NORTH MAHARASHTRA UNIVERSITY, JALGAON (M.S.)

Second Year Engineering (Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – III

W.E.F 2013 – 2014

Annexure - I

SE Semester - III

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory			Practical	Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Engineering Mathematics-III	D	3	1	---	4	20	80	---	---	100	4
Information Theory	B	3	---	---	3	20	80	---	---	100	3
Discrete Structure & Graph Theory	D	3	1	---	4	20	80	---	---	100	4
Digital System & Microprocessor	D	3	---	---	3	20	80	---	---	100	3
Object Oriented Technology	D	3	---	---	3	20	80	---	---	100	3
Soft Skills – III	C	1	---	2	3	---	---	50	---	50	2
Information Theory Lab	B	---	---	2	2	---	---	50	---	50	1
Discrete Structure & Graph Theory Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Digital System & Microprocessor Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Object Oriented Technology Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

SE Semester - IV

Name of the Course	Group	Teaching Scheme				Evaluation Scheme					Credits
						Theory		Practical		Total	
		Theory Hrs / week	Tutorial Hrs / week	Practical Hrs / week	Total	ISE	ESE	ICA	ESE		
Data Communication	D	3	---	---	3	20	80	---	---	100	3
Microprocessor & Microcontroller Interfacing	D	3	1	---	4	20	80	---	---	100	4
Data Structures	D	3	1	---	4	20	80	---	---	100	4
Computer Organization	D	3	---	---	3	20	80	---	---	100	3
Computer Graphics & Multimedia	D	3	---	---	3	20	80	---	---	100	3
Application Development Lab	B	1	---	2	3	---	---	50	---	50	2
Data Communication Lab	D	---	---	2	2	---	---	50	---	50	1
Microprocessor & Microcontroller Interfacing Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Data Structures Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Computer Graphics & Multimedia Lab	D	---	---	2	2	---	---	25	25 **(PR)**	50	1
Total		**16**	**2**	**10**	**28**	**100**	**400**	**175**	**75**	**750**	**23**

ISE: Internal Sessional Examination **ESE: End Semester Examination** **ICA: Internal Continuous Assessment**

Engineering Mathematics –III

COURSE OUTLINE

Course Title	Short Title	Course Code
Engineering Mathematics -III	**EM-III**	

Course Description:

This course is aimed at introducing the fundamentals of basic Mathematics to undergraduate students. The background expected includes a prior knowledge of Mathematics from first year engineering or diploma and familiarity with various laws, principles and theories. The goals of the course are to understand the basic principle of Mathematics and its application in different area.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	40	04
Tutorial	01	15	13	

Prerequisite Course(s): Engineering Mathematics-I, Engineering Mathematics-I / Diploma Mathematics.

COURSE CONTENT

Engineering Mathematics -III **Semester- III**

Teaching Scheme	Examination Scheme	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Laplace Transform (08 Hours, 16 marks)

- Definition and Existence of Laplace transforms.
- Laplace Transform of elementary/standard functions.
- Theorems and Properties of Laplace Transform (without proof).
- Inverse Laplace Transform.
- Laplace Transform of Unit step function.
- Solution of differential equations using LT.

2. Fourier Transform and Z-Transform (08 Hours, 16 marks)

A) Fourier Transform:

- Introduction to Fourier Integral theorem.
- Fourier Transforms, Fourier Cosine Transforms, Fourier Sine Transform and their inverse.

B) Z- Transform:

- Definition and standard properties (without proof)
- Region of Convergence.
- Z-Transform of standard / elementary sequences.
- Inverse Z-transform.

3. Statistics and Probability distributions (08 Hours, 16 marks)

- Introduction to Mean, Mode, Median standard deviation, Variance, Coefficient of Variation.
- Moments, Skewness and kurtosis.
- Correlation and Regression.
- Binominal Distribution.
- Poisson distribution.
- Normal distribution.

4. Testing of Hypothesis and Significance (08 Hours, 16 marks)

- Introduction to population parameters and statistics.
- Testing of Hypothesis, Null Hypothesis and Alternative Hypothesis.
- Level of Significance.
- Test of Significance of large sample.
- Chi-Square test.

5. Fuzzy Sets and System (08 Hours, 16 marks)

- Introduction to Fuzzy sets.
- Standard Fuzzy sets operations.
- Crisp sets, Crisp sets verses Fuzzy sets.
- Fuzzy arithmetic.
- Constructing Fuzzy sets and operations on Fuzzy sets and systems
- Applications of Fuzzy sets.

Text Book:

1. Debashis Dutta, "Textbook of Engineering Mathematics", New Age International Publishers.
2. Witold Pedrycz and Fernando Gomide, "An Introduction to Fuzzy Sets: Analysis and Design", Prentice Hall of India, New Delhi.

Reference Books:

1. H.K. Dass, "Advanced Engineering Mathematics", S. Chand Publication, New Delhi.
2. Erwin Kreyszig, " Advanced Engineering Mathematics", Wiley Eastern Ltd.
3. B.S. Grewal, "Higher Engineering Mathematics" , Khanna Publication, Delhi.
4. Wylie C.R. & Barrett , " Advanced Engineering Mathematics", Mc Graw Hill.
5. B.V. Raman, "Engineering Mathematics", Tata Mc Graw Hill.
6. N. P. Bali , "A Text Book of Engineering Mathematics", Laxmi Publication.
7. George J. Klir and Bo Yuan, ''Fuzzy Sets and Fuzzy Logic: Theory and Applications".

Information Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Information Theory	**IT**	

Course Description:

This subject imparts the fundamentals of both information theory and data compression. The subject details how programmers and electronic communications professionals can use cryptography-the technique of enciphering and deciphering messages-to maintain the privacy of computer data. It describes dozens of cryptography algorithms, gives practical advice on how to implement them into cryptographic software, and shows how they can be used to solve security problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of Computer.

COURSE CONTENT

Information Theory **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction **(08 Hours, 16 marks)**

a) Computer security concepts
b) Security attacks
c) Security services and Security mechanism.

Classical Encryption Techniques

a) Symmetric cipher model
b) Substitution techniques
c) Transposition techniques
d) Rotor machines
e) Steganography
f) Cryptographic Protocols

Block Ciphers and DES

a) Block cipher principles
b) Data Encryption Standard
c) Differential and Linear cryptanalysis

2. Block Cipher Operation **(08 Hours, 16 marks)**

a) Multiple encryption and Triple DES
b) Electronic code book
c) Cipher block chaining mode
d) Cipher feedback mode
e) Output feedback mode
f) Counter mode

Introduction to Number Theory

a) Prime numbers
b) Fermat's and Euler's Theorems
c) Testing for primality
d) Chinese remainder theorem

Public-key Cryptosystem and RSA:

a) Principles
b) RSA algorithm

3. Cryptographic Hash Functions **(08 Hours, 16 marks)**

a) Applications of hash functions
b) Simple hash functions
c) Requirements and security
d) Secure Hash Algorithm (SHA)

Digital Signatures

a) Introduction to Digital Signatures
b) ElGamal and Schnorr digital signature scheme
c) Digital signature standard

Key Management and Distribution

a) Symmetric key distribution using symmetric and asymmetric encryption
b) Distribution of public keys
c) X.509 certificates
d) Public key infrastructure

4. Data Compression **(08 Hours, 16 marks)**

a) Introduction
b) Coding and Modeling
c) Shannon-Fano algorithm
d) Huffman algorithm, Adaptive Huffman coding
e) Arithmetic coding
f) Statistical modeling

5. Graphics and Speech Compression **(08 Hours, 16 marks)**

a) Dictionary based compression
b) Sliding window compression
c) LZ78 compression, Speech compression
d) Lossy graphics compression

Text Books:

1. William Stallings, "Cryptography and Network Security", Fifth edition, Pearson, 2011
2. Mark Nelson and Jean-Loup Gailly, "The Data Compression Book", Second edition, BPB Publications

Reference Books:

1. Bruce Schneider, "Applied cryptography: Protocols, Algorithms and sources code in C", Second edition, Willey, 2008.
2. Atul Kahate, "Cryptography and Network Security", Second edition, TMH, 2007.
3. D.C. Hankerson , Greg A. Harris and Peter D. Johnson Jr., "Introduction to Information Theory and Data Compression", Second edition, CRC Press, 2003.
4. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, "Handbook of Applied Cryptography", CRC Press, 1996.
5. Forouzan, "Cryptography & Network Security", Second edition, TMH, 2010.

