St. Xavier's College – Autonomous, Mumbai
Syllabus
For 5th Semester Courses in Information Technology
(June 2018 onwards)

Contents:

T.Y.B.Sc (I.T) **SITS0501**

Subject: Network Security and Internet Technology

Objective:

Security is an important aspect for the internet. This course teaches various security cryptography techniques and digital signature along with network security. It also introduces to the technique of accessing remote objects through RMI.

[Total lectures 60]

UNIT I	**Computer Security and Cryptography** Computer Security : Introduction, Need for security, Principles of Security, Types of Attacks Cryptography : Plain text and Cipher Text, Substitution techniques, Caesar Cipher, Mono-alphabetic Cipher, Polygram, Poly alphabetic Substitution, Playfair, Hill Cipher, Transposition techniques, Encryption and Decryption, Symmetric and Asymmetric Key Cryptography, Diffie-Hellman Key Exchange.	15
UNIT II	**Symmetric Key, Asymmetric Key Algorithms, Digital Signature** DES, AES, Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Blowfish, Digital Signatures, Digital Certificates, Private Key Management, PKI and Security.	15
UNIT III	**Network Security** What makes Network Vulnerable? Who attacks Networks? Threats in Transit: Eavesdropping and wiretapping, Spoofing, DoS and DDoS, Link Encryption, End-to-End encryption, VPN, IPSec, Kerberos, Firewall, different types of firewall, IDS, Different types of IDS, Security of E-Mail.	15
UNIT IV	**TCP, UDP Socket Programming and RMI** TCP Services, TCP handshake, Concept of windows in TCP, Congestion control, UDP Datagram, Socket concept, Types of socket, Sockets for Clients, Sockets for Servers, Remote Method Invocation, RMI Programming.	15

Continuous Internal Assessment

MCQ/Presentation/Case studies

Midterm test

BOOKS:

1) Atul Kahate: Cryptography and Network Security by Atul Kahate, 2nd Edition, Tata McGrawHill.
2) Behrouz A. Forouzan: TCP/IP Protocol Suite, 4th Edition, Tata McGrawHill.
3) Charles P Pfleeger: Security in Computing.

T.Y. B.Sc.IT **SITS0502**

TITLE: C# with ASP.NET

Learning objective:

Student will learn the latest development of C# and ASP.NET in framework 4.0. This will equip them with required in software industry for developing website projects.

[Total lectures 60]

UNIT I	**Introduction to DOTNET framework 4.0** Over view of .NET Framework, Components of .NET framework, Versions of .net framework, understanding Visual studio 2010 IDE environment: Design view, Source view, Output window, Error list window, Intelligence, Property window, Object browser window, Start page, Toolbar and Toolbox. **C# language** Introduction to C#: understanding C# in .NET, Overview of C# literals, Variables, Data types, Operators, Expressions, Branching and looping operations methods, Arrays, Strings. Classes and objects: class, objects, constructors, static members, static constructors, private constructor, copy constructors, destructors, member initialization, this reference, nesting of classes. Inheritance and Polymorphism: Classical inheritance, containment inheritance, defining of subclasses, visibility control, defining subclasses constructors, multilevel inheritance, Overriding methods, hiding methods, Abstract classes, abstract methods. Interface: Defining an interface, Extending an interface, Implementing interface, Difference between interface and abstract class.	15
UNIT II	**Delegate, Events and Exception handling in C#** Delegate: Delegate declaration, delegate methods, Delegate's instantiation, delegates, multicast delegates, Types of error, exceptions, Syntax of exception handling code, Multiple catch statement, the exception hierarchy, general catch handler, using final statement, nested tri blocks, throwing our own exceptions, checked and un checked operators, Using exceptions for debugging . Controls in ASP.NET : introduction to control class: Text box control, button control, Label control, Image control, Image button control, Image map control, Drop down list control, Check box control, Radio button control, Table control, calendar control, site map control, Tree view control, Menu control, validation controls, login controls, Database controls.	15
UNIT III	**ADO.NET** ADO.NET object model, data binding, Using connection, Command, data reader classes, Queries returning results sets, passing parameters in queries, using repeater control, data adapter, Using data set (typed), Data table, Data row& data column, introducing the ADO.NET entity framework, mapping your data model to an object model	15
UNIT IV	**LINQ and Crystal Report** LINQ: Introducing LINQ, LINQ to objects, LINQ to XML, LINO to ADO.NET. Crystal report: Adding a crystal report to an ASP.NET application, Inserting fills, Text and special fields, sorting, grouping and subtotaling, select expert, dynamic Formatting, using the Crystal report viewer	15

	Continuous internal assessment: Assignment on unit 1, unit 2, unit 3, unit 4, midterm test	

LIST OF RECOMMENDED REFERENCE BOOKS

1) ASP.NET 4.0 in simple steps dreamtech press
2) Integrating Crystal report into an ASP.NET Application by Vincent Varallo Wrox Publication

3)ASP.NET-The Complete reference Tata McGraw Hill.
4) Beginning ASP.NET 4: in C# and VB by Imar Spaanjaars Wrox Publication.
5) C# and .NET 4 by Christian wrox publication.
6) C# 2010 and .NET 4 plat form by Andrew Troelsen Apress publication.

