BS (COMPUTER SCIENCE) SCHEME OF STUDIES
UAF

BS (CS) 4 Years Degree Program {Bachelor of Science in Computer Science}
150 credit hours spread over 8 semesters.

Bachelor of Science in Computer Science; BS (CS); 150 credit hours

<table>
<thead>
<tr>
<th>#</th>
<th>Code</th>
<th>Course Title</th>
<th>Credit hours</th>
<th>Semester</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CS-301</td>
<td>Introduction to Computers</td>
<td>3 (2-2)</td>
<td>1</td>
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<td>2</td>
<td>CS-303</td>
<td>Introduction to Computer Programming</td>
<td>4 (3-2)</td>
<td>1</td>
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<td>3</td>
<td>CS-302</td>
<td>Fundamentals of Algorithms</td>
<td>3 (2-2)</td>
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<td>CS-304</td>
<td>Discrete Structures</td>
<td>4 (4-0)</td>
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<td>CS-401</td>
<td>Object Oriented Programming</td>
<td>3 (2-2)</td>
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<td>6</td>
<td>CS-403</td>
<td>Data Base Systems</td>
<td>3 (2-2)</td>
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<tr>
<td>7</td>
<td>CS-402</td>
<td>Data Structures</td>
<td>3 (2-2)</td>
<td>4</td>
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<tr>
<td>8</td>
<td>CS-404</td>
<td>Digital Logic Design</td>
<td>3 (2-2)</td>
<td>4</td>
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<tr>
<td>9</td>
<td>CS-406</td>
<td>Software Engineering – I</td>
<td>4 (3-2)</td>
<td>4</td>
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<tr>
<td>10</td>
<td>CS-505</td>
<td>Analysis of Algorithms</td>
<td>3 (3-2)</td>
<td>5</td>
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<tr>
<td>11</td>
<td>CS-507</td>
<td>Computer Organization &amp; Assembly</td>
<td>4 (3-2)</td>
<td>5</td>
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<tr>
<td>12</td>
<td>CS-509</td>
<td>Numerical Analysis</td>
<td>3 (2-2)</td>
<td>5</td>
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<tr>
<td>13</td>
<td>CS-502</td>
<td>Operating System Concepts</td>
<td>4 (3-2)</td>
<td>6</td>
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<td>14</td>
<td>CS-504</td>
<td>Computer Architecture</td>
<td>4 (3-2)</td>
<td>6</td>
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<tr>
<td>15</td>
<td>CS-512</td>
<td>Automata Theory</td>
<td>3 (3-0)</td>
<td>6</td>
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<tr>
<td>16</td>
<td>CS-508</td>
<td>Computer Graphics</td>
<td>4 (3-2)</td>
<td>6</td>
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<td>CS-506</td>
<td>Data Communication</td>
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<td>CS-603</td>
<td>Compiler Construction</td>
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<td>4 (3-2)</td>
<td>8</td>
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<td>21</td>
<td>CS-604</td>
<td>Software Project Management</td>
<td>10 (0-20)</td>
<td>8</td>
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<tr>
<td>22</td>
<td>CS-408</td>
<td>Modern Programming Languages</td>
<td>4 (3-2)</td>
<td>4</td>
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<td>23</td>
<td>CS-503</td>
<td>Web Programming</td>
<td>4 (3-2)</td>
<td>5</td>
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<td>24</td>
<td>CS-501</td>
<td>Software Engineering - II</td>
<td>4 (3-2)</td>
<td>5</td>
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<tr>
<td>25</td>
<td>CS-510</td>
<td>Advanced Object Oriented Programming</td>
<td>4 (3-2)</td>
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<td>26</td>
<td>CS-601</td>
<td>System Programming</td>
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<tr>
<td>27</td>
<td>CS-605</td>
<td>Visual Programming</td>
<td>4 (3-2)</td>
<td>7</td>
</tr>
<tr>
<td>28</td>
<td>CS-609</td>
<td>Distributed Database Systems</td>
<td>4 (3-2)</td>
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Supporting Courses (25/150)

<table>
<thead>
<tr>
<th>#</th>
<th>Code</th>
<th>Course Title</th>
<th>Credit hours</th>
<th>Semester</th>
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<tbody>
<tr>
<td>29</td>
<td>Math-303</td>
<td>Calculus and Analytical Geometry</td>
<td>4(4-0)</td>
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<tr>
<td>30</td>
<td>Math-304</td>
<td>Multi Variable Calculus</td>
<td>4(4-0)</td>
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<tr>
<td>31</td>
<td>Math-405</td>
<td>Differential Equations</td>
<td>4(4-0)</td>
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<td>32</td>
<td>Math-406</td>
<td>Linear Algebra</td>
<td>3(3-0)</td>
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<tr>
<td>33</td>
<td>PHY-405</td>
<td>Circuit Theory</td>
<td>3 (2-2)</td>
<td>3</td>
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<tr>
<td>34</td>
<td>PHY-305</td>
<td>Basic Electronics</td>
<td>3 (2-2)</td>
<td>4</td>
</tr>
<tr>
<td>35</td>
<td>Stat-507</td>
<td>Statistics and Probability</td>
<td>4 (3-2)</td>
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</table>

General Education Courses (17/150)

<table>
<thead>
<tr>
<th>#</th>
<th>Code</th>
<th>Course Title</th>
<th>Credit hours</th>
<th>Semester</th>
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<tbody>
<tr>
<td>36</td>
<td>Eng-301</td>
<td>Introductory Exercises in Reading, Comprehension and Communication Skills.</td>
<td>2(2-0)</td>
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<tr>
<td>37</td>
<td>Eng-302</td>
<td>Advanced Exercises in Reading, Comprehension and Communication Skills.</td>
<td>2(2-0)</td>
<td>2</td>
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<tr>
<td>38</td>
<td>MBA-306</td>
<td>Financial Accounting</td>
<td>3(3-0)</td>
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<td>39</td>
<td>MBA-404</td>
<td>Financial Management</td>
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<td>40</td>
<td>MBA-407</td>
<td>Human Resource Management</td>
<td>3(3-0)</td>
<td>3</td>
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<tr>
<td>41</td>
<td>SSH-402</td>
<td>Pakistan Studies</td>
<td>2(2-0)</td>
<td>4</td>
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<tr>
<td>42</td>
<td>IS-401 / SSH-301(A)</td>
<td>Islamic Studies / Ethics</td>
<td>2(2-0)</td>
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</table>
# Scheme of Studies