Discrete Structure and Graph Theory

COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Discrete Structures and also with Graph Theory with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**45**	**04**
Tutorial	**01**	**15**	**15**	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Discrete Structure and Graph Theory **Semester-III**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Propositions, Sets, Probability (08 Hours, 16 marks)

a Propositions, compound proposition, basic logical operations, truth tables, tautology, contradiction.

b Quantifiers: universal and existential quantifiers.

c Theory: Set, Combinations of Sets, Mathematical Induction Principle.

d Cardinality of finite Sets, Rule of sum, Rule of product.

e Permutations, Combinations.

f Discrete Probability.

2. Relations and Functions: (08 Hours, 16 marks)

a Definitions, properties of Binary relations.

b Equivalence Relations and partitions, Partial ordering relations.

c Lattice, chains and antichains.

d Transitive Closure and Warshall's Algorithm.

e Functions Definitions, Composition of Functions, Types of Function.

f Recursive Functions, Pigeonhole principle.

3. Recurrence Relation and Analysis of Algorithms (08 Hours, 16 marks)

a Recurrence Relation, Linear Recurrence Relations with constant Coefficients.

b Homogeneous Solutions, Particular Solutions, total solutions, Solution by the method of generating functions.

c Introduction, Largest number algorithm, sorting algorithms: Bubble sort.

d Divide and conquer algorithms: binary search algorithm.

e strassens matrix multiplication, Time Complexity of Algorithms.

f Complexity of Problems, Tractable and Intractable Problems.

4. Graphs and Trees (08 Hours, 16 marks)

a Basic terminology, multigraphs and weighted graph , paths and circuits.

b Dijkstra's shortest path algorithms.

c Euler and Hamiltonian Paths and circuits .

d factors of a graph, Planner graph.

e Trees, rooted trees, path length in rooted trees.

f prefix code, binary search trees.

g spanning trees and cut set, minimum spanning trees.

h kruskal's and prim's algorithms for minimum spanning tree.

5. Algebraic system Boolean algebra (08 Hours, 16 marks)

a Semigroup, Subsemigroup, Monoid, Submonid.

b Abelian Group, Subgroups.

c Isomorphism, Automorphism,Homomorphism .

d Ring, Integral domain ,field .

e Lattice and Algebraic systems, Principle of duality.

f basic properties of lattice defined by lattices, distributive and complemented lattices.

g Boolean lattices and Boolean algebras, Boolean functions and Boolean Expressions.

h Number system and Interconversion of number systems.

Text Books:

1. C.L. Liu , " Elements of Discrete Mathematics", Second edition, TMH.
2. Seymour Lipschutz, Marc Lipson, " Discrete Mathematics", Second edition, TMH.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH.
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures" Fourth edition, Pearson .
4. J. Treamblay , R. Manohar ," Discrete Mathematical structures with application to computer science" , TMH.
5. Sukhendu dey, "Graph theory and its applications", Shroff publications.
6. John Dossey,Otto,Spence,Eynden, "Discrete Mathematics", Pearson publications, Fifth edition.

Digital System and Microprocessor

COURSE OUTLINE

Course Title	Short Title	Course Code
Digital system and Microprocessor	**DSM**	

Course Description:

The objective of this course is to introduce the students with a comprehensive study of the digital system covering basic concepts of digital system and microprocessors.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamental knowledge of digital system and microprocessors.

COURSE CONTENT

Digital System and Microprocessor **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. **Review of fundamental concepts of digital electronics**
   (08 Hours, 16 marks)
   a. Logic Gates
   b. Implementation of logic gates using universal gates
   c. Digital Signal: Positive & Negative logic
   d. Boolean Algebra
   e. Kmap representation (2, 3 and 4 variable)
   f. Grouping in the Kmap
   g. Don't Care condition in Kmap

2. **Combination logic design** **(08 Hours, 16 marks)**
   a. Kmap representation (5 and 6 variable)
   b. Grouping in the Kmap

c. Don't Care condition in Kmap
d. Design of adder and subtractor
e. Design of BCD adder and BCD subtractor
f. Combination logic design examples
g. Design of multiplexer & its examples
h. Demultiplexer & its examples
i. Design of comparator

3. Sequential logic design (08 Hours, 16 marks)

a. Sequential Logic Design
b. One bit memory cell
c. SR and JK flip flop
d. D and T flip flop
e. Design of synchronous and asynchronous counter
f. Sequence generator & detector

4. 8086 Microprocessor (08 Hours, 16 marks)

a. 8086 Architecture & Register Organisation
b. 8086 Memory Segmentation
c. 8086 Addressing Modes
d. 8086 Signal Descriptions
e. 8086 Instruction Set

5. 8086 assembly programming (08 Hours, 16 marks)

a. Assembler directives
b. DOS and BIOS interrupts
c. Macros and Procedures
d. Assembly language programming of 8086

Text Books:

1. R.P. Jain, "Modern Digital Electronics", Tata McGraw Hill, Fourth edition.
2. A. K. Ray and K.M. Bhurchandi, "Advanced Microprocessors and Peripherals", Tata McGraw Hill, Third edition.

Reference Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 1979.
2. V.K.Puri, "Digital Electronic Circuit and System", Tata McGraw Hill, 1997.
3. F.J. Hill, "Digital Logic and Microprocessor", John Willy & sons.

4. Anandkumar, “Fundamentals of Digital Circuits”, Pearson.
5. John Wiley and Sons, “Introduction to Switching Theory and Logic Design”, Hill and Peterson, Third edition.
6. Douglas V Hall, “Microprocessor and Interfacing, Programming and Hardware”, Tata McGraw Hill, Second edition.
7. Soumitra Kumar Mandal, “Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051”, Tata McGraw Hill.
8. B Ram, “Advanced Microprocessors and Interfacing”, Tata McGraw Hill.
9. Peter Abel, “IBM PC Assembly Language and Programming”, Pearson, Fifth edition.

Object Oriented Technology

COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

The objective of this course is to introduce the students to the concepts of C++ programming language and enable them to apply these concepts for solving real world problems.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): C Programming.