T.Y. B.Sc.IT **SITS0503**

TITLE: Data Warehousing and data mining.

Learning objective:

Learn basic concept of Data Warehousing and data mining.

[Total lectures 60]

UNIT I	**Introduction to data Warehousing** What is the data warehousing, Need for data warehousing, Basic elements of data warehousing, Data warehouse architecture, Data warehouse development life cycle, data warehousing developing methodologies. Overview of the components, meta data in the data warehouse, data warehouse design consideration and dimension modeling defining the business requirement, information package requirement gathering methods, principles of dimensional modeling , dimensional table, fact table, star schema model snow flake schema, slowly changing dimension	15
UNIT II	**Extraction, transformation and loading** ETL overview, data extraction, source identification, data extraction techniques , data transformation, basic task, major transformation types, how to implement transformation, data loading, data refresh verses update, procedure for dimension table incremental loads, OLAP in the data warehouse, OLAP models.	15
UNIT III	**Introduction to data miming and classification** Basic data mining tasks, Data mining verses knowledge discovery in databases, A statistical perspective on data mining, Baye's theorem, regression and correlation, Neural networks classification introduction, Classification Introduction, issues in classification, Statistical based algorithms, Bayesian classification, distance based algorithms, simple approach, K nearest neighbors, Decision tree based algorithms, ID3.C 4.5	15
UNIT IV	**Clustering and association rule** Introduction to clustering, Hierarchical algorithms Agglomerative algorithms, Divisive clustering, Partition algorithms, Minimum spanning tree algorithm, squared error clustering large data base, BIRCH Introduction to association rule Large item set, AR general algorithm, Apriori-gen algorithm, Apriori algorithm	15

Continuous Internet Assessment
Assignments, Written Test, Presentation

List Of Recommended Reference Books

1) Data warehousing fundamentals by Paulraj Ponniah
2) Data Mining Introductory and Advanced Topics, M.H. Dunham, Pearson Education.
3)Ian H. Witten, Data Mining, MK publishers.
4)W.H. Inmon, Building the Data Warehouses, Wiley Dreamtech.
5)R. Kimpall, The data warehouse toolkit, John Wiley.
6)Data warehousing, Soumendra Mohanty, Tata McGraw Hill

T.Y. B.Sc.IT Course Code: SITS0504

TITLE: E-COMMERCE AND ERP

OBJECTIVE:

To create awareness about the role of Information Technology in business and an introduction tothe concepts and techniques of involved in e-commerce. Students will learn the underlying mechanism of ecommerce transactions done via paypal, how verisign works, how payment gateway works.

To introduce the concept of ERP systems and SCM's structures with special focus on MaterialManagement module along with open source ERP software demos as a learning tool.

[Total lectures 60]

UNIT I	**Overview of electronic commerce and case study** Ecommerce Overview: understanding trade/ Business cycle, Business process and business activity, History of e-commerce, generic model of e-commerce, Evolution of e-commerce. Global and Indian scenario, difference between conventional commerce and electronic commerce, classification of ecommerce-B2B,B2C,C2C,C2B,G2G,G2C,B2G sites, introduction to IT act and its role to encourage e-business, growing e-learning and e-governance, understanding horizontal and vertical market, growth of online retailing and e-marketing concepts, Features & benefits of e-commerce –Impacts, challenges and limitations of e-commerce. Case study Amazon – success story, core values, business model, history, growth, future plan, comparison with other e-commerce sites, e-bay-business model, history, future plan, Verisign, Shopping process with Payseal	15

