KADI SARVA VISHWAVIDYALAYA
GANDHINAGAR

Master of Science
(Information Technology)
Programme

June 2018
(2 Years Full Time: 4 Semesters Programme)

KADI SARVA VISHWAVIDYALAYA
(KSV)

CHOICE BASED CREDIT SYSTEM

FOR

Master of Science
(Information Technology)
Programme

Choice Based Credit System:

As per the guidelines given by the University Grants Commission (UGC) to bring equality, efficiency and excellence in the Higher Education System, Choice Based Credit System (CBCS) has been adopted. CBCS offers wide range of choices to students to select the courses based on their interest and career objectives. It provides flexibility to students to opt for the courses of their choice and / or undergo additional courses to strengthen their Knowledge and Skills.

For the M.Sc. (Information Technology) programme, conceptual division of courses:

1. Programme Core Courses (ITCC)

   Programme Core Course is mandatory for all the students of the programme and will not have any other choice for the same. These courses form the base of the programme.

2. Programme Elective Courses (ITEC)

   A Programme Elective Course in which students will have choices available to select course / group of courses. These courses can be based Functional Course / Area of Specialization which are offered or decided by the department from time-to-time.

3. University Elective Course (UEC)

   University Elective Courses are those courses which any student of the University of a particular level PG/UG will choose as offered or decided by the University from time-to-time.

4. Audit Course - Non Credit Course (NCC)

   A Non Credit Course is a course where students will receive Participation or Course Completion certificate. This will not be reflected in Student's Grade Sheet. Attendance and Course Assessment is compulsory for Non Credit Courses.

KSV has designed curricula for all its PG programmes in line with the current requirements and best practices followed internationally which includes IT enabled interactive teaching, Expert Lectures, Hands on Workshops, Industrial Visits and study tours.

All programmes of the KSV follow credit-based system. The method of teaching is student-centered and facilitates students for self-learning. Encourages students for group activities and motivates them to work on innovative projects and research. Some of the unique features of KSV include:

- Objective based Industrial visits
- Regular seminars and lectures by leading academicians and experts from the industry
- Hands on practical based workshops
- Sarva Netrutva programmes for developing leadership qualities
- Real-scenario based projects, case studies and assignments
- Placement assistance through on-campus and off-campus interviews

Syllabus of M.Sc. (IT)

Semester – I
UEC01.   Soft Skills
ITCC01.   Advanced Database Management System
ITCC02.   Object Oriented Analysis and Design
ITCC03.   Advanced Computer Networks
ITCC04.   Web Content Management Systems
ITCC05.   Project – I

Semester - II
UEC02.   Cyber Security
ITCC06.   Enterprise Resource Planning
ITCC07.   Advanced Data Structures and Algorithms
ITCC08.   Linux Systems and Network Administration
ITEC01.   Elective – I
          ITEC01 (A)   Advanced .Net Technologies
          ITEC01 (B)   Advanced Java
          ITEC01 (C)   Python Programming
ITCC09.   Project – II

Semester - III
ITCC10.   Data Science and Big Data Analytics
ITCC11.   Information Security
ITCC12.   Software Testing and Quality Assurance
ITEC02.   Elective – I
          ITEC02 (A)   Advanced Computing Technology
          ITEC02 (B)   Mobile Application Development
          ITEC02 (C)   Machine Learning Techniques
ITEC03.   Elective – II
          ITEC03 (A)   Cloud Computing Technologies
          ITEC03 (B)   IOT and Applications
          ITEC03 (C)   Image Processing
ITCC13.   Project – III

Semester - IV
ITCC14.   IT Project

KADI SARVA VISHWAVIDYALAYA , GANDHINAGAR									
M.Sc. IT Programme									
CBCS STRUCTURE									
SEMESTER - I									
Sr. No	Subject Code	Name of Subject	Total Credit	Teaching Scheme (Per Week)		Examination Scheme			
						MID	External		Total Marks
				Th	Pr		Th	Pr	
1	UEC01	Soft Skills	3	2	2	15	35	0	50
2	ITCC01	Advanced Database Management System	5	3	4	30	70	50	150
3	ITCC02	Object Oriented Analysis and Design	5	3	4	30	70	50	150
4	ITCC03	Advanced Computer Networks	4	3	2	30	70	50	150
5	ITCC04	Web Content Management Systems	5	3	4	30	70	50	150
6	ITCC05	Project – I	2	0	4	30	0	70	100
Total			**24**	**14**	**20**	**165**	**315**	**270**	**750**

SEMESTER - II									
Sr. No	Subject Code	Name of Subject	Total Credit	Teaching Scheme (Per Week)		Examination Scheme			
						MID	External		Total Marks
				Th	Pr		Th	Pr	
1	UEC02	Cyber Security	2	2	0	15	35	0	50
2	ITCC06	Enterprise Resource Planning	5	3	4	30	70	50	150
3	ITCC07	Advanced Data Structures and Algorithms	5	3	4	30	70	50	150
4	ITCC08	Linux Systems and Network Administration	5	3	4	30	70	50	150
5	ITEC01	**Elective – I**	5	3	4	30	70	50	150
	ITEC01 (A)	Advanced .Net Technologies							
	ITEC01 (B)	Advanced Java							
	ITEC01 (C)	Python Programming							
6	ITCC09	Project – II	2	0	4	30	0	70	100
Total			**24**	**14**	**20**	**165**	**315**	**270**	**750**

		SEMESTER - III							
Sr. No	Subject Code	Name of Subject	Total Credit	Teaching Scheme (Per Week)		Examination Scheme			
						MID	External		Total Marks
				Th	Pr		Th	Pr	
1	ITCC10	Data Science and Big Data Analytics	4	3	2	30	70	50	150
2	ITCC11	Information Security	4	3	2	30	70	50	150
3	ITCC12	Software Testing and Quality Assurance	4	3	2	30	70	50	150
4	ITEC02	**Elective – I**	5	3	4	30	70	50	150
	ITEC02(A)	Advanced Computing Technology							
	ITEC02(B)	Mobile Application Development							
	ITEC02(C)	Machine Learning Techniques							
5	ITEC03	**Elective – II**	5	3	4	30	70	50	150
	ITEC03(A)	Cloud Computing Technologies							
	ITEC03(B)	IOT and Applications							
	ITEC03(C)	Image Processing							
6	ITCC13	Project – III	2	0	4	30	0	70	100
		Total	**24**	**15**	**18**	**180**	**350**	**320**	**850**

		SEMESTER - IV							
Sr. No	Subject Code	Name of Subject	Total Credit	Teaching Scheme (Per Week)		Examination Scheme			
						MID	External		
				Th	Pr		Th	Pr	Total Marks
1	ITCC14	IT Project	24	0	30	250	0	500	750
		Total	**24**	**0**	**30**	**250**	**0**	**500**	**750**

<u>**Detailed Syllabus**</u>
Kadi Sarva Vishwavidyalaya
M.Sc. (IT) Semester – I (First Year)

Subject   :   Soft Skills
Subject Code :   UEC01

Objective:
Learning of this subject will help students to enhance holistic development and improve their employability skills.

Learning Outcomes:

After successful completion of this subject students will be able:
- To develop inter personal skills and be an effective goal oriented team player.
- To develop professionals with idealistic, practical and moral values.
- To develop communication and problem solving skills.
- To reengineer attitude and understand its influence on behavior.
- To develop communication competence in prospective engineers.
- To enable them to convey thoughts and ideas with clarity and focus.
- To equip them to face interview & Group Discussion.
- To inculcate critical thinking process.
- To prepare them on problem solving skills.
- To provide symbolic, verbal, and graphical interpretations of statements in a problem description.
- To understand team dynamics & effectiveness.
- To create an awareness on Engineering Ethics and Human Values.
- To instill Moral and Social Values, Loyalty and also to learn to appreciate the rights of others.
- To learn leadership qualities and practice them.

Unit – I   **25%**

SELF ANALYSIS
SWOT Analysis, Who am I, Attributes, Importance of Self Confidence, Self Esteem

COMMUNICATION SKILL & PERSONALITY
Communication skills and Personality Development a) Intra personal communication and Body Language b) Inter personal Communication and Relationships c) Leadership Skills d) Team Building and public speaking

No. of Lectures: 7

Unit - II   **25%**

CREATIVITY
Out of box thinking, Lateral Thinking

No. of Lectures: 7

Unit - III   **25%**

ATTITUDE
Factors influencing Attitude,
Challenges and lessons from Attitude, Etiquettes.

No. of Lectures: 7

Unit - IV   **25%**

GOAL SETTING
Wish List, SMART Goals, Blue print for success, Short Term, Long Term, Life Time Goals.

Time Management
Value of time, Diagnosing Time Management, Weekly Planner To do list, Prioritizing work.
Extempore

No. of Lectures: 7
Total No. of Lecture: 28

Reference Books :

1. SOFT SKILLS, Career Development Centre, Green Pearl Publications,2015
2. Personality Development by Rajiv K. Mishra. Rupa & Co.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	Total Marks
2	2	3	15	35	0	50

Internal Assessment:

A practical and activity oriented course which has continuous assessment based on class room interaction, activities like Role Play, Group discussion, Problem Based Learning technique etc.

Kadi Sarva Vishwavidyalaya
M.Sc. (IT) Semester – I (First Year)

Subject   :   Advanced Database Management System
Subject Code :   ITCC01

Objective:
Students will learn about different architectures of the database management. To gain an awareness of the basic issues in objected oriented data models, learn about the Web-DBMS integration technology and XML for Internet database applications, familiarize with the data-warehousing and data-mining techniques and other advanced topics.

Learning Outcomes:
After studying this subject, student will be able to
- To study Different architectures of the Database system.
- To study Different Parallel architectures of the Database system & how the operations are performed in parallel with each other.
- To study Commit protocol to work in the distributed environment.
- To study Objet Oriented Databases
- Operation of data warehousing and its role in decision support.
- To study different algorithm to perform the analysis of data.

Unit - I   **25%**

Concepts and Architecture:
Centralized Architecture, Client-Server Architecture, Server system Architecture: - Data Servers, Transaction servers and Cloud based servers, Parallel Architecture, Distributed Architecture, Web based system:-Web architecture (2 tiers, 3 tiers, N-tier Architecture) and Web services – SOAP

Parallel Databases:
Introduction, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism, Design of Parallel Systems , Parallelism on Multicore processors

No. of Lectures: 10

Unit - II   **25%**

Distributed Databases:
Introduction, Homogeneous and Heterogeneous Databases, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Availability, Cloud based databases, Directory systems

Object based Databases: OR & OO - Overview of Object- Oriented concepts & characteristics, Database design for OODBMS - Objects, OIDs and reference types, Database design for ORDBMS - Comparing RDBMS, OODBMS & ORDBMS.

