St. Xavier's College – Autonomous, Mumbai
Syllabus
For 5th Semester Courses in Information Technology
(June 2017 onwards)

Contents:

S.ITS5.01	NETWORK SECURITY AND INTERNET TECHNOLOGY
S.ITS5.02	C# AND ASP.NET
S.ITS5.03	DATA WAREHOUSING AND DATA MINING
S.ITS 5.04	E-COMMERCE AND ERP
S.ITS5.05	INTRODUCTION TO ARTIFICIAL INTELLIGENCE
S.ITS5.PR1	C# AND ASP.NET AND ARTIFICIAL INTELLIGENCE
S.ITS5.PR2	DATA WAREHOUSING AND NETWORK SECURITY (DWDM&NSIT)

T.Y.B.Sc (I.T)　　　　　　　　　　　　　　　　　　**S.ITS5.01**
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**	15
	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, Steganography, Key Range and Key Size, Possible Types of Attacks, Diffie-Hellman Key Exchange.	
UNIT II	**Symmetric Key, Asymmetric Key Algorithms, Digital Signature**	15
	DES, AES, Brief history of Asymmetric Key Cryptography, Overview of Asymmetric Key Cryptography, RSA algorithm, Symmetric and Asymmetric key cryptography together, Digital Signatures, Digital Certificates, Private Key Management, PKI and Security.	
UNIT III	**Designing Trusted Operating System and Network Security**	15
	Designing Trusted OS What is Trusted System, Military Security policy, Commercial security policy, Clark-Wilson security policy. Models of security: Multilevel security, Bell-La Padula model, Biba integrity model, Trusted Operating system design. Understanding MAC, DAC. Trusted Computing Base and its functions. *Network Security* What makes Network Vulnerable? Who attacks Networks? Threat Precursors, 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.	
UNIT IV	**TCP/IP Protocol Suite and RMI**	15
	OSI Model, TCP/IP Protocol Suite, IPV 4 Addresses and Protocol and IPV6 Addresses and Protocol, Address Resolution Protocol (ARP), Streams, Sockets for Clients, Sockets for Servers, Secure Sockets, UDP Datagram and Sockets, Remote Method Invocation, RMI Programming.	

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   **S.ITS5.02**
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 Continuous internal assessment: Assignment on unit 1, unit 2, unit 3, unit 4, midterm test	15

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   **S.ITS5.03**
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**	15
	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	

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: ITS0504**
TITLE: E-COMMERCE AND ERP

OBJECTIVE:
To create awareness about the role of Information Technology in business and an introduction to the 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 Material Management module along with open source ERP software demos as a learning tool.

[Total lectures 60]

UNIT I	**Overview of electronic commerce and case study**	15
	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	

	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 marks**

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: S.ITS5.05**
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	

………………………………………………………..

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: S.ITS6.PR1**

Practical:

A) 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.

B) **Subject : Data warehousing and Data mining**

Course code: S.ITS5.PR1

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
         a. K means algorithm
         b. Hierarchical algorithm
   9. Implementation of Apriori algorithm.

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

T.Y. B.Sc.IT   **Course : S.ITS.5.PR1**

Practical – II:

C) 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: S.ITS5.PR2**

Practical:

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

D) **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.

6th Semester Syllabus for Courses in Information Technology. St. Xavier's College –Autonomous, Mumbai.

St. Xavier's College – Autonomous, Mumbai
Syllabus
For 6th Semester Courses in Information Technology
(November 2017 onwards)

Contents:

S.ITS6.01	BIG DATA AND CLOUD COMPUTING
S.ITS6.02	DEEP LEARNING
S.ITS6.03	ADVANCED JAVA
S.ITS 6.04	SOFTWARE TESTING
S.ITS6.05	PROJECT
S.ITS6.PR	ADVANCED JAVA AND MOBILE APPLICATION DEVELOPMENT

CLASS: T.Y. B.Sc.IT   **COURSE CODE: S.ITS6.01**
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	**Evolution of Cloud and its fundamentals:** Hardware evolution, Internet Software evolution, Protocols for communication, Common interface to the internet, the appearance of Cloud Formations. **Cloud Computing Service Models:** IaaS, PaaS, SaaS **Different Cloud Models:** Public, Private, Hybrid Cloud	10
Unit II	**Virtualization:** Introduction & benefits of Virtualization, Characteristics of Virtualized environments, Taxonomy of Virtualization techniques, Pros and Cons of Virtualization, Technology examples: VMware, Microsoft Hyper-V, Virtual Box (Freeware App to try out on Local Computer) Hyper V- Generation 1 & 2 **Storage:** 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. File Systems: NTFS, HDFS. Where to use Cloud Storages, Different Cloud Storage Providers: Google Drive, Microsoft One Drive, Azure Storage, Amazon S3(Simple Storage Service), Drop Box **Virtual Machines** What are Virtual Machines, Which scenario where we can use Virtual Machines, VM's on Cloud (Azure – VM /Amazon EC2), Components of Virtual Machines, How physical Machines can be moved to Virtual Machines(Workloads), Traffic Management – Load Balancers & Traffic Managers, Comparing VMware/HyperVisor VM's to Azure Cloud VM **Security Related to Cloud Computing:** Risk Management, Authentications Modes [Multi Factor, Single SignOn]	20
Unit III	**Fundamentals of Big Data**	10