	and Paypal, Flipkart-history, business model, growth, comparison with other E-commerce sites, future plan, dotcom-its rise, fall and analysis, payTM-business model, growth and history, Infrastructure for shopping cart.	
UNIT II	**E-Commerce Models, Technology of Ecommerce, M-Commerce** E-Commerce Models: store-front model, brick and mortar model, build to order merchant model, service provider model, subscription-based model, broke model, advertiser model, virtual mall model, infomediary model. Portals: Difference between website and portal function of portals, feature of portal. Working of Payment Gateway. Web 3.0, Web Services, Web Mashup, Working of Search Engines, SEO, LDAP, EDI, VPN, click stream analysis. THE TECHNOLOGIES OF M-COMMERCE. - Computer of cell, MS, BSC, MSC, NSS, OSS. - Multiplexing scheme [TDMA, FDMA, CDMA]. - Concept of uplink and downlink traffic. - Understanding handover - Understanding frequency reuse. - GSM in detail. M-COMMERCE Services Today	15
UNIT III	**ERP Introduction &Supply Chain Management** **Introduction:**What is ERP? The Need for ERP, Benefits of ERP,Growth of ERP in India In-house Implementation Pros and Cons,Vendors, Consultants, End-Users What is Supply Chain? Its objective,Supply Chain Decision making**,**Process View of a Supply Chain**,** Examples of Supply Chains **The Network:**The Role of Distribution in the Supply Chain, Factors that influence the Distribution Network Design, Design Options for a Distribution Network, E-Business and the Distribution Network, Channels of Distribution, Distribution Networks in Practice. **The Customer service dimension:** Customer Service and Customer Retention**,** Service driven logistics systems**,** Setting customer service priorities and service standards	15
UNIT IV	**ERP Modules** Finance, Sales and Distribution, Human Resource Management, Marketing, Material Management Understanding the functionality of the modules with the demonstration of open source ERP software.	15

Continuous Internal Assessment

CIA I: Written test **for 20 marks**

CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 mark**

REFERENCE BOOKS:

1) E-Commerce: The cutting edge of business, Kamlesh K. Bajaj and Debjani Nag, Tata McGraw Hill
2) E-Commerce and M-Commerce technologies by P.Candace Deans and IRM press publication
3) "ERP", Alexis Leon, Tata McGraw Hill.
4) Alexis Leon, "ERP Demystified", Tata McGraw Hill
5) "Supply Chain Management Strategy, Planning and Operation", S Chopra, P. Meindl and D. Kalra, Pearson.

CLASS: T.Y. B.Sc.IT **COURSE CODE: SITS0505**

TITLE : Introduction to Artificial Intelligence

LEARNING OBJECTIVES:

To provide students with a basic exposure to the field of Artificial Intelligence.

Total Number of lectures: 60

UNIT I	**Introduction to AI and Searching Techniques**	**(**15 lectures)
	Introduction to AI	
	What is AI? The Foundations of Artificial Intelligence The History of Artificial Intelligence, The State of the Art Agents and Environments, Good Behavior: The Concept of Rationality, the Nature of Environments, the Structure of Agents	
	Searching Techniques	
	Problem-Solving Agents, Example Problems, Searching for Solutions, **Uninformed Search** Strategies, **Informed (Heuristic) Search** Strategies, Heuristic Functions, Local Search Algorithms and Optimization Problems	
UNIT II	**Learning from Observation**	**(**15 lectures)
	Fundamentals of Javascript	
	Forms of Learning, Inductive Learning, Learning Decision Trees, Ensemble Learning, Why Learning Works: Computational Learning Theory	
	Introduction to ANN	
	Units in neural networks, Network structures, Single layer feed-forward neural networks (perceptrons), Multilayer feed-forward neural networks, Learning neural network structures	
UNIT III	**Introduction to Genetic Algorithms**	**(**15 lectures)
	Genetic Algorithms	
	A Brief History of Evolutionary Computation, The Appeal for Evolution, Biological Terminology, Search Spaces and Fitness Landscapes, Elements of Genetic Algorithms, A Simple Genetic Algorithm, Genetic Algorithms and Traditional Search Methods, Some Applications of Genetic Algorithms	
UNIT IV	**Introduction to Fuzzy System**	**(**15 lectures)
	Fuzzy Systems	

	The Case for Imprecision, A historical Perspective, The Utility of Fuzzy Systems, Limitations of Fuzzy Systems, The Illusion: Ignoring Uncertainty and Accuracy, Uncertainty and Information, The Unknown, Fuzzy Sets and Membership, Chance verses Fuzziness

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LIST OF RECOMMENDED REFERENCE BOOKS and URL:

1. Stuart Russel, Peter Norvig, "Artificial Intelligence- A Modern Approach", Pearson Education
2. An Introduction to genetic algorithms- By Melanie Mitchell
3. Fuzzy Logic with Engineering Applications – by Timothy J. Ross
4. Elaine Rich, Kevin Knight, "Artificial Intelligence"
5. Patterson, "Introduction to Artificial Intelligence and Expert Systems"
6. Jacek M Zurada, "Introduction to Artificial Neural Systems"
7. Ahmad Ibrahim, "Introduction to Applied Fuzzy Electronics", PHI

T.Y. B.Sc.IT **Course : SITS05PR 1**

Practical – I:

Network Security and Internet Technology
Data warehousing and Data mining

Network Security and Internet Technology

LEARNING OBJECTIVE:
To equip the students with skills required in software industry
Students will learn RMI and Network Security practicals.
(Minimum 8 expts.)