COURSE CONTENT

Object Oriented Technology **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to Object Oriented Programming

(08 Hours, 16 marks)

a. Introduction to procedural, modular and object-oriented programming techniques.
b. Limitations of procedural programming.
c. Need of object-oriented programming. Advantages, disadvantages and applications of OOP.
d. Class, objects, abstraction, encapsulation, data hiding, inheritance, polymorphism and message passing.
e. The basics of C++
f. Expressions

2. Classes and Objects, Function and Operator Overloading

(08 Hours, 16 marks)

a. Class and objects
b. Constructors and destructors:
c. Functions in C++
d. Function Overloading
e. Operator overloading

3. Pointers and Arrays (08 Hours, 16 marks)

a. Introduction, pointer declaration, voids pointers.
b. Pointers to class objects, this pointer.
c. Pointers to members, accessing private members with pointers.
d. Characteristics of arrays, initialization of arrays.
e. Arrays within a class, arrays of objects.
f. Dynamic memory allocation using new and delete operators.
g. One dimensional and two dimensional arrays using pointers.

4. Inheritance, Virtual functions and Polymorphism

(08 Hours, 16 marks)

a. Introduction, base and derived classes. Inheritance types, access modifiers.
b. Single inheritance, multiple and multilevel inheritance, hybrid, hierarchical, multipath inheritance and virtual base classes.
c. Overriding base class members. Constructors and inheritance, calling base class constructor.
d. Static and dynamic binding. Pointers to base and derived classes.
e. Virtual functions, rules for virtual functions, working of virtual functions, pure virtual functions.
f. Virtual base classes.

5. Files and Streams, Managing Console I/O Operations and Templates

(08 Hours, 16 marks)

a. Concept of a file, file stream operations.
b. Opening a file using constructor and open function, closing a file, detecting end-of-file, file modes, file pointers.
c. Introduction to C++ streams, stream classes, unformatted and formatted I/O.
d. ios class functions and flags, manipulators.
e. Introduction to function template and class template.
f. Overloading of templates functions.

g. Member function templates and template arguments.
h.

Text Books:

1. E. Balagurusamy, “Object Oriented Programming with C++”, Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, “Object Oriented Programming in C++”, Fourth Edition, Pearson Education, 2002.

Reference Books:

1. Ashok N. Kamthane, “Object-Oriented Programming with ANSI and Turbo C++”, Pearson Education, 2006.
2. Rajesh K. Shukla, “Object-Oriented Programming in C++”, Wiley India, 2008.
3. Bjarne Stroustrup, “C++ Programming Language”, Third Edition, Addison Wesley, 2002.
4. Yashavant P. Kanetkar, “Let Us C++”, Second Edition, BPB Publications, 2003.
5. Venugopal K.R., “Mastering C++”, First Edition, TMH, 1999.
6. Mahesh Bhave, Sunil Patekar, “Object Oriented Programming with C++”, Second Edition, 2012.
7. Herbert Schildt, “The Complete Reference C++”, Fourth Edition, TMH, 2003.

Soft Skills – III

COURSE OUTLINE

Course Title	Short Title	Course Code
Soft Skills – III	**SK-III**	

Course Description:

Through this course we have tried to prepare the students for the industry. Most companies test mathematical and logical ability through an aptitude test. This subject aims at working on these skills of a student through strategies formulae and practice exercises.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	1	**14**	**14**	**2**

Prerequisite Course(s): Fundamental knowledge of High School Mathematics.

COURSE CONTENT

Soft Skills – III **Semester-III**

Teaching Scheme **Examination Scheme**

Lecture: 1 hour / week **Internal Continuous Assessment (ICA): 50 Marks**

Unit-I: Arithmetic-1 **(03 Hours, 10 marks)**

a. Basic Formulae

i. Divisibility Rules
ii. Speed Maths
iii. Remainder Theorem
iv. Different Types of Numbers
v. Applications

b. HCF, LCM and Linear Equations

i. HCF – Successive Division and Prime Factorization Methods
ii. LCM – Successive Division and Prime Factorization Methods
iii. Applications

iv. Linear Equations – Elimination Method
v. Substitution Method
vi. Applications

c. Averages and Mixtures

i. Concept of Average
ii. Faster Ways of Finding It
iii. The Allegation Method
iv. Applications

Unit-II: Arithmetic–II **(03 Hours, 10 marks)**

a. Percentages

i. Concept of Percentage
ii. Working with Percentages
iii. Applications

b. Profit and Loss

i. Difference between Cost and Selling Price
ii. Concept of Profit Percentage and Loss Percentage
iii. Applications

c. Time and Work

i. Basic Time and Work Formula
ii. Relation between Time and Work
iii. Applications

Unit-III: Arithmetic–III **(03 Hours, 10 marks)**

a. Permutations and Combinations

i. Sum Rule of Disjoint Counting
ii. Product Rule of Counting
iii. Concept of Factorial
iv. Permutations
v. Linear Permutations
vi. Combinations
vii. Circular Permutations
viii. Applications

b. Probability

i. Definition and Laws of Probability
ii. Mutually Exclusive Events
iii. Independent Events
iv. Equally Likely Events
v. Exhaustive Events
vi. Cards
vii. Dice
viii. Applications

c. Time and Distance

i. Speed
ii. Conversion Factors for Speed
iii. Average Speed
iv. Moving Bodies – Passing, Crossing and Overtaking
v. Relative Speed
vi. Boats and Streams
vii. Applications

Unit-IV: Non-Verbal Reasoning (02 Hours, 10 marks)

a. Analogies

i. Examples
ii. Applications

b. Classification

i. Examples
ii. Applications

c. Sequences

i. Examples
ii. Applications

Unit-V: Analytical Reasoning (03 Hours, 10 marks)

a. Analytical Puzzles

i. Classification Puzzles
ii. Ordering Puzzles
iii. Assignment Puzzles
iv. Applications

b. Letter and Number Series

i. Different Types of Letter Series
ii. Different Types of Number Series
iii. Mixed Series

c. Coding and Decoding

i. Letter Coding
ii. Number Coding
iii. Mixed Coding
iv. Odd Man Out
v. Applications

Guide lines for ICA:
ICA will be based on credit tests and assignments submitted by the student in the form of journal.

Reference Books:

1. R. S. Aggarwal, "Quantitative Aptitude", S. Chand Publication, New Delhi, 2012.
2. R. S. Aggarwal, "A Modern Approach to Verbal Reasoning", S. Chand Publication, New Delhi, 2012.
3. R. S. Aggarwal, "A Modern Approach to Non-Verbal Reasoning", S. Chand Publication, New Delhi, 2012.

Information Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Information Theory	**IT**	

Course Description:

This laboratory provides students with a comprehensive study of the basic concepts of cryptography and data compression. It will helps the students to understand how programmers and electronic communications professionals can use cryptography-the technique of enciphering and deciphering messages-to maintain the privacy of computer data and also shows how they can be used to solve security problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and any programming language (Ex. C language).

