

University of Pune

Revised Syllabus for the F.Y.B.Sc. (Comp. Sci.) (From Academic Year 2008-2009)

a) **Structure of Course**
F.Y.B.Sc. (Comp. Sci.)

Subject (I) Computer Science	
Paper – I	Introduction to Programming and ‘C’ Programming.
Paper – II	File Organization and Fundamental of Databases
Paper- III	Lab Course based on ‘C’ Programming
Paper – IV	Lab Course based on O.S., HTML, Shell Programming and DBMS

Detail Syllabus
Subject :- Computer Science

At F.Y.B.Sc. (Comp. Sci.) there are two theory papers and two practical papers.

The syllabus and the implementation of these papers will be as follows.

Paper – I Computer Science Theory Paper – I
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Title :- Introduction to Programming and ‘C’ Programming.

Teaching Scheme :- 3 Lectures Per Week

Examination Scheme :-

There will be 80 : 20 pattern of evaluation in which 80 marks are for Annual Examination to be conducted at the end of academic year and 20 marks for term wise internal evaluation.

Objective :-

- i) To develop a programming logic
- ii) To teach basic principles of programming
- iii) To develop skills for writing programs using ‘C’

Syllabus :-

F.Y.B.Sc (Computer Science)
Computer Science Paper – I : C Programming

No	Topic	Lectures
1	Programming languages 1.1 Machine language 1.2 Assembly language 1.3 High level languages 1.4 Compilers and Interpreters	3
2	Problem Solving using Computers 2.1 Algorithms 2.2 Flowcharts	4
3	Introduction to C 3.1 History 3.2 Structure of a C program 3.3 Functions as building blocks 3.4 Application Areas 3.5 C Program development life cycle	2
4	C Tokens 4.1 Keywords 4.2 Identifiers	12

	<p>4.3 Variables</p> <p>4.4 Constants – character, integer, float, string, escape sequences</p> <p>4.5 Data types – built-in and user defined</p> <p>4.6 Operators and Expressions</p> <p>Operator types (arithmetic, relational, logical, assignment, bitwise, conditional , other operators) , precedence and associativity rules.</p>	
5	<p>Input and Output</p> <p>5.1 Character input and output</p> <p>5.2 String input and output</p> <p>5.3 Formatted input and output</p>	3
6	<p>Control Structures</p> <p>6.1 Decision making structures</p> <p>If, if-else, switch</p> <p>6.2 Loop Control structures</p> <p>While, do-while, for</p> <p>6.3 Nested structures</p> <p>6.4 break and continue</p>	10
7	<p>Functions in C</p> <p>7.1 What is a function</p> <p>7.2 Advantages of Functions</p> <p>7.3 Standard library functions</p> <p>7.4 User defined functions</p> <p>Declaration, definition, function call, parameter passing (by value), return keyword,</p> <p>7.5 Scope of variables, storage classes</p> <p>7.6 Recursion</p>	8
8	<p>Arrays</p> <p>8.1 Array declaration, initialization</p> <p>8.2 Types – one, two and multidimensional</p> <p>8.3 Passing arrays to functions</p>	8
9	<p>Pointers</p> <p>9.1 Pointer declaration, initialization</p> <p>9.2 Dereferencing pointers</p> <p>9.3 Pointer arithmetic</p> <p>9.4 Pointer to pointer</p> <p>9.5 Arrays and pointers</p> <p>9.6 Functions and pointers – passing pointers to functions, function returning pointers, pointer to function</p> <p>9.7 Dynamic memory allocation</p>	8
10	<p>Strings</p> <p>10.1 Declaration and initialization</p> <p>10.2 Standard library functions</p> <p>10.3 Strings and pointers</p> <p>10.4 Array of strings.</p>	4

11	Structures and Unions 11.1 Creating structures 11.2 Accessing structure members (dot Operator) 11.3 Array of structures 11.4 Passing structures to functions 11.5 Nested structures 11.6 Pointers and structures 11.7 Unions 11.8 Difference between structures and unions	6
12	C Preprocessor 12.1 Format of Preprocessor directive 12.2 File Inclusion directive 12.3 Macro substitution, nested macro, argumented macro 12.4 Conditional compilation	3
13	Command Line Arguments 13.1. Accessing command line arguments	2
14	File Handling 14.1 Streams 14.2 Types of Files 14.3 Operations on files 14.4 Random access to files	6

Total lectures : 80

References

1. Structured Programming approach using C – Forouzan and Gilberg, Thomson learning publications
2. The C Programming language – Kernighan and Ritchie
3. Complete C Reference – Herbert Schildt

Paper – II Computer Science Theory Paper – II

Title :- File Organization and Fundamental of Databases

Teaching Scheme :- 3 Lectures Per Week

Examination Scheme :-

There will be 80 : 20 pattern of evaluation in which 80 marks are for Annual Examination to be conducted at the end of academic year and 20 marks for term wise internal evaluation.

