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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)

Semester V
Paper 1: Network Security
Paper 2: *ASP.NET with C#
Paper 3: Software Testing
Paper 4: *Advanced Java
Paper 5: *Linux Administration
Semester VI
Paper 1: *Internet Technologies
Paper 2: Digital Signals and Systems
Paper 3: *Datawarehousing
Paper 4: Elective: IPR and Cyber Laws Project Management GIS
Paper V: Project Report
Paper VI: Project Viva-Voce

CLASS: B. Sc (Information technology)		Semester – V	
Paper I; 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 – V**	
Paper II; SUBJECT: ASP.NET with C#			
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	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	
Paper III; 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 – V	
Paper IV; 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	
Paper 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	
Paper I; 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**	
Paper II; SUBJECT: Digital Signals and 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	**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**	
Paper III; 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.

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

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 **t**hree 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 **t**hree 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.