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Program for simple encryption and decryption of the message**
   - A simple encryption and decryption of a message can be implemented by using any programming language
   - The program should consist of two modules: Encryption and Decryption
2. **Program for Vernam Cipher (One-time Pad)**
   - Program should consist of encryption and decryption module
3. **Program for Simple Transposition Technique**

- A simple transposition technique such as 'Rail Fence' technique can be implemented
- In this technique plain text is written in zig - zag form to obtain cipher text

4. **Program for Electronic Code Book (ECB) Mode**
   - Algorithmic mode ECB can be implemented
   - Program must exhibits the working of ECB i.e. block-by-block encryption and decryption

5. **Program for Cipher Block Chaining (CBC) Mode**
   - Algorithmic mode CBC can be implemented
   - Program must exhibits the working of CBC

6. **Program for Chinese Remainder Theorem**
   - A simple program is written to show the working of Chinese remainder theorem

7. **Program for Diffie-Hellman Key Exchange Algorithm**
   - Key exchange is a big problem in symmetric key and it can be resolved by using Diffie-Hellman key exchange algorithm

8. **Program for RSA algorithm**
   - Public key algorithm (RSA) can be implemented for simple input
   - Program must consist of three modules: Key generation, Encryption and Decryption

9. **Study of Digital Signature**
   - A digital signature is a mechanism that enables the creator of a message to attach a code that acts as a signature.

Group B

1. **Program for Caesar Cipher**
   - A simple program on Caesar cipher can be implemented
   - It should consists of two modules: encryption and decryption
   - Encryption: Cipher text=Plain text + (Key=3)
   - Decryption: Plain text= Cipher text - (Key=3)

2. **Program for Simple Stream Cipher**
   - Stream ciphers works on bit-by-bit basis
   - It should consists of two modules: encryption and decryption
   - Encryption: Cipher text bit=Plain text bit XOR Key bit
   - Decryption: Plain text bit = Cipher text bit XOR Key bit

3. **Study of JPEG Standard**
   - Image compression standard

4. **Study of Adaptive Huffman Coding Technique**
   - Limitation of Huffman coding techniques are removed in adaptive coding

5. **Program for RLE Encoding Technique**
   - Run-Length encoding technique is lossless data compression technique. It is generally used for text and image compression.

Reference Books:

1. William Stallings, "Cryptography and Network Security", Fifth edition, Pearson, 2011
2. Mark Nelson and Jean-Loup Gailly, "The Data Compression Book", Second edition, BPB Publications
3. Bruce Schneider, "Applied cryptography: Protocols, Algorithms and sources code in C", Second edition, Willey, 2008.
4. Atul Kahate, "Cryptography and Network Security", Second edition, TMH, 2007.
5. D.C. Hankerson , Greg A. Harris and Peter D. Johnson Jr., "Introduction to Information Theory and Data Compression", Second edition, CRC Press, 2003.
6. Alfred J. Menezes, Paul C. van Oorschot and Scott A. Vanstone, "Handbook of Applied Cryptography", CRC Press, 1996.
7. Forouzan, "Cryptography & Network Security ", Second edition, TMH, 2010.

Discrete Structure and Graph Theory Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Discrete Structure and Graph Theory	**DSGT LAB**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in discrete structures and graph theory. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for discrete structures and graph theory.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the group A and minimum FIVE experiments from the group B.)

(Group A)

1. **A program for logical operations using bitwise operators.**
   Perform logical operations like AND,OR,NOT,IF THEN,IF AND ONLY IF
2. **A program for set operations: Union, Intersection, Difference, Symmetric difference.**
   Perform set operations like union, intersection, difference, symmetric difference, complement
3. **A program for generation of Power set of a given set.**
   Producing power set for a given input set.
4. **A program for generation of permutations.**
   Producing permutations set for a given input set.

5. **A program for generation of combinations.**

   Producing permutations set for a given input set.
6. **A Program for Bubble sort.**

   Sorting of given numbers by using Bubble sort.

(Group B)

1. **A Program for Matrix multiplication.**

   Performing Multiplication of two matrices.
2. **A Program for Binary search.**

   Searching of a given number using binary search.
3. **A Program for Shortest Path algorithm using Dijkstra's.**

   Finding shortest path in a graph using Dijkstra's algorithm.
4. **A program for implementation of Kruskal's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
5. **A program for implementation of Prim's algorithm.**

   To find minimum spanning tree using kruskals algorithm.
6. **A program for Inter conversion of number system.**

   Interconverting numbers from one base to another base.

Reference Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Application, Fifth edition, TMH
2. V. K. Balakrishnan, " Graph Theory", TMH.
3. B. Kolman , R. Busby and S. Ross, "Discrete Mathematical Structures", Fourth edition, Pearson.

Digital System and Microprocessor Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Digital System and Microprocessor	**DSM**	

Course Description:

This laboratory provides students with a comprehensive study of the digital system covering basic concepts of digital system and microprocessor covering microprocessor concepts. This laboratory focuses on basic analysis and design of digital circuit's and the basic concepts and programming related to microprocessor.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of basic digital design and microprocessor concepts.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX experiments from group A and FOUR experiments from group B)

Group A (Digital System)

1. **Verify the truth table of all logic gates and verify the Demorgan's theorem**
    a. Draw the logical symbol and truth table
    b. Implement the connection on bread board and verify the truth table
2. **Implement any logic gates by using universal gates**
    a. Construct logic gates using universal gates
    b. Implement the connection on bread board and verify the truth table

3. **Construct and Implement Half Adder and Full adder**

    a. Construct Half Adder and Full adder
    b. Implement the connection on bread board and verify the truth table

4. **Construct and Implement Half Subtractor and Full Subtractor**

    a. Construct Half Subtractor and Full Subtractor
    b. Implement the connection on bread board and verify the truth table

5. **Construct and Implement various Code converters (Binary to Gray and Gray to Binary)**

    a. Construct Code Converter
    b. Implement the connection on bread board and verify the truth table

6. **Verify Muliplexer and Demultiplexer**

    a. Construct Muliplexer and Demultiplexer
    b. Implement the connection on bread board and verify the truth table

7. **Verify the truth table of BCD to 7-Segment display**

    a. Construct BCD to 7-Segment display
    b. Implement the connection on bread board and verify the truth table

8. **Implement and verify S-R, J-K,D, and T flip flop using ICs**

    a. Construct flip flops
    b. Implement the connection on bread board and verify the truth table

Group B (8086 Microprocessor)

Program using Macro

Display personal information using Macro

1. **Program using NEAR and FAR Procedure**

    Addition of two numbers using NEAR and FAR Procedure Perform

2. **Perform arithmetic operations on two numbers**

    Addition/subtraction/multiplication of two numbers using NEAR and FAR Procedure

3. **Find factorial of given number**

    Factorial of given number using recursive instruction

4. **Program for Password Verification**

   Program for Password Verification

5. **Perform the BCD Addition**

   Addition of two 16 bit BCD numbers

6. **Program to Display System Time & Date**

   Display current Time & Date of system

7. **Convert HEX To BCD and BCD to HEX**

   a. HEX to BCD Conversion
   b. BCD to HEX Conversion

Guide lines for ESE:

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

Reference Books:

1. M. Morris Mano, "Digital Logic and Computer Design", Pearson, 1979.
2. V.K.Puri, "Digital Electronic Circuit and System", Tata McGraw Hill, 1997.
3. F.J. Hill, "Digital Logic and Microprocessor", John Willy & sons.
4. Anandkumar, "Fundamentals of Digital Circuits", Pearson.
5. John Wiley and Sons, "Introduction to Switching Theory and Logic Design", Hill and Peterson, Third edition.
6. Douglas V Hall, "Microprocessor and Interfacing, Programming and Hardware", Tata McGraw Hill, Second edition.
7. Soumitra Kumar Mandal, "Microprocessor and Microcontroller: Architecture, Programming and Interfacing using 8085, 8086 and 8051", Tata McGraw Hill.
8. B Ram, "Advanced Microprocessors and Interfacing", Tata McGraw Hill.
9. Peter Abel, "IBM PC Assembly Language and Programming", Pearson, Fifth edition.