## BS (Computer Science)

### Semester 1 (16 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Hrs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 CS-301 Introduction to Computers</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>2 CS-303 Introduction to Computer Programming.</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>3 Phy-305 Basic Electronics</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>4 Math-303 Calculus and Analytical Geometry</td>
<td>4(4-0)</td>
</tr>
<tr>
<td>5 Eng-301 Introductory Exercises in Reading, Comprehension and Communication Skills.</td>
<td>2(2-0)</td>
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</tbody>
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### Semester 2 (16 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Hrs</th>
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<tbody>
<tr>
<td>1 CS-302 Fundamentals of Algorithms</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>2 CS-304 Discrete Structures</td>
<td>4(4-0)</td>
</tr>
<tr>
<td>3 Math-304 Multi variable Calculus</td>
<td>4(4-0)</td>
</tr>
<tr>
<td>4 Eng-302 Advanced Exercises in Reading, Comprehension and Communication Skills.</td>
<td>2(2-0)</td>
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<tr>
<td>5 MBA-306 Financial Accounting</td>
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### Semester 3 (18 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Hrs</th>
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<tbody>
<tr>
<td>1 CS-401 Object Oriented Programming</td>
<td>3(2-2)</td>
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<tr>
<td>2 CS-403 Data Base Systems</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>3 Math-405 Differential Equations</td>
<td>4(4-0)</td>
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<tr>
<td>4 Phy-405 Circuit Theory</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>5 MBA-407 Human Resource Management</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>6 IS-401/ SSH-301(A) Islamic Studies / Ethics</td>
<td>2(2-0)</td>
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### Semester 4 (22 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Hrs</th>
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<tbody>
<tr>
<td>1 CS-402 Data Structures</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>2 CS-404 Digital Logic Design</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>3 CS-406 Software Engineering - I</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>4 CS-408 Modern Programming Languages</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>5 MBA-404 Financial Management</td>
<td>3(3-0)</td>
</tr>
<tr>
<td>6 Math-406 Linear Algebra</td>
<td>3(3-0)</td>
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<tr>
<td>7 SSH-402 Pakistan Studies</td>
<td>2(2-0)</td>
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</tbody>
</table>

### Semester 5 (22 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Hrs</th>
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<tbody>
<tr>
<td>1 CS-501 Software Engineering II</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>2 CS-503 Web Programming</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>3 CS-505 Analysis of Algorithms</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>4 CS-507 Computer Organization &amp; Assembly</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>5 CS-509 Numerical Analysis</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>6 Stat-507 Statistics and Probability</td>
<td>4(3-2)</td>
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</tbody>
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### Semester 6 (22 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
<th>Credit Hrs</th>
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</thead>
<tbody>
<tr>
<td>1 CS-502 Operating System Concepts</td>
<td>4(3-2)</td>
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<tr>
<td>2 CS-504 Computer Architecture</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>3 CS-506 Data Communication</td>
<td>3(2-2)</td>
</tr>
<tr>
<td>4 CS-508 Computer Graphics</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>5 CS-510 Advanced Object Oriented Prog.</td>
<td>4(3-2)</td>
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<tr>
<td>6 CS-512 Automata Theory</td>
<td>3(3-0)</td>
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### Semester 7 (20 credit hrs)

<table>
<thead>
<tr>
<th>Subjects</th>
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<tbody>
<tr>
<td>1 CS-601 System Programming</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>2 CS-603 Compiler Construction</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>3 CS-605 Visual Programming</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>4 CS-607 Computer Networks</td>
<td>4(3-2)</td>
</tr>
<tr>
<td>5 CS-609 Distributed Database Systems</td>
<td>4(3-2)</td>
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### Semester 8 (14 credit hrs)

<table>
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<tbody>
<tr>
<td>1 CS-602 Artificial Intelligence</td>
<td>4(3-2)</td>
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<tr>
<td>2 CS-604 Software Project</td>
<td>10(0-20)</td>
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### NEW COURSES IN COMPUTER SCIENCE

<table>
<thead>
<tr>
<th>COURSE NO.</th>
<th>TITLE WITH CONTENTS</th>
<th>CREDIT HRS</th>
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<tbody>
<tr>
<td>CS-301</td>
<td>Introduction to Computers</td>
<td>3(2-2)</td>
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**Books Recommended:**


<table>
<thead>
<tr>
<th>CS-302</th>
<th>Fundamentals of Algorithms</th>
<th>3(2-2)</th>
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</table>

**Books Recommended**


<table>
<thead>
<tr>
<th>CS-303</th>
<th>Introduction to Computer Programming</th>
<th>4(3-2)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Programming and problem analysis. Development of basic algorithms. Translation of algorithms into programs. Standard data types. Basic control structures and Functions. Structured data types; arrays, structures, Pointers and Files. Debugging and testing programmes <strong>Practical:</strong> programming assignments in C++</td>
<td></td>
</tr>
</tbody>
</table>

**Books Recommended**


<table>
<thead>
<tr>
<th>CS-304</th>
<th>Discrete Structures</th>
<th>4(4-0)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td><strong>1. Algebraic Structures:</strong> Vector Spaces, Linear Independence, Bases and Dimension, Finite Field, Linear Transformations and Isomorphisms, Linear Transformations and Bases, Representation of Linear Transformations by matrices, Linear combination and Spanning set.</td>
<td></td>
</tr>
</tbody>
</table>
2. Sets, Sequences and Functions:
3. Elementary Logic:
   Prepositional Logic, Predicates and Quantifiers, Some computing applications.
4. Methods of Proof:
   Rules of Inference, Rules of Inference for Quantified, Methods of Proving Theorems, and Quantifiers.
5. Mathematical Induction:
   Examples of Proof by Mathematical Induction.
6. Recurrence Relations:
   Solving Recurrence relations, Solving Linear Homogeneous Recurrence Relations with Constant Coefficients, Solving Linear Nonhomogeneous Recurrence Relations with constant coefficients.
7. Relations:
   Relations and their properties, n-Ary Relations and their applications, Representing Relations, Closures of Relations, Equivalence of Relations, Equivalence of Relations and Partition.
8. Partially Ordered Sets:
   Lexicographic Order, Maximal and Minimal Element, Lattices, Topological Sorting.
9. Combinatorics:
10. Basis Counting Techniques:
11. Groups and Semi Groups:
    Examples of Groups, Formation of Group in Vector Space, Formation of Group in Ring, subgroup and Lagrange’s Theorem, Semi group Presentation

Books Recommended:


CS-401 Object Oriented Programming

- Classes
- Encapsulation and Data Abstraction
- Inline Functions and Function Overloading
- Controlling Access to Class Members
- Default Copy Constructor
- Constructors and Destorctors
- Const Object and Const Member Function
- Friend Functions and Friend Classes
- Static Class Members and Static Functions
- Operator Overloading
- Introduction
- Restriction on Operator Overloading
- Overloading Unary Operators
- Overloading Binary Operators
- Inheritance
- Introduction
- Base classes and Derived Classes
- Protected Data Members
- Function Overriding
- Constructors and Destorctors in derived classes
- Multiple Inheritance

