

2HS201: Linear Algebra

[3 1 0 4]

Learning Outcomes:

Upon completion of this course, students will be able to:

- Understand all basic fundamentals of Matrices and Vectors.
- Prepare him/herself for solving a Linear equation.
- Prepare him/herself for Learning Advance Mathematics in coming semester.
- Apply knowledge of matrices and vectors in various applications of his/her branch.

Syllabus:

Unit No	Topics
1	Matrix Algebra: Review of algebra of matrices & elementary transformations, Rank of a matrix, inverse of a matrix by Gauss-Jordan method, normal form of a matrix, Solution of system of algebraic simultaneous equations, Linear dependent and Linear independent vectors. Eigen values and Eigen vectors, Eigen values and Eigen vectors of: Symmetric, Skewsymmetric, Hermitian, Skewhermitian, Unitary and Normal matrix, Algebraic and Geometric multiplicity, Diagonalization, Spectral theorem for real symmetric matrices, Application of Quadratic forms.
2	Vector Space : Vectors in R^n and its properties, Dot product, Norm and Distance properties in R^n , Pythagorean theorem in R^n , Definition and Examples of vector spaces, Vector subspace, Linear Independence and dependence, Linear span of set of vectors, Basis of subspaces, Extension to basis.
3	Linear Transformation : Definition and basic properties, Types of linear transformation (Rotation, reflection, expansion, contraction, shear, projection), Matrix of linear transformations, Change of basis and similarity, Rank nullity theorem
4	Infinite Series : Definition, Comparison test, Cauchy's integral test, ratio test, root test, Leibniz's rule for alternating series, power series, range of convergence, uniform convergence.

Text Books:

- (1) Higher Engineering Mathematics by Dr. B. S. Grewal
- (2) Vector Calculus and Linear Algebra by Dr. A.R.Patel & Dr.H.C.Patel

Reference Books:

- (1) Higher Engineering Mathematics Vol. I & II by Dr. K. R. Kachot.
- (2) Advanced Engineering Mathematics (Fifth Edition), Erwin Kreyszig.
- (3) Applied mathematics for engineering by Dr. R. C. Shah.

2CSE201: Digital Electronics

[3 0 2 4]

Learning Outcomes:

At the end of the course, the student will be able to:

- Able to understand the basics of digital circuits.
- Capable to design different types of digital logic circuit.
- Learn microprocessor with the help of basic knowledge of digital electronics.

Syllabus:

Unit No	Topics
1	Binary Systems: Digital Computer & Systems, Binary Numbers, Number Base conversions, Different Number systems & their relations, Complements, Binary codes, Binary storage & registers.
2	Digital Integrated Circuits: RTL, DTL circuits, I ² L Logic, TTL, ECL, MOS & CMOS circuits & their characteristics, source current & sink current.
3	Boolean Algebra & Logic Gates: Basic definitions, Axiomatic definition of Boolean Algebra, Basic Theorems & Properties, Boolean functions, Canonical & Standard forms, Logic operations, Digital Logic gates & Logic families.
4	Simplification of Boolean Functions: Map method, Two, Three, Four, Five & Six variable maps, Products of Sum & Sum of Products simplification, NAND, NOR & Other two level Implementations, Don't care conditions, Tabulation method.
5	Combinational Logic: Design Procedure, Address, Sub tractors, Code Conversion, Analysis Procedure, Multilevel NAND & NOR circuits, Exclusive-OR & Equivalence functions.
6	Combinational Logic with MSI & LSI: Binary Parallel Adder, Decimal Adder, Magnitude Comparator, Decoders, Multiplexers, ROMs, PLAs, introduction of PLDs, CPLDs and FPGA..

7	Sequential Logic: Latch, Flip Flops, difference between latch and flip flop, Triggering of Flip flops, Analysis of clocked sequential circuits, State reduction & assignment, Flip Flop Excitation tables, Design of Sequential circuits, Design of counters, Design using state equations.
8	Registers and Counters: Registers, Shift registers, Ripple Counters, Synchronous Counters, and Memory.

Reference Books:

1. Digital Logic and Computer Design by Morris Mano
2. Digital Fundamentals by Floyd
3. Digital Electronics by R. P. Jain

2CSE202: BASICS OF COMMUNICATION SYSTEMS

[3 0 2 4]

Learning Outcomes:

At the end of the course, the student will be able to:

- Analyze and design basic communications systems, particularly with application to noise-free analog and digital communications.
- Develop the ability to compare and contrast the strengths and weaknesses of various communication systems.
- Assess and evaluate different analogue and digital modulation and demodulation techniques.
- Evaluate the influence of noise on communications signals.
- Define the basic principles, and network architectures and communication services.
- Identify and describe telephone, mobile phone and public data networks and resolve network-level related problems.