Object Oriented Technology Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Object Oriented Technology	**OOT**	

Course Description:

This laboratory provides students with a comprehensive study of the C++ programming language. Classroom lectures stress the strengths of C++, which provide students with the means of writing efficient, maintainable, and portable code.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**02**	**15**	**30**	**01**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Computers and C programming

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum SIX Experiments from group A and FOUR from group B.)

Group A

1. **Write a program for a simple class and object.**
   Performing simple arithmetic operations using C++ class and object like,
   a. Addition,
   b. Subtraction,
   c. Multiplication,
   d. Division.
2. **Write a program for parameterized constructor.**

Demonstrate the use parameterized constructor by passing different types of parameters to the constructor.

3. **Write a program for overloading constructors.**
   Demonstrate the concept of overloading constructor functions using class and object.

4. **Write a program to find the area of rectangle, triangle and sphere using function overloading.**
   To calculate the area of rectangle, triangle and sphere using function overloading and class and object.
5. **Write a program to overload unary operator using member function.**
   Demonstrate the overloading of unary operators using the concept of member functions.
6. **Write a program to overload binary operator using member function.**
   Demonstrate the overloading of binary operators using the concept of member functions.
7. **Write a program for arrays of pointers to objects.**
   Declaring an array of pointers to objects using suitable example.
8. **Write a program using single inheritance, multiple inheritance and hierarchical inheritance.**
   Demonstrate the use of single inheritance, multiple inheritance and hierarchical inheritance by taking suitable example.
9. **Write a program using multilevel inheritance and hybrid inheritance.**
   Demonstrate the use of multilevel inheritance and hybrid inheritance by taking suitable example.
10. **Write a program for virtual base classes.**
    To calculate the total mark of a student using the concept of virtual base class.
11. **Write a program to read and write class objects from files.**
    Writing/reading class object to/from file.
12. **Write a program to format output using ios class functions and flags.**
    To format the output using different ios class functions and flags.
13. **Write a program to format output using manipulators.**
    To format the output using different manipulators.
14. **Write a program using class template.**
    To swap the numbers using the concept of function template.
15. **Write a program for overloading of template functions.**
    Overload templates functions with the number of parameters.

Group B

1. **Write a program for the copy constructor.**
   To calculate factorial of a given number using copy constructor.
2. **Write a program to overload unary operator using friend function.**
   Demonstrate the overloading of unary operators using the concept of friend function.

3. **Write a program to overload binary + operator using member function for concatenation of two strings.**
   Demonstrate the overloading of binary + operator using the concept of member function for concatenation of two strings.
4. **Write a program for matrix multiplication using new and delete dynamic memory allocation operators.**
   Perform the matrix multiplication using new and delete dynamic memory allocation operators.
5. **Write a program to convert class type data to basic type data.**
   Perform the class type data conversion to any basic type data.
6. **Write a program for run time polymorphism using virtual functions.**
   Perform the run time polymorphism using virtual functions.
7. **Write a program for bubble sort using template functions.**
   Perform the bubble sort using the concept of template functions.

Reference Books:

1. E. Balagurusamy, "Object Oriented Programming with C++", Fifth Edition, Tata McGraw Hill, 2011.
2. Robert Lafore, "Object Oriented Programming in C++", Fourth Edition, Pearson Education, 2002.
3. Ashok N. Kamthane, "Object-Oriented Programming with ANSI and Turbo C++", Pearson Education, 2006.
4. Rajesh K. Shukla, "Object-Oriented Programming in C++", Wiley India, 2008.
5. Bjarne Stroustrup, "C++ Programming Language", Third Edition, Addison Wesley, 2002.
6. Yashavant P. Kanetkar, "Let Us C++", Second Edition, BPB Publications, 2003.
7. Venugopal K.R., "Mastering C++", First Edition, TMH, 1999.
8. Mahesh Bhave, Sunil Patekar, "Object Oriented Programming with C++", Second Edition, 2012.
9. Herbert Schildt, "The Complete Reference C++", Fourth Edition, TMH, 2003.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of the program, execution of the program, type of input and output for the program.

NORTH MAHARASHTRA UNIVERSITY,

JALGAON (M.S.)

Second Year Engineering

(Information Technology)

Faculty of Engineering and Technology

COURSE OUTLINE

Semester – IV

W.E.F 2013 – 2014

Data Communication

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Communication	**DC**	

Course Description:

This course is aimed at introducing the fundamentals of data communications to undergraduate students. The goals of the course are to understand the basics and knowledge about the Data Communications using components and protocols of data communications.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Fundamentals of Data Communication.

COURSE CONTENT

Data Communication **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1 Introduction to Data Communication and Signals

(08 Hours, 16 marks)

a Basics of Data Communication: Characteristics and Components
b Data Representation and Data Flow
c Networks, Introduction to ISO-OSI Reference model
d Introduction to Signals and Transmission Impairments: Analog and Digital
e Periodic Analog Signals, Digital Signals
f Transmission impairment, data rate limits, Performance

2 Digital transmission and Analog transmission

No of Lect – 8, Marks:16

a Digital to Digital Conversion

b Analog to Digital Conversion
c Transmission Modes
d Digital-to-analog Conversion

3 Multiplexing and Transmission Media (08 Hours, 16 marks)

a Multiplexing
b Guided Media
c Unguided Media

4 Switching and Multiple Access (08 Hours, 16 marks)

a Circuit-switched Networks
b Datagram networks
c Virtual-circuit networks
d Multiple Access

5 Error Control and Data Link Control (08 Hours, 16 marks)

a Types of errors
b Block coding
c Linear block codes
d Cyclic codes
e Checksum
f Flow and error control

Text Books:

1. Behrouz A Forouzan, "Data Communications and Networking", Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, "Data Communications", PHI Publications.

Reference Books:

1. William Stallings, "Data & Computer Communications", Seventh edition: PHI Publication.
2. Leon - Garcia, Indra Widijaja, "Communication Networks Fundamental Concepts and Key Architectures", Second edition: McGraw Hill Education.
3. Achyut Godbole, "Data Communication Networks", Tata McGraw Hill.
4. Bruce Hartpence, "Packet Guide to Routing and Switching", O'Reilly.
5. Bruce Hartpence, "Packet Guide to Core Network Protocol" , O'Reilly.
6. James Irvine & David Harle, "Data Communication and Networks: An Engineering Approach", Wiley Edition.

Microprocessor & Microcontroller Interfacing

COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing	**MPMCI**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of microprocessor & microcontroller interfacing with assembly programming language and enable them to apply these concepts for real world applications.

Lecture	Hours / Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	04
Tutorial	01	15	15	

Prerequisite Course(s): Fundamental knowledge of Microprocessors & Microcontrollers.

COURSE CONTENT

Microprocessor & Microcontroller Interfacing **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week **End Semester Examination (ESE) : 80 Marks**
Tutorial: 1 hour / week **Paper Duration (ESE) : 03 Hours**
Internal Sessional Exam (ISE) : 20 Marks

1. Basic I/O Interface

(08 Hours, 16 marks)

a. MSDOS FAT
b. MS DOS Device Drivers Types, Structure of device drivers.
c. 8255 PPI : Internal block diagram, control word and status word, modes of operation, numericals on control word design.

2.

