



# St. Xavier's College – Autonomous Mumbai

## Syllabus For 1<sup>st</sup> Semester Courses in Information Technology (June 2014 onwards)

### Contents:

#### Theory Syllabus for Courses:

S.ITS.1.01 - Professional Communication Skills

S.ITS.1.02 - Applied Mathematics - I

S.ITS.1.03 - Fundamentals of Digital Computing

S.ITS.1.04 - Electronics and Communication Technology

S.ITS.1.05 - Introduction to C++ Programming

Practical Course Syllabus for: S.ITS.1.PR

**F.Y. B.Sc.IT**

**Course: S.ITS.1.01**

**Title: Professional Communication Skills**

**Learning Objective:**

To equip the students with communication skills required in the Information Technology Industry.

**Number of lectures: 75**

**UNIT 1**

**The Seven Cs of Effective Communication**

**(13 lectures)**

Completeness  
Conciseness  
Consideration  
Concreteness  
Clarity  
Courtesy  
Correctness

**UNIT 2**

**Communication: Its interpretation**

**(13 lectures)**

Basics  
Nonverbal Communication  
Barriers to Communication

**UNIT 3**

**Business Communication at Work Place**

**(13 lectures)**

Letter Components and Layout  
Planning a letter  
Process of Letter writing  
E-mail Communication  
Memo and Memo reports  
Employment Communication  
Notice agenda and Minutes of meeting  
Brochures

**UNIT 4**

**Report writing**

**(12 lectures)**

Effective writing  
Types of business reports  
Structure of reports  
Gathering information  
Organization of the material  
Writing abstracts and summaries  
Writing definitions  
Visual aids  
User instruction manual

**UNIT 5**

**Required Skills**

**(12 lectures)**

Reading skills  
Listening skills  
Note-making  
Précis writing

Audiovisual aids  
Oral communication

### **UNIT 6**

#### **Mechanics of writing**

**(12 lectures)**

Transitions  
Spelling rules  
Hyphenation  
Transcribing numbers  
Abbreviating technical and non-technical terms  
Proof reading

#### **Continuous Internal Assessment**

Industrial visits, Group Discussion, presentations / seminars  
Mid Term test.

#### **List Of Text Books**

1. Professional Communication by ArunaKoneru, McGrawHill.
2. Effective Business Communication by Herta A Murphy, Herbert W Hildebrandt, Jane P Thomas, McGrawHill.

#### **List Of Recommended Reference Books**

1. Business Communication, Lesikar and Petit, McGrawHill.
  2. Communication Skills Handbook, Summers, Wiley, India.
  3. Business Communication (Revised Edition), Rai and Rai, Himalaya Publishing House.
  4. Business Correspondence and Report Writing by R. C. Sharma and Krishna Mohan, TMH.
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**F.Y. B.Sc.IT**

**Course: S.ITS.1.02**

**Title: Applied Mathematics - I**

#### **Learning Objective:**

To study basic mathematics required for developing algorithms for system and application software

**Number of lectures: 75**

### **UNIT 1**

#### **Matrices**

**(13 lectures)**

Minors and Cofactors  
Adjoint of a square matrix  
Inverse of a matrix  
Rank of a matrix  
Solution of Homogeneous and non-homogeneous linear Equations using Matrix

method

### **UNIT 2**

#### **Eigen Values and Eigen Vectors**

**(13 lectures)**

Vectors

Linear combination of vectors  
Inner Product of two vectors  
Characteristic equation  
Eigen Vector  
Cayley- Hamilton Theorem  
Similarity of Matrices  
Derogatory and Non-derogatory matrices

Complex Matrices

Hermitian

Skew-Hermitian and Unitary matrices and their properties

### **UNIT 3**

#### **Vector Calculus**

**(13 lectures)**

Vector Differentiation:

Vector Operator Del

Gradient and Geometrical Meaning of gradient

Divergence

Curl

### **UNIT 4**

#### **Differential Equations**

**(12 lectures)**

Differential Equations of 1st order and 1st degree and applications

### **UNIT 5**

#### **Linear Differential Equations**

**(12 lectures)**

Linear Differential equations with constant coefficient

Differential equations of higher order and applications

### **UNIT 6**

Successive differentiation

**(12 lectures)**

Mean Value theorems

Partial differentiation

Euler's Theorem

Approximation and errors

Maxima and Minima

#### **Continuous Internal Assessment**

Assignments / Problem solving test

Mid Term test.

