UNIVERSITY OF MUMBAI

Syllabus for the F.Y.B.Sc.
Program: B.Sc.
Course : Information Technology

(Credit Based Semester and Grading System with
effect from the academic year 2011–2012)

Courses	Theory Code	Practical Code
Professional Communication skills	USIT101	USIT1P1
Applied Mathematics – I	USIT102	USIT1P2
Fundamentals of Information Technology	USIT103	USIT1P3
Electronics and Communication technology	USIT104	USIT1P4
Introduction to C++ programming	USIT105	USIT1P5

CLASS: B. Sc (Information technology)		Semester - I
SUBJECT: Professional Communication skills (USIT101)		
Periods per week	Lectures - 5	3 Credits

Unit – I	The Seven Cs of Effective Communication Completeness, Conciseness, Consideration, Concreteness, Clarity, Courtesy, Correctness	8 Lectures
Unit- II	Communication: Its interpretation Basics, Nonverbal Communication, Barriers to Communication	8 Lectures
Unit-III	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	8 Lectures
Unit-IV	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.	8 Lectures
Unit -V	Required Skills Reading skills, listening skills, note-making, précis writing, audiovisual aids, oral communication	8 Lectures
Unit-VI	Mechanics of Writing Transitions, Spelling rules, hyphenation, transcribing numbers, Abbreviating technical and non-technical terms, Proof reading.	8 Lectures

Books:
Professional Communication by Aruna Koneru, McGrawHill
Effective Business Communication by Herta A Murphy, Herbert W Hildebrandt, Jane P Thomas, McGrawHill

References:
Business Communication, Lesikar and Petit, McGrawHill
Communication Skills Handbook, Summers, Wiley, India
Business Communication (Revised Edition), Rai and Rai, Himalaya Publishing House
Business Correspondence and Report Writing by R. C. Sharma and Krishna Mohan, TMH.

Term Work of USIT101: (For Internal Assessment)

    i)   Assignments: Should contain at least 2 assignments covering the Syllabus.

    ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations

    iii)   Tutorial : Minimum Three tutorials covering the syllabus

Practical USIT1P1:

Case Studies	3 Lectures per week (1 Credit)
List of Practical:	

List of Practical:

    i)   Case study on the 7 Cs of effective communication.

    ii)   Case study on the body language.

    iii)   Case study on different types of letters like Job application, Appointment letter, Memos, formal and informal letters, minutes of the meeting, emails.

    iv)   Case study on reports.

    v)   Case study on oral communication.

    vi)   Case study on technical writing.

CLASS: B. Sc (Information technology)		Semester – I
SUBJECT: Applied Mathematics I (USIT102)		
Periods per week	Lectures - 5	3 Credits

Unit – I	**Matrices**: 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.	**8 Lectures**
Unit- II	**Eigen Values and Eigen Vectors:** 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.	**8 Lectures**
Unit -III	**Vector Calculus:** Vector Differentiation: Vector Operator Del, Gradient, and Geometrical Meaning of gradient, Divergence and Curl.	**8 Lectures**
Unit - IV	**Differential Equations:** Differential Equations of 1st order and 1st degree and applications	**8 Lectures**
Unit - V	**Linear Differential Equations:** Linear Differential equations with constant coefficient, Differential equations of higher order and applications.	**8 Lectures**
Unit -VI	Successive differentiation, Mean Value theorems, Partial differentiation, Euler's Theorem, Approximation and errors, Maxima and Minima	**8 Lectures**

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

References:
Higher Engineering Mathematics by B. V. Ramana, McGrawHill
Differential Calculus by Shanti Narayan. S. Chand.
Higher Engineering Mathematics by B.S. Grewal, Khanna Publications
Vector Analysis by Murray Spiegel, McGrawHill
Matrices by Vashistha, S. Chand

Term Work for USIT102
  i)   Assignments: Should contain at least 2 assignments covering the Syllabus.
  ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations
  iii)   Tutorial : Minimum Three tutorials covering the syllabus

Practical USIT1P2

Problem Solving	3 Lectures per week(1 Credit)
List of Problems	

List of Problems
  i) Problem solving based on matrices
  ii) Problem solving based on Eigen Values and Eigen Vectors
  iii) Problem solving based on Vector Analysis
  iv) Problem solving based on Differential Equations
  v) Problem solving based on Linear Differential Equations
  vi) Problem solving based on Successive Differentiation
  vii)   Problem solving based on Mean Value theorems
  viii)   Problem solving based on Partial differentiation
  ix) Problem solving based on Euler's Theorem
  x) Problem solving based on Approximation and errors
  xi) Problem solving based on Maxima and Minima

CLASS: B. Sc (Information technology)		Semester – I
SUBJECT: Fundamentals of Digital Computing (USIT103)		
Periods per week	Lectures - 5	3 Credits

Unit – I	**Data and Information:** Features of Digital Systems, Number Systems: Decimal, Binary, Octal, Hexadecimal & their 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.	**8 Lect.**
Unit- II	**Boolean Algebra:** 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, Quine McClusky method.	**8 Lect.**
Unit -III	**Combinational Circuits:** Half adder, full adder, code converters, combinational circuit design, Multiplexers and demultiplexers, encoders, decoders, Combinational design using mux and demux.	**8 Lect.**
Unit - IV	**Sequential Circuit Design:** Flip flops (RS, Clocked RS, D, JK, JK Master Slave, T, Counters, Shift registers and their types, Counters: Synchronous and Asynchronous counters.	**8 Lect.**
Unit- V	**Computers:** Basic Organization, Memory: ROM, RAM, PROM, EPROM, EEPROM, Secondary Memory: Hard Disk & optical Disk, Cache Memory, I/O devices	**8 Lect.**
Unit -VI	**Operating Systems:** 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.	**8 Lect.**

Text Books: Modern Digital Electronics by R. P. Jain, 3rd Edition, McGraw Hill
 Digital Design and Computer Organisation by Dr. N. S. Gill and J. B. Dixit,
 University Science Press
 Linux Commands by Bryan Pfaffaenberger BPB Publications
 UNIX by Sumitabha Das, TMH
References: Digital Principles and Applications by Malvino and Leach, McGrawHill
 Introduction to Computers by Peter Norton, McGraw Hill

Term Work for USIT103

  i)   Assignments: Should contain at least 2 assignments covering the Syllabus.
  ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations
  iii)   Tutorial : Minimum Three tutorials covering the syllabus

Practical USIT1P3:

Journal Practical	3 Lectures per week (1 Credit)
List of Practical 1. Study of logic gates (basic and universal) 2. Verify De Morgan's theorems 3. Design and implement Half adder and full adder using gates. 4. Design and implement binary to gray code converter and vice versa using XOR gates. 5. Design & implement multiplier for two 2-bit binary numbers using minimum number of gates. 6. Reduce the given numeric form using K-map and implement using gates. 7. Implement SOP /POS forms using logic gates. 8. Implement logic gates using multiplexers. 9. Implement expressions using multiplexers and demultiplexers 10. Implement 3-bit binary ripple counter using JK flip flops. **Linux:** 1. Installation of Linux 2. 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	

CLASS: B. Sc (Information technology)		Semester – I
SUBJECT: Electronics and Communication Technology (USIT104)		
Periods per week	Lectures - 5	3 Credits

Unit – I	Concept of 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.	**8 Lect.**
Unit- II	Concept of amplification, amplifier notations, Av, Ai, Ap Zi, 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.	**8 Lect.**
Unit-III	Concept of Feedback:- 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)	**8 Lect.**
Unit- IV	Introduction:- 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.	**8 Lect.**
Unit- V	FM: - 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, companding, PCM system, differential PCM, Delta modulation. Multiplexing: - FDM/TDM. Television:- Scanning, Composite Video signal, Television Transmitter, television receiver.	**8 Lect.**
Unit-VI	Introduction to Digital Communication: 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.	**8 Lect.**

References
Allen Mottershead, "Electronic Devices and Circuits", PHI
Boylstead and Neshelesky , "Electronics Devices and Circuits", 4th , PHI, 1999.
Simon Haykin, "An Introduction to Analog and Digital communications", John Wiley and Sons, 1994.
R.B Carlson, "Communication Systems", MacGraw Hill.
George Kennedy, "Electrical Communication systems", Tata McGraw Hill 1993.
Roody Collin, "Electronics Communication", PHI
J. Millman and A Grabel, " Microelectronics" MacGraw Hill 1988.
Proakis J. J, "Digital Communications" Mc Graw Hill.
Digital Communications by TAUB Schilling

Electronic Communication Systems, Roy Blake Delmar, Thompson Learning
Introduction To telecommunications, Anu A Gokhale, Delmar Thompson Learning

Term Work for USIT104

i)   Assignments: Should contain at least 2 assignments covering the Syllabus.
ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations
iii)   Tutorial : Minimum Three tutorials covering the syllabus

Practical (USIT1P4):

Journal Practical	3 Lectures per Week (1 Credit)
List of Practical 1. Study of Zener diode characteristics 2. Study of Half wave and full wave rectifiers 3. Study of bridge rectifier. 4. Study of Transistor as a switch 5. Monostable multivibrator using IC 555 timer. 6. Astable multivibrator using IC 555 timer. 7. Study of Wien bridge oscillator 8. Frequency Response of single stage transistor amplifier 9. Study of Amplitude Modulation 10. Study of Frequency Modulation 11. Study of Fibre Optic transmission 12. Study of Pulse Amplitude Modulation 13. Study of transistor DC Amplifier	

CLASS: B. Sc (Information technology)		Semester – I
SUBJECT: Introduction to C++ programming (USIT105)		
Periods per week	Lectures – 5	3 Credits

Unit – I	**Programming Logic and techniques :** Algorithms, Flow-charts, Program Design, Introduction to C++: Origin of C++, A Sample C++ program, pitfall and programming tips. Testing and Debugging.	**8 Lect.**
Unit-II	**C++ concepts :** 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.	**8 Lect.**
Unit-III	**Flow of Control :** 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	**8 Lect.**
Unit-IV	**Functions:** 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.	**8 Lect.**
Unit-V	**Derived Data types (Arrays , pointers , functions) :** Introduction to arrays, arrays in functions, 2-D arrays , Multidimensional arrays, Introduction to pointers, void pointers, pointers in function, pointer to constant and constant pointer, generic pointer.	**8 Lect.**
Unit-VI	**Strings, Vectors and Structures :** String functions: strcmp, strcat, strlen, strcpy . Vector Basics. Introduction to Structures.	**8 Lect.**

Books: Problem Solving with C++ , Walter Savitch, Sixth Edition, Pearson Education.
J.R.Hubbard, Schaum's outlines "Programming with C++", Second Edition, Tata McGrawHill
Y.P.Kanetkar, "Let us C++" , seventh edition, BPB publication
Reference Books: Object Oriented programming with C++ , E Balagurusamy , Third Edition , Tata McGraw Hill.
Pure C++ programming , Amir Afzal, Pearson Education.
Computer Science – A structured Approach using C++ by B. Forouzan, R. F. Gilberg, Cengage Publication.

Term Work for USIT105

   i)   Assignments: Should contain at least 2 assignments covering the Syllabus.
   ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations
   iii) Tutorial : Minimum Three tutorials covering the syllabus

Practical (USIT1P5):

Journal Practical	3 Lectures per Week (1 Credit)
List of Practical 1) Write a C++ program for finding greatest of three number. 2) Write a C++ program for solving the quadratic equation. 3) Write a C++ program to print all the prime numbers in a given range. 4) Write a C++ program for displaying the Fibonacci series. 5) Write a C++ program for converting number to words. (switch,break,continue) 6) Write a C++ function for swapping two numbers without using third variable. 8) Write a recursive function for factorial of given number. 9) Write your own function for string reverse , string palindrome , string comparision 10) Write a program for sorting the number in ascending and descending order 11) Write a program for Matrix addition and multiplication. 12) Write a program for implementing the concept of structures. 13) Write a program for finding the greatest and smallest number using vector. 14) Write a program for implementing the concept of call by value and call by reference. 15) Write a program for generating the report card.	

Courses	Theory Code	Practical Code
Web Designing and Programming	USIT201	USIT2P1
Applied Mathematics – II	USIT202	USIT2P2
Microprocessor and microcontrollers	USIT203	USIT2P3
Database Management Systems	USIT204	USIT2P4
Data Communication and Networking Standards	USIT205	USIT2P5

CLASS: B. Sc (Information technology)		Semester – II
SUBJECT: Web Designing and Programming (USIT201)		
Periods per week	Lectures – 5	3 Credits

Unit – I	**Internet and WWW :** What is Internet?, Introduction to internet and its applications, E-mail, telnet, FTP, e-commerce, video conferencing, e-business. Internet service providers, domain name server, internet address World Wide Web (WWW) : World Wide Web and its evolution, uniform resource locator (URL), browsers – internet explorer, netscape navigator, opera, firefox, chrome, mozilla. search engine, web saver – apache, IIS, proxy server, HTTP protocol	**8 lectures**
Unit- II	**HTML and Graphics :** HTML Tag Reference, Global Attributes, Event Handlers, Document Structure Tags, Formatting Tags, Text Level formatting, Block Level formatting, List Tags, Hyperlink tags, Image and Image maps, Table tags, Form Tags, Frame Tags, Executable content tags **Imagemaps :** What are Imagemaps?, Client-side Imagemaps, Server-side Imagemaps, Using Server-side and Client-side Imagemaps together, Alternative text for Imagemaps, **Tables :** Introduction to HTML tables and their structure, The table tags, Alignment, Aligning Entire Table, Alignment within a row, Alignment within a cell, Attributes, Content Summary, Background Color, Adding a Caption, Setting the width, Adding a border, Spacing within a cell, Spacing between the cells, Spanning multiple rows or columns, Elements that can be placed in a table, Table Sections and column properties, Tables as a design tool **Frames :** Introduction to Frames, Applications, Frames document, The <FRAMESET> tag, Nesting<FRAMESET> tag, Placing content in frames with the <FRAME> tag, Targeting named frames, Creating floating frames, Using Hidden frames, **Forms :** Creating Forms, The <FORM> tag, Named Input fields, The <INPUT> tag, Multiple lines text windows, Drop down and list boxes, Hidden, Text, Text Area, Password, File Upload, Button, Submit, Reset, Radio, Checkbox, Select, Option, Forms and Scripting, Action Buttons, Labelling input files, Grouping related fields, Disabled and read-only fields, Form field event handlers, Passing form data **Style Sheets :** What are style sheets?, Why are style sheets valuable?,	**8 lectures**