No. of Lectures: 11

Unit - III   **25%**
Data warehousing
Introduction to Data warehousing, Architecture, Warehouse schemas, Dimensional data modeling- star, snowflake schemas, fact constellation, OLAP and data cubes, Operations on

cubes, Data preprocessing -need for preprocessing, data cleaning, data integration &
transformation, data reduction.

No. of Lectures: 10

Unit - IV   **25%**

Data exchange through XML:
Structure of XML data, XML schema, XML Document & Databases schema Storing &
Extracting XML document, XML Querying XML data X Path XQuery, Application
Program Interface to XML, XML Application

No. of Lectures: 11
Total No. of Lectures: 42

Reference Books:
1. Database system concepts', 6th Edition –Abraham Silberschatz, Henry Korth, S, Sudarshan,
(McGraw Hill International)
2. Database systems : "Design implementation and management"- Rob Coronel, 4thEdition,
(Thomson Learning Press)
3. Database Management Systems - Raghu Ramkrishnan, Johannes Gehrke Second Edition,
(McGraw Hill International)
4. Database Management System - Alexis Leaon, Mathews Leon, (leon press)
5. Fundamentals of Database Systems - Remez Elmasri , Shamkant Navathe,Pearson,5th Ed
6. Database Systems – a Practical approach to design , implementation & Management Thomes M.
Colnnolly, Carolyn E. Begg, Pearson 4th Ed.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:

1. Advanced SQL queries
2. PL/SQL Programs using cursors
3. PL/SQL Programs with exception handling
4. Programs for Stored Procedures, Functions
5. Creating and using Packages
6. Creating and using Triggers
7. SQL query tuning
    a. Generating explain plan
    b. Tuning using indexes
8. Study and understand data dictionary views
9. Case studies related to:
    a. Distributed databases
    b. Horizontal/Vertical Partitioning
    c. Data warehouse

Subject : **Object Oriented Analysis and Design**
Subject Code : ITCC02

Objective:
Learning of this subject starts with object oriented concepts and move s towards the preparation of standard UML diagrams using UML Modeling tool. System Analysis and Design is a practical field that relies on a core set of concepts and principles. The objective of this subject is to teach the students tried-and-tested techniques widely embraced by experienced analysts plus new and emerging tools and techniques that recent graduates are expected to apply on the job. The subject is meant to give balanced exposure to both traditional and object oriented approaches to system analysis and design. Subject teaches a technical approach for analyzing and designing an application, system, or business by applying the object-oriented paradigm

Learning Outcomes:
After successfully completing this course you will be able to:
• Describe Object Oriented Analysis and Design concepts and apply them to solve problems.
• Prepare Object Oriented Analysis and Design documents for a given problem using Unified
   Modeling Language.

After completion of the course the students would be well versed with

• The role of System Analyst
• Modern structured analysis approaches
• Key modeling concepts that apply to both the traditional structured approach and the newer object- oriented approach
• Unified Process and use of UML for Object-Oriented Analysis and Design

Unit - I 25%
System Analysis Fundamentals
Types of Systems, Role of the System Analyst, Systems Development Life Cycle, CASE Tools, Interviewing, Joint Application Development, Using Questionnaires
Analysis Modeling
Data Flow Approach, Developing Data Flow Diagrams, Logical and Physical Data Flow Diagrams, Data Dictionary, Creating Data Dictionary, Using Data Dictionary, Process Specifications, Structured English, Decision Tables, Decision Trees
No. of Lectures: 11

Unit - II 25%
System Design
Designing Effective Output, Output Design Objectives, Designing a Web Site, Form Design, Web Forms Design, Data Concepts, Normalization, Denormalization, Data Warehouses, Human-Computer Interaction, Types of Interfaces, Dialog Design, Designing Queries, Effective Coding, Effective Data Capture, Input Validation

Object Modeling Concepts
Introduction, Modeling as a design technique, Class Modeling-Object and Classes, Association, Generalization, aggregation, Abstract class, Multiple inheritance, Metadata, Reification, Constraints, Derived data, Packages, State Modeling- State, Transitions and

Conditions, State Diagrams, Nested state diagrams , Nested States, Signal Generalization, Concurrency

No. of Lectures: 10

Unit - III   25%
Object Oriented Analysis and Design
Process overview- Development stages, Development life cycle, System conception, Domain Analysis, Application Analysis, System Design, Class Design, Process summary

No. of Lectures: 11

Unit - IV   25%
Basic Structural Modeling
Classes, Relationships, Common Mechanisms, Diagrams, Class Diagrams
Behavioral Modeling
Interactions, Use Cases, Use Case Diagrams, Interaction Diagrams, Activity Diagrams

No. of Lectures: 10
Total No. of Lectures: 42

Reference Books :

1. Systems Analysis and Design by Kendall & Kendall, PHI Publication, 7th Edition.
2. Object-Oriented Modeling and Design with UML by Michael Blaha, James Rumbaugh, Pearson Education Publication, 2nd Edition.
3. The Unified Modeling Language - User Guide by Grady Booch, James Rumbaugh, Ivar Jacobson, Pearson Education Publication.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:

1. Draw Package Diagrams, Class Diagrams, Object Diagrams, and Composite Structure Diagrams.
2. Illustrate the application of generalization and specialization principles to discover super class/subclass relationships
3. Draw Class Diagram to demonstrate Class, Object, Method, Attribute and Class relationship.
4. Draw Package Diagrams with Understanding Aggregations, Composites, Composite Structure.
5. Draw Use Case diagram on the basis of given case study.
6. Draw State Transition diagram on the basis of given case study.
7. Draw Sequence Diagram based on given case study.
8. Draw Collaboration diagram based on given scenario.
9. Draw Activity Diagram based on given case study.
10. Modeling the Use-Case activities using Activity Diagrams

Subject   : Advanced Computer Networks
Subject Code : ITCC03

Objective:
This subject will teach the student about the concepts related computer networks. Students will learn to understand different routing algorithms and techniques. Students will learn architectures and protocols used in modern networked systems, such as the Internet itself, wireless and mobile networks, high performance networks and data center networks.

Learning Outcomes:
After studying this subject, student will be able to
- Identify the computer network topologies and its features.
- Understand routing algorithms and routing techniques.
- Analyze wireless LAN technologies
- Understand internet traffic and plan traffic engineering including IP over ATM and multimedia over internet
- Design of routing and transport layer protocols for advanced multi hop networks
- Design simulation and experiments to demonstrate the working of computer network protocols and algorithms.

Unit-I   25%
Basics of Computer Networks
Optical Networking: Introduction to Optical Networking, SONET / SDH Standard, DWDM
ATM: The WAN Protocol
Introducing ATM Technology, Introducing Faces of ATM, Explaining the basic concepts of ATM Networking, Exploring the B-ISDN reference model, explaining the Physical Layer
Explaining the ATM Layer, Explaining the ATM Adaptation Layer, Exploring ATM Physical interface
                                                            No. of Lectures: 11
Unit-II   25%
Packet Switching Protocols: Introduction, Virtual Circuit Packet Switching, Introduction to X.25, Switched multimegabit data service
Protocols and Interfaces in Upper Layers of TCP/IP: Introducing TCP/IP suite, Explaining Network Layer Protocols, Explaining Transport Layer Protocol, Explaining Application Layer Protocol
Routing in the Internet: Introduction to Intra-domain and inter-domain routings, Unicast Routing Protocols, Multicast Routing Protocols
                                                            No. of Lectures: 10
Unit-III   25%
Other Routing Techniques: Introduction to traffic Engineering, IP over ATM, Multiprotocol Label Switching, Storage Area Network
Network Management and Services: Introduction to Network Management, Standard Network Management Protocol
                                                            No. of Lectures: 11
Unit-IV   25%
Traffic Engineering Basics

Introduction to traffic Engineering, Requirement Definition for Traffic Engineering, Traffic sizing, Traffic CharacteristicsProtocols, Time and Delay Consideration, ConnectivityAvailability, Reliability, and MaintainabilityThroughput Calculation

Multimedia over Internet
Introduction to Multimedia Services
Explaining Transmission of Multimedia over the Internet
Explaining IP Multicasting
Explaining VOIP

No. of Lectures: 10
Total No. of Lectures: 42

Test Books:
1. Advance Computer Network, By DayanandAmbawade, Dr. Deven shah, Prof. Mahendra Mehra, Wiley India
2. CCNA Intro – Study Guide – Todd Lammle, Sybex

Reference Books:
1. High-Speed Networks and Internets, Performance and Quality of Service, Second Edition, William Stallings, Pearson
2. TCP/IP Protocol Suite by Behrouz A. Forouzan
3. Computer Networks, Andrew Tanenbaum, 5th Edition, Pearson Education.

List of Open Source Software/learning website:
1. www.isi.edu/nsnam/ns
2. https://www.wireshark.org

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme				
			Internal	External			
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	Total Marks	
3	2	4	30	70	50	150	

Practical list

1. What are SONET / SDH networks?Explain in details
2. Study ATM in detail and prepare presentation on ATM PROTOCOL REFERENCE MODEL
3. Do detailed study and write a noteabout IPV4 addresses.
4. Introduction and installation of Network Simulator (NS-2.30)
5. To study about simple TCL example in NS2.
6. Calculate & plot the graph of throughput for simple.tcl by using NS2 (AWK script).
7. To study about TCP Flavors and their comparison in NS2.
8. To create wireless topology for Five nodes using NS2.
9. To create wired cum wireless topology using NS2.
10. What is VoIP? Explain how VoIP works?

Subject   : Web Content Management Systems
Subject Code : ITCC04

Objective:
Students will learn basics of three most popular content management systems. Students will learn to create and deploy website using WordPress, Joomla and Drupal. CMSes are designed for multiple users with different permission levels to manage (all or a section of) content, data or information of a website project, or internet / intranet application. Managing content refers to creating, editing, archiving, publishing, collaborating on, reporting, distributing website content, data and information

Learning Outcomes:
After studying this subject, student will be able to
- Introduce learners to the three most popular open source content management systems (CMS) in use on the web today, including WordPress, Drupal, and Joomla.
- Understand the difference between a CMS website, a static website, and websites using other server-side technologies.
- Compare and contrast the three most popular open source CMS.
- Create and deploy websites using CMS, including creating and editing content, adding functionality, and creating custom templates and themes.
- Understand ongoing maintenance considerations with CMS websites.