#### **List Of Text Books**

1. Engineering Mathematics A tutorial approach by R. R. Singh and Mukul Bhatt, TMH 2010
2. Text Book of Applied Mathematics Vol I and Vol II. P.N. Wartikar & J.N. Wartikar, Pune Vidyarthi Griha Prakashan

#### **List Of Recommended Reference Books**

1. Higher Engineering Mathematics by B. V. Ramana, McGrawHill
2. Differential Calculus by Shanti Narayan. S. Chand.
3. Higher Engineering Mathematics by B.S. Grewal, Khanna Publications
4. Vector Analysis by Murray Spiegel, McGrawHill
5. Matrices by Vashista, S. Chand

**F.Y. B.Sc.IT**

**Course: S.ITS.1.03**

**Title: Fundamentals of Digital Computing**

**Learning Objective:**

To study the basic building blocks of any digital electronic machine, for example the hardware of a computer

**Number of lectures: 75**

**UNIT 1**

**Data and Information**

**(12 lectures)**

Features of Digital Systems

Number Systems

Decimal

Binary

Octal

Hexadecimal and

Inter conversions

Representation of Data

Signed Magnitude

One's complement

Two's complement

Binary Arithmetic

Fixed point representation and Floating point representation of numbers

Codes

BCD

XS-3

Gray code

Hamming code

Alphanumeric codes (ASCII, EBCDIC, UNICODE)

Error detecting and error correcting codes

**UNIT 2**

**Boolean Algebra**

**(12 lectures)**

Basic gates (AND, OR, NOT gates)

Universal gates (NAND and NOR gates)

Other gates (XOR, XNOR gates)

Boolean identities

De Morgan Laws.

Karnaugh maps:

SOP and POS forms

QuineMcClusky method.

**UNIT 3**

**Combinational Circuits**

**(12 lectures)**

Half adder

Full adder

Code converters

Combinational circuit design

Multiplexers and demultiplexers  
Encoders  
Decoders  
Combinational design using mux and demux.

#### **UNIT 4**

#### **Sequential Circuit Design**

**(13 lectures)**

Flip flops  
RS  
Clocked RS  
D-Type  
JK  
JK Master Slave  
T-Type  
Counters  
Shift registers and their types  
Counters  
Synchronous and Asynchronous counters.

#### **UNIT 5**

#### **Computers**

**(13 lectures)**

Basic Organisation  
Memory  
ROM  
RAM  
PROM  
EPROM  
EEPROM  
Secondary Memory  
Hard Disk and optical Disk  
Cache Memory  
I/O devices

#### **UNIT 6**

#### **Operating Systems**

**(13 lectures)**

Types  
Real Time  
Single User / Single Tasking  
Single user / Multi tasking  
Multi user / Multi tasking  
GUI based OS  
Overview of desktop operating systems  
Windows and LINUX

#### **Continuous Internal Assessment**

Assignments / Project  
Mid Term test.

#### **List Of Text Books**

1. Modern Digital Electronics by R. P. Jain, 3rd Edition, McGraw Hill
2. Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit, University Science Press
3. Linux Commands by Bryan Pfaffaenberger BPB Publications

4. UNIX by Sumitabha Das, TMH

**List Of Recommended Reference Books**

1. Digital Principles and Applications by Malvino and Leach, McGrawHill
2. Introduction to Computers by Peter Norton, McGraw Hill

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**F.Y. B.Sc.IT**

**Course: S.ITS.1.04**

**Title:** Electronics and Communication Technology

**Learning Objective:**

To Study electronic devices and circuits which are used in the communication technology and computer hardware.

**Number of lectures: 75**

**UNIT 1**

Concept of:

**(12 lectures)**

Conductor

Semiconductor

Insulator

Semiconductor Diode

Forward bias

Reverse Bias

Application of Diode as Rectifier

Zener diode and its applications

Introduction to Transistor

BJT, FET

PNP, NPN Transistors their Characteristic

Application of Transistor as amplifier and as a Switch.

**UNIT 2**

Concept of amplification

**(12 lectures)**

Amplifier notations ( $A_v$ ,  $A_i$ ,  $A_{pZi}$ ,  $Z_o$ )

Application of BJT as single stage Amplifier

Frequency response of single stage Amplifier

Multistage Amplifiers (Basics concepts)

RC coupled, cascade

Darlington pair

DC amplifiers

**UNIT 3**

Concept of Feedback

**(12 lectures)**

Negative Feedback and its advantage in Amplification

Positive Feedback

Oscillators

RC Phase Shift Oscillator

LC Oscillator

Switching Circuits Multivibrators

Monostable using IC 555 and Astable using IC 555 (including problems)