- Virtual Functions
- Introduction
- Abstract Base Classes
- Polymorphism
• Virtual Destructors
• Early and Late Binding

• Recommended Books:
  • Object-Oriented Programming in Turbo C++ by Robert Lafore
  • C++ Object Oriented Programming by R. J. Mitchel
  • C++ How To Program by Deitel & Deitel

CS-402 Data Structures 3(2-2)
Basic Data Structures
Static and Dynamic Structures: Linear arrays, Pointer arrays, Record Structures, Matrices
Abstraction and Abstraction Data Types (ADT)
Time and Space requirements of various implementations of ADT
Space and Time trade off
Linked Lists: Representation of Linked List in memory, Traversal, Search, Insertion and Deletion of Linked List, Double Linked List
Stacks: Representation of Stack using Arrays and Pointers
  Polish and Reverse Polish Notations using Stacks, conversion from infix expression to postfix expression by using Stacks.
Queues: Representation of Queue using arrays and pointers, Circular queues, Dequeues, Priority queues.
Trees: Binary trees, Complete binary trees
  Preorder, inorder and postorder traversal of binary trees
  Binary search trees.
Graphs: Directed and undirected graphs, Graph traversal
Hashing Techniques: Hash functions, Collision Resolution.
Practical: programming of different techniques of data structure in C++
Recommended books:
1. Theory and problems of Data Structures
   By Seymour Lipschutz, Shaums’s Outline Series
2. Data Structures using C and C++
   By Yedidyas Langsam, Moshe J.Augensein.

CS-403 Database Systems 3(2-2)
• Introduction to database System
  • Data vs. Information, what is database, Data independence, Advantages and Disadvantages of database Management System, File processing Approach. Types of Database, Database organization (Relational Model, Hierarchical Model, Network Model), components of database Environment, kinds of person use a database system (End users, Application Programmers, Database Administrator) Database Development process, data administrator and database administrator, Role and function of DBA, Three level of architecture (External, Conceptual, internal), Mapping, optimization, Overview of optimization process, Codd’s Rules. Relational Operators (Restriction, Projection, Product, Join, Union, Intersection, Difference),
  • Database design
    • Functional Dependencies, Full Functional Dependencies, Transitive Dependencies, Normalization, 1st normal form, 2nd normal form, 3rd normal form, Entity Relational ship Model, Types of relationship (one-to-one, one-to-Many, Many-to-Many), Cardinality of relationship.
  • Relational Data Integrity
    • Introduction, Primary keys, composite key, candidate keys, foreign keys, secondary keys, Referential Integrity.
  • Recovery
    • Introduction, Transactions, Commit & Rollback Transaction, Transaction recovery, The ACID Properties.
  • Concurrency
    • Introduction, Three concurrency problems
  • Security
    • Introduction, General consideration, Mandatory Access Control, Data Encryption.
  • SQL
    • Overview of SQL, Features of SQL, SQL *PLUS
  • Basic SQL Statement:
    • Select Statement, Where clause, Order by clause, Arithmetic Operators, Comparison operators, Logical operators.
Single Row Function:
- Number Function, Character Functions, Data Function, conversion Function, General Function

Group Functions
- Group Functions, Group by clause, Having Clause, Order of evaluation of clauses, Running Standard Queries with substitution Variable, Single ampersand substitution variables, Double ampersand substitution: The Define Command.

Extracting Data From more than one table
- Product, Join, Equi-join, Nonequi-join, Self join, Outer join, Set operators, Union, Intersect, Minus

Table Creation and Management
- Create table command, Data types, Alter table statement, truncate table statement, Drop table command

Integrity constraints
- Primary key constraint, foreign key constraint, unique constraint, Check constraint, Not null constraint.

Data Manipulation
- Insert Command, Update statement, Delete command, Transaction control commands, Commit, Rollback, Savepoint.

Views
- What is view? Simple view vs. complex view, the create view command, Using a view with DML Operation.

Recommended Books:
3) Database System by Catherine M. Ricardo.
4) Introduction to oracle: SQL and PL/SQL student Guide.

CS-404 Digital Logic Design 3(2-2)

PRACTICALS:
1. To design and check the operation of AND, OR, NOT, NAND and NOR logic gates.
2. To design half adder, full adder and half subtractor circuits.
3. To check the operation of common anode 7-segment display.
4. To check the operation of common BCD to 7-segment decoder using IC 74LS47.
5. Design a single-line digital communication circuit using a multiplexer and decoder.
6. To check the operation of 4-bit comparator.
7. To design and study the operation of RS, D, JK AND T flip flops.
8. Latching BCD data and displaying on 7-segment display.

Books Recommended:

CS-406 Software Engineering-I 4(3-2)

PRACTICALS: Separate report of a real life Information System’s analysis and Design must be submitted by each student.

Recommended books:

CS-408 Modern Programming Languages 4(3-2)
Recommended books:

1. Concepts of programming languages by Robert W. Sebesta
2. Programming languages design and implementation by Terrence W. Pratt and marvin V. Zelkowitz
3. Common LISPCraft by Robert Wilensky

CS-501 Software Engineering-II 4(3-2)

1. RISK MANAGEMENT: Reactive Vs Proactive Risk Strategies, Software Risk, Risk Identification, Risk item Checklist, Risk Estimation, Risk Table.
2. Different types of codes:
   Single Tier, Two-Tier, Multi-Tier Architectures.
3. Evaluating Software Alternative
4. Documentation
   Program Documentation, System Documentation, Operation Documentation, User Documentation.
5. Quality Assurance
6. Software Testing
   Testing, Validation & Verification, Testability, Who tests the S/W, Objectives of testing, Testing Vs Debugging, Test phases, Black Box Vs while Box testing, Exhaustive testing, Selective testing, Test Case, Levels of testing, Unit testing, Integration testing, Top down Vs Bottom up testing, Sandwich testing, Function testing, System testing, Acceptance testing, Types of system tests, Alpha, Beta and Regression testing, Test Completion Criteria, Test planning, Master test plan, Test Documentation, Testing Principles.
7. System Operation & Support
   Support Activities, Maintenance Activities, Maintenance types.
8. Analyzing and Designing System using UML
   • Documenting Requirements & Processes by use cases, Actors, use case diagrams,
   • Conceptual Model, Concepts, Attributes, Associations,
   • System Sequence Diagrams, System Behavior Contracts,
   • Real use Cases-Collaboration Diagrams.
   • GRASP Patterns, Assigning Responsibilities,
   • Class Diagrams

PRACTICAL

Note: more than 3 students are not allowed to work on the same project.
Try to conduct presentations if possible.