(08 Hours, 16 marks)

a. 8254(PIT) : Internal block diagram, control word format, operating modes, numericals on control word design.

b. 8251(USART) : Architecture and signal description, operating modes, interfacing with 8086 and numericals.
c. TSR programs : concept and implementation.

3. Overall Motherboard Component Logic (08 Hours, 16 marks)

a. Functional block diagram of PC.
b. Motherboard (8086/8088 based) : Motherboard components.
c. Motherboard logic : Reset logic, Interrupt logic, RAM parity logic, NMI logic, Wait state logic, Bus Arbitration logic, RAM & ROM logic, CPU logic, DMA logic, keyboard interface block diagram.
d. Microcomputer Display : Raster scan basics, Overview of character display control system.
e. PC display adapters : CGA,EGA,VGA.
f. Introduction to LCD and Plasma display.

4. 8086 Microprocessor interface (08 Hours, 16 marks)

a. Parallel Printer Interface
b. 7 segment display interface.
c. Disk reading methods: FM , MFM.
d. Internal structure of Floppy disk and hard disk.
e. Floppy Disk Controller : Overview, FDC system interface, Overall operation of floppy disk subsystem, 8272 FDC : internal block diagram and commands.
f. Hard disk controller : HDC commands and device control block.

5. Microcontrollers and Interfacing (08 Hours, 16 marks)

a. Interfacing LEDs and of 7-segment displays.
b. Interfacing keys and keyboard interfacing .
c. Interfacing 0808/0809 ADC.
d. Interfacing DAC 0808.
e. Interfacing stepper motor.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures

COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures	**DS**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of Data Structure with concepts of the C programming language and enable them to apply these concepts for solving real world problems.

	Hours / Week	No. of Weeks	Total Hours	Semester Credits
Lecture	**03**	**15**	**45**	**04**
Tutorial	**01**	**15**	**15**	

Prerequisite Course(s): Fundamental knowledge of C

COURSE CONTENT

Data Structures **Semester - IV**

Teaching Scheme	**Examination Scheme**	
Lecture: 3 hours / week	**End Semester Examination (ESE)**	**: 80 Marks**
Tutorial: 1 hour / week	**Paper Duration (ESE)**	**: 03 Hours**
	Internal Sessional Exam (ISE)	**: 20 Marks**

1. Introduction to Data Structures (08 Hours, 16 marks)

a Introduction of data and data object.
b Data structure and Abstract Data Type(ADT).
c Implementation of different data structures.
d Basic terminologies with data structures, types of data structures.
e Data structure operations.
f Concept of arrays,pointer and structures.

2. Stack and Queue (08 Hours, 16 marks)

a Detailed knowledge of data structure like stack, queue & circular queue.
b Polish notations & interconversions by using stack.
c Use of stack in function call,recursion,tower of Hanoi.

3. Linked Lists (08 Hours, 16 marks)

a Understand the concept of linked list data structure.

b Pros & Cons of array compared with linked list.

c Creation,traversing,searching,insertion,deletion opertions w.r.t. single linked list.

d Pros & cons of single linked list, double linked list

e Polynomial addition using single linked list as well as storing multivariable polynomials using generalised list.

4. Trees (08 Hours, 16 marks)

a Creation,traversing,searching,insertion,deletion opertions w.r.t. binary search tree.

b Concept of threaded binary tree,tree traversals(recursive & non-necursive).

c Concept of Huffman Algorithm.

e Height Balanced Tree(AVL Search Tree).

5. Searching and Sorting (08 Hours, 16 marks)

a Basics of searching techniques.

b Basics of sorting techniques.

c Different sorting algorithms including Bubble, Insertion, Selection,Quick,Merge,Heap,Radix.

d Time and Space complexity of an algorithm with big 'O', '' , 'Ω' notations.

e Best, Worst, and Avgerage case time complexity of each of these algorithms.

Text Books:

1. Seymour Lipschutz, "Data Structures", Schaums Outlines Tata McGraw Hill, 2006.
2. Ellis Horowitz and Sartaj Sahani, "Fundamentals of Data Structures", Galgotia Publication.

Reference Books:

1. G.S.Baluja, "Data Structures through C", Dhanpatrai Publications.
2. Ashok N. Kamthane, "Introduction to Data structures in C", Person Publications, 2007.
3. Aarom Tanenbaum, Yedidyah Langsam, Moshe Augenstein, "Data structures using c", Pearson Publication.
4. Alfred Aho, John Hopcroft, Jeffrey Ullman, "Data Structures and Algorithms",Pearson Publications.
5. E.Balagurusamy,"Data Structures using C",Tata MacGraw Hill Publications.
6. P.S.Deshpande,O.G.Kakde,"C and Data Structures",dreamtech press Publications.
7. Rajesh K.Shukla, "Data Structures using C and C++" ,Willy India Publication.
8. Larry Nyhoff, "ADTs' Data Structures and prolems with C++",Pearson Publications.

Computer Organization

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Organization	**CO**	

Course Description:

This course introduces the students about the computer. It includes the terms, concepts, architectures, formats and addressing. This course also describes the Memory organization etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	**15**	**45**	**03**

Prerequisite Course(s): Introduction to Computer.

COURSE CONTENT

Computer Organization **Semester- IV**

Teaching Scheme **Examination Scheme**

Lecture: 3 hours / week

End Semester Examination (ESE) : 80 Marks
Paper Duration (ESE) : 03 Hours
Internal Sessional Exam (ISE) : 20 Marks

1. Introduction to system concepts (08 Hours, 16 marks)

a. To introduce students to System Concept.
b. To learn about Instruction format.
c. To learn General addressing Modes.
d. To learn about Expanding op-codes.
e. To learn about Bus Structures.

2. Arithmetic (08 Hours, 16 marks)

a To know how Numbers are represented.
b To learn Multiplication using Booths and Bit-pairing Algorithms.
c To learn Division using Restoring and Non-Restoring Methods.
d To learn addition and Subtraction of signed numbers.
e To learn Floating point System.

3. Processing Unit (08 Hours, 16 marks)

a To design control unit.

b Designing Control unit using hardwired and Micro programmed methods.

c Learning Wilkes Design method.

d To learn Bus organization.

e To learn execution of complete instruction.

4. Memory (08 Hours, 16 marks)

a Memory organization techniques.

b To know cache memory organization.

c To know Virtual memory.

d To learn basic concepts of memory.

e Introduction to SDRAM, RDRAM, DDRSDRAM, Flash memory.

5. System Organization (08 Hours, 16 marks)

a To know concepts system buses.

b To know Daisy chaining, polling.

c Concepts of PCI bus, SCSI bus, Universal Serial Bus.

d RISC and CISC .

Text Book:

1. Hamacher, Vransic, Zaky, "Computer Organization", Fifth edition, McGraw Hill international.

Reference Books:

1. J.P. Hayes, "Computer Architecture and Organization", Third edition, McGraw Hill international.
2. Sajjan Shiva, "Computer Organization Design & Architecture", CRC Press Publication.
3. Tanenbaum, "Structured Computer Organization", Pearson.
4. William Stallings, "Computer Organization and Architecture", Sixth edition, Pearson.
5. Swati Saxena,"Computer Organization" Dhanpat Rai.
6. Murdocca, Heuring, "Computer Architecture & Organization", Second edition, Wiley.
7. Nicholas Carter, "Computer Architecture", Schaum's Outline.