Unit - I   25%
Basics of PHP: What is PHP, Insert PHP into a web page.PHP Advance Function, Passing information with PHP, PHP with MySQL connection
Understanding of Content Management System, Overview of Different open source content management systems
No. of Lectures: 10
Unit - II   25%
Introduction to Joomla
Installing Joomla, Exploring the Admin Interface, Content creation using the CAM model
Content customization: images, video, audio, tags, formats, etc.Adding and displaying menus
Linking menus to articles and other features
Finding and adding Joomla extensions, Creating customized Joomla templates, Modifying Joomla CSS and HTML parameters, Tweaking the Joomla backend
User management and permissions
No. of Lectures: 11

Unit - III   25%
Introduction to WordPress: WordPress.org vs. WordPress.com, Installing WordPress, Exploring the admin interface, Content creation: Posts vs. pages, Content customization: images, video, audio, tags, formats, etc
Extending WordPress: Learn about working with plug-ins and widgets, including identifying a good plug-in or widget, installing, and configuring them
WordPress Theming: Creating customized WordPress themes, Modifying WordPress CSS and HTML parameters
No. of Lectures: 10

Unit - IV   **25%**

Introduction to Drupal : Installing Drupal, The Admin Interface, Creating Content, Managing Content, Site Building, Site Configuration, How to add Multiple menu and manage it.
User Management, Roles, Permissions , Creating User Accounts , Reports
Layout in Drupal Blocks and Regions, Default blocks, Custom Blocks, How To Add New Block Configuring Blocks, Enable Default Blocks and Controlling the Front page
How To Add New Menu and manage it, How To Add Content Type and manage it,How To Add Seo friendly URL, How To Use Site Blog

No. of Lectures: 11
Total No. of Lectures: 42

Reference Books:
- Professional WordPress: Design and Development by Brad Williams, David Damstra, Hal Stern
- A Beginner's Guide to WordPress Theme Development: By Alex Denning
- THE COMPLETE BEGINNERS GUIDE TO JOOMLA by taty sena
- Beginning Drupal 7 by Todd Tomlinson

List of learning website:
- http://www.tutorialspoint.com/wordpress/wordpress_tutorial.pdf
- https://www.tutorialspoint.com/joomla/joomla_tutorial.pdf

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:
1. Create simple PHP application to Insert, update and Delete records from MySQL database.
2. Create PHP application to retrieve records from MySQL
3. Sample programs and website development using WordPress
4. Sample programs and Sample website development using Joomla
5. Sample programs and Sample website development using Drupal

Subject   :   Project - I
Subject Code :   ITCC05

Objective:
This is aimed to apply the learned concepts, procedures and tools to architect or build an application to develop the skill of application development using acquired knowledge. The students should be motivated to develop the model of application nearer to real life applications and present their work during the evaluation of the projects by the examiners.

Learning Outcomes:
Students will be able to develop procedures, functions and triggers at the back-end and use them in them the application. Students will also learn to prepare technical design document should also be included typically with ER-Diagram, and architecture diagram.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
0	4	2	30	0	70	100

Students will develop database application using any RDBMS as back-end and front-end of their choice.

Here the emphasis will be given to the database design, front-end proto-type, functionality and testing procedures for the selected application.

Students will design database as per normalization rules, and also create primary keys, foreign keys, constraints and necessary indices. All the tables should be populated with enough number of records to test functionality and show case the application features and reports

Usage of procedures, functions and triggers at back-end is desired.

Working application with enough of records created should be demonstrated.

Project report should be prepared specifying requirement specifications and testing details in line with the requirement specifications. Technical design document should also be included typically with ER-Diagram, and architecture diagram.

Subject   :   Cyber Security
Subject Code :   UEC02

Objective:
- To understand the major concepts of Cyber Security and Forensics and to create the awareness through simple practical tips and tricks and to educate the students to learn how to avoid becoming victims of cyber crimes.
- The subject and the course content will help to the student who wish to take up cyber forensics as career as well as those who want to seek careers in cyber security.
- To gain experience of doing independent study and research in the field of cyber security and cyber forensics.

Learning Outcomes:
After learning the course the students should be able to: student should understand cyber-attack, types of cybercrimes, cyber laws and also how to protect them self and ultimately society from such attacks

Unit - I   **50%**
Introduction to Computer and Cyber Security
Types of Threats:
        Malware, Viruses, Trojan Horses, Spyware
        Compromising System Security
        Denial of Service Attacks
        Web Attacks
        Session Hijacking
        DNS Poisoning
Basic Security Terminology
        Hacker Slang
        Professional Terms
Online Security Resources
        CERT
        Microsoft Security Advisor
        F-Security
        SANS Institute
Networks and the Internet
        How the Internet works
            IP Addresses
            CIDR
            Uniform Resource Locators
        Basic Network Utilities
            IPConfig
            Ping
            Tracert
Cyber Stalking, Fraud, and Abuse
Industrial Espionage in Cyberspace
Cryptography Basics
Computer Security Software
        Virus Scanners

           Firewalls
           Antispyware
           Intrusion-Detection Software
Website Security
Email
Mobile Devices
Employees
Facility Security
Operational Security
Payment Cards
Incident Response and Reporting

No. of Lectures: 14

Unit - II   **50%**
Cyber Security Best Practices
Governance and Risk Management
        Governance Framework
        Management Involvement
Best Practice Recommendations for Small and Medium companies
Personnel Screening and the Insider Threat
Physical and Environmental Security
Cyber Security Awareness and Training
Assessing Threats and Vulnerabilities
Network Security
        Wireless Network Security
        Remote Access
Information System Protection
        Bring Your Own Device
        Backup and Recovery
User Account Management and Access Control
Asset Management
Incident Response
Information Sharing and Breach Reporting
        Privacy Breach Notification
        Information Sharing
Vendor Risk Management
        Cloud Computing
Security Policies

Cyber Law of India

Introduction, Categorization of Cybercrimes
Technical aspects of cybercrimes: Unauthorized access & Hacking, Trojan Attack, Virus and Worm attack, E-mail & IRC related crimes, Denial of Service attacks, Pornography, Forgery, IPR Violations, Cyber Terrorism, Banking/Credit card Related crimes, E-commerce/ Investment Frauds, Sale of illegal articles, Online gambling, Defamation, Pedophiles, Identity Theft, Data diddling, Theft of Internet Hours, Theft of computer system (Hardware), Physically damaging a computer system, Breach of Privacy and Confidentiality.

No. of Lectures: 14
Total No. of Lectures: 28

Reference Books :

1. Computer Security Fundamentals, by Chuck Easttom, Pearson Education
2. Anti-Hacker Tool Kit (Indian Edition) by Mike Shema, Publication Mc Graw Hill.
3. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Nina Godbole and Sunit Belpure, Publication Wiley

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			Total Marks
			Internal	External		
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
2	0	2	15	35	0	50

Subject : **Enterprise Resource Planning**
Subject Code : **ITCC06**

Objective:
This subject will teach the student about the concepts related to Enterprise Resource Planning software. The processes and practices in business and their applications are taught in subject. Many important aspects related to ERP like the Best Practices, Functional Modules, ERP vendors, implementation life cycle and ERP Package Evaluation and selection are taught to students in this subject. This helps student in designing computerized business applications with better understanding.

Learning Outcomes:
After studying this subject, student will be able to
 * Understand the conceptual model of ERP, the Evolution of ERP and Structure of ERP.
 * Understand the Best Practices in ERP.
 * Know about important ERP vendors like SAP, Peoplesoft, Baan, J.D. Edwards etc.
 * Understand the Basic Functional Modules in ERP.
 * Understand the ERP Implementation Life cycle.
 * Understand ERP Package Evaluation and Selection.

Unit - I 25%
 * Introduction to ERP
   ERP Concept, Reasons for the growth of the ERP Market
 * Evolution of ERP
   Conceptual Model of ERP, The Evolution of ERP
   The Structure of ERP
     Two-tier Architecture, Three-tier Architecture, Architecture Overview of SAP R/3 ERP, Architecture Overview of Baan's ERP
 * The Best Practices in ERP
   o The Concept of Best Practice
   o Style of Manufacturing
     ▪ Manufacturing Industries, Project Industries, Service Industries
   o Demand Management
     ▪ Introduction to S&OP
   o Organization Structure and Elements
   o Activity Based Costing (ABC)
     ▪ Basic ABC Principles
     ▪ Elements of ABC
   o Costing Methods

No. of Lectures: 11

Unit - II   **25%**
- ERP Vendor Analysis
    - Introduction to Major ERP Vendors and their flagship product
        - SAP, Oracle, PeopleSoft, Baan, J.D. Edwards, Ramco , QAD
    - Domain Expertise
        - Baan Manufacturing
- Basic Functional Modules in ERP
    - Manufacturing, Distribution, Financial, Item Control Module, BoM Module, Financial Accounting Module, Master Production Scheduling Module, MRP Module, CRP Module, Purchase Control Module

No. of Lectures: 11

Unit - III   **25%**
- ERP Implementation
    Implementation Approach, Elements of Implementation Methodology
- Making ERP a Success
    The Indian Scenario, ERP "AS IS", Customization, Prerequisites of ERP, Five Elements for Making ERP Success
- ERP and Related Technologies
    Business Process Re-engineering, Data Warehousing, Data Mining, OLAP, Product Lifecycle Management, Supply Chain Management, Customer Relationship Management, Geographical Information Systems, Intranets and Extranets

No. of Lectures: 12

Unit - IV   **25%**
- ERP Implementation Life Cycle
    Objectives of ERP Implementation, Different Phases of ERP Implementation, Why do many ERP Implementations Fail
- ERP Package Evaluation and Selection
- Post Implementation: Maintenance of ERP- Organizational and Industrial impact; Success and Failure factors of and ERP Implementation.
- ERP and Business analytics, Future trends in ERP systems-web enabled, Wireless technologies, cloud computing.

