# BS (COMPUTER SCIENCE) SCHEME OF STUDIES UAF

BS (CS)

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

Eligibility: F.Sc Pre-Engineering, F.Sc Pre-Medical, Intermediate in General Science, Intermediate in Computer Science, Intermediate in Commerce, FA/DBA/D Com with minimum requirement 45 %.

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

		Computer Science Courses	(108/150)	
#	Code	Course Title	Credit hours	Semester
1	CS-301	Introduction to Computers	3 (2-2)	1
2	CS-303	Introduction to Computer Programming	4(3-2)	1
3	CS-302	Fundamentals of Algorithms	3 (2-2)	2
4	CS-304	Discrete Structures	4 (4-0)	2
5	CS-401	Object Oriented Programming	3 (2-2)	3
6	CS-403	Data Base Systems	3 (2-2)	3
7	CS-402	Data Structures	3 (2-2)	4
8	CS-404	Digital Logic Design	3 (2-2)	4
9	CS-406	Software Engineering – I	4 (3-2)	4
10	CS-505	Analysis of Algorithms	3 (3-2)	5
11	CS-507	Computer Organization & Assembly	4 (3-2)	5
12	CS-509	Numerical Analysis	3 (2-2)	5
13	CS-502	Operating System Concepts	4 (3-2)	6
14	CS-504	Computer Architecture	4 (3-2)	6
15	CS-512	Automata Theory	3 (3-0)	6
16	CS-508	Computer Graphics	4 (3-2)	6
17	CS-506	Data Communication	3 (2-2)	6
18	CS-603	Compiler Construction	4 (3-2)	7
19	CS-607	Computer Networks	4(3-2)	7
20	CS-602	Artificial Intelligence	4(3-2)	8
21	CS-604	Software Project Management	10 (0-20)	8
22	CS-408	Modern Programming Languages	4(3-2)	4
23	CS-503	Web Programming	4(3-2)	5
24	CS-501	Software Engineering - II	4(3-2)	5
25	CS-510	Advanced Object Oriented Programming	4(3-2)	6
26	CS-601	System Programming	4(3-2)	7
27	CS-605	Visual Programming	4(3-2)	7
28	CS-609	Distributed Database Systems	4(3-2)	7

Supporting Courses (25/150)				
29	Math-303	Calculus and Analytical Geometry	4(4-0)	1
30	Math-304	Multi Variable Calculus	4(4-0)	2
31	Math-405	Differential Equations	4(4-0)	3
32	Math-406	Linear Algebra	3 (3-0)	4
33	PHY-405	Circuit Theory	3 (2-2)	3
34	PHY-305	Basic Electronics	3 (2-2)	1
35	Stat-507	Statistics and Probability	4(3-2)	5
General Education Courses (17/150)				
36	Eng-301 <sup>*</sup>	Introductory Exercises in Reading,	2(2-0)	1
	6	Comprehension and Communication Skills.		
37	Eng-302 <sup>*</sup>	Advanced Exercises in Reading, Comprehension	2(2-0)	2
20	NDA 206	and Communication Skills.	2(2,0)	
38	MBA-306	Financial Accounting	3(3-0)	4
39	MBA-404	Financial Management	3(3-0)	2
40	MBA-407	Human Resource Management	3(3-0)	3
41	SSH-402*	Pakistan Studies	2(2-0)	4
42	IS-401 /	Islamic Studies /	2(2-0)	3
	SSH-301(A)	Ethics		
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# **Scheme of Studies**