Syllabus:

Unit No	Topics
1	Introduction : Data Communications, Networks, Data Representation, Data Flow, Distributed Processing, Network Criteria, Physical Structures, Network Models, Categories of Networks, Intranet, The Internet, Protocols and Standards
2	Network Models : Layered Tasks, Sender, Receiver and Carrier Hierarchy, The OSI Model, Layers in the OSI Model, TCP/IP Protocol suit, Addressing – Physical, Logical, Port and Specific Addresses Data and Signals Analog and Digital Signals, Periodic and Non-periodic Signals, Sine Wave, Phase, Wavelength, Time and Frequency Domains, Composite Signals, Bandwidth, Bit Rate, Bit Length, Transmission of Digital Signals, Transmission Impairment, Data Rate Limits, Performance – Bandwidth, Throughput, Latency, Bandwidth-Delay Product, Jitter
3	Digital Transmission : Digital-to-Digital Conversion, Line Coding, Line Coding Schemes, Block Coding, Scrambling, Analog-to-Digital Conversion, PCM, DM, Transmission Modes – Parallel and Serial Transmission

4	<p>Analog Transmission :</p> <p>Digital-to-Analog Conversion, Amplitude Shift Keying, Frequency Shift Keying, Phase Shift Keying, Quadrature Amplitude Modulation, Analog-to-Analog Conversion, Amplitude Modulation, Frequency Modulation, Phase Modulation</p>
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5	<p>Bandwidth Utilization: Multiplexing and Spreading :</p> <p>Frequency-Division Multiplexing, Wavelength-Division Multiplexing, Synchronous and Statistical Time-Division Multiplexing, Spread Spectrum</p>
6	<p>Transmission Media:</p> <p>Guided Media – Twisted Pair, Coaxial and Fibre-Optic Cable, Unguided Media – Radio Waves, Micro Waves and Infrared</p>
7	<p>Switching :</p> <p>Circuit-Switched Networks, Telephone Networks, Datagram Networks, Routing Table, Virtual-Circuit Networks, Structure of a Switch</p>
8	<p>Telephone and Cable Networks for Data Transmission :</p> <p>Telephone Network, Dial-up Modems, Digital Subscriber Line, Cable TV Networks, HFC Network, CM and CMTS, DOCSIS</p>

Reference Books:

1. Data Communication and Networking – 4th Edition By – Behrouz A Forouzan
2. Data and Computer Communications – 7th Edition By – William Stalling
3. Computer Networks – 4th Edition By – Andrew S Tanenbaum

2CSE202: Essentials of Software Foundation & Programming – II [3 0 4 5]

Learning Outcomes:

After completing the Course, students will learn:

- Overview of OOPS with C++ Programming Language
- Understanding Information Management & IBM Information Management Stack
- Concepts of XML and related ideas
- Basic idea about Integrated Development Platform (Eclipse)
- Basic Understanding of Java Development & Debugging the Applications
- Integration of fundamental technologies & development platforms

Syllabus

Unit No	Topics
1	Introduction to C++: OOPS, Essentials of Programming, Features of C++, Inheritance, Polymorphism & encapsulation, Operator Overloading, I/O in C++, Advanced Topics
2	Information Management: Information as a Service, IBM Information Management Software, Order Fulfilment System – Example Case, Open Source: Derby, Cloudscape, DB2 9 pureXML Technology, DB2 Express-C, DB2 Data Server Editions, Information Integration Business Drivers
3	Introduction to XML and Related Technologies: Issues in information exchange, What is XML?, Exercise: XML basics, Document type definitions (DTDs), Exercise: Working with DTDs, XML namespaces, Exercise: XML namespaces, XML schema, part 1, Exercise: Generating XML schemas, XML schema, part 2, Exercise: XML schemas, XPath, Exercise: XPath (and quiz), XSL transformation: part 1, Exercise: XSLT part 1 - simple XSL transforms, XSL transformation: part 2, Exercise: XSLT part 2 - simple XSL transforms
4	Introduction to Integrated Development Environment – Eclipse: What is Eclipse, Eclipse Architecture, Eclipse Platform Architecture, Eclipse Plug-in Architecture, Eclipse Case Studies, Eclipse Terms and Concepts

5	<p>Java Development Tools: The JDT environment, Creating and running a program, Automating testing with JUnit, Using Ant and javadoc</p>
6	<p>Debugging Applications: Using the debugger, Starting the debugger, Setting breakpoints, Stepping through the code, Inspecting variables and expressions, Hot code replace</p>
7	<p>Eclipse Architecture: A brief discussion of the Eclipse plug-in architecture, Finding, installing and updating plug-ins ,Some popular plug-ins</p>
8	<p>Eclipse Web Tools Platform Project 1.0: Eclipse Web Tools Platform (WTP 1.0) Project, Web Standard Tools, J2EE Standard Tools, The Data Tools Project, The AJAX Tools Framework</p>
9	<p>Software in Real World: The IBM Canvas - some of the tools that students shall learn about and use in their future trainings and projects on the IBM technologies.</p>
10	<p>Software in Real World: The Road Ahead: The Road Ahead is woven with the overall course content, especially the IBM Canvas to help students in selection of the right career path and the related IBM courses.</p>