No. of Lectures: 08
Total No. of Lectures: 42

Reference Books:
1. Enterprise wide Resource Planning – Theory and Practice by Rahul V Altekar,PHI
2. Enterprise Resource Planning , second edition by Alexis Leon, Tata McGraw Hill

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:

1. List out the modules available in SAP and describe in detail the production planning module.
2. List down modules which are available in Oracle Apps and explain in detail the Oracle Financial Module.
3. Explain in detail Financial Accounting module in SAP R/3.
4. List down the modules available in PeopleSoft ERP and explain in detail the HRM module.
5. List down the modules available in Ramco ERP and explain in detail the Production module of Ramco.
6. Enlist the 5 primary products in Microsoft Dynamics ERP family. Explain in brief about Microsoft Dynamics CRM.
7. Which are the main modules in Sage ERP X3. Which are the main features in Inventory Management modules of Sage ERP X3.
8. What is the BAAN ERP called now? In which two modules Baan ERP was very strong ? Briefly describe the "Manufacturing module" in Infor10 ERP Enterprise (LN) ERP.
9. List any 10 ERP software products which are available as Open Source ERP softwares. Explain in brief the features of any one of the Open ERP.
10. Briefly mention the features of "Manufacturing" and "Warehouse Management" Modules of OpenPro ERP.
11. Explain the following functional modules of BAAN ERP in brief – BOM, Routing, MPS, MRP, CRP, Shop floor control.
12. Explain in brief about MFGPro ERP and explain in detail about "Manufacturing" module in MFGPro ERP.
13. Explain the main features of "Agresso Business world" ERP suite. Which are the main modules available in Agresso Business world ERP solution.
14. What is a ledger ? What is trail balance ? What is profit and loss account and also its main contents. What is a balance sheet and its main contents.

Subject   :   Advanced Data Structures and Algorithms
Subject Code :   ITCC07

Objective:

Data structures refer to the way we organize information on our computer. With a slight thinking, you can guess that the way we organize information can have a lot of impact on the performance. The study of data structure is an essential part of computer science. Data structure is a logical & mathematical model of storing & organizing data in a particular way in a computer. In system programming application programming the methods & techniques of data structures are widely used. The study of data structure helps the students in developing logic & structured programs.

Learning Outcomes:

Students will be able to-
- Differentiate between different data structure
- To apply the different Searching and Sorting techniques.
- To understand Stack ,Linked List and Trees
- To understand implementation of Queue and Graph
- To understand importance of Hashing and Indexing.

Unit - I   **25 %**
Introduction:
Algorithms: Concept of Algorithm, Characteristics, Notation, Analysis of Algorithms, Time Analysis, Recursion and backtracking –Introduction and example
Data structure: Basic Terminology, Elementary Data Organization, Linear Data Structure-Overview of Array, Link list, Stack and Queue, Data Structure operations
                                                                              No. of Lectures: 10
Unit - II   **25%**
Trees: Basic terminology, Binary Trees, Traversal of Binary Tree, Sequential and Linked Implementation of Binary Trees, Huffman algorithm.
Binary Search Trees: Ordered Lists and Implementations, Tree Search, Insertion and Deletion in BST, Tree Sort, Balanced Binary Tree-Balancing AVL Tree, Insert and Deletion to/from AVL Tree, Threaded Binary Tree.
                                                                              No. of Lectures: 11

Unit - III   **25%**

Searching: Sequential search, binary search, comparison and analysis,
Hashing: Sparse Table, Hash Function, Collision Resolution Strategies
Sorting: Insertion Sort, Selection Sort, Bubble Sorting, Quick Sort, Merge Sort, Heap Sort, Sorting on Different Keys, Practical consideration for Internal Sorting

No. of Lectures: 10

Unit - IV   **25 %**
Graphs: Basic Concept and Definitions, Sequential Representations of Graphs, Adjacency List, Graph Traversal- Breadth-First Search and Breadth- Breadth Search, Minimum Cost Spanning Trees, Kruskal's Algorithm, Dijkstra's Algorithm
File Structures: Goal, Basic Concepts of Files and File System, File Organization – Sequential File, inverted file, Index –Sequential Files. B+ Tree as Secondary index,

No. of Lectures: 11
Total No. of Lectures: 42

Reference Books:

1. "Fundamentals of data Structures", Horowitz and Sahani, ,Galgotia Publication Pvt. Ltd., New Delhi.
2. "Data Structures and Program Design in C", R. Kruse etal, ,Pearson Education Asia, Delhi-2002
3. "Mastering Algorithms with C", K Loudon, Shroff Publisher & Distributors Pvt. Ltd.
4. "Data Structures and Algorithms in C++", Adam Drozdek, ,Thomson Asia Pvt.   Ltd.
5. " Data structure through C", Yashavant Kanetkar, BPB publications
6. "Expert data structure with C", R.B. Patel, Third Edition
7. "M. Tenenbaum, "Data Structures using C & C++", Prentice-Hall of India Pvt. Ltd., New Delhi.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List

Write Programs in C or C++ for following.

1. Programs to learn use of recursion.

2. Implementation of single and multidimensional array operations

3. Implementation of Sorting Algorithms.

4. Implementation of Stack, Queue and Linked List.

5. Implementation of Tree Structures, Binary Tree, Tree Traversal,

6. Implementation of Binary Search Tree, Insertion and Deletion in BST.

7. Implementation of Searching algorithms.

8. Implementation of Graph

9. Implementation, BFS, DFS.

10. Implementation of Min. cost spanning tree.

Kadi Sarva Vishwavidyalaya
M.Sc. (IT) Semester – II (First Year)

Subject   :   Linux Systems and Network Administration
Subject Code :   ITCC08

Objective:
This Subject provides introductory coverage of Linux Network Administration. Introducing Linux; exploring the desktop; using the shell; understanding users and file systems; understanding text processing; managing processes; using network clients; installing Linux; understanding system initialization; Managing software packages and file systems; managing users; configuring networks; system and kernel management; writing Shell scripts; and advanced topics and troubleshooting. The subject requires many hands-on practices and projects, which allow students to practice what they learn.

Learning Outcomes:

After successful completion of this subject students will be able to:
- Describe how Linux was created and how it compares to other operating systems
- Outline the skills required and challenges facing a system administrator
- Distinguish between the graphical system used by Linux and command line
- Manipulate variables in the shell to control the working environment
- Formulate data at the command-line and for print files
- Manipulate text using the vi editor
- Create and manage user and group accounts
- Construct access permissions on files and directories
- Demonstrate how to log in to a Linux system over a network connection. Describe how it is different from a Windows network connection
- Select the appropriate command-line tools for common network services such as FTP and the Web
- Illustrate the difference between network interfaces using command-line and graphical utilities
- Apply the skill necessary to set up simple DHCP server and manage networked printing services.
- Design a hard disk space on hold a new Linux installation
- Describe the steps that hardware starts a standard PC operating system

Unit-I   **25%**

- **Linux Basics & Shell Programming**
Introduction to Operating System, Kernel and Unix Architecture, Shell Commands & Practice, Text Editors – vi, Linux File System Navigation and Using Shell Commands & Scripts
Advanced Shell Commands (grep, awk, expr, chmod, chownetc)

- **Shell Scripting**
Shell Variables, Setting the PATH Environment Variable, Decision Control Statements, Looping Statements, Shell Functions, Regular Expressions

No. of Lectures: 11
Unit-II   **25%**

- **Linux File System**

File system and File system hierarchy standard

Root Directory :System Directories /usr, /media, /mnt, /home, /var, / proc

Mounting file systems Automatically :(/etc/fstab) and manually : mount and Umount

- **Linux System Configuration**

System Services, Files, Directories & Permission-Ownership, Managing Users and Groups, Techniques for Backup and Recovery, Scheduling tasks :cron

No. of Lectures: 10

Unit-III   **25%**

- **Linux Basic Networking and Troubleshooting**

Checking Connectivity, Gateway / Route, Creating & Configuring Ethernet, Configure Ethernet for DHCP Network, Network configuration : system-config-network, Interface configuration scripts : /etc/sysconfig/network-scripts, Network Clients (ssh, telnet, ftp, scp, rsync, wget, yum, CPAN)

No. of Lectures: 11

Unit-IV   **25%**

- **Linux Server Configuration & Administration**

Package Management: rpm, yum, wget, CPAN

Servers: Apache the Web server (httpd), Samba Installation Configuration, FTP Server, Mail Server

No. of Lectures: 10
Total No. of Lectures: 42

Reference Books :
1. The Complete Reference : Fedora 7 and Red Hat Enterprise Linux ,Richard Petersen ,The McGraw Hill.
2. Linux Complete, Sybex BPB Publication
3. UNIX – Concepts & Application, Sumitabha Das, BPB Publication

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List

Assignment 1

1. Installation of Unix/Linux operating system.
2. Study of Unix/Linux general purpose utility command list obtained from (man, who,   cat, cd, cp, ps, ls, mv, rm, mkdir, rmdir, echo, more, date, time, kill, history, chmod, chown, finger, pwd, cal, logout, shutdown) commands.
3. List the commands you can use to perform these operations:
   a. Make your home directory the working directory
   b. Identify the working directory
4. Which command can you use to look at the first few lines of a file named test.txt? Which command can you use to look at the end of the file?

Assignment 2 [Shell Scripts/Programming]

1. Write shell script to determine whether given file exist or not, file name is supplied as command line argument, also check for sufficient number of command line argument
2. Suppose we have a phone-file with names and phone numbers. Write a shell script which gives us an option to insert, delete or update a line in the phone-file. However, at the end of the operation it always sorts the file on first names.
3. Write an program to demonstrate AWKcommand
4. Shell script program for file navigation

Assignment 3[Linux Services and Scheduling]

1. How can I enable Linux to automatically restart applications that are running when I use Shutdown or Logout?
2. Troubleshooting on Server Startup/Grub
3. Configure a Linux Services in different Runlevel and demonstrate
4. Configure services in Runlevel and demonstrate chkconfig command
5. Change Run Level of System to 3 by default
6. Setup a cron job to print memory status in file on first day of every month. (hint : cat /proc/meminfo>> /home/guest/meminfo)
7. Setup a cron job to echo Study Linux every 30 minutes, Monday to Friday.
8. Setup a cron job to echo Study Linux every hour on Saturday and Sunday.
9. Setup a script that displays the date and then a list of everyone who is logged on. Run your script and make sure that it works. Setup cron to run the script you created on the first day of every month at 08:02.
10. Setup a script called backup that echoes the message "You should backup now". Run your script and make sure that it works. Setup cron to run the script you created in question two the first day of every month at 07:17.
11. Demonstrate crontab -r and crontab -l
12. Setup a cron job to take backup of guest home on the first day January of every year at 4:10AM

13. When you are sure that this is working correctly, store the output from crontab -l in the file cronlist.
14. Setup a cron job to say(echo) "Good Morning" and "Good Evening" Monday to Friday (use system time to decide what message to print)

Assignment 4 : [Root/User Accounts, Groups and Permissions]

1. Create/Delete a user account and grant the privilegeof group
2. Find all the files whos name is test.txt and owned by a group called "rootuser"
3. Study and Implement change ownership and group or file and folder and check
4. Implement : Create a new group for read and write access to files that need to be accessed by several users

Assignment 5 : [Linux Networking]

Study and Implements the following Linux Networking Commands
ping, ftp , ssh, telnet, finger, traceroute, host scp, rsync

Assignment 6[Software/Package Management]
Study and Implements the following : rpm, yum, wget, cpan

Elective I
Subject   :   Advanced .Net Technologies
Subject Code :   ITEC01 (A)

Objective:
The .NET has become a platform of choice for the development of web based data driven pages among webpage developer community due to its potential and strong features available to develop virtually all kind of dynamic web sites. Students will be able to use ASP.NET platform for developing web based application with database support. Aim of this subject is to enable students to develop dynamic and data driven web applications utilizing the power of .NET Technology.