# BS (Computer Science)

SubjectsCredit Hrs1CS-301Introduction to Computers3(2-2)2CS-303Introduction to Computer Programming.4(3-2)3Phy-505Basic Electronics3(2-2)4Math-303Calculus and Analytical Geometry4(4-0)5Eng-501Introductory Exercises in Reading, Comprehension and Communication Skills.2(2-0)SubjectsCredit Hrs2CS-302Fundamentals of Algorithms3(2-2)3Math-304Multi variable Calculus4(4-0)4Ling-302Advanced Exercises in Reading, Comprehension and Communication Skills.2(2-0)5MBA-306Financial Accounting3(3-0)Semester 3 (18 credit hrs)Credit HrsSubjectsCredit HrsSubject Oriented Programming.(3(2-2)3Mah-405Differential Equations4Human Resource Management3(3-0)5Semester 3 (18 credit hrs)2(2-0)5StBH-301(A)ElnicsSubjectsCredit HrsSubjectsCredit HrsSubjectsCredit HrsSubjectsCredit HrsSubjectsCredit HrsSubjectsCredit HrsSubjectsCredit Hrs	Semester 1 (16 credit hrs)					
1       CS-301       Introduction to Computers       3(2-2)         2       CS-303       Introduction to Computer Programming.       3(2-2)         4       Math-303       Calculus and Analytical Geometry       3(2-2)         5       Eng-501       Introductory Exercises in Reading. Comprehension and Communication Skills.       2(2-0)         Subjects       Credit Hrs         1       CS-302       Fundamentals of Algorithms       3(2-2)         2       CS-304       Discrete Structures       4(4-0)         3       Math-304       Multi variable Calculus       4(4-0)         4       Eng-302       Advanced Exercises in Reading. Comprehension and Communication Skills.       2(2-0)         5       MBA-306       Financial Accounting       3(3-0)         Subjects       Credit Hrs         1       CS-401       Object Oriented Programming       3(2-2)         2       CS-403       Data Base Systems       3(2-2)         3       Math-405       Differential Equations       4(4-4)         4       Phy-4035       Circuit Theory       3(2-2)         5       MBA-407       Human Resource Management       3(3-0)         6       IS-401/0       Eng-102       D			Subjects	Credit Hrs		
2       CS-303       Introduction to Computer Programming.       4(3-2)         3       Phy-305       Basis Electronics       3(2-2)         4       Math-303       Calculus and Analytical Geometry       4(4-0)         5       Eng-301       Introductory Exercises in Reading, Comprehension and Communication Skills.       2(2-0)         Semester 2 (16 credit Hrs)       Credit Hrs       3(2-2)         2       CS-304       Discrete Structures       4(4-0)         3       Math-304       Multi variable Calculus       4(4-0)         4       Eng-302       Advanced Exercises in Reading, Comprehension and Communication Skills.       2(2-0)         5       MBA-306       Financial Accounting       3(3-0)         Semester 3 (18 credit Hrs)       3(3-0)       3(3-0)         1       CS-400       Object Oriented Programming.       3(2-2)         1       CS-404       Differential Equations       4(4-0)         4       Phy-405       Circuit Theory       3(2-2)         5       MBA-407       Human Resource Management       3(3-0)         5       Sthjects       Credit Hrs         1       CS-404       Digital Logic Design       3(2-2)         3       Cast-404       Biotalis / Ais	1	CS-301	Introduction to Computers	3(2-2)		
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5       Eng-301       Introductory Exercises in Reading, Comprehension and Q2-0)         Semester 2 (16 credit Hrs)       2(2-0)         1       CS-302       Fundamentals of Algorithms       3(2-2)         2       CS-304       Discrete Structures       4(4-0)         3       Math-304       Multi variable Calculus       4(4-0)         4       Eng-302       Advanced Exercises in Reading, Comprehension and Communication Skills.       2(2-0)         5       MBA-306       Financial Accounting       3(3-0)         Semester 3 (18 credit Hrs)       Credit Hrs       2(2-1)         2       CS-403       Data Base Systems       3(2-2)         3       Math-405       Differential Equations       4(4-0)         4       Phy-405       Circuit Theory       3(2-2)         5       MBA-407       Houma Resource Management       3(3-0)         6       IS-401/       Islamic Studies /       2(2-0)         SSH-301(A)       Ehines       Semester 4 (22 credit Hrs)       Credit Hrs         1       CS-404       Digital Logic Design       3(2-2)       3(2-2)         3       CS-404       Digital Logic Design       3(3-0)       3(3-2)         4       CS-404       Molet Programming	4	Math-303	Calculus and Analytical Geometry	4(4-0)		
Communication Skills.         2(2-0)           Semester 2 (16 credit Irrs)         Credit Hrs           1         CS-302         Fundamentals of Algorithms         3(2-2)           2         CS-304         Discrete Structures         4(4-0)           3         Math-304         Multi variable Calculus         4(4-0)           4         Eng-302         Advanced Exercises in Reading, Comprehension and Communication Skills.         2(2-0)           5         MBA-306         Financial Accounting         3(3-0)           Semester 3 (18 credit hrs)         Subjects         Credit Hrs           1         CS-401         Object Oriented Programming         3(2-2)           3         Math-405         Differential Equations         4(4-0)           4         Phy-405         Circuit Theory         3(2-2)           5         MBA-407         Human Resource Management         3(3-0)           6         Is-40/1         Islamic Studies /         2(2-0)           SSH-301(A)         Ehrics         Credit Hrs           1         CS-404         Digital Logic Design         3(2-2)           3         GS-404         Digital Logic Design         3(2-2)           3         CS-404         Digital Logic Design	5	Eng-301	Introductory Exercises in Reading, Comprehension and	.()		
Semester 2 (16 credit hrs)       Credit Hrs         Subjects       Credit Hrs         1       CS-304       Discrete Structures       4(4-0)         3       Mah-304       Multi variable Calculus       4(4-0)         4       Eng-302       Advanced Exercices in Reading, Comprehension and Communication Skills.       2(2-0)         5       MBA-306       Financial Accounting       3(3-0)         Subjects       Credit Hrs         2       CS-401       Object Oriented Programming       3(2-2)         3       Mah-405       Differential Equations       4(4-0)         4       Phy-405       Circuit Theory       3(2-2)         5       MBA-406       Differential Equations       4(4-0)         4       Fully-405       Circuit Theory       3(2-2)         5       MBA-404       Financial Studies /       2(2-0)         SSH-401(A)       Ehisers       Studies/       2(2-2)         2       CS-404       Digital Logic Design       3(2-2)         3       CS-406       Software Engineering -1       4(3-2)         4       CS-408       Modern Programming Languages       4(3-2)         4       CS-408<	-	8	Communication Skills.	2(2-0)		
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2       Co-50.4       Multi variable Calculus       4(4-0)         4       Eng-302       Advanced Exercises in Reading, Comprehension and Communication Stills.       2(2-0)         5       MBA-306       Financial Accounting       3(3-0)         Semester 3 (18 credit hrs)       Subjects       Credit Hrs         1       CS-401       Object Oriented Programming       3(2-2)         2       CS-4040       Data Base Systems       3(2-2)         3       Math-405       Differential Equations       4(4-0)         4       Phy-405       Circuit Theory       3(2-2)         5       MBA-407       Huma Resource Management       3(3-0)         5       Sth-301(A)       Ethics       2(2-0)         SWH-402       Data Bare Systems       3(2-2)       3(3-0)         6       IS-401       Islamic Studies /       2(2-0)         SWH-202       Data Bare Systems       3(2-2)       3(3-2)         7       SWH-202       Data Bare Calculus /       2(2-0)         SWH-202       Data Bare Calculus /       2(2-0)       3(3-2)         4       CS-404       Digital Logic Design       3(2-2)       3(2-2)         5       SWH-402       Pakistan Studies       2(2-	2	CS-302	Disorate Structures	3(2-2)		
	2	CS-304 Moth $304$	Multi variable Calculus	4(4-0)		
Number of the second state of	1	$F_{ng} 302$	Advanced Exercises in Reading, Comprehension and	4(4-0)		
5       MBA-306       Financial Accounting       3(3-0)         Semester 3 (18 credit hrs)       Subjects       Credit Hrs         3       Cx 401       Object Oriented Programming       3(2-2)         2       CS-401       Data Base Systems       3(2-2)         3       Math-405       Differential Equations       4(4-0)         4       Phy-405       Circuit Theory       3(2-2)         5       MBA.407       Human Resource Management       3(3-0)         5       SH-301(A)       Ethics       Semester 4 (22 credit Hrs)         Credit Hrs         3       CS-404       Digital Logic Design       3(2-2)         3       CS-404       Digital Logic Design       3(2-2)         3       CS-404       Digital Logic Design       3(3-0)         4       CS-404       Financial Management       3(3-0)         5       MBA-404       Financial Management       3(3-0)         5       Subjects       Credit Hrs         1       CS-501       Modern Programming       4(3-2)         2       CS-503       Web Programming       4(3-2)         3       CS-505       Analysis of Algorithms       3(2-2)         2 <td>-</td> <td>Liig-J02</td> <td>Communication Skills</td> <td><math>2(2_{-}0)</math></td>	-	Liig-J02	Communication Skills	$2(2_{-}0)$		
Semester 3 (18 credit hrs)Credit Hrs1CS-401Object Oriented Programming $3(2-2)$ 2CS-403Data Base Systems $3(2-2)$ 3Math-405Differential Equations $4(4-0)$ 4Phy-405Circuit Theory $3(2-2)$ 5MBA-407Human Resource Management $3(3-0)$ 6IS-401/Islamic Studies / $2(2-0)$ SSI-101(A)EthicsStemester 4 (22 credit hrs)SubjectsCredit HrsSubjectsCredit HrsSubjectsCre	5	MBA-306	Financial Accounting	3(3-0)		
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	2	CS-604	Software Project	10(0-20)		