	Different approaches to style sheets, Using Multiple approaches, Linking to style information in s separate file, ,Setting up style information, Using the <LINK> tag, Embedded style information, Using <STYLE> tag, Inline style information	
Unit- III	**Java Script :** Introduction, Client-Side JavaScript, Server-Side JavaScript, JavaScript Objects, JavaScript Security, **Operators** : Assignment Operators, Comparison Operators, Arithmetic Operators, % (Modulus), ++(Increment), --(Decrement), -(Unary Negation), Logical Operators, Short-Circuit Evaluation, String Operators, Special Operators, ?: (Conditional operator), , (Comma operator), delete, new, this, void **Statements :** Break, comment, continue, delete, do...while, export, for, for...in, function, if...else, import, labelled, return, switch, var, while, with, **Core JavaScript (Properties and Methods of Each) :** Array, Boolean, Date, Function, Math, Number, Object, String, regExp **Document and its associated objects :** document, Link, Area, Anchor, Image, Applet, Layer **Events and Event Handlers :** General Information about Events, Defining Event Handlers, event, onAbort, onBlur, onChange, onClick, onDblClick, onDragDrop, onError, onFocus, onKeyDown, onKeyPress, onKeyUp, onLoad, onMouseDown, onMouseMove, onMouseOut, onMouseOver, onMouseUp, onMove, onReset, onResize, onSelect, onSubmit, onUnload	**8 lectures**
Unit – IV	**XML :** Introduction to XML, Anatomy of an XML document, Creating XML Documents, Creating XML DTDs, XML Schemas, XSL	**8 lectures**
Unit – V	**PHP :** Why PHP and MySQL?, Server-side web scripting, Installing PHP, Adding PHP to HTML, Syntax and Variables, Passing information between pages, Strings, Arrays and Array Functions, Numbers, Basic PHP errors/problems.	**8 lectures**
Unit – VI	**Advanced PHP and MySQL :** PHP/MySQL Functions, Displaying queries in tables, Building Forms from queries, String and Regular Expressions, Sessions, Cookies and HTTP, Type and Type Conversions, E-Mail	**8 lectures**

References :
1. Web Design The Complete Reference, Thomas Powell, Tata McGrawHill
2. HTML and XHTML The Complete Reference, Thomas Powell, Tata McGrawHill
3. JavaScript 2.0: The Complete Reference, Second Edition by Thomas Powell and Fritz Schneider
4. PHP: The Complete Reference By Steven Holzner, Tata McGrawHill

Term Work for USIT201

   i) Assignments: Should contain at least 2 assignments covering the Syllabus.
   ii) Class Tests: One. Also Known as Unit Test or In-Semester Examinations
   iii) Tutorial : Minimum Three tutorials covering the syllabus

Practicals (USIT2P1):

Journal Practical	3 Lectures per Week (1 Credit)
List of Practical	

1. Design a web page using different text formatting tags.
2. Design a web page with links to different pages and allow navigation between pages.
3. Design a web page with Imagemaps.
4. Design a web page with different tables. Design a webpage suing table so that the content appears well placed.
5. Design a webpage using frames.
6. Design a web page with a form that uses all types of controls.
7. Design a website using style sheets so that the pages have uniform style.
8. Using Java Script design a web page that prints factorial / Fibonacci series / any given series.
9. Design a form with a test box and a command button. Using Java Script write a program whether the number entered in the text box is a prime number or not.
10. Design a form and validate all the controls placed on the form using Java Script.
11. Design a DTD, corresponding XML document and display it in browser using CSS.
12. Design an XML document and display it in browser using XSL.
13. Design XML Schema and corresponding XML document.

CLASS: B. Sc (Information technology)	Semester – II
SUBJECT: Applied Mathematics – II (USIT202)	

Periods per week	Lectures – 5	3 Credits

Unit – I	**Complex Numbers:** Cartesian, Polar & Exponential form, De-Moivre's theorem, Hyperbolic functions, Logarithms of Complex numbers	**8 Lect.**
Unit-II	**Complex Variables :** Cauchy Riemann Equations, , Conformal Mapping and Bilinear Mapping, concept of Line Integral, Riemann Integral, Singularities –Poles, Evaluation of Residues theorem.	**8 Lect.**
Unit – III	**Laplace Transform**: 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.	**8 Lect.**
Unit – IV	Differentiation under Integral sign, Beta and Gamma Functions, Properties and Duplication Formula, Error Functions	**8 Lect.**
Unit – V	**Fourier Series:** 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	**8 Lect.**
Unit – VI	**Integral Calculus:** Double Integral, Area, Triple Integral, Volume	**8 Lect.**

References:
Differential Calculus by Shanti Narayan.
B. S. Grewal, "Higher Engineering Mathematics.
Advanced Engineering Mathematics: R.K.Jain, S.R.K. Iyengar, Narosa Publishing House.
Engineering Mathematics : T Veerajan, Tata McGraw-Hill
Integral Transforms: A. R. Vasishta, Dr. R.K. Gupta, Krishna Prakashan Mandir.

Term Work for USIT202

  i)   Assignments: Should contain at least 2 assignments covering the Syllabus.
  ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations
  iii) Tutorial : Minimum Three tutorials covering the syllabus

Practicals (USIT2P2):

Problem Solving	3 Lectures per Week (1 Credit)

List of Problems
 	
   i) Problem solving based on Complex Numbers
   ii) Problem solving based on Complex Variables
   iii) Problem solving based on Laplace Transforms
   iv) Problem solving based on Inverse Laplace Transforms
   v) Problem solving based on Differentiation under the integral sign
   vi) Problem solving based on Beta and gamma functions
   vii) Problem solving based on error functions
   viii) Problem solving based on Fourier series
   ix) Problem solving based on Fourier transforms
   x) Problem solving based on double integrals and area
   xi) Problem solving based on triple integrals	

CLASS: B. Sc (Information technology)			Semester – II
SUBJECT: Microprocessor and microcontrollers (USIT203)			
Periods per week		Lectures – 5	3 Credits

Unit – I	Logic Devices: Tristate devices, buffers, encoder, decoder, latches. Types of memories, memory organization, concept of control lines such as read/write, chip enable.	**8 Lect.**
Unit-II	Introduction to 8085 microprocessor: - Organization of Microprocessor based system, 8085 µp Architecture, Concept of Address line and Memory interfacing, Address Decoding and Memory Interfacing,	**8 Lect.**
Unit-III	8085 Programming Model, Instruction Classification, Instruction Format, 8085 Instruction Set	**8 Lect.**
Unit-IV	Introduction to Modern day Computer Systems: - 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.	**8 Lect.**
Unit-V	The 8051 Microcontroller: Introduction and overview of 8051 family, 8051 Assembly Language Programming, Jumps, Loops and call instructions.	**8 Lect.**
Unit-VI	8051 I/O port programming, Addressing Modes, Arithmetic and Logical instructions.	**8 Lect.**

References
William Stallings, "Computer Organisation and Architecture" (4th Edition) - PHI, 1998.
Andrew C. Tanenbaum, "Structured Computer Organisation" (3rd Edition) -, PHI.
Computer System Architecture - M. Morris Memo, PHI, 1998.
John P Hayes, "Computer Architecture and Organisation" - McGraw Hill, 1998.
Digital Computer Fundamentals, Malvino
Microprocessor Architecture and Programming and Applications with the 8085, R.S. Gaonkar, PRI (3rd Edition)
Digital Computer Fundamentals, Thomas C Bartee, TMG
The 8051 Microcontroller and Embedded systems by M. A. Mazidi, J. G. Mazidi and R. D. McKinlay, Pearson Education**.**

Term Work for USIT203

     i)   Assignments: Should contain at least 2 assignments covering the Syllabus.
     ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations
     iii)   Tutorial : Minimum Three tutorials covering the syllabus

Practicals (USIT2P3):

Journal Practical	3 Lectures per Week (1 Credit)
8085 programs for 1. Simple 8-bit and 16-bit addition and subtraction 2. Transfer a block of data from one location to another. 3. Find the largest/smallest of the numbers stored at one location. 4. Addition of 10 numbers. 5. Multiplication of 8-bit and 16-bit numbers. 6. Sorting of numbers. 7. BCD addition 8. Division 9. Find GCD and LCM of two numbers 10. Swapping a block of data	
8051 programs for: 1. To search a number from a given set of numbers. The end of the data is indicated by 00. 2. Finding the average of signed numbers. 3. Multiplication of signed numbers. 4. Convert the BCD 0111 0101 number to two binary numbers and transfer this number to registers. 5. To find y where $y = x^2 + 2x + 5$ and x is between 0 and 9. 6. Write a program to show the use of the BIT directive. 7. Write a program to find the number of zeros in register R2 8. Write a program to check if the accumulator is divisible by 8. 9. To check whether a character string is a palindrome or not. 10. To check the number is prime or not.	

CLASS: B. Sc (Information technology)		Semester – II	
SUBJECT: DBMS (USIT204)			
Periods per week		Lectures – 5	3 Credits

Unit – I	**Introduction to Databases and Transactions :** What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management,	**8 Lect**
Unit-II	**Data Models :** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction.	**8 Lect**
Unit-III	**Database Design, ER-Diagram and Unified Modeling Language:** 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).	**8 Lect**
Unit-IV	**Relational Algebra and Calculus:** 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.	**8 Lect**
Unit-V	**Constraints, Views and SQL:** 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.	**8 Lect**
Unit-VI	**Transaction management and Concurrency control:** Transaction management: ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks),Time stamping methods, optimistic methods, database recovery management.	**8 Lect**

Books:

A Silberschatz, H Korth, S Sudarshan, "*Database System and Concepts*", *fifth Edition* McGraw-Hill ,

Rob, Coronel, "*Database Systems*", *Seventh Edition*, Cengage Learning

Term Work for USIT204

- **i)** Assignments: Should contain at least 2 assignments covering the Syllabus.
- **ii)** Class Tests: One. Also Known as Unit Test or In-Semester Examinations
- **iii)** Tutorial : Minimum Three tutorials covering the syllabus

Practicals (USIT2P4):

Journal Practical	3 Lectures per Week (1 Credit)

List of Practical:

1. Design a Database and create required tables. For e.g. Bank, College Database
2. Apply the constraints like Primary Key , Foreign key, NOT NULL to the tables.
3. Write a sql statement for implementing ALTER,UPDATE and DELETE
4. Write the queries to implement the joins
5. Write the query for implementing the following functions:
    MAX(),MIN(),AVG(),COUNT()
6. Write the query to implement the concept of Intergrity constrains
7. Write the query to create the views
8. Perform the queries for triggers
9. Perform the following operation for demonstrating the insertion , updation and deletion using the referential integrity constraints
10. Write the query for creating the users and their role.

CLASS: B. Sc (Information technology)		Semester - II	
SUBJECT: - Data Communication and Networking Standards (USIT2P5)			
Periods per week	Lectures - 5	(3 Credits)	

Unit-I	**Introduction to data communications and networking** 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.	**8 Lect**
Unit-II	**Network Models** Layered Tasks, The OSI reference model , Layers in the OSI reference model , TCP/IP protocol suite , Addressing IPv4	**8 Lect**
Unit-III	**Information Encoding , Errors Detection and Correction** 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.	**8 Lect**
Unit-IV	**Media and Transmission modes** 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	**8 Lect**
Unit-V	**Network topologies ,Switching and routing algorithms** Mesh, star, tree, ring, bus, hybrid, switching basics , circuit switching, packet switching and Message switching , routing algorithms	**8 Lect**
Unit-VI	**IP version 6** Overview , Terminology, IPv6 addresses , Special addresses , IP v 6 header formats, IPv6 extension headers , IPv6 autoconfiguration , configuration via DHCP v6 , IPv6 transition	**8 Lect**

Books:

Behrouz A Forouzan, *"Data communications and Networking"*, Fourth Edition , Mc-Graw Hill

Achyut Godbole, "Data communications and Networks, TMH

Dr.Sidnie Feit, "TCP/IP" ,Second Edition, TMH

Reference:

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

Term Work for USIT205

i)   Assignments: Should contain at least 2 assignments covering the Syllabus.

ii)   Class Tests: One. Also Known as Unit Test or In-Semester Examinations

iii)   Tutorial : Minimum Three tutorials covering the syllabus

Practical (USIT2P5):

Case Studies	3 Lectures Per Week (1 Credit)

List of Cases
 	
   i)   Case study on implementation of TCP/IP model in different OS
   ii) Case study on errors in data transmission
   iii) Case study on transmission media
   iv) Case study on static IP addressing
   v) Case study on dynamic IP addressing
   vi) Case study on network devices: Routers, Switches, Bridges
   vii) Case study on IPv6	

Issues related to Term Work, tutorial, assignments and Practicals

Following is the marks distribution for Theory and Practical. Minimum 16 marks out of 40 and 24 marks out of 60 for passing in Theory and 8 marks out of 20 and 12 marks out of 30 for passing in Practical.

Credit of 3 of Theory and 1 of Practical for any course is to be awarded only if students clear both.

Semester I

Theory

Course	Internal Assessment (40 Marks)			External Assessment (60 Marks)	Total(100 Marks)
	Assignment	Tutorial	Class Test	Theory Exam	
USIT101	10	10	20	60	100
USIT102	10	10	20	60	100
USIT103	10	10	20	60	100
USIT104	10	10	20	60	100
USIT105	10	10	20	60	100

Practical

Course	Internal Assessment (20 Marks)	External Assessment (30 Marks)	Total (50 Marks)
USIT1P1	Case Study	Case Study	50
USIT1P2	Problem Solving	Problem Solving	50
USIT1P3	Lab and Journal	Practical Exam	50
USIT1P4	Lab and Journal	Practical Exam	50
USIT1P5	Lab and Journal	Practical Exam	50

Semester II

Theory

Course	Internal Assessment (40 Marks)			External Assessment (60 Marks)	Total(100 Marks)
	Assignment	Tutorial	Class Test	Theory Exam	
USIT201	10	10	20	60	100
USIT202	10	10	20	60	100
USIT203	10	10	20	60	100
USIT204	10	10	20	60	100
USIT205	10	10	20	60	100

Practical

Course	Internal Assessment (20 Marks)	External Assessment (30 Marks)	Total (50 Marks)
USIT2P1	Lab and Journal	Practical Exam	50
USIT2P2	Problem Solving	Problem Solving	50
USIT2P3	Lab and Journal	Practical Exam	50
USIT2P4	Lab and Journal	Practical Exam	50
USIT2P5	Case Study	Case Study	50

- Tutorials are theory /problems to be solved by the students in the class room at the end of practical / theory session
- Assignments are theory / problems to be solved by the students at home.
- Class Test is to be conducted in the class room with due notice. Test could be out of any sum total but is to be converted out of 20 for class test.

- Semester I,II,III,IV are college examinations. Question papers will be set by examiners appointed by Principals of the affiliated colleges.

Suggested Question Paper Format for END Semester Examination

Duration : 2 hrs.   Total Marks : 60

All Questions Compulsory:

Q. 1	From Unit I
	Attempt any two of following
	   i. …….. 5 marks
	   ii. …….. 5 marks
	   iii. …….. 5 marks
		10 marks

Q. 2	From Unit II
	Attempt any two of following
	   i. …….. 5 marks
	   ii. …….. 5 marks
	   iii. …….. 5 marks
		10 marks

Q. 3	From Unit III
	Attempt any two of following
	   i. …….. 5 marks
	   ii. …….. 5 marks
	   iii. …….. 5 marks
		10 marks

Q. 4	From Unit IV
	Attempt any two of following
	   i. …….. 5 marks
	   ii. …….. 5 marks
	   ii. …….. 5 marks
		10 marks

Q. 5	From Unit II
	Attempt any two of following
	   i. …….. 5 marks
	   ii. …….. 5 marks
	   iii. …….. 5 marks
		10 marks

Q. 6	From Unit II
	Attempt any two of following
	   i. …….. 5 marks
	   ii. …….. 5 marks
	   iii. …….. 5 marks
		10 marks

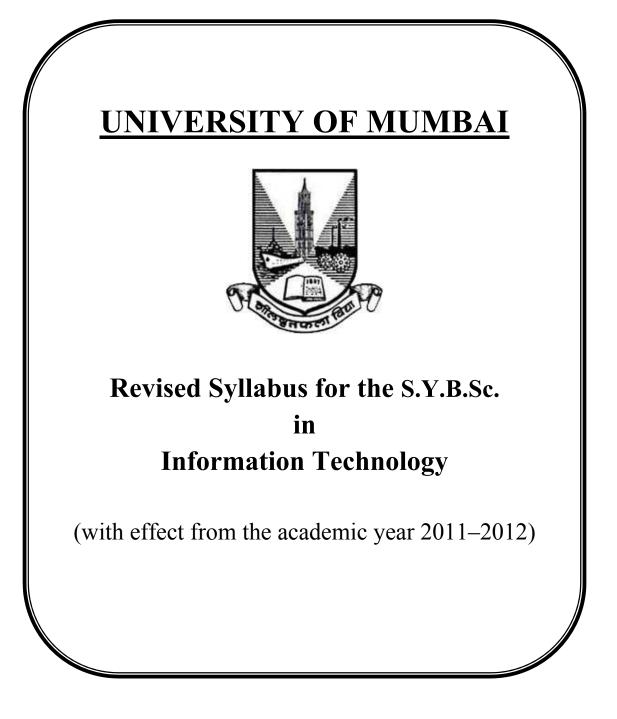Note: Internal choice should be given.