Computer Graphics and Multimedia

COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics & Multimedia	**CGM**	

Course Description:

This course introduces the students about the concepts of user interface with graphics system. It includes the graphics standards, transformations, filling & clipping objects, 2D & 3D as well as multimedia concepts. This course also describes about graphics applications corresponds with scientific work as well as animation, simulation etc.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	03	15	45	03

Prerequisite Course(s): Engineering Graphics.

1. **Basic Concepts** **(08 Hours, 16 marks)**
   a. Introduction to computer graphics
   b. Graphics Standards
   c. Interactive Computer Graphics
   d. Linear and Circle Generation

2. **Polygons** **(08 Hours, 16 marks)**
   a. Polygons
   b. Types of Polygons
   c. Polygon filling
   d. Scan conversion algorithm
   e. Segments

3. **2D & 3D Geometry** **(08 Hours, 16 marks)**
   a. 2D transformation primitives and concepts
   b. 3 D transformations
   c. 3D viewing transformation
   d. Concept of parallel perspective projections
   e. Viewing parameters

4. **Multimedia** **(08 Hours, 16 marks)**
   a. Multimedia Presentation & Production
   b. Hardware & software requirements
   c. Analog & digital representations
   d. Introduction to text & image presentation.

5. Multimedia Architecture (08 Hours, 16 marks)

a. Multimedia Architecture
b. Multimedia Extensions
c. Distributed multimedia applications
d. Introduction to animation
e. Principles of animation

Text Books:

1. "Computer graphics", ISRD group, THM publications, Eleventh reprint 2012.
2. Ranjan Parekh, "Principles of Multimedia", McGraw Hill.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
5. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad, "Graphics user interface with X windows and MOTIF", New Age.
8. Foley, Vandam, Feiner, Hughes, "Computer Graphics Pricipals & Practice", Pearson Second edition.

Application Development Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Application Development Lab	**ADL**	

Course Description:

The objective of this course is to introduce the students to the fundamentals of web development. It includes the technologies like HTML, XML, CSS and Scripting Languages.

Lecture	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	01	**15**	**15**	**02**

Prerequisite Course(s): Fundamental knowledge of Computers.

LAB COURSE CONTENT

This course will use advanced techniques in creating documents for the World Wide Web. Emphasis will be placed on HTML, JavaScript, XML and Java.

1 Introduction to HTML (03 Hours)

a. Tags and Elements
b. Separating Heads from Bodies
c. Attributes
d. Basic Text Formatting
e. Presentational and Phrase Elements
f. List
g. Links and Navigation

2 CSS Style Sheet and Scripting Languages (03 Hours)

a. URLs
b. Images, Audio, and Video
c. Tables, Forms and Frames
d. Cascading Style Sheets
e. Page Layout
f. Scripting Language (Java, VB)

3 Introduction to XML (03 Hours)

a. XML Basics

b. XML Elements
c. Working with DTD

4 DTD and Style Sheet (03 Hours)

a. Adding Style, Using Schemas

5 Introduction to Java (03 Hours)

a. Basic Input/output
b. Applet Class
c. Event handling
d. Introduction to AWT: working with windows, Graphics and Text

Reference Books:

1. Jon Duckett, "Beginning HTML, XHTML, CSS, and JavaScript", John Wiley & Sons publication, 2010.
2. Heather Williamson, "XML: The Complete Reference", First edition, Tata McGraw-Hill Education, 2001.
3. Herbert Schildt, "Java: The Complete Reference", Seventh edition, Tata McGraw-Hill Education, 2006.
4. Thomas A. Powell, "HTML & CSS: The Complete reference", Fifth edition, TMH 2010.
5. Elliotte Rusty Harold, "XML 1.1 Bible", Third edition, Willey Publication, 2004.
6. Steven Holzner, "XML: A Beginner's Guide", First edition, TMH, 2009.
7. Herbert Schildt, "Java: A Beginners Guide", Fifth edition, TMH, 2011.
8. Yashavant Kanetkar, "Let Us Java", BPB Publication, 2011.

Data Communication Lab

LAB COURSE OUTLINE

Course Title	Short Title Course Code
Data Communication Lab	**DC**

Course Description:

This laboratory provides students with a comprehensive study of the Data Communication concepts and practical implementation of Data Communication concepts.

Laboratory	Hours per Week	No. of Weeks	Total Hours	Semester Credits
	02	15	30	01

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of Data Communication.

LAB COURSE CONTENT

Outline of Content:

Group A

1. Comparative analysis of different types of network cables with Specifications
   - Study of different types of Network cables – CAT-5, CAT – 6.
   - Study of different cable specifications comparisons.
2. Implementation of Network performance calculator.
   - Simple Program for Calculating Network Performance.
3. Network related commands such as ARP, IPCONFIG, PING, TRACERT, NSLOOKUP, GETMAC, NETSTAT etc.
   - Practical use of Network commands ARP
   - Study of IPCONFIG for IP configurations
   - Study of PING command for finding destination reachable or not.
   - Study of TRACERT command
   - Study of NSLOOKUP command
   - Study of GETMAC to get MAC address.

- Study of NETSTAT to get the network status.

4. I.T Infrastructure planning using Network Connecting Devices.
   - Consider our own college as a case & prepare a planning for I.T. infrastructure.
5. Network Connecting Devices Specifications and configurations.
   - Practical study of Network Connecting device – Repeater.
   - Practical study of Network Connecting device – Switch /HUB.
   - Practical study of Network Connecting device – Router

Group B

1. Implementation of Stop and Wait Protocol
   - Study the working of stop and wait protocol
   - Implementation of simple client and server should be simple
   - Modular approach should be followed.
2. Implementation of Internet checksum
   - Consider a simple example
   - Study it theoretically.
   - Implementation of same .
3. Crimping of cross-wire and straight-through UTP cable to inter-connect two computers.
   - Study of crimping tool.
   - Study of color coding of Network cables.
   - Crimping the cable using Crimping Tool
   - Test the crimping by interconnecting two computers
4. Interconnections of computers in Local Area Network to share resources.
   - Study of concept of LAN & Shared resources.
   - Interconnect computers in LAN
   - Share and make the use of shared resources.
5. Implementation of cyclic redundancy check
   - Study the concept of CRC.
   - Consider Suitable example.

Implement same using modular approach.

Note:

- Concerned faculty should suitably frame 08 practical assignments (Four from PART – A and Four from PART – B) from above list.

- Every student is required to submit the assignments in the form of journal.

Reference Books:

1. Behrouz A Forouzan, “Data Communications and Networking”, Fourth edition: Tata McGraw Hill.
2. P. C. Gupta, “Data Communications”, PHI Publications.
3. William Stallings, “Data & Computer Communications”, Seventh edition: PHI Publication.
4. Leon - Garcia, Indra Widijaja, “Communication Networks Fundamental Concepts and Key Architectures” Second edition: McGraw Hill Education.
5. Achyut Godbole, “Data Communication Networks”, Tata McGraw Hill.
6. Bruce Hartpence, “Packet Guide to Routing and Switching”, O’Reilly.
7. Bruce Hartpence, “Packet Guide to Core Network Protocol” , O’Reilly.
8. James Irvine & David Harle, “Data Communication and Networks: An Engineering Approach”, Wiley Edition.