## NEW COURSES IN COMPUTER SCIENCE

#### COURSE NO. **TITLE WITH CONTENTS**

**CS-301 Introduction to Computers** 

Brief history of computers and their applications. Major components of a computer. Computer and Society. Social impact of computer age. Computers in offices, industry and education. Office automation tools; Word processing, Graphic packages, Databases and Spreadsheets. Current trends, research and future prospects. Legal and moral aspects of computer and internet usage. Practical: Use of Excel, Msword, windows and internet in daily life application.

#### **Books Recommended:**

- 1. Shelly G.B. and T.J. Cashman, 1996. Using computers - A gateway to information. Boyd & Fraser Publishing company, USA.
- 2. Sinha P.K. 1992. Computer Fundamentals. BPB publications, New Dehli.

#### **CS-302 Fundamentals of Algorithms**

3(2-2)

Using pseudo-language as a base. Introduction to algorithms, analyzing and designing algorithms, Algorithms complexity, Running time of an algorithms.

Introduction to Matrices and their Manipulation: properties of matrices, different type of matrices, matrix addition and multiplication, matrix inverse, solving system of linear equations.

Searching and Sorting Algorithms: Introduction, insertion sort, selection sort, bubble sort, merge sort, quick sort, radix sort, bucket sort, heap sort, sequential search, index sequential search, binary search.

Graph and their Related Algorithms: Application of graphs, sequential representation of graphs, Warshall's algorithms shortest path algorithms, linked representation of a graphs, graph traversal and spanning forest.

Trees and Related Algorithms: binary tree, internal and external node, traversing binary tree, binary search trees, searching and inserting in binary search tree, deleting from a binary search tree, constructing a tree, Huffman's algorithms, general search trees.

Introduction to Concepts of Iteration and Recursion: recursion definition, factorial function, fabonacci sequence, binary search, properties of recursive algorithms tracing and timing, The towers of Hanoi problem, translation from prefix to postfix using recursion.

Introduction to Order of Magnitude and Algorithm Complexity.

**PRACTICAL**: Implementation of algorithms using C++

#### **Books Recommended**

- 1. Weiss, M.A. 1995. Data Structure and Algorithm Analysis. Benjamin / Cummings publishing company, USA.
- 2. Langsam, Y. and M.J. Augenstein 1996. Data Structures Using C and C++. Prentice Hall Inc., USA.