2) Applying UML and Patterns, Craig Larman, Prentice Hall, 2001

Books Recommended:


CS-502 Operating System Concepts 4(3-2)

Introduction
Aims of Operating System, Overview of various types of systems (Simple batch systems, Multi-programmed batch systems, Time-sharing systems, Personal computer systems, Parallel systems, Distributed systems, Real-time System), Computer-System Operation, I/O Structure, Storage Structure, Storage Hierarchy, Hardware Protection, common system components and a brief description of what the responsibilities of an operating system are with regard to each component, Operating system Services, Systems Calls.

Process Concepts

Threads
Introduction to Threads, Types of Threads, Multithreading Models.

Process Synchronization
Race Conditions, Synchronization, Mutual Exclusion, Critical sections, Solution to the Critical Section Problems, Synchronization Hardware, Semaphores.

Deadlock
Introduction to deadlock, Resource concepts, necessary conditions for Deadlock Methods of handling Deadlock, Deadlock prevention, deadlock avoidance Deadlock detection, Deadlock recovery.

Job and Processor Scheduling
Introduction to Scheduling, Scheduling Levels, Scheduling Objectives, Scheduling Criteria Preemptive Vs Non-Preemptive Scheduling, Scheduling Algorithms, Multiple-Processor Scheduling, Real-Time Scheduling.

Memory Management
Introduction, Memory Allocation Methods, (Single, Fixed, Variable Partition), Compaction, Logical vs. Physical Address space, Fragmentation, paging, Segmentation, Segmentation with paging.

Virtual Memory
Introduction to Virtual Memory, Demand Paging, page replacement strategies, Thrashing working sets, page fault.

File System

Security
Introduction, Security Problem, Authentication, Prevention, Program Threats, System Threats.

Case Studies
Linux, Windows 2000

Recommended Books
1. Operating system by Silberschatze
2. Operating system by William stalling

Reference Books
1. An introduction to operating system by Harvey M. Dietel.
2. Modern operating system by Andrew S. Tannan Baum.
Internet Basics

- Basic terminologies of internet
- Basic concepts of Protocols (TCP/IP, HTTP), Internet Domains
- Client-Server Communication

Hyper Text Markup Language (HTML)

- Use of HTML
- Commonly used HTML tags
- Lists and their types
- Adding graphics to HTML documents
- Tables in HTML
- Linking documents
- Frames

JavaScript

- Use of JavaScript and its advantages
- Basic programming techniques in JavaScript
- Operators and Expressions
- Programming Constructs
- Functions
- Dialog Boxes
- JavaScript Document Object Model
- Browser Objects
- Handling Events using JavaScript
- Forms Object’s Methods
- Built-in Objects in JavaScript

Introduction to VBScript

- Using Variables
- Conditional Statements
- Loops (For…Next, Do…Loop, While…Wend)
- Subroutines and Functions
- Browser Objects and Object Hierarchy
- Window object (Status, Alert, Confirm, Prompt, Navigate)
- Window events (on Load, on Unload)
- Document Object

Data-Entry Form and Validation

- Writing Validation for the page

Dynamic HTML

- Cascading Style Sheet and its uses
- Use of classes in DHTML

Front-end Tool (FrontPage)

Project

Recommended Books:

- Web-Enabled Commercial Application Development using HTML, DHTML, JavaScript, Perl CGI
  By Ivan Bayross

- Creating Cool VBSCRIPT Web Page
  By Bill Hatfield, IDG Books
  Practical: Web page development

Books Recommended:

Overview of the Organization of a Computer System and Architecture-Functions and Structures.
Introduction to RISC-CISC-RISC VS CISC.
CPU Functions-Fetch and Execute cycle-Register Organizations of CPU-instruction Cycle-Instruction Pipelining-Addressing-Instruction Format-Instruction set characteristics and Functions-Types of operations-Types of Operands, ALU Design-Processor control unit, Hardwired Control design and microprogramed Control Unit.
Computer memory system, Main Memory, Cache Memory, Cache addressing, direct mapping, fully associative mapping, Set Associative Mapping, Secondary memories, Optical memory, RAID, Replacement Algorithms, Rite policy, Block Size, Number of cache, Single verses two level cache, Pentium cache organization, data cache consistency, cache control.
Magnetic disk: data organization and formatting, RAID: level 0 to level 5.
I/O Modules, Programmed I/O, Interrupt driver I/O, DMA, I/O channels and processor, Scheduling and Memory Management with reference to Operating system support.
Introduction to computer Arithmetic, Integer Representation, Float Pointing Representation.
Instruction sets: characteristics and functions, machine instruction characteristics, types of operands, types of operations.
Instruction Addressing modes and formats, addressing, instruction formats.
Instruction pipelining, pipelining strategy, dealing with branches.
practical
Simulation of computer components using object oriented programming language.

Recommended Books
Computer Organization and Architecture by William Stalling
Computer System Architecture by Morris Mano

Algorithms
Analyzing Algorithms
Designing Algorithms
Growth of Functions
Asymptotic Notation
Standard Notations and Common Functions

Counting and Probability
Counting
Probability
Discrete random variables
The Geometric and binomial distributions
The Tails of the binomial distribution
Probabilistic Analysis

Graph Algorithms
Elementary Graph Algorithms
Minimum Spanning Trees
Single Source Shortest Paths
All-Pairs Shortest Paths
Maximum Flow
NP-Completeness
Polynomial Time
Polynomial-Time Verification
NP-Completeness and Reducibility
NP-Completeness Proofs
NP-Complete Problems

Algorithms for Parallel Computers
Pointer Jumping
Work-Efficient Parallel Prefix Computing
Practical: programming of different algorithms

Books Recommended:

Practical: programming of different algorithms

CS-506 Data Communications 3(2-2)

Introduction

Transmission Media

Data Encoding
- Digital Data & Digital Signal,
- NIC Encoding Techniques
  1. NRZ-L, NRZI, Bipolar Ami, Pseudoternary, Manchester
  2. Differential Manchester
- Digital Data and Analog Signals-Modem Encoding Techniques Ask, Fsk, Psk, Qpsk
  Analog Data & Digital Signals-Coding Techniques (PCM, DM)

Data Link Control
Flow Control Techniques, Stop & Wait, Sliding Window

Error Detection & Control Techniques
- Error Detection
  Even and odd parity check, CRC OR FCS

Error Control Techniques
1. Stop and Wait ARQ, GO-Back-N ARQ
2. Selective-Reject ARQ, High-level Data Link Control Protocol

Multiplexing
FDM, STDM, STDM

Circuit Switching
Switched Networks, Circuit-switching Networks, Switching Concepts, Routing in Circuit-switched Networks, Control Signaling.

