, Array and strings
   - 3.3 System Collection, Delegates and Events, Indexes Attributes, Versioning
   - 3.4 Dot Net Libraries, I/O, Namespace system, windows forms

4. **Dot Net Framework** **(4 hrs)**
   - 4.1 Introduction, Common Language Runtime (CLR)
   - 4.2 Common Type System (CTS)
   - 4.3 Common Language Specification (CLS)
   - 4.4 The base class library, The .net class library intermediate language
   - 4.5 Just in Time (JIT) compilation, garbage collection
   - 4.6 Application installation and assemblies
   - 4.7 Windows Communication Foundation (WCF)

4.8 Windows Presentation Foundation (WPF)

5. Web and database programming with .Net **(3 hrs)**

5.1 Active Server Pages (ASP)
5.2 ASP.Net and database application

6. Java Framework **(2 hrs)**

6.1 Java Virtual Machine (JVM)
6.2 Java Runtime Environment (JRE)
6.3 Java Development Kit (JDK)

7. Java Exception Handling **(3 hrs)**

7.1 Handling Error and Exception, catching Exception
7.2 Tips on handling Exception, debugging techniques
7.3 Stream, Zip file stream, Object Stream and Handling files

8. Applets and Application **(3 hrs)**

8.1 Fundamental concepts of Applet
8.2 Simple Applet and Applet & Application
8.3 Applet Architecture, Parameters to Applet
8.4 Applet Security Policies.

9. Event, Handling Events and Swing **(5 hrs)**

8.1 Basic of event handling
8.2 Event Handling
8.3 Individual Events. Separating GUI and Application code
8.4 Advance Event handling, building GUI with Swing

10. Java Server Pages (JSP)/Servlet Technology **(7 hrs)**

10.1 JSP/Servlet Technology overview
10.2 Servlet Life cycle, Creating and deploying New Servlet
10.3 HTTP Request Handling, Session Management
10.4 JSP Life Cycle, Writing JSP Pages
10.5 Introduction to JSP Tag Library

11. Database Handling **(6 hrs)**

11.1 Server side database drivers and tools: JDBC, ODBC, SQL
11.2 Creating connection to database
11.3 Creating statement, Operations with result set
11.4 Types of Statements, Data source objects and visual data manipulation
11.5 Efficient data accesses

References

1. Harvey Deitel, Paul Deitel. Visual C# 2010 How to Program, prentice hall, 4th Edition

2. Joseph Albahari and Ben Albahari , C# 4.0 in a Nutshell The definitive reference Fourth Edition O'RIELLY
3. Dietel H.M and Dietel P.J., Java: How to program, Third Edition, Pearson Education Asia.
4. Bert Bates, Kathy Sierra , Head First Java, Second Edition,O'REILLY
5. Herbert Schildt, The Complete Reference Java 2,SeventhEdition,Tata MC Grawhill

Database Management System (3-1-3)

Evaluation:

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

Objectives:

The objective of this course is to provide fundamental concept, theory and practices in design and implementation of DBMS.

Course Contents:

1. **Introduction** **(4 hrs)**
   - 1.1 Concept and applications
   - 1.2 Objectives and Evolution
   - 1.3 Needs of DBMS
   - 1.4 Data abstraction
   - 1.5 Data independence
   - 1.6 Schema and Instances
   - 1.7 Concept of DDL, DML and DCL
   - 1.8 Database Manager and users

2. **Data Models** **(4hrs)**
   - 2.1 Logical, Physical and Conceptual Model
   - 2.2 E-R Model
   - 2.3 Relation with UML class diagrams
   - 2.4 2.4Alternate data models (Network Data Model, hierarchical Data Model)

3. **Relational Model** **(4 hrs)**
   - 3.1 Definitions and terminology
   - 3.2 Structure of relational databases
   - 3.3 The relational algebra
   - 3.4 Schema and Views
   - 3.5 Data dictionary