Learning Outcomes:
After studying this subject, student will be able to
- Acquire a working knowledge of creating and rich internet Web application using the .NET Framework 4.5 and Visual Studio 2012.
- Learn how to implement web applications using web forms, including programs that interact with databases.
- Explain how to manage state in an ASP.NET application.
- Identify and handle ASP.NET errors.
- Develop Simple Web form using various standard controls and implement the concept of master page
- Work with data from databases using Language Integrated Query (LINQ) and the Entity Framework (EF).
- Configure and deploy a Microsoft ASP.NET Web application
- Learn to manage data access tasks by using LINQ.
- Learn to create a Microsoft ASP.NET AJAX application.

Unit-I   **25%**
Overview of Asp.net
ASP.NET Architecture and framework
Basics of C# Variables, comments, Control structure, Types, Namespace, objects
Developing Asp.Net Web applications, Validation Controls
         Required Field Validator Control, Regular Expression Validator Control, Compare Field
         Validator Control, Range Validator Control, Validation Summary Control, Custom Validator
         Control, Summary
Creating a Layout Using Master Pages and Themes
          Accessing a Master Page from Code, Nesting Master Pages
                                                                                           No. of Lectures: 10
Unit-II   **25%**
Working with Data
ADO.NET fundamentals
ADO.NET Architecture, ADO.NET Objects, DataSet&DataTable Features,
Data Access Controls :Data Binding Server Controls, SqlDataSource, ObjectDataSource,
AccessDataSource, GridView, DetailsView, Data List and Repeater
Multitier Architecture in ASP.NET
3-tier overview: User Interface Layer, Business Logic Layer, Data Access Layer
                                                                                           No. of Lectures: 11

Unit-III   **25%**

ASP.NET AJAX & JQuery

AJAX Architecture

      AJAX.NET Controls : Accordion, Calendar, CascadingDropDown, CollapsiblePanelFilteredTextBox, NumericUpDown, ModalPopup, PopupControl,

jQuer: Introduction to jQuery, jQuery effects, jQuery html, jQueryajax

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No. of Lectures: 10

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Unit-IV   **25%**

LINQ Overview

Introduction of LINQ : LINQ Queries , Standard Query operators, LINQ to ADO.NET,   Lambda Expressions, LINQ to XML

Entity Framework: Understanding ADO.NET Entity Framework, EntityDataSource Control, LINQ to Entities

Deploying ASP.NET Applications

<div align="right">

No. of Lectures: 11
Total No. of Lectures: 42

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Text Books:
- Beginning ASP. NET 4.5 in C#, MacDonald, Matthew. Apress, 2012.
- ASP .NET Bible, Mridula, Parihar, and A. Essam. New York, NY: Hungry Minds (2002).
- ASP. Net 4 Unleashed, Walther, Stephen, Pearson Education India, 2012
- ASP. NET: the complete reference, MacDonald, Matthew. Osborne/McGraw-Hill, 2002

E-Learning
- https://www.tutorialspoint.com/asp.net/asp.net_pdf_version.htm
- http://www.w3schools.com/asp/

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:

1. Create an application to demonstrate the use of different ASP.NET Server controls.
2. Write c# programs to demonstrate different validation controls
3. Create a web page using the concept of cascading style sheets in ASP.NET
4. Create a web page using the concept of Master page & Theme in ASP.NET
5. Develop a web page to implement the concept of state management using Cookies, ViewState and QueryString.
6. Develop a web page to implement the concept of state management using Session and Application
7. Write sample application to connect to database (connection Object), Fetching and inserting data from database (command Object) and using Data Reader
8. Create a web page to insert user information with all validations in to the database
9. Create a webpage to bind the user data from database into a grid view dynamically.
10. Create an asp.net application to bind data from database to different data bind controls
11. Create and Implement 3-Tier Architecture in ASP.Net
12. Demonstration of integrate AJAXControlToolkit in asp.net website.
13. Write asp.net applications to show the use of different Ajax controls
14. Write different program of JQuery
15. Practical demonstration on how to deploy an asp.net application
16. Different programs to demonstrate how the LINQ framework is used to data access and manipulation from a data sources.
17. Different applications for Creating Entity Framework Data Model

Elective I
Subject   :   Advanced Java
Subject Code :   ITEC01 (B)

Objective:
The objective of this course to teach the concept of J2EE so they can easily development the application using Servlet, JSP , JDBC and other concept. Subject provides the ability to design console based, GUI based and web based applications. Students will also be able to understand integrated development environment to create, debug and run multi-tier and enterprise-level applications .Instructions will be given in a laboratory setting with continuous hands-on implementation of concepts and emphasis on developing application in Advanced Java Programming

Learning Outcomes:
Students will be able to develop the database driven enterprise application using the concept of Advanced Java Programming. Web development Techniques helps them for web application building.

Unit - I   25%
Introduction to Java, Classes and Inheritance, Packages and Interfaces, Exception handling, Multithreaded programming, I/O and Applets, Event Handling, Abstract Window Toolkit
Database Programming using JDBC **:** Introduction to JDBC,JDBC Drivers & Architecture, CURD operation Using JDBC, Connecting to non-conventional Databases.
                                                                            No. of Lectures: 11

Unit - II   25%
J2EE – Understanding, exploring and Applications Development
Servlets - configure TOMCAT; directory structure for a web pplication, Servlet API Overview,
Writing and running Simple Servlet, Servlet Life Cycle GenericServlet & HttpServlet, ServletConfig & ServletContext, Writing servlet to Handle Get and Post Methods, Reading user request data, Servlet & Databases
                                                                            No. of Lectures: 10
Unit - III   25%
JSP: JSP Directives, Writing simple JSP page, Using JSP tags, Declaration tag, Expression tag , Directive tag, Scriplet tag, Action tag, JSP & Java Beans, Managing Sessions using JSP , JSP with Databases
                                                                            No. of Lectures: 11
Unit - IV   25%
JSTL - JSTL Library, Core, XML Processing, formatting, Database access, Functions
Custom Tag : Tag handler classes, Tag library descriptor files, The JSP taglib directive, Simple tags - Examples

Introduction to Struts: Introduction to Struts, Web Application Framework, MVC architecture; ActionServlet, Action Form, Action Mapping, Action classes, Writing and running Simple application
                                                                            No. of Lectures: 10
                                                                            Total No. of Lectures: 42

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	Total Marks
3	4	5	30	70	50	150

Text Books:

1. Java 6 Programming, Black Book, dreamtech
2. Java Server Programming, Java EE6 (J2EE 1.6), Black Book, dreamtech
3. Java Programming Advance Topics, Joe Wigglesworth and Paula McMillan, Cengage Learning

Reference Books:

1. Professional Java Server Programming, a! Apress
2. Core Java, Volume II – Advanced Features, Eight Edition, Pearson
3. Unleashed Java 2 Platform, Sams Techmedia
4. The Complete Reference J2EE, Keogh, McGrawHill
5. Java EE 5 for beginners, Bayross and Shah, SPD
6. JDBC 3 Java Database Connectivity, Bernand Van Haecke, Wiley-dreamtech
7. Java Server Pages for Beginners, Bayross and Shah, SPD
8. Java Servlet Programming, Jason Hunter, SPD (O'Reilly)

Practical List

1. Write a Java Program to sort the elements of an array in ascending order.

2. Write a Java Program which will read a text and count all occurrences of a particular word.

3. Write a java program which shows the use of static members.

4. Write a java program which explains the concept of single inheritance.

5. Write a java program handle the Exception using try and multiple catch block.

6. Write a java program which shows the application of constructors.

7. Write a java program which show the method overriding.

8. Write a java program which implement interface.

9. Write a java program which implements multiple interface.

10. Write a program to demonstrate Multi-threading using Thread Class.

11. Write a program to basic calculator using Applet and Event Handling.

12. Develop simple Servlet which shows "Hello" on web browser

13. Develop HTML Page through which user can insert First Name, Last Name and Middle Name and the complete full name is shown in next servlet page

14. Develop simple Servlet Question Answer Application

15. Develop HTML Page through which user can insert two different values and all the following operations are perform using servlet. (Addition, Multiplication, Subtraction, Division)

16. Assume there is a student database in MYSQL with the following fields: Student enrollment Number, Student Name, Program, Address, School of Study. Write a code for Servlet which will display all the fields of the student database in the tabular manner

17. Develop an application/s to demonstrate all the core tags available in JSP (Declaration, Expression, Directive and Scriptlet Tag)

18. Develop a JSP Application to accept Details from user and store it into the database table

19. Develop a JSP Application to Authenticate User login as per registration details. If login success the forward user to Index Page otherwise show login failure Message

20. Write a web based student registration application where students can register online with their enrolment number. The registered students should be able to log on to the site after getting registered. You are required to use JSP, Servlet and JDBC

21. Develop a Rooms Reservation System Application Using Java Beans

Elective I
Subject   :   Python Programming
Subject Code :   ITEC01 (C)

Objective:

Python is a modern language useful for writing compact codes specifically for programming in the area of Server side Web development, Data Analytics, AI and scientific computing as well as production tools and game programming. This course covers the basics and advanced Python programming to harness its potential for modern computing requirements.