Packet Switching
Packet-switching Principle, Routing, Congestion Control, X25

Recommended Book
1) Data and computer Communications by William Stallings
2) Understanding data communication by Gilber held (Publisher Sams )

Practical: data communication, analog and digital signal

CS-507 Computer Organization and Assembly 4(3-2)

Introduction to assembly Language
Assembly Language Applications, Number System, Character Storage, Basic Elements of Assembly Language, Constants, Statements, Name

- Hardware and Software Architecture
- Components of a Microcomputer, CPU Registers, Segment registers, index registers, special register, flags Registers, Stack, DOS Architecture, Instruction execution cycle.

- Assembly language Fundamentals
  DB, DW, DD, LABEL Directive, MODEL, Directive, Program Segments, Data Transfer Instruction, MOV, XCHG, INC, DEC, ADD, SUB, Flags affected by ADD, SUB, Addressing models, types of Operands, operators & expressions, Arithmetic operators, Boolean Operators, OFFSET operators.

- Input/output services
Interrupts, debugging, INT instruction, character output, string output, video model and video functions, cursor size and cursor movement.

• Loops and comparisons

• Condition and procedures
  PUSH, POP, CALL, RET instructions, While Repeat Until, Case structure, Near and far Procedure.

• Arithmetic
  SHL, SHR, SAL, SAR, ROL, ROR, MUL, DIV, ADC, SBB, XLAT.

  Numeric conversion, String processing (MOVES, CMP, SCAS, STOS, LODS)

  Practical: Programming using Assembly Language

Recommended Books
3. Assembly Language programming and organization of the IBM PC by Ytha Yu and Charles Marut.

CS-508  Computer Graphics  4(3-2)


  Output Primitives: Points and Lines, Scan-Converting a Point, Scan-Converting a Line (Different algorithms, e.g., Direct method, Digital Differential Analyzer, Bresenham's Algorithm), Scan-Converting a Circle (Bresenham's Algorithm and Midpoint Circle Algorithm), Scan-Converting an Ellipse, Scan-Converting Arcs and Sectors, Region Filling, Scan-Converting a Character, Fill area Primitives, Fill area Functions.

  Two-Dimensional Geometric Transformations: Basic Transformations, Translation, Rotation, and Scaling, Matrix Representations and Homogeneous Coordinates,

  Composite Transformation: Translations, Rotations, and Scaling, General Pivot-point Rotation, General Fixed-point Scaling, General Scaling Directions, Concatenation Properties, General Composite Transformations and Computational Efficiency.

  Other Transformations: Reflection and Shearing, Transformation between Coordinate.

  Two-Dimensional Viewing and Clipping: Window-to-Viewport Mapping, Point Clipping, Line Clipping and Polygon Clipping, A 2-D graphics Pipeline,

  Three-Dimensional Concept: 3-Dimensional Display Methods, Three dimensional object Representations.


  Three-Dimensional Viewing and Clipping: Three-Dimensional Viewing and Clipping, Viewing Transformation.

  Practical: Application of Scan conversion algorithms for line, Circle, Ellipse and application of 2-dimesninal transformations.

  Text Book:

Reference Book

CS-509  Numerical Analysis  3(2-2)


  Practical: programming of different numerical techniques

Books Recommended:
Advantages of Java
- Platform independence
- Reusability and maintainability
- Applications, applets and servlets
- Concurrent programming with threads
- IP networking & distributed computing

Structure of a Java program
- Compiling source code into byte code
- Overview of class libraries

Transitional to Java
Features similar to C++
- Similar syntax
- Loops and conditionals
- Expressions and relational operators
- Java references and C++ pointers

Features unique to Java
- Multiple inheritance with interfaces
- Dynamic linking and class loading
- Memory management via the garbage collector
- Static methods and instance methods
- Organizing classes with packages and visibility modifiers

Developing GUIs
Foundations of user interfaces
- Basic GUI widgets
- Event-driven programming
- Modal vs. non-modal interaction

Abstracts Windowing Toolkit (AWT/Swing)
- The need for a portable windowing library
- Adding components to containers
- Arranging components using layout managers

Java Foundation Classes (JFC)
- Advantages of lightweight components
- Creating basic components: buttons, text fields, drop-down lists
- Dialogs and message boxes

Event handling
- Adapters and listeners
- Registering event handlers
- Inner classes and top-level classes

Building applets
- Embedding applets in Web pages
- The applet security model
- The applet life cycle: init(), start(), stop(), destroy()
- Deploying browser-independent applets with Java Plug-In
- Communicating with a back-end sever

Concurrent Programming with Threads
The Java Thread model
- The advantages of multithreading
- Using synchronization primitives
- Thread blocking: join(), wait() & notify()

Creating and managing threads
- The Thread class and the Runnable interface
- Managing multiple threads with Thread Groups

Input and Output
Java streams
- Streams, Readers and Writers
• Accessing files

Files and directories
• Creating, deleting and renaming files
• Obtaining directory & file information
• Streaming Java Objects

Internetworking
Sockets and Server Sockets
• Reliable connections with TCP
• Connectionless communications via UDP
• Developing multithreaded socket-based servers

Java Database Connectivity (JDBC)
• Connectivity to a relational database
• Executing SQL queries

Java Class Libraries and Development Tools
• The Java 2 core library
• Java Development Kit (JDK)
• Compiler
• Appletviewer

Books Recommended
1. Beginning Java 2 by Ivor Horton
2. Exploring Java by Patrick Niemeyers and Joshua Peck

CS-512 Automata Theory 3(3-0)
Define languages, Kleen’s Closer, Regular Expressions, Languages associated with regular expressions, Finite Automata, “FA” and their Languages, Transition graph, Kleen’s Theorem, Converting “TG” into regular expressions, Converting regular expression into FA, Non deterministic Finite Automata, Moor and mealy machines, Transducers as model of sequential circuits, Regular Languages, Context-Free grammar, Trees, Ambiguity, Regular grammar, Killing Null Productions, Chomsky Normal Form, Left most derivation, Pushdown Automata, Building a CFG for every PDA, Context-Free Languages, Parsing simple Arithmetic.

BOOK RECOMMENDED:
Course Description
In-depth training for software developers on Linux and UNIX System programming facilities. Learn how to develop sophisticated multi-process applications using system calls and library routines.