4. **Relational Database Query languages** **(8 hrs)**
   - 4.1 SQL – features of SQL, queries and sub-queries, Join operations, set operations and other SQL constructs
   - 4.2 DDL and DML queries in SQL
   - 4.3 Stored procedures
   - 4.4 QBE

5. **Database Constraints and Relational Database Design** **(8 hrs)**
   - 5.1 Introduction
   - 5.2 Integrity constraints
   - 5.3 Referential Integrity
   - 5.4 Assertions and Triggers

5.5 Functional dependencies
5.6 Normalization and Normal Forms (1NF, 2NF, 3NF, BCNF, 4NF)
5.7 Multivalued Dependencies
5.8 Decomposition of relation schemes

6. Security **(3 hrs)**
6.1 Needs of security
6.2 Security and integrity violations
6.3 Access control
6.4 Authorization
6.5 Security and Views
6.6 Encryption and decryption

7. Query Processing **(3 hrs)**
7.1 Introduction to query processing
7.2 Equivalence of expressions
7.3 Query cost estimation
7.4 Query Optimization

8. File organization and indexing **(4 hrs)**
8.1 Disks and storage
8.2 Organization of records into blocks
8.3 File organizations - The sequential and the indexed sequential file organizations
8.4 B+ Tree index
8.5 Hash index

9. Crash Recovery **(3 hrs)**
9.1 Failure classification
9.2 Concept of log-based recovery and shadow paging
9.3 Data Backup/Recovery
9.4 Remote backup system

10. Transaction Processing and Concurrency Control **(4 hrs)**
10.1 Introduction to Transactions
10.2 ACID properties of transaction
10.3 Schedules and Serializability
10.4 Concepts of locking for concurrency control

11. Advanced Database concepts **(3 hrs)**
11.1 Object-Oriented Model
11.2 Object-Relational Model (ORM)
11.3 Distributed databases
11.4 Concepts of Data Warehouses

Laboratory:
There shall be enough laboratory exercises based on some RDBMS (like ORACLE, MS-SQL server, MySQL, etc) to complement theoretical part studied. An individual project should be given to each student. 10% of sessional marks should be allocated for evaluation for lab works and project.

Text Book:

H. F. Korth and A. Silberschatz, *Database System Concepts*, McGraw Hill.

Reference Books:

1. K. Majumdar and P. Bhattacharaya, *Database Management Systems*, Tata McGraw Hill, India.
2. R. E. Mani and S. C. Nevathe, *Fundamentals of Database Systems*, Benjamin/Cummings Publishing Co. Inc.
3. G.C Everest, *Database Management*, McGraw Hill.

Engineering Mathematics IV (3-2-0)

Evaluation:

	Theory	Practical	Total
Internal	50	-	50
Final	50	-	50
Total	100	-	100

Course Objectives:

After completion of this course students will be able to

- to explain and apply theorems of complex variables in their required applied problems.
- to apply concepts of Fourier and Z-transform in the signal processing.
- to study wave and diffusion equations in Cartesian, cylindrical, and polar coordinates.

Course Contents:

Unit I: Complex variable **12 hrs**

1.1 Review of complex numbers with their properties
1.2 De Moirves Theorem
1.3 Function of complex variables,
1.4 Conformal mappings
1.5 Analyticity , necessary condition of analyticity
1.6 Cauchy integral theorem, Cauchy integral formula, Extension form of Cauchy integral formula,
1.7 Taylor and Laurent series
1.8 Singularities, zeros, poles, complex integration, residue theorem

Unit II: Z-transform **9 hrs**

2.1 Definition, one sided and two sided z transform
2.2 Linear Time invariant system, Unit impulse function
2.3 Properties of z transform, region of convergence
2.4 Inverse Z transform by residue and partial fraction
2.5 Parseval theorem, convolution
2.6 Application (Solution of difference equation)