Learning Outcomes:

After learning the course, the student will be able:

- To develop proficiency in creating based applications using the Python Programming Language.
- To be able to understand the various data structures available in Python programming language and apply them in solving computational problems.
- To be able to do testing and debugging of code written in Python.
- To be able to draw various kinds of plots using PyLab.
- To be able to do text filtering with regular expressions in Python
- To be able to create socket applications in Python
- To be able to create GUI applications in Python

Unit - I   **25%**

Introduction to Python : The basic elements of python,   Branching Programs,   Control Structures, Strings and Input
Functions, Scoping and Abstraction : Functions and scoping, Specifications, Recursion, Global variables, Modules, Files, System Functions and Parameters
Structured Types, Mutability and Higher-Order Functions : Strings, Tuples, Lists and Dictionaries, Lists and Mutability, Functions as Objects

No. of Lectures: - 10

Unit - II   **25%**
Working with Data : A detailed tour of how to represent and work with data in Python. Covers tuples, lists, dictionaries, and sets
Testing and Debugging
Testing : Black-Box Testing, Glass-Box Testing, Conducting Tests
Debugging : Learning to Debug, Designing the Experiment, When the Going Gets Tough, And When You Have Found "The" Bug

No. of Lectures: - 11

Unit - III   **25%**
Exceptions and Assertions : Handling Exceptions, Exceptions as a Control Flow Mechanism, Assertions

Classes and Objects: An introduction to object-oriented programming in Python. Describes how to create new objects, overload operators, and utilize Python special methods. Also covers basic principles of object oriented programming including inheritance and composition.

No. of Lectures: - 10

Unit - IV   **25%**
Iterators and Generators : Covers the iteration protocol, Iterable objects, generators and generator expressions. A major focus of this section concerns the use of generators to set up data processing pipelines--a particularly effective technique for addressing a wide variety of common systems programming problems (e.g., processing large data files, handling infinite data streams, etc.).
Algorithms and Data Structures
Search Algorithms : Linear Search and Using Indirection to Access Elements, Binary Search and Exploiting Assumptions
Sorting Algorithms : Merge Sort, Exploiting Functions as Parameters, Sorting in Python, Hash Tables

No. of Lectures: - 11
Total No. of Lectures: - 42

Reference Books:
1. John V Guttag. "Introduction to Computation and Programming Using Python", Prentice Hall of India
2. R. Nageswara Rao, "Core Python Programming", dreamtech
3. Wesley J. Chun. "Core Python Programming - Second Edition", Prentice Hall

References:
1. Michael T. Goodrich, Roberto Tamassia, Michael H. Goldwasser, "Data Structures and Algorithms in Pyhon", Wiley
2. Kenneth A. Lambert, "Fundamentals of Python – First Programs", CENGAGE Publication
3. Luke Sneeringer, "Professional Python", Wrox
4. "Hacking Secret Ciphers with Python", Al Sweigart, URL- https://inventwithpython.com/hacking/chapters
5. **List of Open Source Software/learning website:**
   o Turtle - https://docs.python.org/2/library/turtle.html
   o PyLab - https://scipy.github.io/old-wiki/pages/PyLab

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:

1. Develop programs to understand the control structures of python
2. Develop programs to learn different types of structures (list, dictionary, tuples) in python
3. Develop programs to learn concept of functions scoping, recursion and list mutability.
4. Develop programs to understand working of exception handling and assertions.
5. Develop programs for data structure algorithms using python – searching, sorting and hash tables.
6. Develop programs to learn regular expressions using python.
7. Develop chat room application using multithreading.
8. Learn to plot different types of graphs using PyPlot.
9. Implement classical ciphers using python.
10. Draw graphics using Turtle.
11. Develop programs to learn GUI programming using Tkinter.

Subject   :   Project - II
Subject Code :   ITCC09

Objective:
This is aimed to apply the learned concepts, tools to architect or build an application to develop the skill of application development using acquired knowledge. The students should be motivated to develop the model nearer to real life applications and present their work during the evaluation of the projects by the examiners.

Learning Outcomes:

Students will also learn to prepare technical design document should also be included typically with ER-Diagram, and architecture diagram.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
0	4	2	30	0	70	100

Here the emphasis will be given to the Study, Analysis, Design and Documentation for the selected application.

Students will design database as per normalization rules, and also create primary keys, foreign keys, constraints and necessary indices. All the tables should be populated with enough number of records to test functionality and show case the application features and reports

Project report should be prepared specifying requirement specifications and testing details in line with the requirement specifications. Technical design document should also be included typically with ER-Diagram, and architecture diagram.

Subject **:** **Data Science and Big Data Analytics**
Subject Code : **ITCC10**

Objectives:
The Data Science and Big Data Analytics course educates students to a foundation level on big data and the state of the practice of analytics. The course provides an introduction to big data and a Data Analytics Lifecycle to address business challenges that leverage big data. It provides grounding in basic and advanced analytic methods and an introduction to big data analytics technology and tools, including MapReduce and Hadoop.

Learning Outcomes:
Upon completing the course:
- Students will have the knowledge and practical experience to participate effectively in big data and other analytics projects.
- Students will be able to define big data and the business drivers for advanced big data analytics
- Students will be able to Describe why and how Data Science is different to traditional Business Intelligence.
- Students will be able to Explain the phases and activities of the data analytics lifecycle and identify the main activities and deliverables.

Unit - I **25%**
Introduction to Data Science and Big Data Analytics
Data Science Overview, Big Data Overview – Characteristics - Data Structures - Analyst Perspective on Data Repositories, Big Data Analytics versus Data Science
State of the Practice in Analytics - Bl Versus Data Science - Current Analytical Architecture - Drivers of Big Data - Emerging Big Data Ecosystem and a New Approach to Analytics
Key Roles for the New Big Data Ecosystem, Examples of Big Data Analytics

Data Analytics Lifecycle
Data Analytics Lifecycle Overview, Phase 1: Discovery, Phase 2: Data Preparation, Phase 3: Model Planning, Phase 4: Model Building, Phase 5: Communicate Results, Phase 6: Operationalize.

No. of Lectures: 10
Unit - II **25%**
Advanced Analytical Theory and Methods: Clustering
Overview of Clustering, K-means - Use Cases - Overview of the Method - Determining the Number of Clusters – Diagnostics - Reasons to Choose and Cautions, Additional Algorithms

Advanced Analytical Theory and Methods: Association Rules
Overview, A priori Algorithm, Evaluation of Candidate Rules, Applications of Association Rules, An Example: Transactions in a Grocery Store - The Groceries Dataset - Frequent ltemset Generation - Rule Generation and Visualization, Validation and Testing, Diagnostics

Advanced Analytical Theory and Methods: Regression
Linear Regression – Use Cases - Model Description – Diagnostics, Logistic Regression – Use Cases - Model Description – Diagnostics, Reasons to Choose and Cautions, Additional Regression Models
No. of Lectures: 11

Unit - III   **25%**
Advanced Analytical Theory and Methods: Classification
Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree
Naive Bayes - Bayes' Theorem - Nai've Bayes Classifier – Smoothing – Diagnostics

Advanced Analytical Theory and Methods: Time Series Analysis
Overview of Time Series Analysis, ARIMA Model

Advanced Analytical Theory and Methods: Text Analysis
Text Analysis Steps, A Text Analysis Example, Collecting Raw Text, Representing Text, Term Frequency-Inverse Document Frequency (TFIDF), Categorizing Documents by Topics, Determining Sentiments, Gaining Insights

No. of Lectures: 11

Unit - IV   **25%**
Advanced Analytics-Technology and Tools: MapReduce and Hadoop
Analytics for Unstructured Data – Use Cases – MapReduce - Apache Hadoop, The Hadoop Ecosystem – Pig – Hive – Hbase – Mahout, NoSQL

Advanced Analytics-Technology and Tools: In-Database Analytics
SOL Essentials – Joins - Set Operations - Grouping Extensions, In-Database Text Analysis, Advanced SOL - Window Functions - User-Defined Functions and Aggregates - Ordered Aggregates – MADiib

No. of Lectures: 10
Total No. of Lectures: 42

Reference Books:

1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley, 2013.
2. EMC Education Services "Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data", Wiley.
3. Bill Franks, ―Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics‖, Wiley and SAS Business Series, 2012.
4. David Loshin, "Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph", 2013.
5. Richard Cotton, "Learning R – A Step-by-step Function Guide to Data Analysis, , O'Reilly Media, 2013.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	2	4	30	70	50	150

Practical List:

R:
1. Implement clustering techniques, K-means algorithm
2. Implement Association Rules – Apriori algorithm
3. Implement Linear and logistic Regression
4. Implement SVM / Decision tree classification techniques
5. Visualize data using any plotting framework

Hadoop:
1. Install, configure and run Hadoop and HDFS
2. Implement word count / frequency programs using MapReduce
3. Implement an MR program that processes a weather dataset

Subject   : Information Security
Subject Code : ITCC11

Objective:
This Subject provides a deep and comprehensive study of the security principles and practices of information systems. Topics include basic information security concepts, common attacking techniques, common security policies, basic cryptographic tools, authentication, access control, software security, operating system security, and legal and ethical issues in information systems security.

Learning Outcomes:
• Students shall be able to understand the basic principles and practices in information systems security.
• In particular, understand what the foundational theory is behind computer security, what the common threats are, and how to play with the games with attackers.

Unit -I   25%
Overview
      Computer Security Concepts, Threats, Attacks, and Assets, Security Functional Requirements, Fundamental Security Design Principles, Attack Surfaces and Attack Trees, Computer Security Strategy
Cryptographic Tools
      Confidentiality with Symmetric Encryption, Message Authentication and Hash Functions, Public-Key Encryption, Digital Signatures and Key Management, Random and Pseudorandom Numbers, Practical Application: Encryption of Stored Data
                                                   No. of Lectures: 11
Unit -II   25%
User Authentication
      Electronic User Authentication Principles, Password-Based Authentication, Token-Based Authentication, Biometric Authentication, Remote User Authentication, Security Issues for User Authentication, Practical Application: An Iris Biometric System, Case Study: Security Problems for ATM Systems
Access Control
      Access Control Principles, Subjects, Objects, and Access Rights, Discretionary Access Control, Examples: UNIX File Access Control, Role-Based Access Control, Attribute-Based Access Control, Identity, Credential, and Access Management, Trust Frameworks, Case Study: RBAC System for a Bank
                                                   No. of Lectures: 10

Unit -III   25%
Database and Cloud Security
      The Need for Database Security, Database Management Systems, Relational Databases, SQL Injection Attacks, Database Access Control, Inferences, Database Encryption
Malicious Software

Types of Malicious Software (Malware), Advanced Persistent Threat, Propagation: Infected Content(Viruses), Propagation: Vulnerability Exploit(Worms), Propagation: Social Engineering(Spam E-Mail), Trojans, Payload: System Corruption, Payload: Attack Agent(Zombie), Payload: Information Theft: (Key loggers), Payload: Stealthing (Backdoors)

Denial-of-Service Attacks

No. of Lectures: 11

Unit -IV **25%**

Firewalls Systems

The Need for Firewalls, Firewall Characteristics and Access Policy, Types of Firewalls, Firewall Location and Configurations

Software Security

Software Security Issues, Handling Program Input, Writing Safe Program Code, Interacting with the Operating System and Other Programs, Handling Program Output

Operating System Security

Introduction to Operating System Security, System Security Planning, Operating Systems Hardening, Application Security, Security Maintenance, Linux/Unix Security, Windows Security, Virtualization Security

No. of Lectures: 10
Total No. of Lectures: 42

Text Books:

- "Computer Security: Principles and Practice", W. Stallings, 3rd Edition, Prentice Hall, ISBN: 0132775069, 2011.