#### **UNIT 4**

##### Introduction

**(13 lectures)**

Need for modulation system  
Concept of Modulation

##### AM

Definition of AM  
Modulation index  
Power relation in AM  
Generation and Demodulation of AM

##### SSB

Power requirement in comparison with AM  
Advantages of SSB over AM  
Concept of Balanced Modulator  
Generation of SSB  
Pilot Carrier System  
Independent Side System  
Vestigial Sideband Transmission

#### **UNIT 5**

##### FM

**(13 lectures)**

Definition of FM  
Bandwidth  
Noise triangle  
Pre-emphasis and De-emphasis

##### PM

Definition of PM  
Difference between AM and FM  
Radio receivers

##### Pulse Modulation

Sampling Theorem  
PAM  
PTM  
PWM  
PPM  
Pulse code modulation  
Quantization noise  
Companding  
PCM system  
Differential PCM  
Delta modulation

##### Multiplexing

FDM/TDM.

##### Television

Scanning  
Composite Video signal  
Television Transmitter  
Television receiver

#### **UNIT 6**

##### Introduction to Digital Communication

**(13 lectures)**

PSK  
ASK



## FSK

Introduction to fibre optics system

Propagation of light in optical fibre

Ray model

Types of fibre

Single mode

Steps index

Graded index

Signal distortion

Attenuation

Dispersion

Optical sources

LED

LASERS

Optical Detectors and optics links

Link Budget

## Continuous Internal Assessment

Assignments / Project

Mid Term test

## List Of Recommended Reference Books

1. Allen Mottershead, "Electronic Devices and Circuits", PHI
2. Boylestad and Neshelesky, "Electronics Devices and Circuits", 4<sup>th</sup>, PHI, 1999.
3. Simon Haykin, "An Introduction to Analog and Digital communications", John Wiley and Sons, 1994.
4. R.B Carlson, "Communication Systems", MacGraw Hill.
5. George Kennedy, "Electrical Communication systems", Tata McGraw Hill 1993.
6. Roody Collin, "Electronics Communication", PHI
7. J. Millman and A Grabel, "Microelectronics" MacGraw Hill 1988.
8. Proakis J. J, "Digital Communications" McGraw Hill.
9. Digital Communications by TAUB Schilling
10. Electronic Communication Systems, Roy BlakeDelmar, Thompson Learning
11. Introduction To telecommunications, AnuAGokhale, Delmar Thompson Learning

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**F.Y. B.Sc.IT**

**Course: S.ITS.1.05**

**Title: Introduction to C++ Programming**

### **Learning Objective:**

To help students learn to write an algorithm, convert it to program logic and execute the same on a computer, thus instilling the foundations of basic programming principles in them.

**Number of lectures: 75**

### **UNIT 1**

**Programming Logic and techniques**

**(12 lectures)**

Algorithms

Flow-charts

Program Design

Introduction to C++

Origin of C++

A Sample C++ program

Pitfall and programming tips

Testing and Debugging.

## **UNIT 2**

**C++ concepts**

**(12 lectures)**

Variables and Assignments

Variables

Identifiers

Variable declarations

Assignment Statements

Reference variable

Symbolic constant

Input and Output

cin, cout

Escape sequences

include directives and Namespaces

Indenting and Comments

Operator precedence

Data types and expressions

Arithmetic operators

Type compatibilities

Continuous Internal Assessment

## **UNIT 3**

**Flow of Control**

**(13 lectures)**

Compound statements

Loops

while

for

do while

nested loops.

Decision making

if – else

nested if else

switch

break and continue

Manipulators

endl

setw

sizeof

Increment and decrement operators

Type Cast Operators

Scope resolution operators

## **UNIT 4**

**Functions**

**(13 lectures)**

Function Prototypes

Built in functions and user defined functions

Function overloading  
Call by reference  
Call by value  
const member functions

Inline Functions and recursive functions

Math Library Functions

### **UNIT 5**

#### **Derived Data types**

**(13 lectures)**

Arrays

Introduction to arrays  
Arrays in functions  
2-D arrays  
Multidimensional arrays

Pointers and Functions

Introduction to pointers  
void pointers  
Pointers in function  
Pointer to constant and constant pointer  
Generic pointer

### **UNIT 6**

#### **Strings, Vectors and Structures**

**(12 lectures)**

String functions

strcmp  
strcat  
strlen  
strcpy

Vector Basics

Introduction to structures

#### **Continuous Internal Assessment**

Assignments / Project  
Mid Term test.