UNIVERSITY OF MUMBAI
No. UG/147 of 2011

CIRCULAR:-

A reference is invited to the Ordinances, Regulations and syllabi relating to the Bachelor of Science in Information Technology (B.Sc.) (I.T.) degree course **vide** this office Circulars No. UG/150 of 2001, dated 3rd May, 2001 and No.UG/402 of 2002, dated 18th September, 2002 and the Principals of the affiliated Colleges in Arts, Science, Commerce and the Professor-cum-Director, Institute of Distance and Open Learning are hereby informed that the recommendation made by the Ad-hoc Board of Studies in Information Technology at its meeting held on 15th March, 2011 has been accepted by the Academic Council at its meeting held on 25th May, 2011, **vide** item No. 4.99 and that, in accordance therewith, the revised syllabus of S.Y.B.Sc. in Information Technology is as per **Appendix** and that the same has been brought into force with effect from the academic year 2011-2012.

MUMBAI – 400 032   (Prin. (Dr.) M.S.Kurhade)
15th June, 2011   I/c. Registrar

UNIVERSITY OF MUMBAI

Revised Syllabus for the S.Y.B.Sc.
in
Information Technology

(with effect from the academic year 2011–2012)

S Y BSc Information Technology Revised syllabus(2011-12)

Semester III

P1. Logic and Discrete Mathematics

P2. Computer Graphics

P3. Advanced SQL

P4. Object Oriented Programming with C++

P5. Modern Operating Systems

Semester IV

P1. Software Engineering

P2. Multimedia

P3. Java and Data Structures

P4. Quantitative Techniques

P5. Embedded Systems

CLASS: B. Sc (Information technology)			Semester – III	
COURSE: Logic and Discrete Mathematics				
Periods per week	**Lecture**		5	
1 Period is 50 minutes	**TW/Tutorial/Practical**		3	
			Hours	**Marks**
Evaluation System	**Theory Examination**		3	100
	TW/Tutorial/Practical		--	50

Unit-I	**Set Theory:** Fundamentals - Sets and subsets, Venn Diagrams, Operations on sets, Laws of Set Theory, Power Sets and Products, Partition of sets, The principle of Inclusion-Exclusion. **Logic:** Propositions and Logical operations, Truth tables, Equivalence, Implications, Laws of Logic, Normal forms, Predicates and quantifiers, Mathematical Induction
Unit-II	**Relations, diagraphs and lattices:** – Product sets and partitions, relations and digraphs, paths in relations and digraphs, properties of relations, equivalence and partially ordered relations, computer representation of relations and digraphs, manipulation of relations, Transitive closure and Warshall's algorithm, Posets and Hasse Diagrams, Lattice.
Unit-III	**Functions and Pigeon Hole Principle:** Definitions and types of functions: injective, surjective and bijective, Composition, identity and inverse, Pigeon hole principle.
Unit-IV	**Graphs and Trees:** Graphs, Euler paths and circuits, Hamiltonian paths and circuits, Planer graphs, coloring graphs, Isomorphism of Graphs. **Trees:** Trees, rooted trees and path length in rooted trees, Spanning tree and Minimal Spanning tree, Isomorphism of trees, Weighted trees and Prefix Codes.

Unit-V	**Algebraic Structures:** Algebraic structures with one binary operation – semi groups, monoids and groups, Product and quotient of algebraic structures, Isomorphism, homomorphism, automorphism, Cyclic groups, Normal sub group, codes and group codes, Algebraic structures with two binary operations – rings, integral domains and fields. Ring homomorphism and Isomorphism.
Unit-VI	**Generating Functions and Recurrence relations:** Series and Sequences, Generating Functions, Recurrence relations, Applications, Solving difference equations, Fibonacci.

Books:

Discrete mathematical structures by B Kolman RC Busby, S Ross PHI Pvt. Ltd.

Discrete mathematical structures by RM Somasundaram (PHI) EEE edition

References:

Discrete structures by Liu, Tata McGraw-Hill

Digital Logic John M Yarbrough Brooks/cole, Thompson Learning

Discrete Mathematics and its Applications, Kenneth H. Rosen, Tata McGraw-Hill

Discrete Mathematics for computer scientists and Mathematicians, Joe L.Mott, Abraham Kandel Theodore P. Baker, Prentice-Hall of India Pvt. Ltd.

Discrete Mathematics With Applications, Susanna S. Epp, Books/Cole Publishing Company

Discrete Mathematilcs, Schaum's Outlines Series, Seymour Lipschutz, Marc Lipson, Tata McGraw-Hill

Term Work:

Assignment: Should **contain at least 6 assignments (one per unit) covering the**

Syllabus.

Tutorial: At least **t**hree tutorials based on above syllabus must be conducted.

CLASS: B. Sc (Information technology)		Semester – III	
COURSE: Computer Graphics			
Periods per week **1 Period is 50 minutes**	Lecture	5	
	TW/Tutorial/Practical	3	
		Hours	**Marks**
Evaluation System	Theory Examination	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Introduction Computer Graphics and Primitive Algorithms:** Introduction to Image and Objects, Image Representation, Basic Graphics Pipeline, Bitmap and Vector-Based Graphics, Applications of Computer Graphics, Display Devices, Cathode Ray Tubes, Raster-Scan Display, Random-Scan Display, Flat Panel Display, Input Technology, Coordinate System Overview, **Scan-Conversion of graphics primitives:** Scan-Conversion of a Lines (Digital Differential Analyzer Algorithm, Bresenham's Line-Drawing Algorithm, Scan-Conversion of Circle and Ellipse (Bresenham's Method of Circle Drawing, Midpoint Circle Algorithm), Drawing Ellipses and Other Conics.
Unit-II	**Two Dimensional Transformation:** Introduction to transformations, Transformation Matrix, Types of Transformations in Two-Dimensional Graphics: Identity Transformation, Scaling, Reflection, Shear Transformations, Rotation, Translation, Rotation about an Arbitrary Point, Combined Transformation, Homogeneous Coordinates, 2D Transformations using Homogeneous Coordinates
Unit-III	**Three-dimensional transformations**, Objects in Homogeneous Coordinates, Three-Dimensional Transformations: Scaling, Translation, Rotation, Shear Transformations, Reflection, World Coordinates and Viewing Coordinates, Projection, Parallel Projection, Perspective Projection.
Unit-IV	**Viewing and Solid Area Scan-Conversion:** Introduction to viewing and clipping, Viewing Transformation in Two Dimensions, Introduction to Clipping, Two-Dimensional Clipping, Point Clipping, Line Clipping, Introduction to a Polygon Clipping, Viewing and Clipping in Three Dimensions, Three-Dimensional Viewing Transformations, Text Clipping **Introduction to Solid Area Scan-Conversion**, Inside–Outside Test, Winding Number Method and Coherence Property, Polygon Filling, Seed Fill Algorithm, Scan-

	Line Algorithm, Priority Algorithm, Scan Conversion of Character, Aliasing, Anti-Aliasing, Halftoning, Thresholding and Dithering
Unit-V	**Introduction to curves**, Curve Continuity, Conic Curves, Piecewise Curve Design, Parametric Curve Design, Spline Curve Representation, Bezier Curves, B-Spline Curves, Fractals and its applications. **Surface Design**: Bilinear Surfaces, Ruled Surfaces, Developable Surfaces, Coons Patch, Sweep Surfaces, Surface of Revolution, Quadric Surfaces, Constructive Solid Geometry, Bezier Surfaces, B-Spline Surfaces, Subdivision Surfaces **Visible Surfaces:** Introduction to visible and hidden surfaces, Coherence for visibility, Extents and Bounding Volumes, Back Face Culling, Painter's Algorithm, Z-Buffer Algorithm, Floating Horizon Algorithm, Roberts Algorithm.
Unit-VI	**Object Rendering:** Introduction Object-Rendering, Light Modeling Techniques, Illumination Model, Shading, Flat Shading, Polygon Mesh Shading, Gaurand Shading Model, Phong Shading, Transparency Effect, Shadows, Texture and Object Representation, Ray Tracing, Ray Casting, Radiosity, Color Models. **Introduction to animation**, Key-Frame Animation, Construction of an Animation Sequence, Motion Control Methods, Procedural Animation, Key-Frame Animation vs. Procedural Animation, Introduction to Morphing, Three-Dimensional Morphing

Books:

Computer Graphics, R. K. Maurya, John Wiley.

Mathematical elements of Computer Graphics, David F. Rogers, J. Alan Adams, Tata McGraw-Hill.

Procedural elements of Computer Graphics, David F. Rogers, Tata McGraw-Hill.

Reference:

Computer Graphics, Donald Hearn and M. Pauline Baker, Prentice Hall of India.

Computer Graphics, Steven Harrington, McGraw-Hill.

Computer Graphics Principles and Practice, J.D. Foley, A. Van Dam, S.K. Feiner and R.L. Phillips, Addision Wesley.

Principles of Interactive Computer Graphics, Willaim M. Newman, Robert F. Sproull, Tata McGraw-Hill.

Introduction to Computer Graphics, J.D. Foley, A. Van Dam, S.K. Feiner, J.F. Hughes and R.L. Phillips, Addision Wesley.

Term Work:

Practical(Suggested):

Should contain at least 10 programs developed using C++. Some Sample practical are listed below.

1. Write a program with menu option to input the line coordinates from the user to generate a line using Bresenham's method and DDA algorithm. Compare the lines for their values on the line.
2. Develop a program to generate a complete circle based on
    a. Bresenham's circle algorithm   b. Midpoint Circle Algorithm
3. Implement the Bresenham's/DDA algorithm for drawing line (programmer is expected to shift the origin to the center of the screen and divide the screen into required quadrants).
4. Write a program to implement a stretch band effect. (A user will click on the screen and drag the mouse/arrow keys over the screen coordinates. The line should be updated like rubber-band and on the right-click gets fixed).
5. Write program to perform the following 2D and 3D transformations on the given input figure
    a. Rotate through θ.
    b. Reflection
    c. Scaling
    d. Translation.
6. Write a program to demonstrate shear transformation in different directions on a unit square situated at the origin.
7. Develop a program to clip a line using Cohen-Sutherland line clipping algorithm between $(x_1,y_1)(x_2, y_2)$ against a window $(x_{min} , y_{min})(x_{max} , y_{max})$.
8. Write a program to implement polygon filling.
9. Write a program to generate a 2D/3D fractal figures (Sierpinski triangle, Cantor set, tree etc).
10. Write a program to draw Bezier and B-Spline Curves with interactive user inputs for control polygon defining the shape of the curve.
11. Write a program to demonstrate 2D animation such as clock simulation or rising sun
12. Write a program to implement the bouncing ball inside a defined rectangular window.

CLASS: B. Sc (Information technology)		Semester – III	
COURSE: Advanced SQL			
Periods per week	Lecture	5	
1 Period is 50 minutes	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Structured Query Language:** Writing Basic SQL Select Statements**,** Restricting and Sorting Data, Single-Row Functions**,** Joins (Displaying Data from Multiple Tables), Aggregating Data using Group Functions, Subqueries, Manipulating Data, Creating and Managing Tables, Including Constraints, Creating Views, Creating Other Database Objects(Sequences, Indexes and Synonyms)
Unit-II	**Advanced SQL:** Controlling User Access, Using SET operators, DateTime Functions, Enhancements to Group by clause(cube, Rollup and Grouping), Advanced Subqueries (Multiple column subqueries, Subqueries in FROM clause, Scalar and correlated subqueries), WITH Clause, Hierarchical retrieval,
Unit-III	**PLSQL:** Introduction, Overview and benefits of PL/SQL, Subprograms, types of PL/SQL blocks, Simple Anonymous Block, Identifiers, types of Identifiers, Declarative Section, variables, Scalar Data Types, The %TYPE Attribute, Bind Variables, Sequences in PL/SQL Expressions, Executable Statements, PL/SQL Block Syntax, Comment the Code, Deployment of SQL Functions in PL/SQL, Convert Data Types, Nested Blocks, Operators. Interaction with the Oracle Server, Invoke SELECT Statements in PL/SQL, SQL Cursor concept, Data Manipulation in the Server using PL/SQL, SQL Cursor Attributes to Obtain Feedback on DML, Save and Discard Transactions.
Unit-IV	**Control Structures:** Conditional processing using IF Statements and CASE Statements, Loop Statement, While Loop Statement, For Loop Statement, the Continue Statement, **Composite Data Types:** PL/SQL Records, The %ROWTYPE Attribute, Insert and Update with PL/SQL Records, INDEX BY Tables, INDEX BY Table Methods, Use INDEX BY Table of Records, **Explicit Cursors**, Declare the Cursor, Open the Cursor, Fetch data from the Cursor, Close the Cursor, Cursor FOR loop, The %NOTFOUND and %ROWCOUNT Attributes, the FOR UPDATE Clause and WHERE CURRENT Clause, **Exception Handling,** Handle Exceptions with PL/SQL, Trap Predefined and non-predefined Oracle Server Errors, User-Defined Exceptions, Propagate Exceptions, RAISE_APPLICATION_ERROR Procedure,
Unit-V	**Stored Procedures:** Create a Modularized and Layered Subprogram Design, the PL/SQL Execution Environment, differences between Anonymous Blocks and Subprograms, Create, Call, and Remove Stored Procedures, Implement Procedures Parameters and Parameters Modes, View Procedure Information, Stored Functions and Debugging Subprograms, Create, Call, and Remove a Stored Function, advantages of using Stored Functions, the steps to create a stored function, Invoke User-Defined Functions in SQL Statements, Restrictions when calling Functions, Control side effects when calling Functions, View Functions Information, debug Functions and Procedures, **Packages,** advantages of Packages, components of a Package, Develop a Package, enable visibility of a Package's Components, Create the Package Specification and Body using the SQL CREATE Statement and SQL Developer, Invoke the Package Constructs, View the PL/SQL Source Code using the Data Dictionary, Deploying Packages, Overloading Subprograms in PL/SQL, Use the STANDARD Package, Use Forward Declarations, Implement Package Functions in SQL and Restrictions, Persistent State of Packages, Persistent State of a Package Cursor, Control side effects of PL/SQL Subprograms, Invoke PL/SQL Tables of Records in Packages

Unit-VI	**Dynamic SQL:** The Execution Flow of SQL, Declare Cursor Variables, Dynamically Executing a PL/SQL Block, Configure Native Dynamic SQL to Compile PL/SQL Code, invoke DBMS_SQL Package, Implement DBMS_SQL with a Parameterized DML Statement, Dynamic SQL Functional Completeness, **Triggers,** the Trigger Event Types and Body, Business Application Scenarios for Implementing Triggers, Create DML Triggers using the CREATE TRIGGER Statement and SQL Developer, Identify the Trigger Event Types, Body, and Firing (Timing), Statement Level Triggers and Row Level Triggers, Create Instead of and Disabled Triggers, Manage, Test and Remove Triggers. Creating Compound, DDL and Event Database Triggers, Compound Trigger Structure for Tables and Views, Compound Trigger to Resolve the Mutating Table Error, Comparison of Database Triggers and Stored Procedures, Create Triggers on DDL Statements, Create Database-Event and System-Events Triggers, System Privileges Required to Manage Triggers

Books:

Murach's Oracle SQL and PLSQL by Joel Murach, Murach and Associates.