Based on Socket and RMI

Q1) Write a socket program using TCP to find the factorial of a number.

Q2) Write a socket program using UDP to whether the number provided is even or odd.

Q3) Write a program using RMI concept to implement a menu driven task.

Q4) Write RMI program to implement sum of digits of number.

Based on Substitution and Transposition Cipher

Q5) Write a java code to implement Caeser Cipher with encryption and decryption.

Q6) Write a java code to implement polygram substitution Cipher with encryption and decryption.

Q7) Write java program to implement Rail-Fence Transposition Technique taking no of rows from the user as input.

Q8) Write java program to implement Vernam cipher with encryption and decryption.

Q9) Implement RSA algorithm accepting the inputs from user.

Based on AES /DES/Blowfish

Q10) Accept 16 Hex bits(64 bits) number from user and generate 16 subkeys of 12Hex bits(48bits) each using DES Algorithm and PC-1 Table .

Q11) Implement the Blow Fish algoritm.

Q12) Implement the subbyte transformation using S-Box of AES.

Q13) Implement digital signature in the program.

Subject : Data warehousing and Data mining

Course code:SITS05PR1

Objective : to develop the skill of data analytics and to understand the concept of data warehouse.
Software: Oracle 11g and Weka

Practical topics:

1. Oracle Database creation
2. Importing tables from data sources.
3. Designing staging area.
4. Design star schema model
5. Implementation of data extraction , transformation and loading
6. Setting up a data mart
7. Implementation of classification algorithm

a. Naïve Bayes algorithm
b. Decision tree based algorithms(J48)

8. Implementation of different types of clustering algorithm

. K means algorithm
a. Hierarchical algorithm

9. Implementation of Apriori algorithm.
10. Implementation of classification, clustering and association rule using Knowledge flow.

T.Y. B.Sc.IT **Course : SITS05PR2**

Practical – II:

C# with ASP.NET
Artificial Intelligence

C# with ASP.NET

Learning Objective:
To equip the students with skills required in software industry Students will learn the latest of C# and ASP.NET in framework 4.0 Students can apply the skill learnt in developing website projects

I) Write a C# code to generate fibonacci numbers in between the sequence along with an option to continue or quit. Accept the start and end numbers from user.
II) Write a C# code to separate the numbers in an array num[20] having odd and even numbers into two arrays even[10] containing only even numbers and odd[10] containing only odd numbers. Accept the numbers from the user.
III) Write a C# code to find a number which appears maximum number of times in an array of n numbers. Repetition is allowed.
IV) Write a C# code to print pascals triangle. Accept the number of rows from the user
V) Write C# code to arrange the name of cities in sorted order. Accept name of 10 cities from the user
VI) Write C# code to use the LINQ (Language-Integrated Query) feature of C# by creating a collection of CarNames stored in string array. Now display all the names using LINQ.
VII) Create methods add(). multiply(), substract() ,divide() with suitable parameters and call these methods using concept of C# delegate.
VIII) Using DataList control in ASP.NET display the following fields ENO ENAME ADDRESS PHOTO from the database. Accept the eno range from the user
IX) Which control should be used to validate:
    a) A password which is entered twice for confirmation
    b) The age of the user to be over 21
    c) The date to be after the 10/10/2000

Justify your answer by writing correct Validators and conditions.

Design a Login screen in ASP.NET which accepts user name and password. On submit it should check from the server whether the user exists or not. If the user exists in web server then he/she should be directed to proper html page with welcome message.

X) Design a Login screen in ASP.NET which accepts user name and password. On submit it should check from the server whether the user exists or not. If the user exists in web server then he/she should be directed to proper html page with welcome message.
XI) Write the following application.
The initial page is called Validator.aspx and it has 7 text boxes representing (Name, Family Name, Address,City, Zip Code, Phone and e-mail address), and a Check button. Display the page that user gets after clicking on Check button.