		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	
Unit IV		**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 with Map Reduce, Map and Reduce tasks Map, Combine, Partition, Shuffle and sort Reduce, Understanding map reduce algorithms **Hadoop** Hadoop Fundamentals, What is hadoop?, Hadoop Framework A hadoop cluster, Hadoop directory layouts The Hadoop distributed File System YARN and HDFS	20

LIST OF REFERENCE BOOKS:

1)Big data fundamentals concepts, Drivers and Techniques -Thomas Earl, Wajid Khattak, Paul Bulher
2)Virtualizing Hadoop   -George Trujillo, Charles Kim, Steven Jones , Romme Garcia, Justin Murray
3)Cloud computing patterns, Fehling, Leymann, Ralph Retter, et. al., Springer
4)Cloud Computing, Rittinghouse, Ransome, CRC press

ASSESSMENT:
THEORY:
CIA I: Written test **for 20 marks**
CIA II: Assignments / Project / Presentation / Case Study/ Written Test **for 20 marks**

ESE PATTERN:
 For 60 marks: 4 Units- 4 Questions of 15 marks each [per unit]

For 100 marks: 4 Units- 5 Questions of 20 marks each [Q1 of ALL units and Q2 to Q5 per unit]

CLASS: T.Y. B.Sc.IT   **COURSE CODE:ITS0602**
TITLE: Digital 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: S.ITS6.03**
Title: Advanced Java
Learning Objective:
To equip the students with skills required in software industry
Students will learn the latest of Java through Struts2, Hibernate and Spring.
Students can apply the skill learnt for projects.
Total Number of lectures: 60

Unit 1	J2EE Concepts and Java Database Connectivity [JDBC] (15 lectures)
	JDBC - Introduction to JDBC Architecture - Type I Driver (JDBC-ODBC Bridge) - Types of Driver - Understanding Statement, PreparedStatement, CallableStatement Interface through examples - Understanding ResultSet , ResultSetMetadata interface through examples - Difference between execute() , executeUpdate(), executeQuery() method - Transactions , Commits, Rollbacks, and Savepoints Batch Processing **J2EE** -meaning of J2EE, J2EE Architecture.

	-Component Technology (EJB) and Service Technology (JNDI, JAAS).
Unit 2	**Servlet and JSP** **(15 lectures)** *Servlet* - What is a Servlet ? - Servlet Lifecycle - Servlet API -Object model of Servlet framework. -understanding web.xml, servlet tags and directory structure of web application. - GenericServlet and HttpServlet, ServletConfig & ServletContext - Handling Form data with get and post request - Initializing a servlet - Request Dispatcher, Redirecting Request. - Session Management. -Filters in servlet -programs in servlet to read all parameters from form, database handling program, reading cookies values. *JSP* - What is JSP page? Compare it with servlet - Lifecycle of JSP page - JSP syntax using Directive, Declaration , Expression , Scriptlet, Comment - Using javabean and Action Tag in JSP - JSP implicit objects - Using JSP standard tag library (JSTL) - Session management - Exception handling - Custom tag - Transferring Control to Another Web Component - Using JDBC in JSP -Programs in JSP. -Integrating JSP with JQuery, Bootstrap, Angular JS, JSON.
Unit 3	**Struts** **(15 lectures)** *Basic of Struts2* - Understanding MVC architecture - Struts2 framework. -understanding default-stack. -comparing struts with other framework. *Working with Struts2 Actions* 1) Introducing Struts 2 actions 2) Packaging your actions 3) Implementing actions *Adding workflow with interceptors* 1) Why intercept requests?

	2) Interceptors in action 3) Surveying the built-in Struts 2 interceptors 4) Declaring interceptors 5) Building your own interceptor ***Data transfer: OGNL and type conversion*** 1) Data transfer and type conversion: common tasks of the web application domain 2) OGNL and Struts 2 3) Built-in type converters 4) Customizing type conversion ***Validation framework*** 1) RequiredFieldValidator Class 2) RequiredStringValidator Class 3) ExpressionValidator Class 4) Email Validator Class 5) RegexFieldValidator Class 6) DateRangeFieldValidator Class ***Struts UI and Tiles***
Unit 4	**Hibernate and Spring** **(15 lectures)** ***Hibernate*** - Introduction to Hibernate - Understanding ORM (Object Relational Mapping) - Understanding Transient, Persistent and Detached Object states - Issues while writing manual JDBC code. - Hibernate and JPA (Java Persistence API). - Writing persistence classes. -Steps to work with Hibernate. - Handling CRUD operations in Hibernate. - Mapping Inheritance between classes with tables in database. -HQL -One to One and One to One mapping in Hibernate. ***Core Spring*** -Springing into action. -Wiring beans. -Advanced wiring. -Aspect oriented Spring. ***Spring in Web and Backend*** -Building spring web application -JDBC with spring / Hibernate with spring **Continuous Internal Assessment** Assignment on unit 1, unit 2, unit 3, unit 4

	Mid Term Test.