Prerequisites
- Fundamental knowledge of Unix or Linux
- C or C++ Programming experience

Course Contents (Theory)

UNIX Standards
- Brief History of UNIX
- UNIX Systems
- Major Vendors
- Standards
- What is POSIX?
- Other Industry Specs and Standards

Files and Directories
- The POSIX.1 Basic File Types
- File Descriptions
- Keeping Track of Open Files
- File Table Entries
- The v-node Structure
- The fcntl Function
- File Attributes
- The access Function
- Link, unlink, remove, and rename Functions
- Functions to Manipulate Directories

System I/O
- Standard I/O vs System I/O
- System I/O Calls
- File and Record Locking

Processes
- What is a Process?
- Process Creation and Termination
- Process Memory Layout
- Dynamic Memory Allocation
- Accessing Environment Variables
- Real and Effective User IDs

Process Management
- Programs versus Processes
- The fork() System Function
- Parent and Child
- The exec System Function
- Current Image and New Image
• The wait() and waitpid() Function
• Interpreter Files and exec

Signals
• What is a Signal?
• Types of Signals
• Signal Action
• Blocking Signals from Delivery
• The sigaction() Function
• Signal Sets and Operations
• Sending a Signal to Another Process
• Blocking Signals with sigprocmask()
• Scheduling and Waiting for Signals
• Restarting System Calls (SVR4)
• Signals and Reentrancy

Interprocess Communication
• IPC
• IPC Facilities
• Common Operation - Get (IPCget)
• Common Operation - Control (IPCctl)
• Calls to Operate on the Facilities
• Commonalities between msg, sem, and shm
• IPC via Message Queues
• IPC via Shared Memory Segments
• Coordinating the Use of Shared Memory
• Semaphore Sets-semget() and semct1() Calls
• Semaphore Sets - the semop() calls
• Shared Memory Coordination Using Semaphores
• IPC Facility Handling ipcs and ipcrm

Date and Time Functions
• Time Representations
• Decoding Calendar Time
• Shorthand Functions - asctime(), ctime()
• Formatting Calendar Time Shared
• Process Times
• The Difference Between clock() and times()
• High resolution Timers

Standard I/O
• I/O Calls to manipulate streams
• I/O Calls which perform character I/O
• I/O Calls which perform string I/O
• I/O Calls which perform formatted I/O
I/O Calls which perform binary I/O

Practical
Writing programs using UNIX libraries routines.

Books Recommended:
Advanced Programming in UNIX Environment

CS-602 Artificial Intelligence 4(3-2)

Practical: Programming in prolog

Books Recommended:

CS-603 Compiler Construction 4(3-2)

Practical: construction of different compiler phases

Books Recommended:

CS-604 Software Project Management 10(0-20)

Books Recommended:

CS-605 Visual Programming 4(3-2)

Introduction to Programming

Introduction to Visual Basic

Managing Forms & Controls:
Managing controls, Object Properties, Assigning properties at run time, Naming Controls, Object Methods, Object Events, Event Procedures, Managing Forms, Common Keyboard events, Common Mouse Events, Focus, Managing Controls on Form, Using Multiple Forms.

Programming in Visual Basic
Programming in Visual Basic, Keywords, Data Types, Variables, Types of Variables, Constant, Mathematical Expression, Concatenation, Input and Output: Input and output using Controls, Input box, Message Box, Comments

Conditional & Looping Structure:
Arrays,
Introduction, Declaring one dimensional arrays, Variation in Array Declaration, Accessing Individual elements in array, entering data in arrays, Reading data from arrays, Searching Arrays, Sorting Arrays, Two-dimensional arrays, Dynamic Arrays, Control Arrays.

**Visual Basic Common Controls**

Intrinsic controls, Active X Controls, Common properties of controls, Command button control, Text box, Label, Check box, option buttons, Frame, List box, Combo box, Image and picture, Scroll bar Control, Drive ListBox, Dir list box, File ListBox, Combining Drivelistbox, Dirlstbox and Fielstlistbox, Timer, Shape, Line and OLED Control

**Menu, MDI Forms & Dialog boxes:**

Menus, Designing Menus in VB, Menu Editor, Popup Menus, Toolbar, MDI, Common Dialog boxes, Types of Dialog boxes, Open Dialog boxes, Save AS Dialog box, font dialog box, print dialog box

**Procedures, Functions & Modules**

Types of code block, procedures, Scope of Variables, Lifetime of variables, Static Variables, Function, Return type, Argument passing Mechanism, Exit sub & exit function, Module, Built-in-function

**Error Handling & Debugging:**

Error handing in vb, Type of Errors, Handing Run-time Errors in VB, Err object, Debugging facilities in VB, Break point, stepping through code

**File Handling:**

Introduction, File system object, File object, Folder object, drive object, TextStream object, Creating Sequential Files, Reading Sequential Files, Random Access Files

**Database Programming**

Introduction, DBMS, Relational Databases, Keys in Relational databases, Relational ship, Database application in VB, Designing user interface, Data Control, Data Bound Controls, Record set object, DAO, DAO Hierarchy, SQL

**Active X Data Object**

Introduction, Open database connectivity, OLE DB, Activex data object, ADO data control, ADO object Model, Connection object, Recordset object, Command object, Microsoft FlexGrid control, Master-detail tables

**Visdata & Data Environment**

Visual Data Manager, Data Environment, Data Report Designer

**A Complete Database Project Using ADO**

**Text Book:**

Visual programming Using Visual Basic
by Tariq Mahmood, Imran saeed, Taseem Mustafa, Ahsan Raza

**Reference Books**

Mastering Visual Basic, BPB Publisher
Visual Basic in 21 Days

**Computer Networks**

Course introduction, uses of computer networks, network hardware, network software, reference models, example networks, example data communication services, network standardization
The theoretical basis for data communications

**Network Types**

Network Models
Network Services
Difference between LANs, MANs and WANs

**Network Protocols**

Protocol Stacks
OSI Model
Network Media
Network Adapters
Transmission media
Wireless transmission
Data Transmission

**Network Design**

Physical Topologies
ARCNET, Ethernet, Token Ring, FDDI
LAN, WAN Protocols

**Connecting Networks**

LAN connectivity devices
Internetworking devices

**Network Administration**

User & security Administration
Broadband ISDN and ATM
Cellular radio, Communication satellites
Multiple access protocols, IEEE standard 802 for LANS & MANS Bridges
High speed LAN, Satellite Networks
The network layer in ATM networks
A simple transport protocol
The internet transport protocols (TCP & UDP), The ATM AAL layer protocols
Network security, DNS-domain name system
SNMP-simple network management protocol
Electronic mail, Usenet news
The world wide web.