Text Books:

- (1) Object Oriented Programming with C++ by E Balagurusamy

Reference Book:

- (1) Object Oriented Programming in C++ - 4th Edition By-Robert Lafor

2CSE204: Basics of Operating System & Scripting

[3 0 4 5]

Learning Outcomes:

Students successfully completing this course will be able to:

- Understand UNIX computing environment and how to access system and UNIX Graphical Interfaces
- Learn how to access and manage files and directories and how to apply file systems and file utilities
- Learn UNIX System Administration and Network Administration
- Demonstrate how to utilize text editors
- Identify shell features and environmental customization and create shell scripts

Syllabus

Unit No	Topics
1	Basic of Operating System : Architecture of OS (Ex. Monolithic, Microkernel, Layered ,Exokernel), Operating system objectives and functions, Virtual Computers, Interaction of O. S. & hardware architecture, Evolution of operating systems, Batch, multiprogramming. Multitasking, Multiuser, parallel, distributed & real –time O.S. , System calls, O. S. Shell, Overview of Linux, Linux Shell commands, The Linux File system , The Shell, Users and File permissions, The vi editor, Filter commands, Processes
2	Shell scripting : Special Characters, Introduction to Variables and Parameters, Quoting, Exit and Exit Status, Manipulating Variables, Loops and Branches, Command Substitution, Arithmetic Expansion, Internal Commands and Built-ins, External Filters, Programs and Commands, System and Administrative Commands,18. Regular Expressions, I/O Redirection, Sub shells, Restricted Shells, Process Substitution, Functions, Aliases, List Constructs, Arrays.
3	Case Study : Different Operating Systems Overview Reading: Computer Hope’s “Operating Systems” Link: Computer Hope’s “Operating Systems” (HTML)
4	32-Bit vs. 64-Bit OS : Reading: Initercon’s “32bit vs. 64bit Operating System” Link: Initercon’s “32bit vs. 64bit Operating System” (HTML) Reading: Microsoft Corporation’s “32-bit and 64-bit Frequently Asked Questions” Link: Microsoft Corporation’s “32-bit and 64-bit Frequently Asked Questions” (HTML)

UNIX-based :

Reading: Unix.org: The UNIX Systems Cooperative Promotion Group's "The Unix Operating System: Mature, Standardized and State-of-the-Art"

Link: Unix.org: The UNIX Systems Cooperative Promotion Group's "The Unix Operating System: Mature, Standardized and State-of-the-Art" (HTML)

Linux (Ubuntu, Fedora, etc.) :

Reading: Linux.com's "What Is Linux: An Overview of the Linux Operating System"

Link: Linux.com's "What Is Linux: An Overview of the Linux Operating System" (HTML)

Solaris:

Reading: operating-system.org's "Solaris"

Link: operating-system.org's "Solaris" (HTML)

Windows :

Reading: operating-system.org's "Windows® Family"

Link: operating-system.org's "Windows® Family" (HTML)

Mobile**Palm OS :**

Reading: operating-system.org's "Palm Computing"

Link: operating-system.org's "Palm Computing" (HTML)

IOS:

Reading: Wikipedia: "iOS (Apple)"

Link: Wikipedia: "iOS (Apple)" (HTML)

Android OS :

Reading: operating-system.org's "Android OS"

Link: operating-system.org's "Android OS" (HTML)

Windows CE :

Reading: operating-system.org's "Windows CE"

Link: operating-system.org's "Windows CE" (HTML)

Real-Time:

Reading: IIT Kharagpur NPTEL Online's "Introduction to Real-Time Systems"

Link: IIT Kharagpur NPTEL Online's "Introduction to Real-Time Systems" (PDF)

Reading: IIT Bangalore NPTEL Online's "Operating Systems Module 8" Lecture Notes

Link: IIT Bangalore NPTEL Online's "Operating Systems Module 8" Lecture Notes (PDF)

	<p>Reading: IIT Kharagpur NPTEL Online's "Embedded Systems" Link: IIT Kharagpur NPTEL Online's "Embedded Systems" (PDF)</p> <p>VxWorks : Reading: operating-system.org's "VxWorks" Link: operating-system.org's "VxWorks" (HTML)</p> <p>QNX : Reading: operating-system.org's "QNX" Link: operating-system.org's "QNX" (HTML)</p> <p>Communicate Easy by Dale Carnige</p>
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References:

1. Beginning the Linux Command Line by Sander van Vugt
2. Linux Bible by Christopher Negus and Christine Bresnahan