Objective :-

- i) To teach fundamental concepts of files
- ii) To teach principles of databases
- iii) To teach database management operation

Syllabus :- **F.Y.B.Sc (Computer Science)**
Computer Science Paper – II :Database Fundamentals

No	Topic	Lectures
1	File Organization Introduction Physical / logical files Special characters in files, fields & record organization (fixed , variable length) types of file organization (heap, sorted, indexed,hashed), choosing a file organization	6
2	Indexed File Organization Overview of indexes, types of indexes (dense, sparse, clustered, primary, secondary, tree (multilevel indexes, B+ tree)	4
3	Introduction of DBMS Overview, File system Vs DBMS, Describing & storing data (Data models (relational, hierarchical, network)), Levels of abstraction , data independence, Queries in DBMS (SQL : DDL, DML,DCL,TCL), Structure of DBMS, People who deal in DBMS, Advantages of DBMS	6
4	Conceptual Design (E-R model) . Overview of DB design, ER data model (entities, attributes, entity sets, relations, relationship sets) , Additional constraints (key constraints, participation constraints, weak entities, aggregation / generalization,	15

	conceptual design using ER (entities VS attributes, Entity Vs relationship, binary Vs ternary, constraints beyond ER), Conceptual design for small to large enterprises, Case studies .	
5	Relational data model Relations (concepts, definition), Conversion of ER to Relational model , integrity constraints (key, referential integrity, general constraints)	6
6	Relational algebra Preliminaries, Relational algebra (selection, projection, set operations, renaming, joins, division)	6
7	SQL DDL (create, drop, alter), forms of a basic SQL query (egs, expressions, strings in SQL), union / intersection / except, nested queries(introduction, correlated queries, set comparison operators), Aggregate operators (group by, having), aggrerate functions, Null values (comparison using NULL, logical connections (AND,OR,NOT) impact on SQL commands, outer joins, disallowing NULL), examples on SQL (case studies)	22
8	Functional dependency Introduction to schema refinement (problems caused by redundancy, use of decomposition , problems related to decomposition, functional dependencies, egs motivating schema refinement (constraints on an entity set, constraints on relation set, identifying attributes of entities, identifying entity sets)), reasoning about functional dependency (F^+ , attribute closure), Normalization forms (1NF, 2NF, 3NF, BCNF), decomposition (lossless join, dependency preserving property), normalization (decomposition into BCNF, decomposition into 3NF), other kinds of decomposition (multivalued dependency)	15

Total lectures : 80

References

1. Database systems , By KORTH
2. Database systems By Nawathe
3. Postgresql , O'Reilly publications
4. Database systems , by Raghuramakrishnan

Paper – III Computer Science Practical Paper – I

Title :- Lab Course based on 'C' Programming

Teaching Scheme :- 4 Lectures Per Week per batch of 15 students

Examination Scheme :-

Practical examination will be conducted by respective colleges at the end of academic year, 80 marks will be assigned to practicals and 20 marks for journals and orals.

Assignment List (20 Assignments) for Lab - I (F.Y.B.SC (CS))

1. Assignment to demonstrate use of data types, simple operators (expressions)
2. Assignment to demonstrate decision making statements (if and if-else, nested structures)
3. Assignment to demonstrate decision making statements (switch case)
4. Assignment to demonstrate use of simple loops
5. Assignment to demonstrate use of nested loops
6. Assignment to demonstrate menu driven programs.
7. Assignment to demonstrate writing C programs in modular way (use of user defined functions)
8. Assignment to demonstrate recursive functions.
9. Assignment to demonstrate use of arrays (1-d arrays) and functions
10. Assignment to demonstrate use of multidimensional array(2-d arrays) and functions
11. Assignment to demonstrate use of pointers
12. Assignment to demonstrate concept of strings (string & pointers)
13. Assignment to demonstrate array of strings.
14. Assignment to demonstrate use of bitwise operators.
15. Assignment to demonstrate structures (using array and functions)
16. Assignment to demonstrate structures and unions
17. Assignment to demonstrate command line arguments and preprocessor directives.
18. Assignment to demonstrate file handling (text files)
19. Assignment to demonstrate file handling (binary files and random access to files)
20. Assignment to demonstrate graphics using C