Oracle Database 11g PL/SQL Programming Workbook, ISBN: 9780070702264, By: Michael McLaughlin,John Harper, Tata McGraw-Hill

Reference:

Oracle PL/SQL Programming, Fifth Edition By Steven Feuerstein, Bill Pribyl

Oracle 11g: SQL Reference Oracle press

Oracle 11g: PL/SQL Reference Oracle Press.

Expert Oracle PL/SQL, By: Ron Hardman,Michael McLaughlin, Tata McGraw-Hill

Oracle database 11g: hands on SQL/PL SQL by Satish Asnani (PHI) EEE edition

Term Work:

*Assignments: **Should contain at least 6 assignments (one per unit) covering the***

syllabus.

Practical (Suggested):

Should contain at the least 10 programs. Some sample practical are listed below.

1. **Practical 1: Select queries and joins**
   a. Select queries on single table using alias, where and order by clause.
   b. Select queries on single table using aggregate functions and group by clause.
   c. Querying data from multiple tables using all types of joins.

2. **Practical 2: Subqueries, DML and DDL**
   a. Querying single and multiple tables using subqueries.

b. Manipulating data (Insert, update and delete)
c. Creating simple tables and tables with constraints.

3. **Practical 3: Creating database objects, Controlling user access and using set operators**
   a. Creating Views, Sequences, Indexes and synonyms.
   b. Granting and revoking privileges on user objects.
   c. Using set operators, date-time functions, roll up, cube and grouping sets.

4. **Practical 4: Working with advanced subqueries and WITH clause**
   a. Multiple column subqueries, subqueries in from clause,
   b. Scalar subqueries and correlated subqueries,
   c. WITH Clause and hierarchical retrieval.

5. **Practical 5: Basic PL/SQL, INDEX BY tables, PL/SQL Record and FOR loop.**
   a. Creating anonymous PL/SQL blocks.
   b. Define, create, and use INDEX BY tables and a PL/SQL record.
   c. Process a number of rows from a table and populate another table with the results using a cursor FOR loop.

6. **Practical 6: Cursors, Exceptions and procedures issuing DML and query commands.**
   a. Cursors with parameters to process a number of rows from multiple tables.
   b. Create exception handlers for specific situations.
   c. Create procedures that issue DML and query commands.
7. **Practical 7: Functions and Stored Procedures**
   a. Creating and invoking functions from SQL statements.
   b. Creating and invoking stored procedures.
   c. Re-create the source code for a procedure and a function.

8. **Practical 8: Working with packages**
   a. Create package specifications and package bodies. Invoke the constructs in the packages.
   b. Create a package containing an overloaded function.
   c. Create a one-time-only procedure within a package to populate a PL/SQL table.

9. **Practical 9: Working with Large Objects and triggers**
   a. Create a table with both BLOB and CLOB columns. Use the DBMS_LOB package to populate the table and manipulate the data.
   b. Create statement and row triggers.
   c. Create procedures that will be invoked from the triggers.

10. **Practical 10: Working with INSTEAD OF triggers, business rules and recompiling procedures, functions, packages and views.**
    a. Create instead of triggers for views.
    b. Implement a number of business rules. Create triggers for those rules that should be implemented as triggers. The triggers must execute procedures that that are placed in a package.
    c. Use the DEPTREE_FILL procedure and the IDEPTREE view to investigate dependencies in your schema. Recompile invalid procedures, functions, packages, and views.

CLASS: B. Sc (Information technology)		Semester – III	
COURSE: Object Oriented Programming with C++			
Periods per week **1 Period is 50 minutes**	**Lecture**	5	
	TW/Tutorial/Practical	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Introduction to OOPs:** Need object oriented programming, comparison of procedural and object oriented approach, characteristics of OOPs – object , classes , polymorphism, inheritance, reusability, data hiding and abstraction, applications of OOPs
Unit-II	**Classes and Objects:** Class declaration, constructors, constructor initialization lists, access functions, private member functions, the copy constructor, the class destructor ,constant objects, structures, pointers to objects, static data members, static function members
Unit-III	**Operator Overloading:** overloading the assignment operator, the this pointer, overloading arithmetic operators, overloading the arithmetic assignment, operators, overloading the relational operators ,overloading the stream operators, conversion operators ,overloading the increment and decrement operators, overloading the subscript operator
Unit-IV	**Composition and Inheritance:** inheritance, protected class members , overriding and dominating inherited members, private access verses protected access, virtual functions and polymorphism, virtual destructors, abstract base classes **File Handling:** Classes for file stream operations, opening and closing a file, detecting end of file, file modes, file pointers and their manipulations, sequential input and output operations, random access, file operations error handling, command line argument
Unit-V	**Strings and Streams:** the string class interface, the constructors and destructor , the copy constructor, the assignment operator, the addition operator , an append operator, access functions , the comparison operators, stream operators,

	stream classes, the ios class, ios format flags, ios state , variables ,the istream and ostream classes, unformatted input functions , unformatted output functions, stream manipulators.
Unit-VI	**Templates and Iterators:** function templates, class templates, container classes, subclass templates, passing template classes to template parameters, iterator classes **Libraries:** the standard C++ library, proprietary libraries, contents of the standard c headers, string streams, file processing, the standard template library

Books:

Schaum's Outline of Theory and Problems of Programming with C++ John R. Hubbard, TataMcGraw-Hill

Object Oriented Programming with C++, E.Balagurusamy,Fourth Edition, TataMcGraw-Hill

Object Oriented Programming with C++, by P. Sarang 2nd Edition,(PHI) EEE edition

Reference:

C++ programming , 3rd Edition, Bjarne Stroustrup

Mastering C++, 2nd Edition, Venugopalan, TataMcgrawHill

C++ Programming, , Robert Lafore,

C++ for Beginners, P. M. Harwani, X-Team Series,

Term Work:

 Assignments : ***Should contain at least 6 assignments (one per unit) covering the***

syllabus.

 Practical (Suggested):

Should contain at the least 10 programs. Some sample practical are listed below.

1   **Implement the following**

a.   Design an employee class for reading and displaying the employee information,   the getInfo() and displayInfo() methods will be used repectively. Where getInfo() will be private method.

b.   Design the class student containing getData() and displayData() as two of its methods which will be used for reading and displaying the student information respectively.Where getData() will be private method.

c.   Design the class Demo which will contain the following methods: readNo() ,factorial() for calculating the factorial of a number, reverseNo() will reverse the given number, isPalindrome() will check the given number is palindrome, isArmstrong() which will calculate

the given number is armStrong or not.Where readNo() will be private method.

2   **Implement the following**

a.   Write a friend function for adding the two complex numbers, using a single class.

b.   Write a friend function for adding the two different distances and display its sum, using two classes.

c.   Write a friend function for adding the two matrix from two different classes and display its sum.

3   **Implement the following**

a.   Design a class Complex for adding the two complex numbers and also show the use of constructor.

b.   Design a class Geometry containing the methods area() and volume() and also overload the area() function .

c.   Design a class StaticDemo to show the implementation of static variable and static function.

4   **Implement the following**

a.   Overload the operator unary(-) for demonstrating operator overloading.

b.   Overload the operator + for adding the timings of two clocks, And also pass objects as an argument.

c.   Overload the + for concatenating the two strings. For e.g "c" + "++" = c++

5   **Implement the following**

a.   Design a class for single level inheritance using public and private type derivation.

b.   Design a class for multiple inheritance.

c.   Implement the hierarchical inheritance.

6.   **Implement the following**

a.   Implement the concept of method overriding.

b.   Show the use of virtual function

c.   Show the implementation of abstract class.

7.   **Implement the following**

a.   String operations for string length , string concatenation

b.   String operations for string reverse, string comparison,

c.   Console formatting functions.

8.   Implement the following:

a.   Show the implementation of exception handling

b.   Show the implementation for exception handling for strings

c.   Show the implementation of exception handling for using the pointers.

9.   Show the implementation

a.   Design a class FileDemo open a file in read mode and display the total number of words and lines in the file.

b.   Design a class to handle multiple files and file operations

c.   Design a editor for appending and editing the files

10.   Show the implementation for the following

a.   Show the implementation of template class library for swap function.

b.   Design the template class library for sorting ascending to descending and vice-versa

c.   Design the template class library for concatenating two strings

CLASS: B. Sc (Information technology)		Semester – III	
COURSE: Modern Operating Systems			
Periods per week	**Lecture**	5	
1 Period is 50 minutes	**TW/Tutorial/Practical**	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Introduction to Operating Systems:** OS and Computer System, System performance, Classes of OS, Batch processing, time-sharing, multiprocessing, real time, distributed and modern operating systems, Desktop Systems, Handheld Systems, Clustered Systems, Assemblers, Compilers and Interpreters, Linkers.
Unit-II	**Operating-System Structures:** Operating-System Services, User Operating-System Interface, System Calls, Types of System Calls, System Programs, Operating-System Design and Implementation, Operating-System Structure, Virtual Machines, Operating-System Generation, System Boot.
Unit-III	**Processes and Process Synchronization:** Process Concept, Process Scheduling, Scheduling Criteria, Scheduling Algorithms, Operations on Processes, Interprocess Communication, Multithreading Models, Threading Issues, Thread Scheduling, Communication in Client–Server Systems, The Critical-Section Problem, Peterson's Solution, Semaphores.
Unit-IV	**Memory Management:** Memory management without swapping or paging; Swapping, Virtual Memory, Page replacement algorithms, Modeling paging algorithms, Design issues for paging systems, segmentation
Unit-V	**File-System Interface and Implementation:** File Concept, File-System Mounting, Free-SpaceManagement, File Sharing, NFS. **Mass-Storage Structure:** Disk Structure, Disk Management, Swap-Space Management, RAID Structure, Stable-Storage Implementation. Deadlocks , Deadlock detection and recovery, avoidance and prevention
Unit-VI	**I/O Systems:** Application I/O Interface, Transforming I/O Requests to Hardware Operations, STREAMS, Performance. **Protection and Security:** Principles of Protection, Domain of Protection, Access Matrix, Access Control, Capability-Based Systems, Language-Based Protection, The Security Problem, System and Network Threats, Implementing Security Defenses.

Books:

Modern Operating Systems, Andrew Tanenbaum,

Operating Systems, 2nd Edition, K. A.Sumitra Devi and N.P Banashree, SPD

Operating System Concepts, 8th Edition, Abraham Silberschatz, Peter B.Galvin, Greg Gagne, Wiley publication

Reference:

Operating Systems- A concept based approach , 2nd Edition, D.M. Dhamdhere, McGrawHill publications

Operating Systems, 3rd Edition , Godbole and Kahate, McGrawHill publications.

Term Work:

Assignment: **Should contain at least 6 assignments (one per unit) covering the**

Syllabus.

Tutorial: At the least **t**hree tutorials based on above syllabus must be conducted.

Case Studies (Suggested):

a) MS-DOS
b) Windows NT
c) Windows 2008 Server
d) Windows 7
e) Unix
f) Linux
g) OS/2
h) MAC OS
i) Symbian
j) Chrome
k) Android

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Software Engineering			
Periods per week	**Lecture**	5	
1 Period is 50 minutes	**TW/Tutorial/Practical**	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**An Introduction** : To Software, Software Engineering, Software Process, Software Engineering Methods; CASE Tools, Attributes of good software. **Socio-technical system :** Essential characteristics of socio technical systems, Emergent System Properties, Systems Engineering, Components of system such as organization, people and computers, Dealing Legacy Systems. **Critical system** : Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems
Unit-II	**Software processes :** Fundamental activities of software process, Different software process models, Process Iteration and Activities, The Rational Unified Process, CASE in detail. **Project Management** : Software Project Management, Management activities, Project Planning, Project Scheduling, Risk Management. **Software Requirements:** Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements
Unit-III	**Requirements Engineering Processes** : Feasibility study, Requirements elicitation and anlaysis, Requirements Validations, Requirements Management. **System Models** : Models and its types, Context Models, Behavioural Models, Data Models, Object Models, Structured Methods. **Architectural Design :** Architectural Design Decisions, System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures
Unit-IV	**Application Architectures** : Data Processing Systems, Transaction Processing Systems, Event Processing Systems, Language Processing Systems **Object Oriented Design** : Objects and Object Classes, An object Oriented Design

	Process, Design Evolution
	User Interface Design : Need of UI design, Design issues, The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation
	Rapid Software Development : Agile Methods, Extreme Programming, Rapid Application Development, Software Prototyping
Unit-V	**Component based Software Engineering :** Components and Component models, The CBSE Process, Component Composition. **Verification and Validation :** Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods. **Software Testing :** System Testing, Component Testing, Test Case Design, Test Automation. **Software Cost Estimation :** Software Productivity, Estimation Techniques, Algorithmic Cost Modeling, Project Duration and Staffing
Unit-VI	**Quality Management :** Process and Product Quality, Quality assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics
	Process Improvement : Process and product quality, Process Classification, Process Measurement, Process Analysis and Modeling, Process Change, The CMMI Process Improvement Framework. **Security Engineering :** Security Concepts, Security Risk Management, Design for Security, System Survivability. **Service Oriented Software Engineering** : Services as reusable components, Service Engineering, Software Development with Services

Books:

Software Engineering, "Ian Somerville", 8th edition, Pearson Education.

Software Engineering, Pankaj Jalote, Narosa Publication

Reference:

Software Design, "D.Budgen", 2nd edition, Pearson education.

Software engineering, A practitioner's approach, Roger Pressman, Tata McGraw-Hill

Software Engineering by KL James, PHI(2009) EEE edition

Software Engineering principles and practice by WS Jawadekar Tata McGraw-Hill

Term Work:

*Assignments: **Should contain at least 6 assignments (one per unit) covering the***

Syllabus.

Tutorial: At least three tutorials based on above syllabus must be conducted.