The required validation actions are:

- name different from family name,
- address at least 2 letters,
- city at least 2 letters,
- zip-code 5 digits,
- phone according to the format XX-XXXXXXX or XXX-XXXXXXX,

- e-mail is a valid email.

Display the page with the message that user gets after entering only some of the details correctly.
Finally display the page that the user gets after a correct submission of all the details.

XII) Create a screen which accepts student roll no. On click of submit it should display student result in the grid view with fields

Name Course Marks Total Marks Percentage

The database table contains table called student (roll no, name, course , address, year)
Result (roll no, subject, marks, total marks)

XIII) Design a purchase order report using crystal report. PO must have the basic fields

VENDOR SHIP TO ITEM NO DESCRIPTION QTY UNIT PRICE TOTAL

XIV) Using crystal report design simple mark-sheet for SSC result. The data should appear dynamically form database.

XV) Using crystal report design attendance report for SYIT in various subjects.
Data should be taken dynamically from database

XVI) Design the front page of the website using various controls of DOTNET framework Some of the controls are SiteMap control, TreeView control, Menu control, Validation controls, Login controls etc.

Continuous Internal Assessment
Conducting practical test

T.Y. B.Sc.IT **Course: SITS05PR2**

Practical:

The practical for this subject can be performed in any of the following programming languages: Java, C#.NET, Python, C++ and Android.

Artificial Intelligence

1. Implementation of any 2 uninformed search methods with some meaningful application.
2. Implementation of any 2 informed search methods with some application.
3. Implementation of a simple NN for any suitable application (with tool/library).
4. Implementation of a simple NN for any suitable application (without tool).
5. Implementation of a simple GA for any suitable application (with tool/library).
6. Implementation of a simple NN for any suitable application (without tool).

7. Implementation of MiniMax approach for TIC-TAC-TOE using Java/ Android/Python.

8. Demonstrate the use of fuzzy systems to help the management decide whether the player should get selected for a team or not.

9. Develop a book recommend-er (a book that the reader should read and is new to the reader) Expert system or (any other).

ASSESSMENT:
PRACTICALS *
ESE: **45 marks** for exam + **05 marks** for journal
A journal of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

St. Xavier's College – Autonomous, Mumbai
Syllabus
For 6th Semester Courses in Information Technology
(November 2019 onwards)

Contents:

CLASS: T.Y. B.Sc.IT **COURSE CODE: SITS0601**
TITLE: **Cloud Computing and Big Data**

LEARNING OBJECTIVES:

To study the fundamentals of cloud computing, various architectures and applications that implement cloud computing and understand the scope of its security features.
To understand the basic concept of Big data.

Total Number of lectures: 60

Unit I	**Cloud Computing Fundamentals:** Fundamental Cloud Computing Patterns, application workloads **Cloud Service Models:** IaaS, PaaS, SaaS Amazon web services: Amazon EC2, Amazon S3, Amazon SimpleDB, Amazon SQS, Amazon CloudFront **Different Cloud Deployment Models:** Public, Private, Community, Hybrid Cloud **What is a Cloud Storage** 1. Different storage type over Cloud: Blobs, Tables (Non-Relational), File Storage. 2. Blob: Block Blob, Page Blob, Append Blobs. 3.Table Storage 4. File Storages, Amazon Elastic File System(Requirements and Applications) Where to use Cloud Storages, Different Cloud Storage Providers: Google Drive, Microsoft One Drive, Azure Storage, Amazon, Drop Box	15
Unit II	**Virtualization:** Introduction & benefits of Virtualization, Characteristics of Virtualized environments, Levels of Virtualization, ParaVirtualization, Full Virtualization, virtualization of CPU, memory, and I/O devices Technology examples: VMware, Microsoft Hyper-V, Virtual Box (Freeware App to try out on Local Computer) Hyper V- Generation 1 & 2 **Virtual Machines** What are Virtual Machines, Properties of Virtual Machines, How physical Machines can be moved to Virtual Machines(Workloads), Traffic Management – Load Balancers & Traffic Managers.	15
Unit III	Fundamentals of Big Data	15
	Understanding Big data, concepts and terminology Big data characteristics, different types of data business motivations and drivers for big data adoption Business architecture, big data adoption and planning considerations Organizational prerequisites, Data procurement Big data analytics life cycle, enterprise technologies and big data business intelligence, Online transaction processing(OLTP),	