Paper – IV Computer Science Practical Paper – II

Title :- Lab Course based on O.S., HTML, Shell Programming and DBMS

Teaching Scheme :- 4 Lectures Per Week per batch of 15 students

Examination Scheme :-

Practical examination will be conducted by respective colleges at the end of academic year, There will be grading system based on performance of candidates.

The grading system is as follows.

Marks	Grade
Below 40	D
40 - 50	C
50 - 60	C+
60 - 70	B
70 - 80	B+
80 - 90	A
90 and Above	A+

Assignment List (10 Assignments) for Lab - II (F.Y.B.SC (CS) Term I)

1. Introduction to DOS (Using basic commands like date, time, dir, copy con , type,ren etc.)
2. Creating a directory structure in Dos (Using commands md, cd, rd, copy) and batch file.
3. Introduction to Windows (File operations using windows explorer,Internet explorer, desktop related operations etc.)
4. Introduction to Linux (Using basic commands like cat with options, ls with options, cal, pwd, wc, grep with options, i/o redirection using >,>>,<,| etc.)
5. Creating a directory structure in Linux (Using commands mkdir,cd, rmdir, cp, mv etc.)
6. Shell Programming (Writing simple shell scripts, use of conditional structures).
7. Shell programming (Writing shell scripts using control structures (embedding simple Linux commands into the script)
8. HTML programming (Creating simple HTML pages (use of different tags for changing fonts, foreground and background colors etc.))
9. HTML programming (use of lists, tables, frames, hyperlinks)
10. HTML programming (Creation of forms, small case study to create HTML pages using all the above learnt techniques).

Assignment List (10 Assignments) for Lab - II (F.Y.B.SC (CS) Term II)

1. Assignment to create simple tables , with only the primary key constraint (as a table level constraint & as a field level constraint) (include all data types)
2. Assignment to create more than one table, with referential integrity constraint, PK constraint.
3. Assignment to create one or more tables with following constraints, in addition to the first two constraints (PK & FK)
 - a. Check constraint
 - b. Unique constraint
 - c. Not null constraint
4. Assignment to drop a table from the database, to alter the schema of a table in the Database.
5. Assignment to insert / update / delete records using tables created in previous Assignments. (use simple forms of insert / update / delete statements)
6. Assignment to query the tables using simple form of select statement
Select <field-list> from table [where <condition> order by <field list>]
Select <field-list, aggregate functions > from table [where <condition> group by <> having <> order by <>]
7. Assignment to query table, using set operations (union, intersect)
8. Assignments to query tables using nested queries
NB : 1. 'Where' clause condition will be compound demonstrating joins between tables.

2. 'Where' clause condition can be demonstrating joins can be written as nested query
9. Assignment to query tables , using nested queries (use of 'Except', exists, not exists clauses
10. Assignment related to small case studies (Each case study will involve creating tables with specified constraints, inserting records to it & writing queries for extracting records from these tables)

Lab Course Guidelines for F.Y.B.Sc (Computer Science)

1. There should be a lab book for the practical course
2. The lab book will contain details of all practicals to be conducted in the lab
3. Students should read the lab book before coming to the lab
4. Every practical should have:
 - a. Title
 - b. Objectives
 - c. Description
 - d. Examples
 - e. Self Activities
 - i. Objective questions
 - ii. Sample programs to be typed and executed
 - f. Task list to be decided by the lab in-charge.
 - g. Outputs to be verified by the lab in-charge.
5. Each practical should be conducted in the following manner :
 - a. Explanation by lab-incharge – 10 minutes
 - b. Self activities by students
 - c. Lab in-charge will allocate tasks to each student (selection from a list / modify given task / specify new task)
 - d. At the end of the slot, the lab in-charge has to verify the outputs and give a remark (Complete / Incomplete / Needs Improvement)