Unit III: Fourier Integral and Fourier Transform **7 hrs**

3.1 Fourier series in complex form
3.2 Fourier integral, Sine integral and cosine integral
3.3 Fourier transform, cosine transform, sine transform
3.4 Inverse Fourier transform, Parseval identity
3.5 Convolution theorem and its applications

Unit IV: Partial Differential Equation **14 hrs**

4.1 Definition with examples
4.2 Method of separation of variables

4.3 Derivation and solutions of Wave equations (one and two dimensional) and their applications.
4.4 Wave equation by D Alembert's method
4.5 Derivation and solution of heat equation (one and two dimensional)and their application
4.6 Laplacian equation [Cartesian, polar, cylindrical, spherical form(statement only)], their solutions.
4.7 Engineering applications of partial differential equation.

Unit V: Curve in space **3 hrs**

5.1 Ellipsoid, hyperboloid, Paraboloid, cylinder, cone (Standard equations, their sketch)
5.2 Tangent line and tangent plane on the space curve

Text books:

1. E. Kreyszig, *Advanced Engineering Mathematics*,8th edition Wiley-Easter Publication, New Delhi
2. H. K. Dass & R. Verma, Higher Engineering Mathematics, First edition, S. Chand & Company Limited, New Delhi

Reference Books:

1. Digital Signal Processing: J. G. Proakis, Prentice Hall of India.
2. V Sundaran, R Bala Subramanayam, K. L . Laxminarayanam, *Engineering Mathematics* , Volume II
3. A. V. Oppenheim, *Discrete-Time Signal Processing*, Prentice Hall, India Limited, 1990.
4. K. Ogata, *Discrete-Time Control System*, Prentice Hall, India Limited, 1993.

Instrumentation (3 -2 -2)

Evaluation:

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

Course Objectives:

1. To provide knowledge of instrumentation.
2. To give knowledge of measurements.
3. To develop skills of instrumentation system.

Course Contents:

1. Introduction to Instrumentation System **(3 hrs)**

1.1 Components of Instrumentation and their function,
1.2 Basic concepts of Transducer
1.3 Signal conditioning and transmission
1.4 Output device
1.5 Type of signals in instrumentation.

2. Signal Measurements **(12 hrs)**

2.1 Units and standards of measurements
2.2 Measuring instruments
2.3 Performance parameters (static and dynamic)
2.4 Concepts of bridges: Wheat stone bridge, Kelvin's bridge, Maxwell's bridge, Hay's bridge, Capacitance bridge, Schering bridge & Errors, probability of errors, normal distribution

3. Physical Variables and transducers **(12 hrs)**

3.1 Physical variables and their types (Electrical, Mechanical, Process, bio-physical variable)
3.3 Transducer principle of operations
3.4 Input and output characteristics and applications of transducers (resistive, capacitive, inductive, voltage and currents)
3.5 Calibrations and error in transducers.

4. Signal Conditioning and Processing **(8 hrs)**

4.1 Importance of signal conditioning
4.2 Signal amplification, filtering, and wave shaping
4.3 Instrumentation Amplifier
4.4Op-Amp in instrumentation
4.5 Isolation amplifiers: principles and essentials of isolation amplifiers
4.6 Amplifier Applications
4.7 Interference signals and their elimination
4.8 Signal conversion (Analog – to – digital, Digital – to analog).

5. Data Transmission **(4 hrs)**

5.1 Transmission types
5.2 Transmission schemes
5.3 Data transmission system and standards.

6. Output Devices **(3 hrs)**

6.1 Indication instruments
6.2 Magnetic data recorders
6.3 Strip – chart, X-Y display unit and Plotter.

7. Data Acquisition Systems **(3 hrs)**

7.1 Components of Analog and Digital Data Acquisition System
7.2 Use of Data Acquisition Systems
7.3 Modern trends in data acquisition system.