Case Studies (Suggested)

1. Project Initiation and scheduling.
2. Analyzing a system and specifying the requirements
   a. Structured Approach
   b. Object oriented Approach
3. Project Cost Estimation
4. Designing the database design
5. Designing the User interface design
6. Use of testing methodologies
7. Cost Estimation Techniques
8. Cost benefit Analysis

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Multimedia			
Periods per week	**Lecture**	5	
1 Period is 50 minutes	**TW/Tutorial/Practical**	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Introduction:** What is multimedia? Defining the scope of multimedia. Applications of multimedia, hardware and software requirements, multimedia database.
Unit-II	**Digital representation:** Introduction, Analog representation, waves, digital representation, need for digital representation, A to D conversion, D to A conversion, relation between sampling rate and bit depth, Quantization error, Fourier representation, pulse modulation. Importance and drawback of digital representation.
Unit-III	**Text and Image:** Introduction, Types of text, Font, insertion, compression,File formats. Types of images, colour models, Basic steps for image processing, principle and working of scanner and digital camera, Gamma and gamma correction.
Unit-IV	**Audio and Video technology:** Fundamental characteristics of sound, psycho-

	acoustics, Raster scanning principles, sensors for TV cameras, color fundamentals, additive and subtractive color mixing, Liquid crystal display (LCD), Plasma Display Panel (PDP), file formats
Unit-V	**Compression and coding**: What is compression? Need for compression, Types of compression- basic compression techniques-run length, Huffman's coding, JPEG, zip coding. Overview of Image and Video compression techniques.
Unit-VI	**Multimedia presentation and authoring:** Overview, multimedia authoring metaphor, multimedia production, presentation and automatic authoring, Design paradigms and user interface, overview of tools like adobe premier, director, flash and dreamweaver. Barriers to wide spread use.

Books:

Principles of Multimedia by Ranjan Parekh. Tata McGraw-Hill

Reference:

Multimedia Systems Design by Prabhat K. Andleigh and Kiran Thakrar-PHI publication

Multimedia systems by John F. Koegal Buford-Pearson Education.

Fundamentals of multimedia by Ze-Nian Li and MS Drew. PHI EEE edition.

Term Work:

Assignments: ***Should contain at least 6 assignments (one per unit) covering the***

Syllabus.

Tutorial: At least **t**hree tutorials based on above syllabus must be conducted.

Mini Project: Develop a multimedia application

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Java and Data Structures			
Periods per week	Lecture	5	
1 Period is 50 minutes	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Core Java:** Features of Java, JVM, Data Types, Variables, and Arrays, Operators, Control Statements, type-casting, Classes, Objects and Methods, Constructor, method overriding, finalize methods.
Unit-II	**Derived concepts:** Inheritance, Packages and Interfaces, Exception Handling, String handling, Multithreaded Programming
Unit-III	**The Java I/O Classes and Interfaces:** File, Directories, Using FilenameFilter, The listFiles( ) Alternative, Creating Directories, The Stream Classes, The Byte Streams, InputStream, OutputStream, FileInputStream, FileOutputStream, ByteArrayInputStream, ByteArrayOutputStream, Filtered Byte Streams, Buffered Byte Streams, SequenceInputStream, PrintStream, RandomAccessFile, The Character Streams, Reader, Writer, FileReader , FileWriter, CharArrayReader, CharArrayWriter, BufferedReader, BufferedWriter, PushbackReader, PrintWriter
Unit-IV	**Data Structures:** Complexity and analysis of algorithms – algorithm, time and space complexity, asymptotic notations, Types of data structures, Arrays - Properties of Arrays, Duplicating an Array, sequential search algorithm, binary search algorithm, Stacks- Stack Operations, indexed Implementation, Linked Implementation, , Applications - recursion, Queue - Queue Operations, indexed Implementation, Applications, Circular Queue – insertion , deletion
Unit-V	**Linked Lists** – representation of linked list, traversing, searching, insertion, deletion and doubly linked list. **Hash table methods** – hashing functions , collision-resolution techniques

	Trees- Binary Trees, traversing binary tree, traversing algorithm using stacks, header nodes, threads, binary search trees (insertion and deletion), AVL trees , B trees
Unit-VI	**Heaps –** insertion and deletion **Sorting –** selection, bubble, merge, tree , radix , insertion **Graphs –** graph theory, sequential representation, adjacency matrix, path matrix, Warshall's algorithm, linked representations, operations, traversing.

Books:

Core Java for Beginners, Sharanam Shah and V Shah, The X Team SPD

Java 2 Complete Reference, 5th Edition , Osborne , Tata-McGrawhill

Data Structures,S Lipschutz, Tata-McGrawhill

Reference:

An introduction to data structures with applications, second edition, Jean-Paul Tremblay, P Sorenson, Tata-McGrawhill

Data Structures with Java, 2nd edition, J Hubbard, Tata-McGrawhill

Term Work:

Assignments: ***Should contain at least 6 assignments (one per unit) covering the***

Syllabus.

Practical List:

1   **Implement the following**

a.   Design a java program for type casting different types of variables.

b.   Design a Calculator class in java, and implement all the methods required by calculator operations.

c.   Design a java class for method overloading and method overriding.

2   **Implement the following**

a.   Design a java program for different types of inheritance.

b. Design a java class for the use of interface.

c. Design a java class performing string operations.

3   Implement the following

a. Design a class in java to add two complex numbers using constructors.

b. Design a java class for performing all the matrix operations i.e addition, multiplication, transpose etc.

c. Design a java class for implementing the packages.

4   Implement the following

a. Design a java class for implementing the concept of threading and multithreading.

b. Design a java class for performing all the file-operations.

c. Design a java class for operating the random access files using

5   Implement the following

a. Design a class for sorting the names or numbers in ascending and descending order.

b. Design a java class for implementing the operations of stack.

6.   Implement the following

a. Design a class in java for implementing the operations of queue.(insert, delete, display, exit)

b. Design a class in java for implementing the operations of circular queue.

7.   Implement the following

a. Design a class to implement the operations of singly link-list. (insertion , deletion, sorting, display)

b. Design a class to implement the operations of doubly-linked list.

8.   Implement the following

a. Implement the concept of hashing technique and also show its collision avoidance.

b. Design a class to create a tree and also implement the binary search tree.

9.   Show the implementation

a. Design a class in java for creating the heap and also show heap sort for it.

b. Design a class in java for implementing selection and insertion sort.

10. Show the implementation for the following

a. Design a class in java for bubble and merge sort.

b. Design a class in java for implementing the graph

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Quantitative Techniques			
Periods per week	**Lecture**	5	
1 Period is 50 minutes	**TW/Tutorial/Practical**	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Errors**, **Solutions of Algebraic and Transcendental Equations** using - Bisection Method, the Method of False Position, Newton-Raphson Method. **Interpolation:** Interpolation: - Forward Difference, Backward Difference, Newton's Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.
Unit-II	**Solution of simultaneous algebraic equations (linear) using iterative methods:** Gauss-Jordan Method, Gauss-Seidel Method. **Numerical Integration:** Trapezoidal Rule, Simpson's 1/3 rd and 3/8 th rules. **Numerical solution of 1st and 2nd order differential equations:** - Taylor series, Euler's Method, Modified Euler's Method, Runge-Kutta Method for 1st and 2nd Order Differential Equations.

Unit-III	**Random variables:** Discrete and Continuous random variables, Probability density function, Probability distribution of random variables, Expected value, Variance. **Moments and moment generating functions:** Relation between Raw moments and Central moments. **Distributions:** Binomial, Poisson, Normal, exponential, uniform distributions for detailed study, Central Limit theorem (statement only) and problems based on this theorem.
Unit-IV	**Fitting of curves:** Least square method, Fitting the straight line and parabolic curve, Correlation, Covariance, Karl Pearson's coefficient and Spearman' s Rank, correlation coefficient, Regression coefficients and lines of regression.
Unit-V	**Sampling distribution:** Test of Hypothesis, Level of Significance, Critical Region, One Tailed and Two Tailed Test, Interval Estimation of Population Parameters, Test of Significance for large Samples and small Samples, Student's 't' Distribution and its properties.
Unit-VI	**Chi-Square Distribution and its properties,** Test of the Goodness of Fit and Independence of Attributes, Contingency Table, Yates Correction **Mathematical Programming:** Linear optimization problem, Formulation and Graphical solution, Basic solution and Feasible solution, Primal Simplex Method.

Books:

Introductory Methods of Numerical Methods, Vol-2, S.S.Shastri, PHI
Fundamentals of Mathematical Statistics, S.C.Gupta, V.K.Kapoor

Reference:
Elements of Applied Mathematics, Volume 1 and 2, P.N.Wartikar and J.N.Wartikar, A. V. Griha, Pune
Engineering Mathematics, Vol-2, S.S.Shastri, PHI
Applied Numerical Methods for Engineers using SCILAB and C, Robert J.Schilling and Sandra L.Harris, " , Thomson Brooks/Cole

Term Work:

*Assignments: **Should contain at least 6 assignments (one per unit) covering the***

Syllabus.

Practical List to be performed in Scilab:

1. **Practical 1: Solution of algebraic and transcendental equations:**
   a. Program to solve algebraic and transcendental equation by bisection method.
   b. Program to solve algebraic and transcendental equation by false position method.
   c. Program to solve algebraic and transcendental equation by Newton Raphson method.
2. **Practical 2: Interpolation**
   a. Program for Newton's forward interpolation.
   b. Program for Newton's backward interpolation.
   c. Program for Lagrange's interpolation.
3. **Practical 3: Solving linear system of equations by iterative methods:**
   a. Program for solving linear system of equations using Gauss Jordan methods.
   b. Program for solving linear system of equations using Gauss Seidel methods.
4. **Practical 4: Numerical Integration**
   a. Program for numerical integration using Trapezoidal rule.
   b. Program for numerical integration using Simpson's $1/3^{rd}$ rule.
   c. Program for numerical integration using Simpson's $3/8^{th}$ rule.
5. **Practical 5: Solution of differential equations:**
   a. Program to solve differential equation using Euler's method
   b. Program to solve differential equation using modified Euler's method.
   c. Program to solve differential equation using Runge-kutta 2nd order and 4th order methods.
6. **Practical 6: Random number generation and distributions**
   a. Program for random number generation using various techniques.
   b. Program for fitting of Binomial Distribution.
   c. Program for fitting of Poisson Distribution.
   d. Program for fitting of Negative Binomial Distribution.
7. **Practical 7: Moments, Correlation and Regression**
   a. Computation of raw and central moments, and measures of skewness and kurtosis.
   b. Computation of correlation coefficient and Fitting of lines of Regression (Raw and Frequency data)
   c. Spearman's rank correlation coefficient.
8. **Practical 8: Fitting of straight lines and second degree curves**
   a. Curve fitting by Principle of least squares. (Fitting of a straight line, Second degree curve)
9. **Practical 9: Sampling:**
   a. Model sampling from Binomial and Poisson Populations.
   b. Model sampling from Uniform, Normal and Exponential Populations.
   c. Large sample tests-(Single mean, difference between means, single proportion, difference between proportions, difference between standard deviations.)
   d. Tests based on students 't-test'(Single mean, difference between means and paired 't')
10. **Practical 10: Chi-square test and LPP**
    a. Test based on Chi-square- Distribution (Test for variance, goodness of Fit,)
    b. Chi-square test of independence of attributes.
    c. Solution of LPP by Simplex method.

CLASS: B. Sc (Information technology)		Semester – IV	
COURSE: Embedded Systems			
Periods per week	Lecture	5	
1 Period is 50 minutes	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	3	100
	TW/Tutorial/Practical	--	50

Unit-I	**Introduction:** Embedded Systems and general purpose computer systems, history , classifications, applications and purpose of embedded systems **Core of embedded systems:** microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components, PCB and passive components.
Unit-II	**Characteristics and quality attributes of embedded systems:** characteristics, operational and non-operational quality attributes, application specific embedded system – washing machine, domain specific - automotive.
Unit-III	**Programming embedded systems:** structure of embedded program, infinite loop, compiling , linking and locating, downloading and debugging
Unit-IV	**Embedded Hardware:** Memory map, i/o map, interrupt map, processor family, external peripherals, memory – RAM , ROM, types of RAM and ROM, memory testing, CRC ,Flash memory
Unit-V	**Peripherals:** Control and Status Registers, Device Driver, Timer Driver- Watchdog Timers, Embedded Operating System, Real-Time Characteristics, Selection Process

Unit-VI	**Design and Development:** embedded system development environment – IDE, types of file generated on cross compilation, disassembler/ decompiler, simulator , emulator and debugging , embedded product development life-cycle, trends in embedded industry.

Books:

Programming Embedded Systems in C and C++, First Edition January**,** Michael Barr ,O'Reilly

Introduction to embedded systems, Shibu K V TataMcGraw-Hill.

References:

Embedded Systems, Rajkamal, TataMcGraw-Hill

Term Work:

*Assignments: **Should contain at least 6 assignments (one per unit) covering the***

Syllabus.

Tutorial: At least **t**hree tutorials based on above syllabus must be conducted.

Practical List:

1) Configure timer control registers of 8051 and develop a program to generate given time delay.
2) Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's
3) Serial I / O: Configure 8051 serial port for asynchronous serial communication with serial port of PC exchange text messages to PC and display on PC screen. Signify end of message by carriage return.
4) Interface 8051 with D/A converter and generate square wave of given frequency on oscilloscope.
5) Interface 8051 with D/A converter and generate triangular wave of given frequency on oscilloscope.
6) Using D/A converter generate sine wave on oscilloscope with the help of lookup table stored in data area of 8051.
7) Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clock wise direction.
8) Generate traffic signal.
9) Temperature controller.
10) Elevator control.

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University of Mumbai
B.Sc –IT

1) **Evaluation Pattern for Term work(Tutorial, Assignments , Case Studies, Mini Project and Practical for SYBSc:**

- Marks distribution for subjects having Practical and for the subjects having Tutorials and case studies.
- Theory 100 marks per paper, TW/tutorial/practical total 50 marks
- Minimum 40% marks out of 100 for passing in theory and 20 marks out of 50 for passing in TW (tutorial/practical/case studies).

Semester III

Subject	Theory (100)	Term work(50) Practical / Case studies	Tutorial	Assignments	Class tests	Total Total
P1.Logic and Discrete Mathematics	Yes (100)	No	Yes (25)	Yes (15)	Yes (10)	100+50
P2. Computer Graphics	Yes (100)	Practical (25)	No	Yes (15)	Yes (10)	100+50
P3. Advanced SQL	Yes (100)	Practical (25	No	Yes (15)	Yes (10)	100+50
P4. Object Oriented Programming with C++	Yes (100	Practical (25)	No	Yes (15)	Yes (10)	100+50
P5. Modern Operating Systems	Yes (100)	Case studies (15)	Yes (10)	Yes (15)	Yes (10)	100+50

Semester IV

| Subject | Theory (100) | Term Work (50) | | | | Total |
		Practical / Case studies/ Mini Project	Tutorial	Assignments	Class tests	Total
P1. Software Engineering	Yes (100)	Case studies (15)	Yes (10)	Yes (15)	Yes (10)	100+50
P2. Multimedia	Yes (100)	Mini Project (15)	Yes (10)	Yes (15)	Yes (10)	100+50
P3. Java and Data Structures	Yes (100)	Practical (25)	No	Yes (15)	Yes (10)	100+50
P4. Quantitative Techniques	Yes (100	Practical (25)	No	Yes (15)	Yes (10)	100+50
P5. Embedded Systems	Yes (100)	Practical (25)	No	Yes (15)	Yes (10)	100+50

- *Tutorials are theory/problems to be solved by the students in the classroom at the end of a practical/Theory session.*
- **Assignments are theory/problems to be solved by the students at home.**
- *Test is conducted in the classroom with due notice. Test could be out of any sum total but is to be converted out of 10.The Record of term work is to be maintained at least for the year after the declaration of the result.*
- **Semesters I, II, III, IV are college examinations. Question papers will be set by the examiners appointed by the Principal/Heads of the affiliated colleges or University Departments.**
- **The Principal/Head of the respective colleges is expected to appoint senior faculty as examiners in each subject.**
- **In respect of I, II, III, IV semesters the assessment will be done by the respective colleges. Moderation and result preparation will be as per existing College / University rules in respect of other similar courses.**
- ATKT/Failures examination: After 15 to 20 days from the date of declaration of results of the semester in question.

