St. Xavier's College – Autonomous Mumbai

Syllabus
For 2nd Semester Courses in Information Technology
(June 2011 onwards)

Contents:

Theory Syllabus for Courses:

 S.ITS.2.01 – Computer Graphics

 S.ITS.2.02 – Applied Mathematics II

 S.ITS.2.03 – Microprocessor and Microcontrollers

 S.ITS.2.04 – Database Management Systems (DBMS)

 S.ITS.2.05 – Data Communication and Network Standards

Practical Course Syllabus for: S.ITS.2.PR

F.Y. B.Sc.IT   **Course: S.ITS.2.01**
Title: Computer Graphics

Learning Objective:
To understand the logic used in drawing graphs and to implement it through the use of a programming language.

Number of lectures: 75

UNIT 1
Introduction to Computer Graphics   **(13 lectures)**
Introduction and application areas of computer graphics,
Video Display Devices,
Raster-Scan Systems,
Random-Scan Systems,
Input Devices,
Hard-Copy Devices.

UNIT 2
Algorithms   **(13 lectures)**
Line-drawing Algorithms-DDA Algorithm,
Bresenham's Line Algorithm,
Circle-Generating Algorithms,
Ellipse Generating Algorithms,
Filled Area Primitives.

UNIT 3
Modeling and Approaches to System Requirements   **(13 lectures)**
Lines Attributes,
Curve Attributes,
Color and Grayscale Levels,
Area-Fill Attributes, Character Attributes,
Bundled Attributes,
Inquiry Functions,
Antialiasing.

UNIT 4
Two Dimensional Geometric Transformation and Viewing   **(12 lectures)**
Basic Transformations, Matrix Representations,
Composite Transformations, other Transformations-Reflection,
Shear, Viewing Pipeline, Window-to-Viewport Coordinate Transformation,
Clipping Operation, Point-Clipping,
Line-Clipping, Polygon Clipping, Curve Clipping,
Text Clipping.

UNIT 5
Three-Dimensional Concepts   **(12 lectures)**
Three-Dimensional Display methods-Parallel Projection,
Perspective Projection, Depth Cueing,
Visible Line and Surface Identification,
Surface Rendering,
Three-Dimensional Object Representations- Bezier Curves and Surfaces,
 B-Spline Curves and Surfaces.

UNIT 6
Visible-Surface Detection Methods **(12 lectures)**
Classification of Visible-Surface Detection Algorithms,
Back-Face Detection, Depth-Sorting Method,
Area-Subdivision Method, Image and Object Precision,
Z-buffer algorithm, Floating horizons.

Continuous Internal Assessment
Presentation / Developing Games using concepts learnt in CG.
Mid Term test.

List Of Text Books
1. "Computer Graphics", Donald Hearn & M. Pauline Baker, Pearson Education.
2. "Computer Graphics", A. P. Godse, Technical Publications Pune.

List Of Recommended Reference Books
1. Computer Graphics by Hill Jr
2. Computer Graphics, Steven Harrington, McGraw-Hill
3. Computer Graphics Principles and Practise, J.D. Foley, A. Van Dam, S.K. Feiner& R. L. Phillips, Addision Wesley
4. Principles of Interactive Computer Graphics, William M. Newman, Robert F. Sproull, McGraw-Hill.
5. Introduction To Computer Graphics, J.D. Foley, A. Van Dam, S.K. Feiner, J.F. Hughes & R.L. Phillips, Addision Wesley
6. Computer Graphics by Rogers.

F.Y. B.Sc.IT **Course: S.ITS.2.02**

Title: Applied Mathematics II

Learning Objective:
To study advanced mathematical concepts used in software development of Computer Graphics, animation, image processing, cryptography, etc.

Number of lectures: 75

UNIT 1
Complex Numbers: **(13 lectures)**
Cartesian,
Polar & Exponential form,
De-Moivre's theorem,
Hyperbolic functions,
Logarithms of Complex numbers
UNIT 2
Complex Variables : **(13 lectures)**
Cauchy Riemann Equations,
Conformal Mapping and Bilinear Mapping,
concept of Line Integral,

Riemann Integral,
Singularities –Poles, Evaluation of Residues theorem.

UNIT 3

Laplace Transform (13 lectures)

Introduction,
Definition,
Properties of Laplace Transform,
Laplace Transform of standard function.

Inverse Laplace Transform:

Inverse Laplace Transform ,
Methods of obtaining Inverse Laplace transform,
Laplace transform of Periodic Functions,
Heavyside Unit-step Function,
Dirac-delta function (Unit Impulse Function),
Application of Inverse Laplace transform to solve differential equations

UNIT 4

Differentiation under Integral sign, (12 lectures)
Beta and Gamma Functions,
Properties and Duplication Formula,
Error Functions

UNIT 5

Fourier Series (12 lectures)

Fourier Series,
Change of Interval,
Even and odd functions,
Half range expansions.