Laboratory:

1. Conversion of physical variables into electrical signal.
2. Signal conditioning using active devices or Op-Amp.
3. Measurement of physical variables using various Bridges.
4. Error measurements in instrumentation system.
5. Observation of interference in instrumentation and their remedy.
6. Transmission of signal in different mediums.
7. Conversion of analog signal into digital and digital into analog signal.

Text Book:

A. D. Helfrick and W.D. Cooper, Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India, 1996.

Reference Books:

1. S. Wolf and R.F.M. Smith, *Student Reference Manual for Electronic Instrumentation* Laboratories, prentice Hall of India, 1996.
2. E.O. Deobelin, *Measurement System: Application and Design*, McGraw Hill, 1990.
3. A.K. Sawhney, *A Course in Electronic Measurements and Instrumentation,* Dhanpat Rai and Sons, India, 1998.
4. C.S. Rangan, G.R Sarma and V.S.V Mani, *Instrumentation Devices and Systems*, Tata McGraw Hill, India, 1992.
5. D.M. Considine, *Process Instruments and Control Handbooks*, McGraw Hill 1985.

Microprocessors (3 – 1 – 2)

Evaluation:

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

Course Objectives:

The Objective of this course is to provide the knowledge of

1. the architecture and organization of a Microprocessor (8085/8086).
2. the Basic operations, programming and application of Microprocessor.
3. the Interfacing I/O devices with the Microprocessor.
4. the foundation for the microprocessor based system design.

1. Introduction to Microprocessors **[4 hrs]**

1.1 Evolution of Microprocessors
1.2 Von Neumann and Harvard architecture
1.3 Microprocessor & Micro controller
1.4 Internal architecture of 8 bit Microprocessor 8085
1.5 concept of fetch, decode and execution

2. Assembly Language Programming **[10 hrs]**

2.1 Instruction Formats (Opcodes, mnemonics and operands)
2.2 8085 Instruction Sets
2.3 Functional Architecture of 8085
2.4 Addressing Modes of 8085
2.5 Data Transfer Instructions, Arithmetic and Logic Instructions, Program Control
Instructions (Jump Instructions, Subroutine Call)
2.6 Timing Diagram
2.7 RTL Instruction descriptions
2.8 Assembly language program

3. Bus Structure, Memory and I/O Interfacing **[13 hrs]**

3.1 Bus Structure: Bus structure, Synchronous and Asynchronous data bus, Address bus, Read/Write operations and bus timing (READ Cycle, WRITE Cycle).
3.2 Memory Interfacing: Types of Memory, RAM and ROM Interfacing with Timing Considerations, DRAM Interfacing, Memory mapped I/O, I/O mapped I/O.
3.3 I/O Interfacing: Concept of Interrupt, Interrupts of 8085 (Programmed I/O, Interrupt Driven I/O), DMA, Parallel I/O (8255-PPI), Serial I/O (8251/8250), 8259-Programmable Interrupt Controller, 8237-DMA Controller.

4. 16-bit Microprocessor and Programming **[13 hrs]**

4.1 Internal Organization of 8086
4.2 Bus Interface Unit & Execution Unit
4.3 Pin diagram

4.4 Instruction Set
4.5 Addressing Modes of 8086
4.6 Assembly language programming (Simple Sequence programs, jumps, flag and conditional jumps, if-then programs)
4.7 One Pass and Two Pass Assemblers
4.8 Assembler Directives
4.9 Procedures and Macros
4.10 System Timing Diagrams
4.11 Functional Chips (8284A Clock Generator, 8282 Address Latch, 8286 transceiver, 8288 Bus Controller)
4.12 Interrupt and Interrupt service procedures
4.13 Interrupt Vector Table
4.14 Introduction to Intel 80386.

5. Data Communication Basics **[5 hrs]**

5.1 Serial and Parallel Data Communication
5.2 Asynchronous Serial Data Communications
5.3 Serial data transmission methods and standards (RS232/RS-232C, RS422/423A)
5.4 Synchronous Serial Data Communication and Protocols (BISYNC).