UNIVERSITY OF MUMBAI

Syllabus for the T.Y. B. Sc. Sem. V & VI

Program: T.Y.B.Sc.

Subject: Information Technology

(with effect from the academic year 2012–2013)

CLASS: B. Sc (Information technology)		Semester – V	
SUBJECT: Network Security			
Periods per week	Lecture	5	
1 Period is 50 minutes	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	2	60
	TW/Tutorial/Practical	--	40

Unit-I	Cryptography: Introduction: Some Simple Cryptosystems, The Shift Cipher, The Substitution Cipher, The Affine Cipher, The Vigenere Cipher, The Hill Cipher, The Permutation Cipher, Stream Ciphers, Cryptanalysis, Cryptanalysis of the Affine Cipher, Cryptanalysis of the Substitution Cipher, Cryptanalysis of the Vigenere Cipher, Cryptanalysis of the LFSR-based Stream Cipher. Shannon's Theory, Perfect Secrecy, Entropy, Huffman Encodings and Entropy, Properties of Entropy, Spurious Keys and Unicity Distance The Data Encryption Standard, Description of DES, An Example of DES Encryption, The DES Controversy, DES in Practice, DES Modes of Operation, A Time-memory Trade-off, Differential Cryptanalysis, An Attack on a 3-round DES, An Attack on a 6-round DES. Introduction to Public-key Cryptography, More Number Theory, The Euclidean Algorithm, The Chinese Remainder Theorem, Other Useful Facts, The RSA Cryptosystem, Implementing RSA, Probabilistic Primality Testing, Attacks On RSA, The Decryption Exponent, Partial Information Concerning Plaintext Bits, The Rabin Cryptosystem, Factoring Algorithms, The p - 1 Method, Dixon's Algorithm and the Quadratic Sieve, Factoring Algorithms in Practice
Unit-II	**Signature Schemes** : Introduction, The ElGamal Signature Scheme, The Digital Signature Standard, One-time Signatures, Undeniable Signatures, Fail-stop Signatures **Hash Functions** Signatures and Hash Functions, Collision-free Hash Functions The Birthday Attack, A Discrete Log Hash Function, Extending Hash Functions, Hash Functions from Cryptosystems, The MD4 Hash Function, Timestamping. **Key Distribution and Key Agreement** Introduction, Key Predistribution , Blom's Scheme, Diffie-Hellman Key Predistribution, Kerberos, Diffie-Hellman Key Exchange, The Station-to-station Protocol, MTI Key Agreement Protocols, Key Agreement Using Self-certifying Keys.
Unit-III	Security Trends, The OSI Security Architecture, Security Attacks, Security Services, Security Mechanisms, A Model for Network Security
Unit-IV	Authentication Applications: Kerberos, X.509 Authentication Service, Public-Key Infrastructure, Recommended Reading and Web Sites, Key Terms, Review Questions, and Problems, A Kerberos Encryption Techniques, Electronic Mail Security, Pretty Good Privacy, S/MIME, Key Terms, Review Questions, and Problems, A Data Compression Using Zip, Radix-64 Conversion, PGP Random Number Generation

Unit-V	**IP Security:** IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations, Key Management, Recommended Reading and Web Site, Key Terms, **Web Security:** Web Security Considerations, Secure Socket Layer and Transport Layer, Security, Secure Electronic Transaction.
Unit-VI	**Intruders:** Intrusion Detection, Password Management, Recommended Reading and Web Sites. **Malicious Software:** Viruses and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls:** Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

Books:
Cryptography: Theory and Practice, *Douglas Stinson,* CRC Press, CRC Press LLC (Unit I and II)
Cryptography and Network Security Principles and Practices, Fourth Edition, William Stallings, PHI(Pearson), (Unit: III-VI)

References:
Information Security and cyber laws, Saurabh Sharma, student series, Vikas publication.
Encryption, Ankit Fadia and J. Bhattacharjee, Vikas publication

Term Work:

Assignments: Should contain at least 6 assignments (one per unit) covering the Syllabus.

Practical List:
1   Substitution Techniques
a   Write a program to perform substitution ciphers to encrypt the plain text to Caesar cipher and to decrypt it back to plain text.
b   Write a program to perform substitution ciphers to encrypt the plain text to Modified Caesar cipher and to decrypt it back to plain text.
c   Write a program to perform substitution ciphers to encrypt the plain text to homophonic cipher and to decrypt it back to plain text.
d   Write a program to perform substitution ciphers to encrypt the plain text to monoalphabetic cipher and to decrypt it back to plain text.
e   Write a program to perform substitution ciphers to encrypt the plain text to homophonic cipher and to decrypt it back to plain text.
f   Write a program to perform substitution ciphers to encrypt the plain text to polyalphabetic cipher and to decrypt it back to plain text.
2   Transposition Ciphers
a   Write a program to perform transposition ciphers to encrypt the plain text to cipher and to decrypt it back to plain text using rail fence technique.
b   Write a program to perform transposition ciphers to encrypt the plain text to cipher and to decrypt it back to plain text using Simple Columnar technique.
c   Write a program to perform transposition ciphers to encrypt the plain text to cipher and to decrypt it back to plain text using Columnar with multiple rounds.

D Write a program to encrypt a plain text to a cipher text and decrypt it back to plain text using vernam cipher as the transposition technique

3 Write a program to generate Symmetric Keys for the following Cipher algorithms DES, AES, Blowfish, TripleDES, HmacMD5 and HmacSHA1.

4 Write a program to generate assymmetric Keys for the following Cipher algorithms a) DSA (Digital Signature Algorithm), b) DH (DiffieHellman), c) RSA.

5 Write a program to encrypt input string by using SecretKey of the following algorithms, and then decrypt the encrypted string and compare the decrypted string with the input string. Use the following algorithms for encryption and decryption:
   a. DES
   b. BlowFish
   c. IDEA
   d. Triple DES

6 Write a program to encrypt input string by using SecretKey of the following algorithms, and then decrypt the encrypted string and compare the decrypted string with the input string. Use the following algorithms for encryption and decryption:
   a. RSA
   b. AES
   c. DSA

7 Implement following HashFunctions: RSHash, JSHash, BKDRHash, SDBMHash, DJBHash

8 Write a program to encrypt the given string by using RC4 , MD5, algorithms.

9 Write a program for creating, exporting and validating Digital Certificate.

10 Create a permission that controls access to pages of a book. The permission name consists of a book id, a colon, and a set of allowable pages.

CLASS: B. Sc (Information technology)		Semester – VI	
SUBJECT: ASP.NET with C#			
Periods per week	**Lecture**	5	
1 Period is 50 minutes	**TW/Tutorial/Practical**	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2	60
	TW/Tutorial/Practical	--	40

Unit-I	Review of .NET frameworks, Introduction to C#, Variables and expressions, flow controls, functions, debugging and error handling, OOPs with C#, Defining classes and class members. Assembly, Components of Assembly, Private and Shared Assembly, Garbage Collector, JIT compiler. Namespaces
Unit-II	Collections, Comparisons and Conversions, Delegates and Events, Windows programming: Controls(Button, Label , Link Label, Radio Button, CheckBox, Text Box, Rich TextBox, List Box, Checked List Box, List View, Tabbed), Forms (Menus and ToolBars, SDI and MDI applications, Building MDI applications.

Unit-III	**Introduction to ASP.NET 4:** Microsoft.NET framework, ASP.NET lifecycle. Themes in ASP.NET **CSS**: Need of CSS, Introduction to CSS, Working with CSS with visual developer **ASP.NET server controls:** Types of control, ASP.NET state management engine. Web.config and global.asax files.
Unit-IV	**Programming ASP.NET web pages:** Introduction, data types and variables, statements, organizing code, object oriented basics. Master Pages, Caching. **Navigation**: Using navigation controls, programmatic redirection **User Controls:** Introduction to user controls **Validating User Controls**
Unit-V	**Databases:** Introduction, Using SQL to work with database, retrieving and manipulating data with SQL, working with ADO.NET, ADO.NET architecture, ASP.NET data control, data source control, deploying the web site. Crystal reports. **LINQ:** Operators, implementations, LINQ to objects,XML,ADO.NET, Query Syntax **ASP.NET Security:** Authentication, Authorization, Impersonation, ASP.NET provider model
Unit-VI	**ASP.NET Ajax:** Introducing AJAX, Using ASP.NET AJAX, Web Services and Page methods in AJAX websites, **JQuery:** Introduction to JQuery, JQuery syntax, modifying DOM with JQuery, effects with JQuery, JQuery and extensibility,

Books:
Beginning Visual C# 2010, K. Watson, C. Nagel, J.H Padderson, J.D. Reid, M.Skinner, Wrox (Wiley) 2010. (Unit I and II).
Beginning ASP.NET 4 in C# and VB, I. Spanjaars, Reprint 2011 (Unit III to VI).
ASP.NET 4.0 programming, J. Kanjilal, Tata McGraw-Hill (Unit III to VI).

References:
Programming ASP.NET, D.Esposito, Microsoft Press (Dreamtech), Reprint 2011.
ASP.NET Visual C#.NET, Vijay Nicoel, TMH
Advanced .NET Technology, Patel, Dreamtech.

Term Work:

> **Assignments:** Should contain at least 6 assignments (one per unit) covering the Syllabus.

Practical:

1. Simple Programs with C#:
   a) Write a console application that obtains four int values from the user and displays the product. Hint: you may recall that the Convert.ToDouble() command was used to convert the input from the console to a double; the equivalent command to convert from a string to an int is Convert.ToInt32().

b) If you have two integers stored in variables var1 and var2, what Boolean test can you perform to see if one or the other (but not both) is greater than 10?

c) Write an application that includes the logic from Exercise 1, obtains two numbers from the user, and displays them, but rejects any input where both numbers are greater than 10 and asks for two new numbers.

d) Write a console application that places double quotation marks around each word in a string

e) Write an application that uses two command-line arguments to place values into a string and an integer variable, respectively. Then display these values.

f) Write an application that receives the following information from a set of students:
   Student Id:
   Student Name:
   Course Name:
   Date of Birth:
   The application should also display the information of all the students once the data is entered. Implement this using an Array of Structs.

g) Write programs using conditional statements and loops:
   i.   Generate Fibonacci series.
   ii.   Generate various patterns (triangles, diamond and other patterns) with numbers.
   iii.   Test for prime numbers.
   iv.   Generate prime numbers.
   v.   Reverse a number and find sum of digits of a number.
   vi.   Test for vowels.
   vii.   Use of foreach loop with arrays.

2. Object oriented programs with C#
   a. Program using classes.
   b. Program with different features of C#
      Function Overloading
      Operator Overloading
      Inheritance (all types)
      Constructor overloading
      Interfaces
      Using Delegates and events
      Exception handling

3. Programs using different controls.
4. Programs using CSS.
5. Programs using ASP.NET Server controls.
6. Database programs with ASP.NET and ADO.NET
7. Programs using Language Integrated query.
8. Programs securing web pages.
9. Programs using AJAX.
10. Programs using JQuery.

CLASS: B. Sc (Information technology)			Semester – V	
SUBJECT: Software Testing				
Periods per week 1 Period is 50 minutes	Lecture		5	
	TW/Tutorial/Practical		3	
			Hours	Marks
Evaluation System	Theory Examination		2	60
	TW/Tutorial/Practical		--	40

Unit-I	Introduction to quality, software quality, fundamentals of software testing, VV model of testing.
Unit-II	Functional Testing: Boundary value Testing, Equivalence class testing, Decision Table based testing, Retrospection.
Unit-III	Structural Testing: Path Testing, Data Flow Testing, Retrospection
Unit-IV	Levels of Testing, Integration Testing, System Testing, Interaction Testing
Unit-V	Object Oriented Testing: Issues, Class Testing, Object Oriented Integration Testing, Object Oriented System Testing
Unit-VI	Testing Process: Planning, Metrics and Reports, Quantitative and Qualitative Analysis, Improvements.

Books:
Software Testing Principles, Techniques and Tools, M.G. Limaye, TMH, (Unit- I and VI)
Software Testing A Craftman's Approach, Second Edition, Paul C. Jorgensen, CRC Press.(Unit-II to V)
References:
Software testing by Yogesh Singh. Cambridge University Press, 2012
Introduction to Software Testing, Paul Ammann, Jeff Offutt, Cambridge University Press.
Managing the Testing Process: Practical Tools and Techniques for Managing Hardware and Software Testing, Rex Black, Wiley.
Software Testing, Second Edition,Ron Patton,SAMS
Software Testing, Perry, Wiley India.
Software testing by Sandeep Desai, Abhishek Srivastava. (PHI) EEE edition.

Term Work:

  Assignments: Should contain at least 6 assignments (one per unit) covering the Syllabus.

Practical:

1. Prepare a small project and submit SRS, design, coding and test plan.
2. Study of any one of the testing tools. (e.g winrunner, testdirect,etc)
3. MANUAL TESTING for the project
   a. Walkthrough
   b. Whitebox Testing
   c. Blackbox Testing
   d. Unit Testing
   e. Integration Testing

4. Functional Testing
   a. Boundary value Testing
   b. Equivalence class testing
   c. Decision Table based testing
   d. Cause-effect graphs

5. Structural Testing
   a. Path testing
   b. Data-flow testing

6. Regression Testing (use VTEST tool) using automated testing for website.

7. AUTOMATED TESTING for websites
   a. Load Testing(use WAPT)
   b. Performance Testing(use WAPT)

8. Implement the process Object oriented testing
9. For automated testing, design the test plan and test cases for integration testing on the given case.
10. For automated testing, design the test plan for unit testing.

CLASS: B. Sc (Information technology)			Semester – VI	
SUBJECT: Advanced Java				
Periods per week **1 Period is 50 minutes**	**Lecture**		5	
	TW/Tutorial/Practical		3	
			Hours	**Marks**
Evaluation System	**Theory Examination**		2	60
	TW/Tutorial/Practical		--	40

Unit-I	**Swing:** Event Handling, JFrames, Lists , Tables, Trees, Text Components, Progress Indicators, Component Organizers
Unit-II	**Introduction to servlets:** Need for dynamic content, java servlet technology, why servlets? **Servlet API and Lifecycle:** servlet API, servletConfig interface, ServletRequest and ServletResponse Interfaces, GenericServlet Class. ServletInputStream And ServletOutputStream Classes,RequestDispatcher Interface,HttpServlet Class, HttpServletRequest and HttpServletResponse Interfaces, HttpSession Interface, Servlet Lifecycle. **Working with servlets:** organization of a web application, creating a web application(using netbeans) , creating a servlet, compiling and building the web application
Unit-III	**JDBC:** Design of JDBC, JDBC configuration, Executing SQL statement, Query Execution, Scrollable and updatable result sets, row sets, metadata, Transaction. **JSP:** Introduction, disadvantages, JSP v/s Servlets, Lifecycle of JSP, Comments, JSP documents, JSP elements, Action elements, implicit objects, scope, characterquoting conventions, unified expression language.
Unit-IV	**Java server Faces :** Need of MVC , what is JSF?, components of JSF, JSF as an application, JSF lifecycle, JSF configuration, JSF web applications (login form, JSF pages) **EJB:** Enterprise bean architecture, Benefits of enterprise bean, types of beans, Accessing beans , packaging beans, creating web applications, creating enterprise bean, creating web client, creating JSP file, building and running web application.
Unit-V	**HIBERNATE:** Introduction, Writing the application, application development approach, creating database and tables in MySQL, creating a web application, Adding the required library files, creating a java bean class, creating hibernate configuration and mapping file, adding a mapping resource, creating JSPs. **STRUTS:** Introduction, Struts framework core components, installing and setting up struts, getting started with struts.
Unit-VI	**WEB Services:** SOAP, Building a web services using JAX-WS, Building web service. **JAVAMAIL:** Mail Protocols, Components of the Javamail API, JAVAMAIL API, Starting with API. **JNDI:** NAMING Service, Directory service, JNDI, Resources and JNDI,

Books:
Java EE 6 for Beginners, Sharanam Shah, Vaishali Shah, SPD (Unit II to VI)
Core Java Vol. II – Advanced Features, Cay S. Horstmans, Gary Coronell, Eight Edition,
Pearson (Unit I and III)
Java Complete Reference, Herbert Schildt, Seventh Edition,TMH. (Unit I)

References:
Java EE Project using EJB 3, JPA and struts 2 for beginners, Shah, SPD
Java Programming A practical Approach, C Xavier, McGraw Hill
Java Server Faces A practical Approach for beginners, B M Harwani, Eastern Economy
Edition (PHI).
Advanced Java Technology, Savaliya, Dreamtech.