#### **CS-303 Introduction to Computer Programming**

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 Practical: programming assignments in C++

**Books Recommended:** 

Terrence W.P. 1997. Programming Languages. Prentice Hall International Inc., USA. 1.

Perry G. and M. Johnson 1992. Turbo C++ by examples. Library of Congress, USA. 2.

#### **CS-304 Discrete Structures**

1. **Algebraic Structures:** 

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.

# 4(3-2)

4(4-0)

3(2-2)

CREDIT HRS

## 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:

Counting Principles, Permutation Groups and Applications, Ramsey Theory, Difference Equation, Discrete Probability, Probability Theory.

 Basis Counting Techniques: The Pigeon Hole Principle, Generalized Permutations and Combinations, Inclusion-Exclusion Principle Application of Inclusion-Exclusion Principle.

### 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:**

- 1. John, G.M., 1993. Application of Discrete Applied Mathematics. McGraw Hill Inc., USA.
- 2. Judith, L. 1990. Mathematical Structure for Computer Science. McGraw Hill. Inc., USA.

### CS-401 Object Oriented Programming

• Classes

# Class and Object

- Encapsulation and Data Abstraction
- Inline Functions and Function Overloading
- Controlling Access to Class Members
- Default Copy Constructor
- Constructors and Destructors
- 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 Destructors in derived classes
- Multiple Inheritance
- •

### • Virtual Functions

- • Turtura dira:
- IntroductionAbstract Base Classes
- Polymorphism

3(2-2)

- 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 Data Structures

3(2-2)

3(2-2)

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.
- 3. Weiss, M.A. 1995. Data Structure and Algorithm Analysis. Benjamin / Cummings Publishing Company, USA.
- 4. Langsam, Y. and M.J. Augenstein 1996. Data Structures Using C and C++. Prentice Hall Inc., USA.

#### CS-403 Database Systems

• 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, 1<sup>st</sup> normal form, 2<sup>nd</sup> normal form, 3<sup>rd</sup> 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:
- 1) Date, C.J., 1998. An introduction to Database System .Addison –Wesley Publishing Company Inc., USA.
- 2) McFadden, F.R. and J.A. Hoffer, 1994. Modern Database Management. Benjaman Publishing Company Inc., USA
- 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)

Fundamentals of Boolean Algebra. Minimization techniques: algebraic, K-maps, QM methods, etc. Combinational logic circuits with MSI and LSI. Adders, Comparators, Encoders and Decoders, Multiplexers and Demultiplexers, ROM and PLA and PAL implementation. Sequential logic circuits: flip flops, registers, counters, memory timing sequences. Moore and Mealy machine concepts. **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:

- 1. Gajski, D. 1997. Principles of Digital Design. Mcgraw Hill inc., U.S.A.
- 2. Floyd, T.L. 1990. Digital Fundamentals. Macmillan Publishing Company, N.Y., USA.

#### CS-406 Software Engineering-I

System, Components of a System, Information Technology and Information Systems, Building Blocks of an Information System. Front-office and Back-Office Information Systems, Classes of Information Systems, Software Characteristics, Software Components, Software applications ,Software Engineering as a Layered Technology, Software Process Models, 4GLs, Structured Analysis, Information Engineering, Object Oriented Analysis, Prototyping Analysis, Requirements gathering techniques, System Analysis and System Design, Software Design, Cohesion and coupling, Software development Architectures, Introduction to CASE tools, Forward and Reverse Engineering, Software development tools, Different Coding Techniques, Programming Techniques

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

#### **Recommended books:**

- 1. Pressman , R.S. 1997. Software Engineering. McGraw Hill, Inc., USA
- 2. Jeffrey L.W, Lonnie D.B and Kevin C.D, 2000. System Analysis and Design Methods . McGraw Hill, Inc., USA

4(3-2)

Principles of programming languages design (imperative. functional, logic and object oriented), Implementation methods(compilation, interpretation and hybrid) and Implementation of the procedural, functional, and the logical programming paradigms including syntax(BNF, expression grammars, and operator associativity), binding of variables, type checking and equivalence, scope and extent of variables(activation record, static, and dynamic links), syntax and semantics, parameter passing and environments, formal semantics, sequence control, subprogram control, recursion, Abstraction, Encapsulation, the concept of Object Oriented.

Introduction to non-conventional programming languages, e.g, LISP, Prolog, Perl.

#### **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 br 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:**

Sequence Code, Block Sequence Code, Classification Code, Alphabetic Codes, Mnemonic Codes, Significant digit Code, Cipher Code, Action Code, Self-Checking Code. Single Tier, Two-Tier, Multi-Tier Architectures.

### 3. **Evaluating Software Alternative**

Request for quotation, Request for proposal, Identifying Vendors, Make or buy Decision, In-House built S/W, Packages, Customizing S/W packages, Outsourcing, End-user Systems, Enterprise Computing.

4. **Documentation** 

Program Documentation, System Documentation, Operation Documentation, User Documentation.

5. Quality Assurance

Quality, Software Quality, Principles of Quality, Software Quality Assurance, Why SQA, S/W Quality factors, Product Operation, Product Revision, Product Transition, SQA major Activities.