Text Book

Reference Book/s

CS-609 Distributed Database Systems 4(3-2)
Introduction to DDBMS, Overview of relational DBMS, DDBMS Architecture, Distributed Database Design[alternative design strategies, distribution design issues, Fragmentation], Views in distributed DBMSs. Data security, distributed semantic integrity control, Query decomposition, localization of distributed data, query optimisation, centralized query optimisation, join ordering in fragment queries, distributed query optimisation algorithms[INGRES Algorithm, R* Algorithm.

Practical: Design and implementation using oracle the following:
(I) Design of Distributed databases
(II) Query decomposition
(III) Data localization and optimization of distributed queries

Books Recommended:

Math-303 Calculus and Analytic Geometry 4(4-0)
Complex Numbers, De Moivre’s Theorem and its Applications, Simple Cartesian Curves, Functions and Graphs, Symmetrical Properties, Curve Tracing, Limit and Continuity, Differentiation of Functions. Derivative as Slope of Tangent to a Curve and as Rate of Change, Application to Tangent and Normal, Linearization, Maxima/Minima and Point of Inflection, Taylor and Maclaurin Expansions and their convergence. Integral as Antiderivative, Indefinite Integration of Simple Functions. Methods of Integration: Integration by Substitution, by Parts, and by Partial Fractions, Definite Integral as Limit of a Sum, Application to Area, Arc Length, Volume and Surface of Revolution

Books Recommended:

Math-304 Multivariable Calculus 4(4-0)
1. Multivariable Functions and Partial Derivatives:
Functions of Several Variables, Limits and Continuity, Partial derivatives, Differentiability, Linearization, and Differentials, Partial Derivative with constrained variables, directional Derivatives, Gradient Vectors and Tangent Planes, Extreme Values and Saddle Points, Lagrange Multipliers, Taylor’s Formula.

2. Multiple Integrals: Double Integrals,
Areas, Moments and Centers of Mass, Double Integrals in Polar form, Triple Integrals in Integrals in Rectangular Coordinates, Masses and Moments in three Dimension, Triple Integrals in Cylindrical and Spherical Coordinates, Substitution in Multiple Integrals.

3. Integration in Vector Fields:
Lines Integrals, Vector Fields, Work, Circulation and Flux, Green’s Theorem in the Plane, Surface Area and Surface Integrals, Stoke’s Theorem.
4. **Fourier Series:**


5. **Fourier Transform:**

   Three Important Integrals, Properties, of Fourier Transformation, Fourier Integral Formula, Fourier Inversion Theorem, Convolution, Convolution Theorem, Fourier Sine and Cosine Transform.

6. **Laplace Transform:**


7. **Z-Transform.**

Books Recommended:


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**Math-405  Differential Equations**


Books Recommended:


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**Math-406  Linear Algebra**

**VECTORS:** Vector algebra in 2-space and 3-space, inner product, vector product, vector and scalar functions and fields, derivations; Curves, tangents, arc length, Velocity and acceleration, Gradient, divergence and curl, gradient of a scalar field, directional derivatives, divergence of a vector field, Curl of a vector field, Grad, div, curl in curvilinear. Coordinator.

**VECTOR SPACES AND THEIR LINEAR TRANSFORMATIONS**

Introduction, concept of a ring, concept of a field, addition of vectors and scalar multiplication of vectors in $\mathbb{R}^n$. Linear combinations of vectors of $\mathbb{V}(F)$, linear dependence of vectors, subspaces, quotient space, basis of vector space, linear transformation.

**MATRICES AND THEIR LINEAR TRANSFORMATIONS**

Matrices, basic concepts, different kind of square matrices, Elementary row and column operations, Echelon form of a matrix, Hermitian, skew-Hermitian and unitary matrices, symmetric, skew-symmetric and orthogonal matrices, Inverse of a matrix, Algebra of matrices, rank of matrix, matrix of a linear transformation.

**DETERMINANTS:**

Determinant of a square matrix, Axiomatic definition of a determinant, determinant as a sum of products of elements, determinant of the transpose $A^T$. An algorithm to evaluate $\det A$.

Determinants and inverse of matrices, rank in terms of determinants, Cramer’s rule.

**EIGENVALUES AND EIGENVECTORS**

Definitions, some applications of eigenvalue problems, properties of eigen vectors, Diagonalization.

**APPLICATIONS TO SYSTEMS OF EQUATIONS**

Introduction, Equivalent equations, Gaussian elimination method, Gauss-Jordan method, consistent or inconsistent system, Consistency criteria.
APPLICATIONS TO SYSTEMS OF EQUATIONS TO GEOMETRY

Preliminaries, point dividing a line segment in a given ratio, straight lines in $\mathbb{R}^3$, angle between two straight lines, Distance of a point from a line, equation for planes, Angle between two planes, straight line as intersection of two planes, straight line and a plane, Shortest distance between two straight lines.

Books Recommended:


Phy-305 Basic Electronics 3(2-2)

Ohm’s law, Kirchoff’s laws, loop and node equations, Cramer’s rule, Network theorems. Introduction to materials (Conductor, Semiconductor, Insulator). Band theory of solids. Types of diode and its applications (Half wave, Full wave rectifier, Clipper, Clamper and etc.). Introduction to Transistor. Different configurations of transistors (Common Emitter, Common Collector, Common Base).

Practical: Designing of different circuits

1. To determine the resistance and hence specific resistance of the material of a given coil of wire using a slide wire bridge.
2. To determine unknown resistance and hence specific resistance of a material using post office box.
3. To determine the internal resistance of a galvanometer by half deflection method.
4. To determine a low resistance.
5. To determine the internal resistance of a cell by potentiometer.
6. To determine resistance of a voltmeter.
7. To study the relation between current passing through a tungsten filament lamp and the potential applied across it.
8. To study the characteristics of a semi-conductor diode.
9. To study the static characteristics of a PNP/NPN transistor.
10. To study the half wave rectifier and the wave shape on a CRO.
11. To study the full wave rectifier and the wave shape on a CRO.
12. Plot common emitter input characteristics of PNP transistor, from the given data taking $V_{BE}$ and $I_{B}$ along abscissa and ordinate respectively.
13. Plot common emitter output characteristics (or collector characteristics) of PNP transistor from the given data taking $V_{CE}$ and $I_{C}$ along abscissa and ordinate respectively.

Books Recommended:

3. Physics Practical manual-II by M. Rafiq Nasim et al

Phy-405 Circuit Theory 3(2-2)

- Low frequency basic amplifiers using BJTs & FETs; biasing of single stage & multistage circuits:
  - Introduction, Amplification, Biasing and Graphical Treatment, Temperature Stability, CE amplifier design, CB amplifier design, CC amplifier design Introduction to JFET, Biasing of JFET, JFET amplifier common source, common dam, common gate comparison of FET & BJT.
  - Biasing of single & cascaded (two-stage) CE BJT amplifier

- Frequency response of amplifier circuit;
  - Sketch of a frequency versus gain curve for a single stage CE voltage amplifier, F2 & F4 frequencies, Band width, behavior of the amplifier within the band width.