#### **List Of Text Books**

1. Problem Solving with C++ , Walter Savitch, Sixth Edition, Pearson Education.
2. J. R. Hubbard, Schaum's outlines "Programming with C++", Second Edition , Tata McGrawHill
3. Y.P.Kanetkar, "Let us C++" , seventh edition, BPB publication

#### **List Of Recommended Reference Books**

1. Object Oriented programming with C++ ,E Balagurusamy , Third Edition , Tata McGraw Hill.
2. Object oriented programming with C++ PoonamchandraSarang, PHI Second Edition.
3. Pure C++ programming , Amir Afzal, Pearson Education.
4. Computer Science – A structured Approach using C++ bu B. Forouzan, R. F. Gilberg, Cengage Publication

**F.Y. B.Sc.IT**

**Course: S.ITS.1.PR**

**Title: Electronics Communication & Digital Computing and Introduction to C++ Programming (ECT & C++)**

**Practical – I:**

**Fundamentals of Digital Computing and  
Electronics and Communication Technology**

**Learning Objective:** To understand the working of the fundamental building blocks of a digital computer. To study basic electronics and telecommunication circuits.

**Number of lectures: 45**

**For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

**Digital Computing practicals**

- I) Study of logic gates (basic and universal)
- II) Verify De Morgan's theorems
- III) Design and implement Half adder and full adder using gates.
- IV) Design and implement binary to gray code converter and vice versa using XOR gates.
- V) Design and implement multiplier for two 2-bit binary numbers using minimum number of gates.
- VII) Reduce the given numeric form using K-map and implement using gates.
- VIII) Implement SOP /POS forms using logic gates.
- IX) Implement logic gates using multiplexers.
- X) Implement expressions using multiplexers and demultiplexers
- XI) Implement 3-bit binary ripple counter using JK flip flops.

**Linux**

- I) Installation of Linux
- II) Study of Linux Commands with all switches:  
ls, mkdir, cd, rmdir, wc, cat, mv, chmod, date, time, grep, tty, who, whoami, finger, pwd, man, cal, echo, ping, ifconfig, tar, telnet

**Electronics and Telecommunication practicals**

- I) Study of Zener diode characteristics
- II) Study of Half wave and full wave rectifiers
- III) Study of bridge rectifier.
- IV) Study of Transistor as a switch
- V) Monostablemultivibrator using IC 555 timer.
- VI) Astablemultivibrator using IC 555 timer.

- VII) Study of Wien bridge oscillator
- VIII) Frequency Response of single stage transistor amplifier
- IX) Study of Amplitude Modulation
- X) Study of Frequency Modulation
- XI) Study of Fibre Optic transmission
- XII) Study of Pulse Amplitude Modulation
- XIII) Study of transistor DC Amplifier

### **Continuous Internal Assessment**

MCQ / Viva test during practicals

Mid Term practical test.

**F.Y. B.Sc.IT**

**Course: S.ITS.1.PR**

**Practical – II:**

## **Introduction to C++ Programming**

### **Learning Objective:**

To help students learn to write an algorithm, convert it to program logic and execute the same on a computer, thus instilling the foundations of basic programming principles in them.

**Number of lectures: 45**

**For a 1.5 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.**

- I) Write a C++ program for Formatting the following statement using setw and endl:  
“ Nothing is difficult than beginning”  
“So Let’s start the voyage of technology”
- II) Write a C++ program to Calculate simple and compound interest.
- III) Write C++ programs to perform the following:
  - a. Calculate sum of the digits of a number
  - b. Find the reverse of a number, entered by the user.
- IV) Write a C++ program for:
  - a. solving the quadratic equation
  - b. printing all the prime numbers in a given range (ask user input for lower bound and upper bound of the range)
- V) Write a C++ program for displaying the Fibonacci series.
- VI) Write a C++ program for converting number to words. (switch, break, continue)
- VII) Write a C++ function for:
  - a. Swapping two numbers with the use of a third variable
  - b. Swapping two numbers without using third variable.
- VIII) Write a recursive C++ function for calculating the factorial of a given number
- IX) Write a C++ program for (1D arrays):
  - a. sorting an array of numbers in ascending and descending order
  - b. Finding the max in the array
- X) Write a C++ program for the following(2D arrays):
  - a. Matrix Transpose
  - b. Matrix Addition.

- c. Matrix Multiplication.
- d. Inverse of a matrix.
- XI) Write your own function for string reverse, string palindrome, string comparison
- XII) Write a program for implementing the concept of structures
- XIII) Write a C++ program for finding the greatest and smallest number using vector
- XIV) Write a C++ program for:
  - a. Implementing the concept of call by value and call by reference.
  - b. Programs on use of pointers

### **Continuous Internal Assessment**

MCQ / Viva test during practicals

Mid Term practical test.