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

Analysis & Design Report of a Real time I. S Documented using UML notations. Note: more than 3 students are not allowed to work on the same project. Try to conduct presentations if possible.

# PressMan, R.S. 1997. Software Engineering. MCGraw-Hill, Inc., USA Applying UML and Patterns, Craig Larman, Prentice Hall, 2001Books Recommended:

#### 1. Cris, F.K 1997. Software Project Management. McGraw Hill, Inc., USA.

2. Roger, S. 1997. Software Engineering. McGraw Hill, Inc., USA.

#### CS-502 Operating System Concepts

#### 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**

Introduction to process Management, Process State Transition, PCB, Process Scheduling, Context Switch, Operation on process, Cooperating Processes, Intercrosses Communication.

# 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**

File Concepts, File Attribute, File operations, File Type, File structure, Access Method, Directory Structure.

# 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.
- 3. A Comprehensive Study of Operating Systems by Tariq Mahmood, Imran Saeed

#### CS-503 Web Programming

#### 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:**

- 1. Deitel H.M. and P.J. Deitel., 1998. Java How to Program. Prentice Hall International, USA.
- 2. Naughton, P. and H. Schildt. 1998. The Complete Reference Java 2. Third Edition. McGraw Hill California, USA.

#### CS-504 Computer Architecture

- Overview of the Organization of a Computer System and Architecture-Functions and Structures.
- Briefly History of Computers i.e., Structure of ENVIAC-Structure of Von Neumann Machine-Structure of IAS Computer-Microelectronics-highlights of Basic Architecture of IBM-PC.
- Introduction to RISC-CISC-RISC VS CISC.
- Introduction to system Bus-Components of Bus-Computer Components-Interconnection Structure-Bus Interconnection-PCI-Types of PCI Bus.
- 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 Rofiquzaman and Chandra Galgotia, Modern Computer Architecture, Publications (Pvt.) Ltd, 1965.

#### CS-505 Analysis of Algorithms

Introduction:

#### 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 bionomial distributions The Tails of the bionomial 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:**

3(2-2)

- 1. Wesis M. A. 1995. Data Structure and Algorithm Analysis. Benjamin Commings Company USA.
- 2. Adam. D. 2001. Data Structures and Algorithms in C++. Thomsan Asia Ltd, Singapore.

3. Introduction to Algorithms by Thomas H. Cormen, McGraw Hill Book Company New York. **Practical:** programming of different algorithms

CS-506 Data Communications

3(2-2)

#### Introduction

Elements of Data Communication, Analog and Digital Transmission, Data Transmission Mode, Transmission Impairments, Topologies, Data Communication Networking, Protocols and protocol Architecture (TCP/IP, OSI Model).

### **Transmission Media**

Introduction, Guided Transmission Media, Wireless Transmission.

### **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)
- 3) Prakash C. 1999. Data Communication, Prentice Hall International Inc., U.S.A

Practical: data communication ,analog and digital signal

#### CS-507 Computer Organization and Assembly

• 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, LAGBEL 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

4(3-2)

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

- Loops and comparisons LEA instruction, JP, JA, JB JG, JL, JE, JNE, JC, XZ, JZ Instructions, Loop instruction, CMP instruction, AND, OR, XOR, NOT, TEST, NEG Instruction.
- 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, CMPS, SCAS, STOS, LODS)

**Practical:** Programming using Assembly Language

- **Recommended Books** 
  - Mono M.M. 1998. Digital Logic & Computer Design. Prentice Hall Inc., USA. 1.
  - Kip R.I 2000. Assembly Language for IBM-PC. Macmillan Publishing Company, New Yor 2.

3.) Assembly Language programming and organization of the IBM PC

by Ytha Yu and Charles Marut.

#### **CS-508 Computer Graphics**

Introduction to Computer Graphics: Application of Computer Graphics.

**Overview of Graphics Systems:** RGB color model, Video Display Devices, Refresh Cathode-Ray Tubes, Raster Scan Displays and System, Random Scan Displays and system, Color CRT Monitors, Input Devices, hard-copy Devices.

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 Fixedpoint 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 Transformations: Geometric Transformation, Coordinate Transformations, Composite Transformations.

Mathematics of Projection: Taxonomy of Projection, perspective Projection, parallel Projection.

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**:

Hearn, D. and M. P. Baker, 1997, Computer Graphics, 2<sup>nd</sup> Edition in C, Prentice Hall Inc. USA. 2.

# **Reference Book**

- Foley, J. D., Andries, Van Dam, Steven K. Feiner and John F. Hughes, Computer Graphics, Principles 1. and Practices, 2<sup>nd</sup> edition in C, Addison Wesely, New York, USA.
- Xiang, Z., and R. A. Plastock, Schaum's Outline of Computer Graphics, McGraw Hill Book 2. Company.

#### **CS-509**

#### Numerical Analysis

3(2-2)Mathematical Preliminaries, Solution of equations in one variable, Interpolation and Polynomial Approximation, Numerical Differentiation and Integration, Initial Value Problems for Ordinary Differential Equations, Direct methods for solving Linear Systems, Iterative techniques in Matrix Algebra, Solution of non-linear equations. Approximation Theory. Eigenvalues and Eigenvector computation. Practical: programming of different numerical techniques

#### **Books Recommended:**

- 1. Fnires, B. 1996. Numerical Analysis. PW Publishing Company, Boston, USA.
- Watkings, S.D, 1991. Fundamental of Matrix Computations. John weley and sons, USA. 2.