Reference Books:

- "Information Security: Principles and Practice," M. Stamp, 2nd Edition, Wiley, ISBN: 0470626399, 2011.
- "Principles of Information Security," M. E. Whitman and H. J. Mattord, 4th Edition, Course Technology, ISBN: 1111138214, 2011.
- "Computer Security: Art and Science," M. Bishop, Addison Wesley, ISBN: 0-201-44099-7, 2002.
- "Software Security: Building Security In," G. McGraw, Addison Wesley, ISBN: 0321356705, 2006.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	2	4	30	70	50	150

Practical List:

Practical Based on Symmetric Encryption technique

1. Write a program to demonstrate encryption and decryption scheme using Caesar Cipher technique.
2. Write a program to demonstrate encryption and decryption scheme using Mono-alphabetic Cipher.
3. Write a program to demonstrate encryption and decryption scheme using Hill Cipher.
4. Write a program to demonstrate encryption and decryption scheme using Transposition Cipher.
5. Write a program to demonstrate encryption and decryption scheme using Poly-alphabetic Cipher.
6. Write a program to demonstrate Encrypt/Decrypt your password by using your own technique (using Substitution).
7. Write a program to demonstrate Encrypt/Decrypt your password by using your own technique (using Transposition/permutation).

Practical Based on Public key Encryption

1. Write a program to demonstrate encryption and decryption RSA Algorithm
2. Write a program to demonstrate Millar- Rabin Algorithm.
3. Write a program to demonstrate Diffie-hellman key exchange algorithm.

Write a program to demonstrate Euclidean Algorithm scheme.

Subject : **Software Testing and Quality Assurance**
Subject Code : ITCC12

Objective:
This subject will teach the student about the concepts and techniques for software testing. This subject makes students understand the quality processes that are applied in the industry for assuring quality of the software. Topics cover software testing at the unit, module, subsystem, and system levels, techniques for generating and validating test data, and the testing process, static vs. dynamic testing, functional testing, inspections, and system testing. Quality Assurance provides open environment to learn the Quality Aspect in terms of Product, Services, project etc.

Learning Outcomes:
After studying this subject, student will be able to
1. Understand the Testing process
2. Understand Test Levels, Verification and Validation.
3. Understand Regression Test, Confirmation Testing
4. Understand Static Testing and various reviews
5. Understand Black-box and White-box Test Design techniques
6. Understand Bug-Tracking Life cycle and Technical metrics related to testing
7. Understanding of CMM, Six Sigma, ISO-ISI Standard

Unit – I 25%
Fundamentals of testing
- o Why is testing necessary?
  - ▪ Causes of software defects
  - ▪ Testing and quality
  - ▪ How much testing is enough?
- o General testing principles
- o Fundamental test process
  - ▪ Test planning and control
  - ▪ Test analysis and design
  - ▪ Test implementation and execution
  - ▪ Evaluating exit criteria and reporting
  - ▪ Test closure activities

Testing throughout the software life cycle
- o Software development model – V Model
- o Test levels
  - ▪ Unit testing
  - ▪ Integration testing
  - ▪ System testing
  - ▪ Acceptance testing – Alpha Testing, Beta Testing
- o Verification and Validation
- o Test types
  - ▪ Functional testing
  - ▪ Non-functional testing
  - ▪ Confirmation testing (Re-testing)
  - ▪ Regression testing

Unit - II

Static techniques
- o   Static techniques and the test process
- o   Review process
  - ▪   Phases of a formal review
  - ▪   Roles and responsibilities
  - ▪   Types of review – Informal Review, Walkthrough, Inspection
  - ▪   Success factors for reviews

Test design techniques
- o   The Test Development Process
- o   Specification-based or black-box techniques
  - ▪   Equivalence partitioning
  - ▪   Boundary value analysis
  - ▪   Decision table testing
  - ▪   State transition testing
- o   Structure-based or white-box techniques
  - ▪   Statement coverage
  - ▪   Decision (Branch) coverage
- o   Experience-based techniques

Types of System Testing
- o   Performance Testing, Load Testing, Stress Testing
- o   Security Testing, Usability Testing
- o   Smoke Testing, Compatibility Testing
- o   Recovery testing, Backup testing

Unit - III

Defect Tracking and Defect Reporting
- o   Bug Life Cycle Stages
- o   Priority, Severity
- o   Defect Prevention Meetings, Defect Parato charts.

Technical metrics
Requirements coverage related metrics, Efforts related metrics, Review process related metrics Test process related metrics, Defects related metrics, Productivity related metrics, and Schedule related metrics.

Unit - IV

Quality Assurance
Quality concepts – quality, quality control, quality assurance, cost of quality Software quality assurance – SQA activities, software reviews, inspections, audits, Software reviews, inspections, audits, Software reliability Quality Attributes: correctness, reliability, usability, integrity, portability, maintainability, interoperability.
Quality Standards: Basic concept of – ISO 9000 & 9001, CMM, Six Sigma.
Development of CMM
CMM – Following KPAs : requirements management (RM), software project tracking and oversight (SPTO), software configuration management (SCM), organization process definition (OPD), software product engineering (SPE), peer reviews (PR), quantitative process management (QPM), defect prevention (DP), process change management

Software Quality, Quality attribute, Quality Assurance, Quality control & assurance, Methods of quality management, Cost of quality, Quality management, Quality factor, Quality management & project management, Software quality metrics-TQM, Six Sigma, ISO, SQA Model

No. of Lectures: 10
Total No. of Lectures: 42

Reference Books:
1. Software Engineering R. Pressmen , 6th Editon
2. Software Engineering, Sommerville
3. Introducing Software Testing, Louise Tamres
4. Effective Methods for software Testing William Perry, John Wiley & Sons
5. Software Testing in Real World Edward Kit
6. Software Testing Techniques, Boris Beizer
7. Software Testing and Quality Assurance: Theory and Practice, by KshirasagarNaik, PriyadarshiTripathy
8. Software Quality Assurance: From Theory to Implementation by Dr Daniel Galin

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	2	4	30	70	50	150

Practical List:
1. Students are required to prepare a journal in which students need to write at least 30 test cases related to business application.
2. Practical related to bugtracking and testing using Bugzilla.
3. Study and Explore Junit and Nunit Unit Testing tool.
4. Tutorial based learning on Manual testing, Automated Testing Tools and its Case studies
5. Study and Explore Testing tools Like QTP, Rational Robot, Winrunner, Loadrunner etc.
6. Study and Explore Web based, GUI testing, Manual testing and Automated testing,
7. Test Script generation and recording using Selenium.
8. Tutorial based learning for Alpha and Beta Testing. (Case Study)
9. ISO and ISI Certification Process study.

Elective I
Subject   : Advanced Computing Technology
Subject Code : ITEC02 (A)

Objective:
This course covers general introductory concepts in the design and implementation of distributed systems, covering all the major branches such as Cloud Computing, Grid Computing, Cluster Computing. Complete coverage of modern distributed computing technology including clusters, the grid, service-oriented architecture.

Learning Outcomes:
After successful completion of the course, student will be able to

- Understand the core concepts of Grid Computing and Cluster Computing
- Have the core concepts and principles of Distributed programming techniques.
- Emerging concepts of Load Balancing, Load Sharing as well as concepts of synchronization would be clear.
- Understand the use of Cloud Computing to make decisions for business organization
- Understand the core concepts and gain knowledge of managing Cloud services

Unit - I   **25%**
Distributed Computing
Introduction, History of Distributed Computing; Forms of computing: Monolithic, Micro, distributed, parallel, Co-operative; Distributed System Models; Issues in designing DS.

Synchronization in Distributed Computing

Introduction; Clock Synchronization: Physical clock, Clock synchronization algorithms Introduction, use of synchronized clock, Mutual Exclusion: Centralized algorithms, distributed algorithms, token ring algorithm; Election algorithms: bully algorithm, ring algorithm

Interprocess Communication
Event synchronization, Timeout and Threading, Deadlock and timeouts, Data Encoding, Request Response Protocols, Event diagram, sequence diagram, Connection-oriented/connectionless IPC, Evolution of paradigms for IPC.

No. of Lectures: 11
Unit -II   **25%**
Grid Computing
Introduction to Grid and its Evolution :
Beginning of the grid, building blocks of the grid, grid applications and application middleware, future of the grid, Evolution of the Grid: first, second and third generation
Implementing Production Grids:
Grid context, Grid support for collaboration, Building an initial multisite, computational and data grid, cross site trust management, Transition to a prototype production grid
Anatomy of Grid: Virtual organizations, Nature of grid architecture, Grid architecture description and practice.
No. of Lectures: 10

Unit -III   **25%**
Cluster Computing
Cluster Computing at Glance :
Ease of Computing, Scalable Parallel Computer Architecture, Towards Low Cost Parallel
Computing & Motivation, Windows opportunity, A Cluster Computer And Its Architecture, Cluster
Classification, Commodity Components fir Clusters, Programming environment Tools, Cluster
Applications.