Fourier Transform and Inverse Fourier Transform:

Fourier transform of Even and Odd functions,
Fourier Transform of sine and cosine functions
Files

UNIT 6

Integral Calculus (12 lectures)

Double Integral,
Area,
Triple Integral,
Volume

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
2. Differential Calculus by Shanti Narayan.
3. B. S. Grewal, "Higher Engineering Mathematics.
4. Advanced Engineering Mathematics: R.K.Jain, S.R.K. Iyengar, Narosa Publishing House.
5. Engineering Mathematics : T Veerajan, Tata McGraw-Hill
6. Integral Transforms: A. R. Vasishta, Dr. R.K. Gupta, KrishnaPrakashanMandir

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F.Y. B.Sc.IT   **Course: S.ITS.2.03**

Title: Microprocessor and Microcontrollers

Learning Objective:
To understand the architecture and functioning of a microprocessor and a microcontroller which are the prototypes of the modern large computers.

Number of lectures: 75

UNIT 1
Logic devices   **(13 lectures)**
Tristate devices,
buffers, encoder,
decoder, latches,
Types of memories,
memory organization,
concept of control lines such as read/write chip enable
UNIT 2
Introduction to 8085 microprocessor   **(13 lectures)**
Organization of Microprocessor based system,
8085 µp Architecture,
Concept of Address line and Memory Interfacing,
Address Decoding and Memory Interfacing,
UNIT 3
8085 Programming Model   **(13 lectures)**
Instruction Classification,
Instruction Format,
8085 Instruction Set
UNIT 4
Introduction to Modern day Computer Systems   **(12 lectures)**
Organization and Architecture, Structure and function.
System Buses
        Computer Components,
        Computer function,
PCI
   Features of PCI bus,
   Why PCI bus is needed?
   Concept of PCI Arbitration.
Internal Memory
        Concept of Cache Memory,
        Methods of Cache Mapping,
        Concept and need for Cache coherency.
External Memory
        RAID.
UNIT 5
The 8051 Microcontroller   **(12 lectures)**

Introduction and overview of 8051 family,
8051 Assembly Language Programming,
Jumps,
Loops and call instructions.

UNIT 6
Interfacing the 8051 Microcontroller   **(12 lectures)**
8051 I/O port programming,
Addressing Modes,
Arithmetic and Logical instructions

Continuous Internal Assessment
Assignments / Project
Mid Term test

List Of Text Books

1. William Stallings,"ComputerOrganisation and Architecture"(4th Edition)- PHI,1998.

2. Andrew C. Tanenbaum, "Structured Computer Organisation" (3rd Edition) -, PHI.

3. Computer System Architecture - M. Morris Memo, PHI, 1998.

4. John P Hayes, "Computer Architecture and Organisation" - McGraw Hill, 1998.

5. Digital Computer Fundamentals, Malvino Microprocessor Architecture and Programming and Applications with the 8085,   R.S. Gaonkar, PRI (3rd Edition)
6. Digital Computer Fundamentals, Thomas C Bartee, TMG
7. The 8051 Microcontroller and Embedded systems by M. A. Mazidi, J. G. Mazidi and R. D.
8. McKinlay, Pearson Education.

F.Y. B.Sc.IT   **Course: S.ITS.2.04**

Title: Data Base Management Systems (DBMS)

Learning Objective:
To learn the concept of database systems and software techniques for manipulating and maintaining databases.

Number of lectures: 75

UNIT 1
Introduction to Databases and Transactions   **(13 lectures)**
What is database system,
purpose of database system,
view of data, relational databases,
database architecture, transaction management
UNIT 2
Data Models   **(13 lectures)**
The importance of data models,
Basic building blocks, Business rules,
The evolution of data models,
Degrees of data abstraction.
UNIT 3
Database Design,ER-Diagram and Unified Modeling Language   **(13 lectures)**
Database design and ER Model:
        overview, ER-Model, Constraints,
        ER-Diagrams, ERD Issues,
        weak entity sets, Codd's rules,
        Relational Schemas, Introduction to UML
Relational database model:
        Logical view of data, keys, integrity rules.
Relational Database design:
        Features of good relational database design,
        Atomic domain and Normalization
                1NF, 2NF, 3NF, BCNF
UNIT 4
Relational Algebra and Calculus   **(12 lectures)**
Relational algebra:
        introduction, Selection and projection,
        set operations, renaming, Joins,
        Division, syntax, semantics.
        Operators, grouping and ungrouping,
        relational comparison.
Calculus:
        Tuple relational calculus,
        Domain relational Calculus,
        calculus vs algebra,
        computational capabilities.
UNIT 5
Constraints, Views and SQL   **(12 lectures)**

What is constraints ?
types of constrains, Integrity constraints,
Views:
> Introduction to views, data independence,
> security, updates on views,
> comparison between tables and views

SQL:
> data definition, aggregate function,
> Null Values, nested sub queries,
> Joined relations.

Triggers.
UNIT 6
Transaction management and Concurrency control (12 lectures)
Transaction management:
> ACID properties,
> serializability and concurrency control,
> Lock based concurrency control (2PL, Deadlocks),
> Time stamping methods, optimistic methods,
> Database recovery management

Continuous Internal Assessment
Assignments / Project
Mid Term test.