Microprocessor & Microcontroller Interfacing Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Microprocessor & Microcontroller Interfacing Lab	**MPMCI**	

Course Description:

This laboratory provides students with a comprehensive study of the 8086 and 8051 assembly programming language.

	Hours per Week	No. of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of microprocessors & microcontroller along with instruction set and addressing modes.

LAB COURSE CONTENT

Outline of Content:

(**Note:** Any 6 experiments from Group A and any 4 experiments from Group B. Total 10 experiments should be conducted.)

Group A

Assembly language programming for 8086.

1. Program for mouse interfacing.
2. Program for graphics editor.
3. Program for PC to PC communication using serial port.
4. Program for parallel printer interfacing.
5. Program for ADC interfacing with 8086.
6. Program for DAC interfacing with 8086.
7. Program for stepper motor interfacing.
8. Program for printer device driver.

Group B

Assembly language programming for 8051.

1. Program for interfacing LEDs.
2. Program for interfacing 7-segment displays.
3. Program for keyboard interfacing.
4. Program for ADC interfacing.
5. Program for DAC interfacing.

6. Program for stepper motor interfacing.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Reference Books:

1. Douglas V. Hall, " Microprocessors and Interfacing : Programming and Hardware", Second edition , Tata McGraw Hill.
2. A. K. Ray & K. M. Bhurchandi, "Advanced Microprocessor and Peripherals – Architecture, Programming and Interfacing", Third edition, Tata Mc Graw Hill.
3. Ray Duncan, "Advanced MS-DOS Programming", Second edition, Microsoft Press.
4. Peter Abel, " IBM PC Assembly language and programming" , Fifth edition, Pearson education/ Prentice Hall of India Pvt. Ltd.
5. B. Govindarajalu, "IBM PC and Clones", Second edition, Tata McGraw Hill.

Data Structures Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Data Structures Lab	**DS**	

Course Description:

This laboratory provides students with a comprehensive study of the C programming language in data structures. Classroom lectures stress the strengths of C which provide students with the means of writing efficient codes for different data types and data structures.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**15**	**30**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C.

LAB COURSE CONTENT

Outline of Content:

(Note: Minimum FIVE experiments from the Group A and FIVE experiments from the Group B .)

(Group A)

1. **Implementation of stack using array or linked list.**
   Performing simple operations like push, pop and display with respect to stack.

2. **Implementation of queue using array or linked list.**

   Performing simple operations like insertion and deletion of an element into the queue.

3. **Implementation of circular queue using array or linked list.**
   Performing simple operations like insertion and deletion of an element into the circular queue.
4. **Conversion of infix expression to postfix expression.**
   Performing simple conversions of given infix expression into postfix expression.

5. **Conversion of postfix expression to infix expression**.

Performing simple conversions of given postfix expression into infix expression.

6. **Program for addition of two single variable polynomials using Linked List.**

   Performing the addition of two polynomials using Linked List.

(Group B)

1. **Implementation of double linked list & perform insertion, deletion and searching.**

   Performing the operations on double linked list like insertion, deletion and searching.

2. **Creation of binary tree & perform all non-recursive traversals**.

   Create the binary tree and perform the Inorder,Preorder and Postorder traversal.

3. **Creation of binary search tree & perform insertion, deletion and printing in tree shape.**

   Create the Binary Search tree performing the operations on BST like insertion, deletion and printing in tree shape.

4. **Create a hash table and handle the collision using linear probing with or without replacement**

   Creation of hash Table and handle the collision using linear probing with or without replacement.

5. **Implementation of Quick Sort.**

   Sort the given set of numbers using Quick sort.

6. **Implementation of Radix Sort.**

   Sort the given set of numbers using Radix sort.

7. **Implementation of Merge Sort.**

   Sort the given set of numbers using Merge sort.

8. **Conversion of Infix Expression to Prefix Expression.**

   Performing Simple conversions of given Infix Expression into prefix Expression.

Reference Books:

1. G.S.Baluja, “Data Structures through C”, Dhanpatrai Publications.
2. Ashok N. Kamthane, “Introduction to Data structures in C”,Person Publications,2007.
3. Aarom Tanenbaum,Yedidyah Langsam,Moshe Augenstein, “ Data structures using C”,Pearson Publications.

4. Alfred Aho,John Hopcroft,Jeffrey Ullman, “Data Structures and Algorithms”,Pearson Publications.
5. E.Balagurusamy, “Data structures using C”,Tata McGraw Hill publications.
6. P.S.Deshpande,O.G.Kakde,”C and Data Structures”,dreamtech press publications.
7. Rajesh K.Shukla, “Data Structures using C and C++” ,Willy India Publication.
8. Larry Nyhoff, “ADTs’ Data Structures and prolems with C++”, Pearson Publications.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- In the ESE, the students may be asked to perform the practical assignment with minor modification.
- Evaluation will be based on the paper work of concept understanding of topic and algorithm, understanding of the logic and the syntax, quality of program, execution of the program, type of input and output for the program.

Computer Graphics and Multimedia Lab

LAB COURSE OUTLINE

Course Title	Short Title	Course Code
Computer Graphics & Multimedia	**CGM LAB**	

Course Description:

This laboratory provides students with a comprehensive study of graphics commands , animation & use of multimedia. The practical's make students able for draw different line styles, polygon, circle as well as clipping of polygons & filling of polygons. It also implements 2D & 3D transformations. Because of it students with the means of writing efficient, maintainable, and portable code.

	Hours per Week	No. Of Weeks	Total Hours	Semester Credits
Laboratory	**2**	**10**	**20**	**1**

Total Semester Credits: 1

Prerequisite Course(s): Fundamental knowledge of C, C++ & Graphics.

Group A: Computer Graphics

1. Study of various Graphics Commands
2. Line generation using DDA
3. Different Line Style using Bresenham's Algorithm
4. Circle Generation using Bresenham's Algorithm
5. Program for Polygon Filling
6. Program for 2D Transformations (Translation, Rotation and Scaling)
7. Program for Segmentation
8. Program for 3D rotation
9. Program for Parallel Projections
10. Program for Perspective Projection

Group B: Multimedia

1. Program for animation using C/C++.
2. Program using flash.
3. Program using dream viewer.
4. Mini Project based on creating animation using Maya.

Concerned faculty should suitably frame at least 10 practical assignments. Any seven lab assignments from computer graphics & any three from multimedia.

Guide lines for ESE:-

- ESE will be based on the practical assignments submitted by the students in the form of journal.
- Evaluation will be based on the paper work of flowchart and algorithm, understanding of the logic and the syntax, quality of program code, execution of the program code, type of input and output for the program code.
- Simple program codes may be asked based on above syllabus.

Reference Books:

1. David F. Rogers, "Procedural Elements for Computer Graphics, Tata McGraw Hill, Second edition.
2. Shirley, Marshner, "Fundamentals of Computer Graphics", Third edition, CRC Publication/ A.K. Peters.
3. Steven Harringtom, "Computer graphics A Programming Approach", MGH.
4. Mukherjee, "Fundamentals of Computer Graphics and Multimedia", PHI.
5. Maurya, "Computer Graphics: with virtual reality system", Wiley India.
6. Donald Hearn and Pauline Baker," Computer Graphics", Pearson LPE, Second edition.
7. Rao and Prasad" Graphics user interface with X windows and MOTIF", New Age.
8. Foley, Vandam, Feiner, Hughes, "Computer Graphics Principals & Practice", Pearson Second edition.