4(3-2)

# CS-510 Advanced Object Oriented Programming 4(3-2)

#### **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 doe into byte code
- Overview of class libraries

#### **Transitioning 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 lvor Horton
- 2. Exploring Java by Patrick Niemeyers and Joshua Peck

#### CS-512 Automata Theory

3(3-0)

Define languages, Kleen's Clouser, 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 RECOMMANDED:**

- 1. Daniel I.A 1997. Introduction to Computer Theory. John Wiley & Sons Inc., USA
- 2. Kohavi Z.1996. Switching and Finite Automata Theory. McGraw Hill Inc, USA

#### CS-601 Systems Programming

#### 4(3-2)

### **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 semctl() 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

1.

#### **CS-602 Artificial Intelligence**

Introduction to Common LISP. AI classical systems: General Problem Solver, rules, simple search, meansends analysis. ELIZA, pattern matching, rule based translators, OPS-5. Knowledge Representation: Natural language, rules, productions, predicate logic, semantic networks, frames, objects, scripts. Search: Depth first search, breadth first search, best first search, hill climbing, min-max search, A\* search. Symbolic Mathematics: solving algebra problems, translating English equations, solving algebraic equations, simplification rules, re-write rules, meta-rules, Macsyma, PRESS, ATLAS. Logic programming: resolution, unification, horn-clause logic, Prolog programming. Sample case studies of shells and Knowledge based systems. Practical: Programming in prolog

**Books Recommended:** 

- 1. Luger, G.F. and W.A. Stubblefield, 1993. Artificial Intelligence. The Benjamin/Cummings Publishing company Inc., USA.
- 2. Elaine R., 1997. Artificial Intelligence. McGraw Hill Inc., USA.

#### **CS-603 Compiler Construction**

4(3-2)Compiler techniques and methodology. Organization of compilers. Lexical and syntax analysis. Parsing techniques. Object code generation and optimization, detection and recovery from errors. Contrast between compilers and interpreters.

Practical: construction of different compiler phases

#### **Books Recommended:**

- 1. Aho, A.V., Sethi, R. and J.D. Ullman, 1997. Compilers Principles, Techniques and Tools. Addison-wesley Publishing company, USA.
- 2. Louden, K.C., 1998. Compiler Construction, Principles and Practice. Galgotia Publishing Pvt. Ltd, New Delhi.

#### **CS-604 Software Project Management**

Software Project management: Managing the development of software products, Software estimation, Planning, Monitoring and Controlling, Metrics and Measurement, Process maturity, Quality assurance, software quality standards, Human factors in people management, Leadership and team building. Developing a Software as a Project.

#### **Books Recommended**:

- Walker R. 1998. Software Project Management, Addison Wesley Longman Inc., USA. 1.
- 2. Hold S. 2001. Software process Design, Clays Ltd, England

#### **CS-605** Visual Programming 4(3-2)

# **Introduction to Programming**

Event Driven Programming, Visual Programming: Advantages of Visual Programming, Disadvantages of Visual Programming, Graphical User Interface (GUI).

### **Introduction to Visual Basic**

Introduction to VB, History of Visual Basic, Visual Basic Edition, Visual Basic IDE, Components of IDE, Application development steps in VB, Saving your project, Three Basic Controls, Working with your Project, Creating Executable Files, and Exiting 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,

#### 4(3-2)

#### 10(0-20)

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, Dirlistbox and Filelistbox, Timer, Shape, Line and OLE 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, TexStream 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, Tasleem 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**

Network Essentials by Jason Nash, IDG books, 2000, ISBN 81-265-0034-4 Andrew S. Tanenbaum, Computer Networks, 3rd Edition, Prentice Hall 1996, ISBN 0133499456

#### **Reference Book/s**

William Stallings, Data and Computer Communications, 6<sup>th</sup> Edition, Prentice Hall 1999, ISBN 0130843709 Alberto Leon-Garcia and Indra Widjaja, Communication Networks, McGraw Hill 2000, ISBN 0070228396

#### **Distributed Database Systems CS-609**

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:**

- 1. Tamer Ozsu and Patrick Valduriez, 2002. Principles of Distributed database systems.
- Date, C.J., 1998. An introduction to Database systems. Addison-Wesley Publishing Company, USA. 2.
- 3. McFadden, F.R. and J.A. Hoffer, 1994. Modern Database Management. Benjamin Publishing Company Inc., USA.

#### Math-303 **Calculus and Analytic Geometry**

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:**

Thomas, G.W. 1992. Calculus with analytic geometry. Addison Wesley Pub. Company, U.K. 1

2. Krayszig, E. 1990. Advanced Engineering Mathematics. John Wiley and sons, New York.

#### Math-304 **Multivariable Calculus**

#### **Multivariable Functions and Partial Derivatives:** 1.

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.

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### 4(4-0)

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### 4. **Fourier Series**:

Periodic Functions, Function of any Period P-2L, Even and Odd Functions, Half Range Expansions.