List Of Text Books
  1. A Silberschatz, H Korth, S Sudarshan, "*Database System and Concepts*", *fifth Edition* McGraw-Hill,
  2. Rob, Coronel, "*Database Systems*", *Seventh Edition*, Cengage Learning

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F.Y. B.Sc.IT **Course: S.ITS.2.05**

Title: Data Communication and network standards

Learning Objective:
To study the process of networking computers and to study the data transfer process from one computer to another using networks.

Number of lectures: 75

UNIT 1
Introduction to data communications and networking (13 lectures)
Introduction, Fundamental concepts,
Data communications, Protocol, standards,
standard organizations, signal propagation,
analog and digital signals,
bandwidth of signal and a medium,
Fourier analysis and the concept of bandwidth of a signal,

The data transmission rate and bandwidth.

UNIT 2

Network Models   **(13 lectures)**

Layered Tasks, The OSI reference model,
Layers in the OSI reference model,
TCP/IP protocol suite , Addressing IPv4

UNIT 3

Information Encoding, Errors Detection and Correction   **(13 lectures)**

Introduction, representing different symbols,
Minimizing errors, Multimedia,
Multimedia and Data compression.
Error classification, types of errors,
redundancy, detection versus correction,
hamming distance, cyclic redundancy check

UNIT 4

Media and Transmission modes   **(12 lectures)**

Data and signals, Periodic analog signals,
Digital signals, Transmission impairment,
Data rate limits, Performance,
Digital to digital, Analog to digital conversion,
Transmission modes, Digital to analog conversion,
Analog to analog conversion, Guided media and Unguided media

UNIT 5

Network topologies ,Switching and routing algorithms   **(12 lectures)**

Mesh,star,tree,ring,bus,hybrid,
switching basics, circuit switching,
packet switching and Message switching,
routing algorithms.

UNIT 6

IP version 6   **(12 lectures)**

Overview, Terminology, IPv6 addresses,
Special addresses , IP v 6 header formats,
IPv6 extension headers, IPv6 auto configuration,
configuration via DHCP v6 , IPv6 transition

Continuous Internal Assessment

Assignments / Project
Mid Term test

List Of Text Books
1. Behrouz A Forouzan, *"Data communications and Networking"*, Fourth Edition, Mc-Graw Hill
2. AchyutGodbole, "Data communications and Networks, TMH
3. Dr.SidnieFeit, "TCP/IP" ,Second Edition, TMH

List Of Recommended Reference Books

W.Stallings,"Data and Computer Communications",Eight Edition,Pearson Education

F.Y. B.Sc.IT   **Course : S.ITS.2.PR**

Practical I:

COMPUTER GRAPHICS
MICROPROCESSOR AND MICROCONTROLLERS

Number of lectures: 45

COMPUTER GRAPHICS

Learning Objective: To develop a program to implement following algorithms

For 1st part of the course (1.5 credits) 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.

Modern Operating System practical list

I)   Write a program to implement the DDA Algorithm.
II)   Write a program to implement the Bresenham's Algorithm.
III)   Write a program to implement the Mid-point Circle Algorithm.
IV)   Write a program to implement the Ellipse Algorithm.
V)   Write a program to implement the Pie-Algorithm.
VI)   Write a program to design any given pattern.
VII)   Write a program to implement the 2D Translation Concept.
VIII) Write a program to implement Translation Concept.
IX)   Write a program to implement Scaling Concept.
X)   Write a program to implement Reflection Concept.
XI)   Write a program to implement the Cohen-Sutherland Line Clipping Concept.
XII)   Write a program to implement the Bezier Curve

MICROPROCESSOR AND MICROCONTROLLERS

Learning Objective:
To be able to develop and execute assembly language programs for microprocessors and microcontrollers.

8085 programs:
I)   Simple 8-bit and 16-bit addition and subtraction
II) Transfer a block of data from one location to another.
III) Find the largest/smallest of the numbers stored at one location.
IV) Addition of 10 numbers.
V) Multiplication of 8-bit and 16-bit numbers.
VI) BCD addition

8051 programs:
I) To search a number from a given set of numbers. The end of the data is indicated by 00.
II) Finding the average of signed numbers.
III) Multiplication of signed numbers.
IV) Convert the BCD 0111 0101 number to two binary numbers and transfer this number to registers.

Continuous Internal Assessment
MCQ / Viva test during practicals
Mid Term practical test.

Practical II:
DATA BASE MANAGEMENT SYSTEMS (DBMS)

Number of lectures: 45

Learning Objective: To be able to design and develop a dynamic database system and design queries to extract information and update and modify the data base.
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.

DBMS practical list

I)   Design a Database and create required tables. For e.g. Bank, College Database
II)   Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
III)   Write a SQL statement for implementing ALTER,UPDATE and DELETE
IV)   Write the queries to implement the joins
V)   Write the query for implementing the following functions:
        MAX(),MIN(),AVG(),COUNT()
VI)   Write the query to implement the concept of Integrity constrains
VII)   Write the query to create the views
VIII)   Perform the queries for triggers
IX)   Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints
X)   Write the query for creating the users and their role.