Syllabus
For 1st 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
Completeness
Conciseness
Consideration
Concreteness
Clarity
Courtesy
Correctness

UNIT 2
Communication: Its interpretation
Basics
Nonverbal Communication
Barriers to Communication

UNIT 3
Business Communication at Work Place
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
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
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
2. Effective Business Communication by Herta A Murphy, Herbert W Hildebrandt, Jane P Thomas, McGraw Hill.

List Of Recommended Reference Books

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**  

**List Of Recommended Reference Books**  
5. Matrices by Vashistha, S. Chand
F.Y. B.Sc.IT 
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
  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.IITS.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 (Av, Ai, ApZi, Zo)
- 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
- Per-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
- Comping
- 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
9. Digital Communications by TAUB Schilling
11. Introduction To telecommunications, AnuAGokhale, Delmar Thompson Learning

F.Y. B.Sc.IT
Title: Introduction to C++ Programming
Course: S.ITS.1.05

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

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

String functions
strcmp
strcat
strlen
strcpy

Vector Basics
Introduction to structures

Continuous Internal Assessment
Assignments / Project
Mid Term test.

List Of Text Books

List Of Recommended Reference Books
3. Pure C++ programming, Amir Afzal, Pearson Education.
F.Y. B.Sc.IT  
Course: S.I.T.S.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.  
VI) Reduce the given numeric form using K-map and implement using gates.  
VII) 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) Monostable multivibrator using IC 555 timer.  
VI) Astable multivibrator 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.