Laboratory Works:

1. Assembly language program using 8085 microprocessor kit. Program should comprise the use of all types of instructions and addressing modes.
2. Assembly language programming with 8086 family. Program should comprise the use of all types of instructions and addressing modes.
3. The programming should include the concept of Arrays and the concept of Multiplications and Division operations on Microprocessor.
4. Assembly language programming, using any type of Assembler, which should include the different functions of Interrupt (Int 10h, and Int 21h).

Text Books:

1. R. Gaonkar, *Microprocessor Architecture, Programing & Application*, Penram International Publishing.
2. Hall D. V., *Microprocessors Interfacing*, TMH (2nd Edition)
3. Liu G. A. Gibson, *Microcomputer Systems: The 8086 / 8088 Family*, PHI 2nd Ed.

Reference Books:

1. M. Rafiquzzaman, *Microprocessors Theory & Applications*, PHI
2. Kenneth J. Ayala, *The 8051 Micro controller*, Penram International Publishing 1996
3. Kip Irvine, Maxwell Macmillan, *Assembly language for the IBM PC*
4. K. Gosh, Prentice Hall, *Introduction to 8085 Microprocessor for Engineers and Scientists*

Project I (0-0-3)

Evaluation:

	Theory	Practical	Total
Sessional	-	100	100
Final	-	-	-
Total	-	100	100

Course Objectives:

1. To provide the practical knowledge of project undertaking by focusing on planning, requirements elicitation, design, development and implementation of a project.
2. To provide the knowledge of Programming tools currently used in the market by carrying out a project.
3. To teach students to work and solve problem in a team environment
4. To provide the knowledge to formulate project documentation and oral presentation for his/her project.

Procedures:

The project course requires students to get themselves involved in a group on a proposed task under the direct supervision of the faculty members of their respective department. The project may be selected in consultation with the industries. The project shall be software and or electronic hardware based. The project may be done on any platform. The application shall be on any relevant areas of application e.g. Scientific Applications, Information Systems, Web Applications, Games, Simulations, Hardware based applications.

The project must be started at the beginning of the semester, span through out the semester and finished by the end of that very semester. The project should be undertaken preferably by group of students who will jointly work and implement the project. The project will be assessed by a panel of examiners as appointed by head of the department. Oral examination will be conducted by internal and external examiners as appointed by the college.

Project Work Phases:

The entire project work shall be divided in to three phases and evaluation shall be done accordingly:

First Phase: The students are required to come up with a conceptual framework for their project work which must be documented in the form of a Proposal and presented in front of an examiner in a formal presentation lasting for about 10 minutes, on the date prescribed by the college.
30% of the marks shall be based on the following criteria:

Evaluation Criteria:

Task Accomplished (20%)

- Feasibility Study
- Requirements Analysis and Specification
- Project plan

- Creativity, Innovativeness and Usefulness of the Idea

Documentation (10%)
- Proposal Report
- Estimations
- Time Line

Second Phase: The students are required to show the progress of their work done so far. They must have finished the design phase including the overall system/architectural design and validation scheme. 50% of total mark shall be based on the following criteria:

Evaluation Criteria:

Task Accomplished (40%)
- System/Architectural Design
- Depth of Project work
- Progress
- Level of achievement
- Group/Team Effort
- Ability to propose solutions

Documentation (10%)
- Report organization
- Completeness and consistency of the report
- Validation Criteria
- Organization and analysis of data and results

Third Phase: All students must have finished all phases of their project work including requirements analysis, design, coding, testing on time before Final Project Presentation.

Students must come up with a visible output of the product that they have developed and perform an oral defense of their work in the presence of an external examiner (external to the department or from industries). The final presentation should be conducted on the last week of final semester term.

Evaluation (20%):
- Presentation
- Completeness and Final Output of the Project
- Viva
- Final Project Report