	Online analytical processing(OLAP) Extract, Transform ,Load(ETL), Traditional BI, Big data BI Big Data storage concepts Clusters, File systems and distributed systems NoSQL, Sharding , Replication, CAP theorem ACID, Big data processing concepts, Parallel data processing Distributed data processing, Processing workloads, batch Transactional Cluster, Processing in batch mode Batch processing	
Unit IV	**Hadoop** Hadoop Fundamentals, What is Hadoop? Hadoop Framework A Hadoop cluster, Hadoop directory layouts The Hadoop Distributed File System Hive, Hbase, Pig Latin Scripts Name node, Data node, Job Tracker, Task Tracker, Data block MapReduce with Map Reduce, Map and Reduce tasks Map, Combine, Partition, Shuffle and sort Reduce, understanding map reduce algorithms	15

Continuous Internal Assessment:

Assignment / Project /Presentations

LIST OF REFERENCE BOOKS:

1)Big data fundamentals concepts, Drivers and Techniques -Thomas Earl, Wajid Khattak, Paul Bulher
2)Cloud computing patterns, Fehling, Leymann, Ralph Retter, et. al., Springer

2) Cloud Computing, Rittinghouse, Ransome, CRC press
3) Cloud Computing Black Book, jayaswal, Kallakurchi,Houde,Shah, DreamTech Press
4) Cloud Computing: A practical Approach – Anthony T. Velte, Robert Elsenpeter, Toby J. Velte
5) Cloud + Study guide, Todd Montgomery
6)Virtualizing Hadoop -George Trujillo, Charles Kim, Steven Jones , Romme Garcia, Justin Murray.

CLASS: T.Y. B.Sc.IT **COURSE CODE:SIT0602**

TITLE: Image Processing & Deep Learning

LEARNING OBJECTIVES:

To keep pace with moving technology, deep learning has been added so students can apply this to solve real life problems which cannot be solved by programming alone.

Total Number of lectures: 60

UNIT I	**Introduction to Signals and Image Processing (15 lectures)** Discrete Time Signal and System : Introduction of Signals, Systems and Signal processing, classification of signals, system, LTI system, Freqency domain representation of DTS & Signals. Convolution, Correlation. Z-Transforms: Introduction, Z-transforms, Inverse Z- Transforms, properties,System Function, Application of Z- Transform, Unilateral Z-Transform. Image Processing: Introduction, Brightness adoption and discrimination, Image sampling and quantization, basic relationship between pixels. **Spatial Filtering:** Histogram Processing, Arithmetic and Logic Operation, Spatial filtering: Introduction, smoothing and sharpening filters
UNIT II	**Image Transformation, Enhancement and Segmentation (15 lectures)** Point operation and Neighbourhood Operation, Gray-Level Transformation, Median Filter , Bit plane slicing , Image Enhancement in the frequency domain: Frequency-domain filters: smoothing and sharpening filters, homomorphic filtering, Highpass and Lowpass Filters, noise reduction, MSE filtering, Inverse Filtering Introduction to Fourier Transform, properties of Walsh Transform, Hadamard Transform, Discrete Cosine Transform, Comparison of Transform. Introduction to wavelet transform. Detections of discontinuities, edge-linking and boundary detection, thresholding, region- based segmentation, Hough transform. **Image Segmentation:** Fundamentals, Point, Line and Edge Detection, Thresholding, Segmentation by Region Growing and by Region Splitting and Merging, Region Segmentation using Clustering and Superpixels, **Feature Extraction:** Background, Boundary Preprocessing, Boundary Feature Descriptors, Region Feature Descriptors, Principal Components as Feature Descriptors, Whole-Image Features
UNIT III	**Deep Learning Fundamentals (15 lectures)** Biological Neuron, Linear Perceptron, Perceptron Learning Algorithm, Linear separability, Perceptron Learning Algorithm. Feedforward Neural networks. Gradient descent and the backpropagation algorithm. Unit saturation,the vanishing gradient problem, and ways to

	mitigate it. RelU Heuristics for avoiding bad local minima. Heuristics for faster training.
UNIT IV	**Deep Learning Algorithms (15 lectures)** Convolutional Neural Networks: Architectures, convolution / pooling layers Recurrent Neural Networks: LSTM, GRU, Encoder Decoder architectures Deep Unsupervised Learning: Autoencoders (standard, sparse, denoising, contractive, etc) Gradient descent with Adaptive Learning Rate. Case study of application of deep learning.