Term Work:

      Assignments: Should contain at least 6 assignments (one per unit) covering the
                Syllabus.

Practicals:
1. Write a java program to present a set of choices for a user to select Stationary products and display the price of Product after Selection from the list.   2. Write a java program to demonstrate typical Editable Table, describing employee details for a software company.   3. Write a java program using Split pane to demonstrate a screen divided in two parts, one part contains the names of Planets and another Displays the image of planet. When user selects the planet name form Left screen, appropriate image of planet displayed in right screen.
4. Develop Simple Servlet Question Answer Application to demonstrate use of HttpServletRequest and HttpServletResponse interfaces.   5. Develop Servlet Application of Basic Calculator (+,-,*, /, %) using ServletInputStream and ServletOutputStream.
6. Develop a JSP Application to accept Registration Details form user and Store it into the database table.   7. Develop a JSP Application to Authenticate User Login as per the registration details. If login success the forward user to Index Page otherwise show login failure Message.
8. Develop a web application to add items in the inventory using JSF.   9. Develop a Room Reservation System Application Using Enterprise Java Beans.
10. Develop a Hibernate application to store Feedback of Website Visitor in MySQL Database.   11. a .Develop a simple Struts Application to Demonstrate 3 page Website of Teaching Classes which passes values from every page to another.   b.Develop a simple Struts Application to Demonstrate E-mail Validator.
12. a. Develop a simple "Hello World" Web Service with SOAP in Java.   b. Develop a Simple Web Service and Client with JAX-WS.   c. Develop an application to show searching the Directory using JNDI capabilities.

CLASS: B. Sc (Information Technology)		Semester – V	
SUBJECT: Linux Administration			
Periods per week **1 Period is 50 minutes**	**Lecture**	5	
	TW/Tutorial/Practical	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2	60
	TW/Tutorial/Practical	--	40

Unit-I	**Introduction:** Introduction to UNIX, Linux, GNU and Linux distributions **Duties of the System Administrator,** The Linux System Administrator, Installing and Configuring Servers, Installing and Configuring Application Software, Creating and Maintaining User Accounts, Backing Up and Restoring Files, Monitoring and Tuning Performance, Configuring a Secure System, Using Tools to Monitor Security **Booting and shutting down:** Boot loaders-GRUB, LILO, Bootstrapping, Init process, rc scripts, Enabling and disabling services, **The File System:** Understanding the File System Structure, Working with Linux-Supported File Systems, Memory and Virtual File Systems, Linux Disk Management Network Configuration Files:
Unit-II	**System Configuration Files:** System wide Shell Configuration Scripts, System Environmental Settings, Network Configuration Files, Managing the init Scripts, Configuration Tool, Editing Your Network Configuration **TCP/IP Networking:** Understanding Network Classes, Setting Up a Network Interface Card (NIC), Understanding Subnetting, Working with Gateways and Routers, Configuring Dynamic Host Configuration Protocol, Configuring the Network Using the Network, **The Network File System:** NFS Overview, Planning an NFS Installation, Configuring an NFS Server, Configuring an NFS Client, Using Automount Services, Examining NFS Security
Unit-III	**Connecting to Microsoft Networks:** Installing Samba, Configuring the Samba Server, Creating Samba Users 3, Starting the Samba Server, Connecting to a Samba Client, Connecting from a Windows PC to the Samba Server **Additional Network Services:** Configuring a Time Server, Providing a Caching Proxy Server, Optimizing Network Services **Internet Services:** Secure Services, SSH, scp, sftp Less Secure Services (Telnet ,FTP, sync,rsh ,rlogin,finger,talk and ntalk, Linux Machine as a Server, Configuring the xinetd Server, Comparing xinetd and Standalone, Configuring Linux Firewall Packages,

Unit-IV	**Domain Name System:** Understanding DNS, Understanding Types of Domain Servers, Examining Server Configuration Files, Configuring a Caching DNS Server, Configuring a Secondary Master DNS Server, Configuring a Primary Master Server, Checking Configuration **Configuring Mail Services:** Tracing the Email Delivery Process, Mail User Agent (MUA), Introducing SMTP, Configuring Sendmail, Using the Postfix Mail Server, Serving Email with POP3 and IMAP, Maintaining Email Security **Configuring FTP Services:** Introducing vsftpd, Configuring vsftpd, Advanced FTP Server Configuration, Using SFTP
Unit-V	**Configuring a Web Server:** Introducing Apache, Configuring Apache, Implementing SSI, Enabling CGI, Enabling PHP, Creating a Secure Server with SSL **Providing Web Services:** Creating Mailing Lists, Setting Up Web-Based Email, Configuring an RSS Feed, Adding Search Functionality,
Unit-VI	**Optimizing Internet Services:** Optimizing LDAP Services, Optimizing DNS Services, Optimizing Mail Services, Optimizing FTP Services, Optimizing Web Services **System Administration:** updating system, upgrading and customizing kernel, Administering Users and Groups Installing and Upgrading Software Packages

Books:

1. Beginning Linux by Neil Mathew 4th Edition
2. Red hat Linux Networking and System Administration by Terry Collings

References:
1. UNIX: Concepts and techniques, S. Das, Tata McGraw-Hill,
2. Linux Administration: A Beginner's Guide, Fifth Edition, Wale Soyinka,
         Tata McGraw-Hill
3. Linux: Complete Reference, 6th Edition, Richard Petersen, Tata McGraw-Hill

Term Work:

Assignments: Should contain at least 6 assignments (one per unit) covering the Syllabus.

Practical:

1. Installation of Red HAT/Fedora Linux operating system.
    a. Partitioning drives
    b. Configuring boot loader (GRUB/LILO)
    c. Network configuration
    d. Setting time zones
    e. Creating password and user accounts
    f. Shutting down

2. Software selection and installation
3. Programming Shell scripts for Linux administration

4. Linux system administration
    a. Becoming super user
    b. Temporarily changing user identity with su command
    c. Using graphical administrative tools
    d. Administrative commands
    e. Administrative configuration files

5. Connecting to the internet and configuring samba
    a. Setting up dial-up PPP
    b. Creating a dial- up connection with the internet configuration wizard
    c. Launching PPP connection
    d. Setting up linux as a proxy server
    e. Configuring mozilla or firefox to use as a proxy

6. Setting up local area network
    a. LAN topologies
    b. LAN equipment
    c. Networking with TCP/IP
    d. Configuring TCP/IP
    e. Adding windows computer's to user LAN
    f. IP address classes

7. Server setup and configuration
    a. Setting up NFS file server
    b. Setting up Samba file server
    c. The Apache web server
    d. Setting up FTP server
    e. Setting up proxy server

8. Understanding COMPUTER SECURITY: Firewall and security configurations
    a. LINUX security checklist
    b. Securing linux with IP table firewalls
    c. Configuring an IP table firewall
    d. Securing Linux features

9. Programming using C.
10. Implementing Socket programs.
11. Setting up hardware devices including sound card and printers and others(USB devices etc).

12. Working with X-windows
    a. Switching between text and graphical consoles
    b. set up my video card, monitor and mouse for the X-server.
    c. Install KDE, change default desktop to KDE (or Gnome)
    d. Accessing X-window remotely.
    e. Installing TrueType fonts from my MS Windows partition.
    f. Display and Control a Remote Desktop using VNC.

CLASS: B. Sc (Information technology)		Semester – VI	
SUBJECT: Internet Technologies			
Periods per week 1 Period is 50 minutes	Lecture	5	
	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	2	60
	TW/Tutorial/Practical	--	40

Unit-I	Introduction: OSI Model, TCP/IP Protocol Suite, Network Layer, IPV 4 and IPV6 Addresses and Protocol
Unit-II	Address Resolution Protocol (ARP),Internet Control Message Protocol Version 4 (ICMPv4),Mobile IP, Unicast Routing Protocols (RIP, OSPF and BGP)
Unit-III	Transport Layer, User Datagram Protocol (UDP), Transmission Control Protocol (TCP), Stream Control Transmission Protocol (SCTP)
Unit-IV	Host Configuration: DHCP, Domain Name System (DNS), Remote Login: TELNET and SSH, File Transfer: FTP and TFTP
Unit-V	World Wide Web and HTTP, Electronic Mail: SMTP, POP, IMAP and MIME, Network Management: SNMP, Multimedia
Unit-VI	Client Server Programming: Concurrent Connection Oriented (TCP) and Connectionless programming(UDP), Iterative connectionless(TCP) and connection oriented servers(UDP.

Books:
TCP/IP Protocol Suite, Behrouz A. Forouzan, 4th Edition , TMH (Unit I – V)
Internetworking with TCP/IP, Volume III, Second Edition, Douglas E. Comer, D.L. Stevens, PHI (Unit VI)

References:
Internetworking with TCP/IP, Volume I, Fifth Edition, Douglas E. Comer, PHI
Internetworking with TCP/IP, Volume II, Third Edition, Douglas E. Comer, D.L. Stevens, PHI
TCP/IP Illustrated, Eastern Economy Edition,N.P. Gopalan, B.Siva Selvan, PHI

Term Work:

Assignments: Should contain at least 6 assignments (one per unit) covering the Syllabus.

Practical:

1. Write a function in JAVA to simulate the cache control, input and output modules of ARP.
2. Write a JAVA code to implement the routing algorithm for RIP.
3. Write a JAVA code to find the shortest path between two points in the network.
4. Write aJAVA code to simulate the main module of TCP.
5. Write a JAVA code that calculates the checksum of UDP datagram.
6. Write a JAVA code for TCP echo Server application.
7. Write a JAVA client/server TCP code in which a client sends a number to server and server responds by returning its factorial.
8. Write a JAVA client/server TCP code to illustrate simple chat application.
9. Write a JAVA client/server UDP code in which a client greets the server and the server send date and time to the client.
10 Write JAVA client/server UDP code where client send series of numbers to server and server returns greatest among them.

CLASS: B. Sc (Information technology)	Semester – VI		
SUBJECT: Digital Signals and Systems			
Periods per week	Lecture	5	
1 Period is 50 minutes	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	2	60
	TW/Tutorial/Practical	--	40

Unit-I	**Classification of Signals and systems:** Introduction, Continuous Time and discrete time signals, classification of signals, simple manipulations of discrete time signals, amplitude and phase spectra, classification of systems, analog to digital conversion of signals **Fourier Analysis of Periodic and Aperiodic Continuous Time Signals and Systems:** Introduction, trigonometric Fourier series, Complex or exponential form of Fourier series, Parsevals identity for Fourier series, Power spectrum of a periodic function. Fourier transform and its properties, Fourier transforms of some important signals, Fourier transforms of power and energy signals.
Unit-II	**Applications of Laplace Transform to System Analysis** Introduction, definition, region of convergence (ROC) LT of some important functions, Initial and final value theorems, convolution integral, Table of Laplace transforms, partial fraction expansions, network transfer function. S-plane Poles and zeros. LT of periodic functions. Application of LT in analysing networks.

Unit-III	**Z Transform:** Introduction, definition of z-transform, properties of z-transform, evaluation of inverse z-transform.
Unit-IV	**Linear Time Invariant Systems:** Introduction, properties of DSP system, Discrete convolution, solution of linear constant coefficient difference equation. Frequency domain representation of discrete time signals and systems. Difference equation and its relationship with system function, impulse response and frequency response,
Unit-V	**Discrete and Fast Fourier Transforms:** Introduction, discrete Fourier series, Discrete time Fourier transform (DTFT), Fast Fourier transform (FFT), Computing an inverse DFT by doing direct DFT, Composite radix FFT, Fast (Sectioned) convolution, Correlation.
Unit-VI	**Finite Impulse Response (FIR) Filters** Introduction, magnitude response and phase response of digital filters, frequency response of linear phase FIR filters, Design techniques of FIR filters, design of optimal linear phase FIR filters. **Infinite Impulse Response (IIR) Filters:** Introduction, IIR filter design by approximation of derivatives, IIR filter design by impulse invariant method, IIr filter design by the bilinear transformation, Butterworth filters, Chebyshev filters, Elliptic filters, frequency transformation.

Books:
Digital Signal Processing by S. Salivahanan, C. Gnanapriya Second Edition, TMH

References:
Digital Signal Processing by Sanjit K. Mitra, Third Edition, TMH
Signals and systems by A Anand Kumar (PHI) 2011
Signals and Systems by Alan V. Oppenheim and Alan S. Willsky with S. Hamid Nawab,
Second Edition, PHI (EEE)
Digital Signal Processing by Apte, Second Edition, Wiley India.

Term Work:
> **Assignments:** Should contain at least 6 assignments (one per unit) covering the
> Syllabus.

Practical : (To be conducted using Scilab / MATLAB)
1. Write a program to study and implement Discrete Time Signals and systems.
    a. Unit Step Sequence
    b. Unit Ramp Sequence
    c. Exponential Sequence
    d. Exponential Increasing Sequence
    e. Exponential Decreasing Sequence
    f. Even Signals
    g. Odd Signals

2. Write a program to implement Z-Transforms.
    a. Z-transform of Finite duration signals
    b. Time shifting property of Z transform
3. Write a program to demonstrate convolution property.
4. Write a program to demonstrate correlation property.
5. Write a program to implement Frequency Response of First order Difference Equation.
6. Write program to
    a. Determine N-Point DFT.
    b. Find DFT and IDFT of the given sequence.
7. Write a program to implement circular convolution using DFT
8. Write a program to perform linear filtering (linear convolution using DFT.
9. Write a program to implement/Design of FIR Filter using Frequency Sampling Technique.
10. Write a program to implement low pass, high pass and band pass filters.

CLASS: B. Sc (Information technology)		Semester – VI	
SUBJECT: Data warehousing			
Periods per week 1 Period is 50 minutes	Lecture	5	
	TW/Tutorial/Practical	3	
		Hours	Marks
Evaluation System	Theory Examination	2	60
	TW/Tutorial/Practical	--	40

Unit-I	**History of data warehousing:** database management system, personal computers and 4GL technology, spider web environment, evolution from business perspective, data warehouse environment, what is datawarehouse? , integrating data, volumes of data, different development approach, evolution to DW 2.0 environment, business impact of the data warehouse, components of datawarehouse environment, evolution of data warehouse from the business perspective, other notions about data warehouse, federated data warehouse, star schema, data mart.