### 5. Fourier Transform:

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

### 6. Laplace Transform:

Properties of Laplace Transform, Inversion Theorem, Convlution, Convlution Theorem, Second Shifting Theorem, Application of Laplace Transform to Partial Differential Equations.

#### 7. Z-Transform.

### **Books Recommended:**

1. Thomas, G.W. 1992. Calculus with Analytic Geometry. Addison Wesley Pub. Company, UK.

2. Krayszig, E. 1990. Advanced Engineering Mathematics. John Wiley and Sons, New York, USA.

#### Math-405 Differential Equations

#### 4(4-0)

3(3-0)

Ordinary Differential Equations of the First Order: Geometrical Considerations, Isoclines, Separable Equations, Equations Reducible to Separable Form, Exact Differential Equations, Integrating Factors, Linear First-Order Differential Equations, Variation of Parameters. Ordinary Linear Differential Equations; Homogeneous Linear Equations of the Second Order, Homogeneous Second-Order Equations with Constant Coefficients, General Solution, Real Roots, Complex Roots, Double Root of the Characteristic Equation, Differential Operators, Cauchy Equation, Homogeneous Linear Equations of Arbitrary Order, Homogeneous Linear Equations of Arbitrary Order with Constant Coefficients, Nonhomogeneous Linear Equations of Arbitrary Order with Constant Coefficients, Nonhomogeneous Linear Equations of Differential Equations. Series Solutions of Differential Equations.

Partial Differential Equations: Method of Separation of variables, Wave, Heat & Laplace equations and their solutions by Fourier series method.

#### **Books Recommended:**

- 1. Thomas, G.W, 1987, Calculus with Analytic Geometry, Addison Wesley Pub. Company, U.K.
- 2. Rainvile, T.D. 1997, A short course in differential equation, Macmillan Publishing company Inc., New York.

#### 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  $\mathbb{R}^2$ . Linear combinations of vectors of 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 ,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, Digonalization.

#### APPLICATIONS TO SYSTEMS OF EQUATIONS

Introduction, Equivalent equations, Gaussian elimination method, Gauss-Jordan method, consistent or inconsistent system, Consistency criterion.

#### 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:**

- 1. Thomas, G.W. 1992. Calculus with Analytic Geometry. Addison Wesley Pub. Company, UK.
- 2. Krayszig, E. 1990. Advanced Engineering Mathematics. John Wiley and Sons, New York, USA.

#### Phy-305 Basic Electronics

3(2-2)

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
- To Determine the resistance and hence specific resistance of the material of a given coil of wire using a slide wire bridge.
- To determine unknown resistance and hence specific resistance of a wire 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  $L_B$  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  $L_C$  along abscissa and ordinate respectively.

#### **Books Recommended:**

- 1. Grobe, S. 1997. Basic Electronics. McGraw Hill inc., USA.
- 2. Halkias M. 1997. Integrated Electronics. McGraw Hill inc., USA.
- 3. Physics Practical manual-II by M. Rafiq Nasim et al

Phy-405 Circuit Theory

#### • 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 darn, 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/nonsinusoidal) wave shape, frequency.

#### • 555 Timer and Its applications;

- Introduction to 555 timer, multivibrator circuits with 555 timer circuit. Operational amplifier and its application.
- Introduction to Op. Amp., inverting, non-inverting op-amp. Circuits and their output gain.
- •

#### PRACTICAL

1. Common Emitter Amplifier Biasing and Stabilization.

- 2. Common emitter Amplifier power and phase relationship.
- 3. Common base amplifier.
- Common collector amplifier. 4.
- 5. Frequency response of an amplifier.
- Junction field effect transistor (JFET) common source amplifier. 6.
- Junction filed effect transistor (JFET) Gate source amplifier. 7.
- 8. Junction filed effect transistor (JFET) Drain source amplifier.
- 9. Feedback Amplifier.
- 10. Operational Amplifier.

### **Books Recommended:**

- 1. Basic Electronics by Grob.
- Electronic Principles by Malvino. 2.
- Doyledod, W., 1997. Introduction to electronic circuit analysis. McGraw Hill Inc., USA. 3.
- Halkias M. 1997. Integrated Electronics. McGraw Hill Inc., USA. 4

#### 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:**

- 1. Chaudhry, S.M. 1998. Introduction to Statistical Theory Volume I-II. Ilmi Kitab Khana, Lahore.
- 2. 3. Snedecor, G.W. 1990. Statistical Methods. Iowa State University Press, U.S.A.
- Walpole, R.E. 1992. Introduction to Statistics. Macmillon Publishing company, New York.

#### **MBA-306 Financial Accounting**

#### . **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

Bookkeeping, Journal, Ledger, Trail Balance, Adjusting Entries, Closing Entries, Work Sheet.

#### 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.

#### **Accounts Receivables and Notes Receiveles** 5.

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

#### **Inventories & Cost of Goods Sold** 6.

**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.

3(3-0)

### 8. Liabilities Commen to Most Business Org.

Current Liabilities, Long term liabilities, Evaluating the Safety of Creditors Claim, Estimated Liabilities, Loss Contgencies and Commitments.

#### 9. Corporation Organizations and Stockholders

What is Corporation, Advantages and Disadvantages of Corporation, Formation of Corporation, Stockholder Equity, Cash dividends, Capital Stock, Preferred Stock, Common Stock.