Continuous Internal Assessment
CIA I: Written test **for 20 marks**
CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

LIST OF RECOMMENDED REFERENCE BOOKS:

1. R. C.GonsalesR.E.Woods, Digital Image Processing,Second edition, Pearson
2. S.Salivahanan, Digital Signal processing TMH
3. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning." An MIT Press book in preparation.
4. Neural Networks and Deep Learning by Michael Nielsen

T.Y. B.Sc.IT **Course: SITS0604**
Title: Software Testing
Learning Objective:
To develop the skill of software testing
Number of lectures: 60

Unit 1	**The basics of software testing (15 lectures)** Terms and Motivations: Error and Bug Terminology, Testing Terms, Software Quality The Fundamental Test Process Test Planning and Control, Test Analysis and Design, Test Implementation and Execution, Evaluation of the Test Exit Criteria and Reporting, Test Closure Activities **Testing in software lifecycle** The General V Model Component Test: Explanation of Terms**,** Test Objects**,** Test Environment**,** Test Objectives**,** Test Strategy, Integration Test: Integration Strategy, System Test, Acceptance test:

	Testing for user acceptance**,** Operational testing**,** Field testing, alpha testing and beta testing.
Unit 2	**Functional testing (15 lectures)** Boundary value analysis testing, Robustness testing, Worst case testing, Equivalence class testing, Decision table based testing, Cause effect graphing technique and State transition testing. **Structural testing** Control flow testing, Statement coverage, Branch coverage, Conditional coverage and path coverage, Data flow testing, Basis path testing, cyclomatic complexity, Mutation testing, mutation and mutants, Mutation operators and mutation score and slice based testing
Unit 3	**Static testing and Test management (15 lectures)** Static testing, Foundations, Review, Walkthroughs, inspections, The General Process, Roles and Responsibility and Types of Review **Test Management** Test Planning: Quality Assurance Plan, Test Plan, Prioritizing Tests Cost and Economy Analysis: Cost of Testing, Test Effort Estimation Definition of Test Strategy: Preventives Reactive Approach, Analytical vs. Heuristic Approach
Unit 4	**Advanced concepts of software testing (15 lectures)** Metrics and models in software testing, Software metrics, categories of metrics, What should be measured during testing? Testing web applications, Functional testing, user interface testing, navigation testing and form based testing, automated test data generation using genetic algorithm, initial population, Crossover and mutation, fitness function and algorithm for generating test data.

List of Recommended Reference Books

1. Software Testing by Yogesh Singh
2. Software testing foundations–AndreasSpillner, TiloLinz, HansSchaefer(SPD publication)
3. Software Testing–Ron Patton second edition
4. Software engineering–A Practitioners Approach Roger s Pressman
5. Software testing–Principles, Techniques and Tools- TataMc-GrawHill education Pvt .Ltd, New Delhi

T.Y. B.Sc.IT **Course: SITS06PROJ**
Title: Project

Learning Objective:

To build an innovative software solution for a well defined problem by applying the knowledge of all the application oriented software learnt in the BSc.IT course and beyond.

Students are expected to continue the project which they had started in semester V. Project will carry 8 credits with 200 Marks.

Students can do live project in industry or in-house project.

Students are expected to give time equivalent to 12 lecture periods/week, out of which 3 periods will be contact time for guidance from internal guide. There will be continuous internal assessment (CIA) for 40% of the credit (80Marks).

This will consist of:

Remaining 60% of the credit (120Marks) will be end semester examination consisting of documentation, presentation and viva. This will be jointly examined by the project guide and external examiner under the subheading of marks as follows:

Documentation	Presentation	viva	Execution of	System design
	(validation, database		various modules	understanding
	handling)		with report and	
			testing	
30	30	20	30	10

List of project categories

1. Hardware projects based on microcontroller / PIC
2. Networking projects
3. Mobile projects
4. Wireless technologies
5. Website projects
6. Desktop application
7. Real-time application in Linux/Unix
8. Or any other suitable project which is approved by the project guide

Suggested format for project report S. ITS.6.PROJ

1. Cover page
2. Certificate from college(for in-house / external project)
3. Synopsis of project

4. Project report

a. Table of content
b. Definition of problem
c. Objective and scope of project
d. System analysis and design

User requirement

Functional requirement

Non-functional requirement

ii. Normalization
iii. DFD , context level diagrams

iv. Flowchart, ER diagram
v. Use case diagrams

b. Feasibility study

. Technical feasibility
i. Economical feasibility
ii. Operational feasibility

c. Software engineering paradigm applied
d. Software and hardware requirement specification
e. PERT chart, Gantt chart
f. Coding
g. Code efficiency

k. Validation checks
l. Testing

- Test techniques(white box and black box testing)
- Writing Test cases
- Using test data
- Generating defect reports

- Use of testing tools(manual/automated)

b. System security measures
c. Cost estimation of project
n. Reports
o. Screen shots
p. Future enhancement
q. Bibliography
r. Glossary

5. Students have to submit black book to college(1 per group) in A4 size with one side written (approx 150-200 pages) along with CD having full documentation and codes

6. Students doing project in industry will have to get certificate from the company.

ADVANCED JAVA

Learning Objective:

To equip the students with skills required in software industry. Students will learn the latest of Java through Struts2 and Hibernate Practicals. Students can apply the skill learnt for projects.