	Introduction: Lifecycle of data warehouse, reasons for different sectors, metadata, Access of data, structures data/ unstructured data, Textual analysis, blather, issue of terminology, specific text, metadata – a major component, local metadata, changing business requirements, flow of data within DW 2.0, volumes, useful applications, DW 2.0 and referential integrity, reporting in DW 2.0 **DW components:** Interactive sector, integrated sector, Near Line sector, Archival sector.
Unit-II	**Metadata in DW:** Reusability of data analysis, Metadata, Active/ passive repository, enterprise metadata, metadata and the system record, Taxonomy, Internal and external taxonomy, metadata in archival sector, maintaining metadata, using metadata – an example, end user perspective. **Methodology and Approach for DW:** Spiral model methodology, seven streams approach, enterprise reference model, enterprise knowledge coordination stream, information factory development stream, Data correction stream, infrastructure stream, Total information quality management stream. **Statistical processing and DW:** Two types of transaction, statistical analysis, integrity of comparison, heuristic analysis, freezing data, exploration processing, frequency of analysis, exploration facility, sources for exploration processing, refreshing exploration data, project based data, Data marts and exploration facility, A backflow of data, using exploration data internally, perspective of business analyst.
Unit-III	**Data models and DW:** datamodel and business, scope of integration, making the distinction between granular and summarized data, levels of the data model, data models and interactive sector, corporate data model, transformation of models, data models and unstructured data, perspective of business user. **Monitoring the DW environment:** Monitoring DW environment, transaction monitor, monitoring data quality, datawarehouse monitor, transaction monitor, peak period processing, ETL data quality monitor, Dormant data. **DW and security:** Protecting access to data, encryption, drawbacks, firewall, moving data offline, limiting encryption, direct dump, datawarehouse monitor, sensing an attack, security for near line data.
Unit-IV	**Time variant data:** All data in DW, Time relativity in the interactive sector, data relativity elsewhere in DW, Transactions in integrated sector, discrete data, continuous time span data, a sequence of records, nonoverlapping records, beginning and ending a sequence of records, continuity of data, Time-collapsed data, time variance in the archival sector, **Flow of data in DW:** flow of data throughout the architecture, entering the interactive sector, role of ETL, data flow into integrated sector, near line, archival sector, falling probability of data access, exception flow of data. **ETL processing and DW:** changing states of data, Where ETL fits, application data to corporate data, ETL in online mode and batch mode, source and target, ETL mapping, more complex transformation, ETL and throughput, ETL and metadata, ETL and an audit trail, ETL and data quality, creating ETL, code creation or parametrically driven ETL, ETL and rejects, changed data capture, ETL and rejects, Changed data capture, ELT

Unit-V	**DW and granularity manager:** granularity manager, raising the level of granularity, filtering data, functions of the granularity manager, homegrown versus third party granularity manager, parallelizing the granularity manager. **DW and performance:** online response time, analytical response time, flow of data, Queues, heuristic processing, analytical productivity and response time, many facets to performance, indexing, removing dormant data, end user education, monitoring the environment, capacity planning, metadata, batch parallelization, parallelization for transaction processing, workload management, data marts, exploration facilities, separation of transactions into classes, service level agreements, protecting the interactive sector, partitioning data, choosing the proper hardware, separating farmers and explorers, physically group data. **Migration:** Migration in perfect world, adding components incrementally, adding archival sector, creating enterprise metadata, building the metadata infrastructure, swallowing source system, ETL as shock absorber, migration to the unstructured environment.
Unit-VI	**Implementation And Maintenance:** Physical design process, data warehouse deployment, growth and maintenance.

DW2.0 The architecture for Next Generation of Datawarehousing W.H. Inmon, Derek Strauss, Genia Neushloss, ELSEVIER. (Unit I to V)

Paulraj Ponnian, "*Data Warehousing Fundamentals*", John Wiley. (Unit VI)

References:
Building the data warehouse, W.H.Inmon, third Edition, Wiley.
Datawarehousing, S. Mohanty, TMH .
The Data Warehouse Lifecycle toolkit", Ralph Kimball ,John Wiley.

Term Work:

   Assignments: Should contain at least 6 assignments (one per unit) covering the
                         Syllabus.

Practical List:

1.	Create around 25 records and design the tabular view using Excel.
	Create around 25 records and design the Chart view using Excel.
2.	Extract the data from excel , access and sql and integrate it in SQL server.
3.	Perform the same process using DTS package
4.	Design the star schema and create a cube using OLAP services
5.	Perform the cube analysis on MOLAP
6.	Perform the cube analysis on ROLAP
7.	Perform the cube analysis on HOLAP

8.	Consider a data warehouse storing data about sales, where the total items sold are stored, organised by customer order and product. Each customer order includes the name of the customer and the date of the order; each product includes a description of the product and its price. i. Devise the relational schema (specifying the relations, the attributes, the primary keys, and the foreign keys) of the above data warehouse using the star schema. ii. Write a SQL query to answer the following question: "Which customer(s) made an order containing at least five products with different descriptions?" iii. Write a SQL query for the following report: "Which customer(s) made the largerst order (i.e., those that would result in the largest bill)?" iv. Consider to add a new level product categories to the product dimension. Devise the new relational star schema, and write a SQL query for the following report: "Select the total number of products sold per product category".
9.	Design at least five queries for the created cube using MDX application.
10.	Retrieve the cube data into the excel sheet and present the information in tabular and graphical form.

Elective Subjects (ANY ONE)	Semester – VI
1. IPR and Cyber Laws **2. Project Management** **3. GIS**	

CLASS: B. Sc (Information technology)		Semester – VI	
SUBJECT: IPR AND CYBER LAWS			
Periods per week **1 Period is 50 minutes**	**Lecture**	5	
	TW/Tutorial/Practical	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2	60
	TW/Tutorial/Practical	--	40

Unit-I	**Basic Principles and Acquisition of Intellectual Property Rights:** Focus on the: Philosophical Aspects of Intellectual Property Laws, Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark, Basic Principles of Design Rights, International Background of Intellectual Property
Unit II	**Information Technology Related Intellectual Property Rights** Computer Software and Intellectual Property-Objective, Copyright Protection, Reproducing, Defences, Patent Protection. Database and Data Protection-Objective, Need for Protection, UK Data Protection Act, 1998,US Safe Harbor Principle, Enforcement. Protection of Semi-conductor Chips-Objectives Justification of protection, Criteria, Subject-matter of Protection, WIPO Treaty, TRIPs, SCPA. Domain Name Protection-Objectives, domain name and Intellectual Property, Registration of domain names, disputes under Intellectual Property Rights, Jurisdictional Issues, and International Perspective.
Unit-III	**Patents (Ownership and Enforcement of Intellectual Property)** Patents-Objectives, Rights, Assignments, Defences in case of Infringement Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement Trademarks-Objectives, Rights, Protection of good will, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement

| Unit-IV | Enforcement of Intellectual Property Rights - Civil Remedies, Criminal Remedies, Border Security measures. |
| | Practical Aspects of Licencing – Benefits , Determinative factors, important clauses, licensing clauses. |

Unit-V	**Cyber Law:**
	Basic Concepts of Technology and Law : Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence
	Law of Digital Contracts : The Essence of Digital Contracts, The System of Digital Signatures, The Role and Function of Certifying Authorities, The Science of Cryptography
	Intellectual Property Issues in Cyber Space: Domain Names and Related issues, Copyright in the Digital Media, Patents in the Cyber World.
	Rights of Netizens and E-Governance : Privacy and Freedom Issues in the Cyber World, E-Governance, Cyber Crimes and Cyber Laws
Unit-VI	**Information Technology Act 2000 :** Information Technology Act-2000-1 (Sec 1 to 13), Information Technology Act-2000-2 (Sec 14 to 42 and Certifying authority Rules), Information Technology Act-2000-3 (Sec 43 to 45 and Sec 65 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 and CRAT Rules), Information Technology Act-2000-5 (Sec 79 to 90), Information Technology Act-2000-6 (Sec 91-94) Amendments in 2008.
	International Scenario in Cyber Laws : Data Protection Laws in EU and USA, Child Abuse Protection Laws in EU and USA, Cyber Laws - the Malaysian Approach.
	Cyber Law Issues for Management : Cyber Law Issues in E-Business Management, Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit.

References:

1. Peter Weill , Jeanne Ross "IT Governance: How Top Performers Manage IT Decision Rights for Superior Results"
2. Jeanne W. Ross "Enterprise Architecture As Strategy: Creating a Foundation for Business Execution"
3. Peter Weill "IT Savvy: What Top Executives Must Know to Go from Pain to Gain
4. www.wipo.org
5. IT Act 2000 with amendments in 2008
6. How To Register Your Own Copyright by Marx Warda, Sphinx Publishing
7. Licensing Art & Design by Caryn R. Leland, Allworth Press
8. Managing Intellectual Property: The Strategic Importance, (2 ed.) V. V. Sopale (PHI)
   Term Work:

Assignments: Should contain at least 6 assignments (one per unit) covering the Syllabus.

Tutorial: At least three tutorials based on above syllabus must be conducted.

CLASS: B. Sc (Information technology)		Semester – VI	
SUBJECT: Project Management			
Periods per week **1 Period is 50 minutes**	**Lecture**	5	
	TW/Tutorial/Practical	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2	60
	TW/Tutorial/Practical	--	40

Unit-I	Conventional Software Management : The waterfall model, conventional software Management performance. Evolution of Software Economics : Software Economics, pragmatic software cost estimation. Improving Software Economics : Reducing Software product size, improving software processes, improving team effectiveness, improving automation, Achieving required quality, peer inspections.
Unit-II	The old way and the new : The principles of conventional software Engineering, principles of modern software management, transitioning to an iterative process. Life cycle phases : Engineering and production stages, inception, Elaboration, construction, transition phases. Artifacts of the process : The artifact sets, Management artifacts, Engineering artifacts, programmatic artifacts. Model based software architectures : A Management perspective and technical perspective.
Unit-III	Work Flows of the process : Software process workflows, Iteration workflows, Checkpoints of the process : Major mile stones, Minor Milestones, Periodic status assessments. Iterative Process Planning : Work breakdown structures, planning guidelines, cost and schedule estimating, Iteration planning process, Pragmatic planning.
Unit-IV	Project Organizations and Responsibilities: Line-of-Business Organizations, Project Organizations, evolution of Organizations. Process Automation: Automation Building blocks, The Project Environment.
Unit-V	Project Control and Process instrumentation: The seven core Metrics, Management indicators, quality indicators, life cycle expectations, pragmatic Software Metrics, Metrics automation. Tailoring the Process: Process discriminants.
Unit-VI	Future Software Project Management: Modern Project Profiles, Next generation Software economics, modern process transitions.

Books:
1. Software Project Management, Walker Royce: Pearson Education, 2005.
2. Information Technology Project management (4th Edition) – Kathy Schwalbe (Centgage Learning – Indian Edition)

Reference Books:
1. Project Management Core Textbook – Mantel Jr., Meredith, Shafer, Sutton with Gopalan (Wiley India Edition)
2. Information Technology project Management,: a concise study, (3rd ed.) by S A Kelkar (PHI)
3. Project Management- A systems Approach to planning, scheduling and controlling - Harold Kerzner (John Wiley & Sons, Inc)
4. *A Guide to the Project Management Body of Knowledge (3rd Edition)-* Newtown Square, PA, Project Management Institute, 2005.

Term Work:

> **Assignments:** Should contain at least 6 assignments (one per unit) covering the Syllabus.

> **Tutorial:** At least **t**hree tutorials based on above syllabus must be conducted.

CLASS: B. Sc (Information Technology)		Semester – VI	
SUBJECT: Geographic Information Systems			
Periods per week **1 Period is 50 minutes**	**Lecture**	5	
	TW/Tutorial/Practical	3	
		Hours	**Marks**
Evaluation System	**Theory Examination**	2	60
	TW/Tutorial/Practical	--	40

Unit I	**Spatial Data Concepts:** Introduction to GIS, Geographically referenced data, Geographic, projected and planer coordinate system, Map projections, Plane coordinate systems, Vector data model, Raster data model
Unit II	**Data Input and Geometric transformation:** Existing GIS data, Metadata, Conversion of existing data, Creating new data, Geometric transformation, RMS error and its interpretation, Resampling of pixel values.
Unit III	**Attribute data input and data display :** Attribute data in GIS, Relational model, Data entry, Manipulation of fields and attribute data, cartographic symbolization, types of maps, typography, map design, map production

Unit IV	**Data exploration:** Exploration, attribute data query, spatial data query, raster data query, geographic visualization
Unit V	**Vector data analysis:** Introduction, buffering, map overlay, Distance measurement and map manipulation. **Raster data analysis:** Data analysis environment, local operations, neighbourhood operations, zonal operations, Distance measure operations
Unit VI	**Spatial Interpolation:** Elements, Global methods, local methods, Kriging, Comparisons of different methods

Text Book
Introduction to Geographic Information Systems by Kang-Tsung Chang Published by Tata Mcgraw Hill
Reference Books and websites
Concepts and Techniques in Geographic Information Systems by Chor Pang Lo and Albert K. W. Yeung
http://www.ncgia.ucsb.edu/giscc/

Term Work:

Assignments: Should contain at least 6 assignments (one per unit) covering the Syllabus.

Tutorial: At least three tutorials based on above syllabus must be conducted.

CLASS: B. Sc (Information Technology)		**Semester – VI**	
SUBJECT: PROJECT			
Periods per week **1 Period is 50 minutes**	**Lecture**	**5**	
	TW/Tutorial/Practical	**3**	
		Hours	**Marks**
Evaluation System	**Final Examination**	2	60
	Term Work	--	40

The project should be undertaken preferably individually or by the group of maximum 3 students who will jointly work and implement the project. The candidate/group will select a project with the approval of the Guide (staff member) and submit the name of the project with a synopsis of the proposed work of not more than 02 to 08 pages within one month of the starting of the semester. The candidate/ group is expected to complete detailed system design, analysis, data flow design, procurement of hardware and/or software,

implementation of a few modules of the proposed work during the semester VI as a part of the term work submission in the form of a joint report.

Candidate/group will submit the completed project work to the department at the end of semester VI as mentioned below.

1. The workable project.
2. The project report in the bound journal complete in all respect with the following : -
   i) Problem specifications.
   ii) System definition – requirement analysis.
   iii) System design – dataflow diagrams, database design
   iv) System implementation – algorithm, code documentation
   v) Test results and test report.
   vi) In case of object oriented approach – appropriate process be followed.

The project report should contain a full and coherent account of your work. Although there will be an opportunity to present the work verbally, and demonstrate the software, the major part of the assessment will be based on the written material in the project report. One can expect help and feedback from the project guide, but ultimately it's the candidates own responsibility. The suggestive structure of a project report should be guided by your guide in selecting the most appropriate format for your project.

The term work assessment will be done jointly by teachers appointed by Head of the Institution.

The oral examination will be conducted by an internal and external examiner as appointed by the University.

Note:
1. Project work should be continually evaluated based on the contributions of the candidate/group members, originality of the work, innovations brought in, research and developmental efforts, depth and applicability, etc.
2. Two mid-term evaluations should be done, which includes presentations and demos of the work done.

General Instructions for all the courses in sem IV and V:

   a) Six assignments, one on each unit is expected to be completed in a semester for each subject.
   b) The subjects not having practicals should be supported by tutorials/case studies to be discussed in a class.
   c) Extensive problem solving exercises should be given in order to improve the interest in the subject.