BOOKS:

1) Struts 2 in Action --Manning publication

Author: Donald Brown, Chad Michael Davis, and Scott Stanlick

2) Spring in Action—Craig Walls—Manning Dreamtech press

2) Pure JSP by James Goodwill Techmedia SAMS publication

3) Hibernate in Action Manning publication Author: Christian Bauer and Gavin King

REFERENCE:

1) Java Servlet Programming O'Reilly Publication-Author: Jason Hunter.

2) Struts 2 Black Book.

3) Database Programming with JDBC and Java – O'Relly Publication.

T.Y. B.Sc.IT   **Course: S.ITS6.04**
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. SoftwareTestingbyYogesh Singh
2. Softwaretestingfoundations–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: S.ITS6.PROJ**
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 (validation, database Handling,)	Execution of various modules with report and testing, UI, Project Quality	System design Understanding And viva
30	30	30	30

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

Suggested format for project report S.ITS6.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
   e. User requirement

      f. Functional requirement

      g. Non-functional requirement

      h. Normalization

      i. DFD, context level diagrams

      j. Flowchart, ER diagram

      k. Use case diagrams

      l. Feasibility study

          1. Technical feasibility

          2. Economical feasibility

          3. Operational feasibility

    m. Software engineering paradigm applied

    n, Software and hardware requirement specification

    o. PERT chart, Gantt chart

    p. Coding

    q. Code efficiency

    r. Validation checks

    s. Testing

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

- Use of testing tools(manual/automated)

    t. System security measures

    u. Cost estimation of project

    v. Screen shots

    w. Future enhancement

    x. Bibliography

    y. Glossary

5. Students have to submit black book to college(1 per group) in A4 size with one side written (approx 100-200 pages) along with CD having full documentation and codes

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

T.Y. B.Sc.IT   **Course: S.ITS6.PR1**

Practical:

A) 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
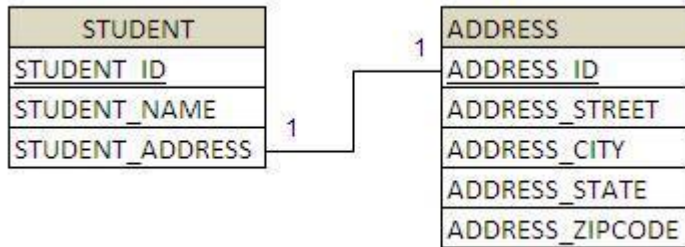
Continuous Internal Assessment
 MCQ / Viva test during practicals

Mid Term practical test.

T.Y. B.Sc.IT **Course: S.ITS6.PR1**

Practical:

B) Mobile Application Development

1) a. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the blue color with white background.

b. Create an app with two buttons. Have the first one pop up a Toast or insert text into a TextView that says "Hello". Have the second one say "Goodbye". Use the named inner class approach. (**Hint**: String text = "..."; Toast tempMessage = Toast.makeText(referenceToMainActivity, text, Toast.LENGTH_SHORT); tempMessage.show();)

2) Create a project with a Spinner

a. That displays the choices Red, Yellow, Blue, and Green. Have a TextView whose color matches the Spinner. Set the choices in XML.
b. Modify the above project by adding a second Spinner with the same choices and behavior as above. But, this time, set the choices from Java.
c. If you want to have a prompt (i.e., title at the top when the spinner pops up, use your Spinner. Set Prompt and supply either an id or a String).

3) a. Create a sample application with login module. (Check username and password) On successful login, go to next Activity. And on a failed login, alert user using Toast. Also pass username to next Activity with a Welcome Message.

b. Create a project whose initial screen has a Text View that says "Activity 1" and has a Button that says "Go to Activity 2". Have Activity 2 show a Text View that says "Activity 2" and have a Button that says "Go to Activity 1". Have the buttons switch back and forth.

c. Understanding of UI:
Create an UI such that, one screen have list of all the types of cars. On selecting of any car name, next screen should show Car details like: name, launched date, company name, images (using gallery) if available, show different colors in which it is available.

4) Create an application to read:
a. File from the scared and display that file content to the screen.
b. Read messages from the mobile and display it on the screen.

5) Create an application to send message between two emulators.

6) Create an application to perform Insert, update, Delete and retrieve operation on the slate database.

7) Create an application that uses the Google maps API to help you locate your current geographical location.

8) Create a project to send a common mail to all the intended recipients via Gmail from your application.

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.

###