For a 2 credit course a minimum of 8 programs should be executed. A journal of the printouts of the programs and its output should be maintained. Certified journal will have to be presented at the time of practical exam.

I) Write a servlet code with the initialization parameter.

II) Implement a Stack in Java and perform the following operations: (Create, Push, Pop, Search a data item)

III) Write Filter program in servlet to block the user from particular IP address.

IV) Write a servlet which displays the cookie name and the value.

V. Create Bulletin Board Servlet

This is a bulletin board that is maintained by the server. Entries are parsed as HTML, so you can post anything from plain text to applets. The entries are saved to a file, so the board will survive server shutdowns.

Enter message:

Submit Message | Clear Message | View Postings

VI) Create a "**DataServlet.java**" which is the servlet which is making the connection to the database and retrieves the data from database. After getting the values from database, data is added to the Data List. Then data list is added to the request object and sent to the JSP page. In JSP page the values are displayed using **Iterator** class object.

VII) Create an html page with fields, eno, name, age, desg, salary. Now on submit this data to a jsp page which will update the employee table with matching eno.

VIII) Write jsp code to demonstrate the use of session object in shopping cart.

IX) Write JSP code to do login authentication from database and redirect to new JSP page as per the role assigned in the database.

X) Using struts validation framework do validation for

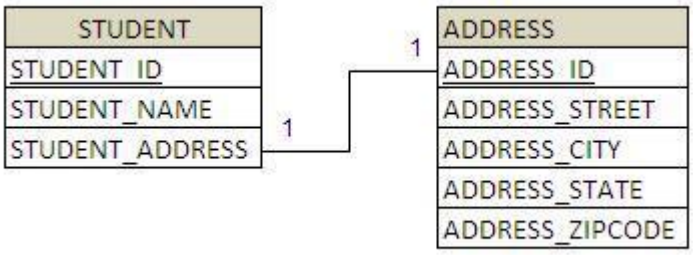
1)email

2)phone 3)emp no
4)emp name 5)age

XI) Create a login interceptor in struts which always intercepts and displays a login screen when the user has not logged in and tries to visit some page on the website.

XII) To persist the java objects using the Hibernate Object/Relational Mapping (ORM) framework

XIII) Consider one to one relation as shown. Now map this relationship using hibernate



Continuous Internal Assessment
MCQ / Viva test during practicals

Mid Term practical test.

T.Y. B.Sc.IT **Course: SITS06PR1**

Practical: **BIG DATA VISUALIZATION**

Objective:
This course is useful for those students who would like to become a data analyst or Data Scientist. A Business intelligence tool for visually analyzing data will be used. Students will be able to create as well as depict the trends, variations and density of the data in the form of graphs and charts.

List of practical:
1.Performing graphical analysis in R
2.Getting familiarized with different data visualization technologies.
3. Basics- Students will understand Environment set up and get acquainted with its user interface. Toolbar Icons, Main Menu, Data types, Charts etc.
4. Data Sources:
Data Sources,
Data Extraction,
Data Joining,
Data Blending,
Data View
5. Worksheet Calculations:
Add worksheets,
Rename worksheets,

Reorder Worksheets ,
Basic sorting,
Basic Filters,

6.Operations on data:
Operators,
Functions,
Numeric calculation ,
String calculation,
Table calculations

7. Sorting and Filtering:
Computed sorting,
Manual sorting,
Quick filters,
Condition filters,
Filter operations

8.Designing Charts: Basic
Bar Chart,
Line Chart,
Pie Chart,
Cross tab,
Histogram ,
Motion Chart,

9. Designing Charts:Advanced
Gantt Chart,
Bubble Chart,
Tree Map,
Waterfall chart

10. Text Mining: Word Cloud:
11.Dashboard: Creating a Dashboard and Formatting.

Dash board: Combine Multiple views of data to get richer insight.

12: Creating a forecast: Forecasting is about predicting the future value of a measure.
13. Create a trend line: Trend lines are used to predict the continuation of a certain trend of a variable. It also helps to identify the correlation between two variables.
14. Create a story: A story is a sequence of visualizations that work together to convey the information.
Create a story point
Explore layout option
Format a story
Present your story

Reference book:
Big Data Black Book

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