- Feedback Amplifiers
  - Concept of Feedback, Positive & Negative Feedback, Negative Feedback Voltage amplifier (Oscillator).

- Oscillator;
  - Types of oscillators, RC phase shift oscillator, conditions for oscillation, type of output (Sinusoidal/non-sinusoidal) wave shape, frequency.

- 555 Timer and Its applications;
  - Introduction to 555 timer, multivibrator circuits with 555 timer circuit. Operational amplifier and its application.
  - PRACTICAL

2. Common emitter Amplifier power and phase relationship.
5. Frequency response of an amplifier.
6. Junction field effect transistor (JFET) common source amplifier.
7. Junction field effect transistor (JFET) Gate source amplifier.
10. Operational Amplifier.

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Books Recommended:

1. Basic Electronics by Grob.
2. Electronic Principles by Malvino.

Stat-507 Statistics and Probability

4(3-2)
Introduction to Statistics, Descriptive Statistics, Statistics in decision making, Graphical representation of Data Stem-and Lead plot, Box-Cox plots, Histograms and Ogive, measures of central tendencies, dispersion for grouped and ungrouped Data, Moments of frequency distribution; examples with real life, use of Elementary statistical packages for explanatory Data analysis. Counting techniques, definition of probability with classical and relative frequency and subjective approaches, sample space, events, Laws of Probability. Conditional probability and Bayes theorem with application to Random variable (Discrete and continuous) Binomial, Poisson, Geometric, Negative Binomial Distributions; Exponential Gamma and Normal distributions.

Practical: application of different statistical design techniques

Books Recommended:


MBA-306 Financial Accounting 3(3-0)

1. Accounting Principles and Concepts
   Purpose of Accounting, Concept of Business Entity, Cost Principle, The Going Concern Assumption, The Objectivity Principle, Stable Dollar Assumption, Conservatism, Principle of Consistency,

2. Accounting Cycle

3. Financial Statements
   Income Statement or Trading Profit and Loss Account Balance Sheet, Statement of Owner Equity.

4. Control of Cash Transactions
   Reporting of Cash in Balance Sheet, Management Responsibilities relevant to Cash, Cash Balances and Corporate dividends, Internal Control Over Cash, Cash Receipts and Disbursement, Bank Reconciliation Statement, Cash Book (Three Column), Electronic Funds Transfer System.

5. Accounts Receivables and Notes Receivables
   Accounting for Uncollectibles (Bad Debts), A/R Managements/Internal Controls for Receivables/A/R Aging Schedules, Accounting for Notes Receivables.

6. Inventories & Cost of Goods Sold
   Flow of Inventory Cost
   LIFO, FIFO, Average Cost Method.

Taking A Physically Inventory
   Recording Shrinkage losses, LCM and other write down of inventory, Year End Cut-off transition, periodic Inventory System, Importance of an Accurate Valuation of Inventory.

7. Depreciation and Types of Depreciation
   Plant and Equipment
   Accounting for plant & equipment, Intangible Assets, Natural Recourses.

Depreciation
   Straight Line Method, Units of Output Method, Accelerated Depreciation, Method, Sum of Year Digit Method.

9. Corporation Organizations and Stockholders

10. Corporation Operations and Additional stock Holders Equity Transactions
    Reporting the result of Operations
    Developing Productive Information, Unusual Items Reporting, Continuous Operations, Extra Ordinary Items, EPS, Primary and Fully Diluted EPS, Change in Accounting Principle.

11. Other Stockholder Equity Transactions

Books Recommended:

MBA-404 Financial Management 3(3-0)

Books Recommended:

MBA-407 Human Resource Management 3(3-0)

Book Recommended:

Eng-301 Introductory Exercises in Reading, Comprehension & Communication Skills. 2(2-0)
   Guided study of prescribed textbook and introductory exercises in rapid reading, Comprehension and summarization of passages pertinent to agricultural and related sciences. Practical applications of Principles of English grammar and usage of remedial exercises in essay writing on topic of social and scientific importance.

1. A Selection of English Prose (Textbook)
   i) The Damned Human Race (Mark Twain)
   ii) The Place of Science in A Liberal Education (Bertrand Russell)
   iii) End of the Road (Muhammad Asad)

2. Essay Writing
3. Comprehension (Current English Passage)
4. Letter (Official/Private) and Application Writing
5. Cloze Test (Insertion of appropriate words in the paragraph meaningfully)
6. Translation into English
7. Home Assignments

Books Recommended


Eng.302 Advanced Exercises in Reading, Comprehension and Communication Skills. 2(2-0)

Guided study of prescribed textbook and advanced exercises in rapid reading, comprehension and summarization of passages pertinent to agricultural and related sciences. Advanced remedial exercises in written and oral expression. Essay writing on important topics of social and technical nature.

1. Selection of English Prose (Textbook)
   a) The Nature of Science (Ralph Ross)
   b) The Marvel of an Insect (Alan Devoe)
   c) The Addiction (Marie Winn)
2. Essay Writing
3. Precise Writing
4. Technical Report Writing
   a) Introduction
   b) Use of Library
   c) Collection and Organization of Materials (Presentation)
   d) Techniques of Composition
5. Synthesis Techniques (Simple, Compound and Complex Sentences)
6. Home Assignments

Books Recommended


IS-401/ Islamic Studies 2(2-0)
SSH-301(A) / Ethics Already Approved

SSH-402 Pakistan Studies 2(2-0)

HISTORICAL & IDEOLOGICAL PERSPECTIVE OF PAKISTN MOVEMENT.

Two-Nation Theory:
Definition, claim of Muslim being a different national from Hindu based upon Cultural diversity.

Significance:
Cultural diversity and threats posed to Muslims rights and interests led to and justified the demand of Pakistan. (growth of Muslims Nationalism, Creation of Muslim League and Role of Muslims), Muslim League-British enactments and political awareness-Lahore Resolution, Two nation theory elaborated by Sir Syed Ahmed Khan, Allama Iqbal and Quaid-e-Azam Muhammad Ali Jinnah.

Creation of Pakistan:
Factors leading to the creation of Pakistan-Economic, Social and Political.
Quaid-e-Azam and the demand of Pakistan

**Geo-Political and Strategical importance of Pakistan:**
Neighboring Countries, Pakistan relation with Central Asian Countries, Pakistan’s importance with Reference to Middle East and the Super Powers.

**Contemporary Issues in Pakistan Social Issues:**

**Books Recommended**