#### 10. Corporation Operations and Additional stock Holders Equety Transactions Reporting the result of Operations

Developing Productive Information, Unusual Items Reporting, Continuous Operations, Extra Ordinary Items, EPS, Primary and Fully Dilated EPS, Change in Accounting Principle.

#### 11. Other Stockholder Equity Transactions

Cash Dividends, Dividend Dates, Liquidating Dividend, Stock Dividends, Stock Splits, Statement of Retained Earnings, Prior Period Adjustment, Treasury Stock, Recording Purchases of Treasury Stock, Re-Issuance of Treasury Stock, Stock Payback Program.

#### **Books Recommended:**

- 1. Vinayaham, M.&K.L.Magrafan 1992. Principles of Accounting, Eurasia, Pub. House, New Delhi.
- 2. Ghani, M.A. 1985. Principles of Accounting, National Publishing Corp. Lahore.
- 3. Malik, G.A., S.A. Siddiqi and M.-ul-Hassan, 1995. Accounting Principles. Naveed Publications, 63-Shahrah-e-Quaid-e-Azam, Lahore.

#### MBA-404 Financial Management

3(3-0)

Introduction to Financial Management, Concepts and Models in Valuation, The time value of money. Fundamentals of risk and portfolio analysis. Valuation of stocks and bonds. The capital Asset Pricing Model. The Arbitrage Pricing Model and other valuation models. The Cost of Capital: Capital structure and Dividend Policy, The cost of capital, Capital structure theory, Capital structure policy and optimal capital structure, Internal financing and dividends policy Capital Budgeting: The basis of capital budgeting, The determination and use of cash flow, Mutually exclusive investments and capital rationing, Annual equivalent cost and replacement decisions, Risk analysis and the optimal capital budget, Islamic guidelines for financial management: The rational of prohibition of interest, Alternate capital structure, Capital Budgeting in an Interest free economy, working Capital Management in 100% equity capital structure.

#### **Books Recommended:**

- 1. Vanhorn, J.C. 1999. Fundamentals of Financial Management. Lawarance J.Gitman, N.Y., USA.
- 2. Khan, M. Y. & P.K.Jain 1995. Financial Management Second Edition. Eurasia, Publication house, New Dehli.

#### MBA-407 Human Resource Management

An overview of Human Resource Management and Human Resource Manager. The Environment of Human Resource Management, External and Internal Environment. Equal Employment Opportunity and Affirmative Action. Job Analysis: A Basic Human Resource Tool. Human Resource Planning, Recruitment, and Selection. Organization Change and Human Resource Development. Corporate Culture and Organization Development. Career Planning Development. Performance Appraisal.

#### **Book Recommended:**

- 1. Brovee, H. 1997. Human Resource Management. McGraw Hill Inc., USA.
- 2. Willaim B and J. Werther 1997. Human Resource and Personnel Management. McGraw Hill, Inc, USA.

# 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)

#### 3(3-0)

- 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**

- 1. Khan, Nosheen & Qureshi, G. s. A Selection of English Prose 1997. The Caravan Book House, Katochy Road, Lahore.
- 2. W. Stannard Allen. The Living English Structure, 1978. Khurrum, Publishing Enterprises, Lahore.
- L. A. Hill and R. D. S. Fielden, Further Comprehension and Precis Pieces for Overseas Students (Latest Edition). The Book House, Publishers and Booksellers, 15-Trust Buildings, Opposite Urdu Bazar, P. O. Box 734, Lahore; and Longmans, Green & Co. Ltd., Annexe 2-K, Gulberg, Lahore.

#### 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
  - Synthesis Techniques (Simple, Compound and Complex Sentences)
- 6. Home Assignments

### **Books Recommended**

5.

- 1. Khan, Nosheen & Qureshi, G. s. A Selection of English Prose. The Caravan Book House, Kachehri Road, Lahore.
- 2. W. Stannard Allen. The Living English Structure. 1978. Khurrum Publishing Enterprises, Lahore.
- 3. Ganter, Elliott S. M. and Cordasco, Francesco. Research and report Writing. 1959. Barnes & Noble, New York.
- 4. Hubbel, Georage Shelton. Writing Term Papers and Reports. 1971. Barnes & Noble, New York.

IS-401/ SSH-301(A)	Islamic Studies / Ethcis	Already Approved	2(2-0)
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:**

Literacy and Education, Population Growth, State of Science & Technology, Prospects for development in Information Technology, Unemployment and under employment, Drug addiction, Weaponization and lawlessness, Tribal Customs and intolerance.

#### **Books Recommended**

- 1. Zia-Ud-Din , 1995. The Analytical and Critical Essay on Pakistan Affairs. Azeem Academy Lahore.

- Lia-Od-Din', 1995. The Analytical and Critical Essay on Latistan Analysis.
   Haq, M.Riaz,2000. Towards Pakistan. Star Book Depot , Lahore.
   Rabbani I., 2000. Pakistan Studies , Caravan Publishers Lahore.
   Mehmood, Safdar. 2001. International Affairs . Jang Publishers Lahore.
- 5. Burke, S.M.1975. Pakistan Foreign Policy, Oxford University Press Karachi.