Cluster Setup and Administration:
Setting up the cluster, Security, System Monitoring, System Tuning

Constructing Scalable Services:
Environment, Resource sharing, Resource sharing enhanced locality,
prototype implementation and extension

           No. of Lectures: 11
Unit -IV   **25%**
Cloud Computing
Introduction to Cloud Computing:
Defining Clouds. Cloud Providers, Consuming Cloud Services, Cloud Models –Iaas, Paas, SaaS,
Inside the cloud, Administering cloud services, technical interface, cloud resources
Nature of cloud:
Tradition data center, cost of cloud data center, Scaling computer systems, economics, cloud work
load, managing data on clouds, public, private and hybrid clouds
Cloud elements:
Infrastructure as a service, Platform as a Service, Software as a Service
           No. of Lectures: 10
           Total No. of Lectures: 42

Text Books:

- M.L. Liu, "Distributed Computing: Principles and Applications", Pearson.
- High Performance Cluster Computing, Volume 1, Architecture and Systems,
  Rajkumar Buyya, Pearson Education
- Grid Computing – Making the Global Infrastructure A Reality, Edited by Berman,
  Fox and Hey, Wiley India
- Cloud Computing for Dummies, Hurwitz, Bllor, Kaufman, Halper, Wiley India.

Reference Books:

1. Sunita Mahajan, Seema Shah "Distributed Computing" Oxford Publications

2. P.K.sinha, " Distributed Operating Systems Concepts and design", PHI.

3. Andrew S. Tanenbaum, Maarten Van Steen, "Distributed Systems Principles and
   Paradigms".

4. Grid and Cluster Computing, Prabhu C.S.R, PHI Learning Private Limited

5. High Performance Cluster Computing: Architectures and Systems, Vol. 1, Prentice Hall

6. Gautam Shroff, Enterprise Cloud Computing Technology Architecture Applications [ISBN:
   978-0521137355]

7. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach
   [ISBN:0071626948]

8. Dimitris N. Chorafas, Cloud Computing Strategies [ISBN: 1439834539]

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List

1. Case studies on Infrastructure as a Service (IaaS),Virtualization, Platform as a service (PaaS), Cloud platform management, Software as a Service.
2. Sketch out and analyze architecture of Aneka / Eucalyptus / KVM identify different entities to understand the structure of it.
3. Create a scenario in Aneka / Eucalyptus to create a datacenter and host. Also create virtual machines with static configuration to run cloudlets on them.
4. Make and perform scenario to pause and resume the simulation in Aneka / Eucalyptus entity, and create simulation entities dynamically.
5. Organize a case in Aneka / Eucalyptus for simulation entities in run-time using a its toolkit support and manage virtual cloud.
6. Sketch out and analyze architecture of Microsoft Azure.
7. Sketch out and analyze architecture of Amazon Web Service (AWS).
8. Categorize Microsoft Azure Services and discuss on each.
9. Categorize Amazon Web Service (AWS) and implement its various cloud entities using its Cloud Toolbox support.
10. Implement and use sample cloud services with the help of Microsoft Azure.

Kadi Sarva Vishwavidyalaya
M.Sc. (IT) Semester – III (Second Year)

Elective I
Subject   : Mobile Application Development
Subject Code   : ITEC02 (B)

Objective:
- Understand system requirements for mobile applications.
- Generate suitable design using specific mobile development frameworks.
- Generate mobile application design.
- Implement the design using specific mobile development frameworks.
- Deploy the mobile applications in marketplace for distribution.

Learning Outcomes:
- Upon completion of the course, the students should be able to:
- Describe the requirements for mobile applications.
- Explain the challenges in mobile application design and development.
- Develop design for mobile applications for specific requirements.
- Implement the design using Android SDK.
- Implement the design using Objective C and iOS.
- Deploy mobile applications in Android and iPhone marketplace for distribution.

Unit - I   **25%**
Introduction
Introduction to mobile applications – Embedded systems - Market and business drivers for mobile applications – Publishing and delivery of mobile applications – Requirements gathering and validation for mobile applications. Mobile application development frameworks
Design
Introduction – Basics of embedded systems design – Embedded OS - Design constraints for mobile applications, both hardware and software related – Architecting mobile applications
No. of Lectures: 11
Unit - II   **25%**
UI
User interfaces for mobile applications – touch events and gestures – Achieving quality constraints – performance, usability, security, availability and modifiability.
Designing applications with multimedia and web access capabilities – Integration with GPS and social media networking applications – Accessing applications hosted in a cloud computing environment – Design patterns for mobile applications.
Techniques, Methodologies for Mobile Application Development
No. of Lectures: 10
Unit -III: **25%**
Architecture
Architecture (Android and iOS) : Introduction, Establishing the development environment, Architecture
Android UI
Activities and views – Interacting with UI – Persisting data using SQLite – Packaging and deployment
No. of Lectures: 11

Unit - IV: **25%**
Android Network Communication
Interaction with server side applications – Using Google Maps, GPS and Wifi – Integration with social media applications.

iOS
Introduction to Objective C – iOS features – UI implementation – Touch frameworks – Data persistence using Core Data and SQLite – Location aware applications using Core Location and Map Kit – Integrating calendar and address book with social media application – Using Wifi - iPhone marketplace.

No. of Lectures: 10
Total No. of Lectures: 42

Reference Books:
1. Charlie Collins, Michael Galpin and Matthias Kappler, ―Android in Practice‖, DreamTech, 2012.
2. David Mark, Jack Nutting, Jeff LaMarche and Frederic Olsson, ―Beginning iOS 6 Development: Exploring the iOS SDK‖, Apress, 2013.
3. James Dovey and Ash Furrow, ―Beginning Objective C‖, Apress, 2012.
4. Jeff McWherter and Scott Gowell, "Professional Mobile Application Development", Wrox,2012.
5. Reto Meier, ―PProfessional android Development‖, Wiley-India Edition, 2012.

E-Learning:
- https://www.tutorialspoint.com/android
- http://developer.android.com/develop/index.html.
- https://developer.android.com/training/index.html
- https://www.codementor.io/learn-android-development

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:
1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the red color with white background.
2. To understand Activity, Intent
   Create sample application with login module.(Check username and password)
   On successful login, go to next screen. And on failing login, alert user using Toast.
   Also pass username to next screen.
3. Create login application where you will have to validate EmailID (UserName). Till the username and password is not validated, login button should remain disabled.
4. Create and Login application as above . On successful login , open browser with any URL.
5. Create an application that will pass some number to the next screen and on the next screen that number of items should be display in the list.
6. Understand resource folders :
   Create spinner with strings taken from resource folder (res >> value folder).
   On changing spinner value, change image.
7. Understand Menu option.

Create an application that will change color of the screen, based on selected options from the menu.

8   Create an application that will display toast (Message) on specific interval of time.
9   Create a background application that will open activity on specific time.
10   Create an application that will have spinner with list of animation names. On selecting animation name, that animation should effect on the images displayed below.
11   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.
12   Understanding content providers and permissions:
     Read phonebook contacts using content providers and display in list.
13   Read messages from the mobile and display it on the screen.
14   Create an application to call specific entered number by user in the Edit Text
15   Create an application that will create database with table of User credential.
16   Create an application to read file from asset folder and copy it in memory card.
17   Create an application that will play a media file from the memory card.
18   Create an application to make Insert, update, Delete and retrieve operation on the database.
19   Create an application to read file from the sdcard and display that file content to the screen.
20   Create an application to draw line on the screen as user drag his finger.

Elective I
Subject   : Machine Learning Techniques
Subject Code   : ITEC02(C)

Objectives:
- To introduce students to the basic concepts and techniques of Machine Learning.
- To have a thorough understanding of the Supervised and Unsupervised learning techniques
- To study the various probability based learning techniques
- To understand graphical models of machine learning algorithms

Learning Outcomes:
Upon completion of this course, the students will be able to:
- Distinguish between, supervised, unsupervised and semi-supervised learning
- Apply the appropriate machine learning strategy for any given problem
- Suggest supervised, unsupervised or semi-supervised learning algorithms for any given problem
- Design systems that uses the appropriate graph models of machine learning
- Modify existing machine learning algorithms to improve classification efficiency

UNIT I   **25%**
INTRODUCTION
Learning – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search – Finding a Maximally Specific Hypothesis – Version Spaces and the Candidate Elimination Algorithm – Linear Discriminant – Perceptron – Linear Separability – Linear Regression.
No. of Lectures: 10
UNIT II   **25%**
LINEAR MODELS
Multi-layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-layer Perceptron in Practice – Examples of using the MLP – Overview – Deriving Back-Propagation – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.
No. of Lectures: 10
UNIT III   **25%**
TREE AND PROBABILISTIC MODELS
Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers – Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantification – Self Organizing Feature Map
No. of Lectures: 11

UNIT IV   **25%**
Dimensionality Reduction – Linear Discriminant Analysis – Principal Component Analysis – Factor Analysis – Independent Component Analysis – Locally Linear Embedding – Isomap – Least Squares Optimization – Evolutionary Learning – Genetic algorithms – Genetic Offspring: - Genetic Operators – Using Genetic Algorithms – Reinforcement Learning – Overview – Getting Lost Example – Markov Decision Process - Graphical Models - Naive Bayes' Classifier Hidden Markov Model - Linear Regression

Reference Books:

- Ethem Alpaydin, ―Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series)‖, Third Edition, MIT Press, 2014
- Jason Bell, ―Machine learning – Hands on for Developers and Technical Professionals‖, First Edition, Wiley, 2014
- Peter Flach, ―Machine Learning: The Art and Science of Algorithms that Make Sense of Data‖, First Edition, Cambridge University Press, 2012.
- Stephen Marsland, ―Machine Learning – An Algorithmic Perspective‖, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
- Tom M Mitchell, ―Machine Learning‖, First Edition, McGraw Hill Education, 2013

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical List:

WEKA:
1. Installation of WEKA
2. Practical of Creating Datasets for WEKA
3. Preparation of training data for WEKA
4. Practical of Creating ARFF files
5. Filtering algorithms based on feature-type in WEKA
6. Practical of Probabilistic Models with WEKA
7. Practical of Classifying data in WEKA, including the major WEKA features
8. Practical of Clustering in WEKA
9. Practical of Linear Regressions in WEKA
10. Practical of Data visualization in WEKA

Orange:
1. Installation process of Orange Tool and data workflow
2. Practical of different widgets like Data, visualize, classify,regression, Evaluate and channels
3. Practical of Loading and Preprocessing of data
4. Practical of hierarchical Clustering in Orange
5. Practical of Making Prediction in orange
6. Practical of making evaluation and scoring in orange
7. Practical of principle component analysis
8. Practical of feature scoring and ranking
9. Practical of Text preprocessing, Classification and clustering.
10. Practical of image classification and clustering.

Elective II
Subject   : Cloud Computing Technologies
Subject Code : ITEC03 (A)

Objective:
- To understand the concepts of virtualization and virtual machines
- To gain expertise in server, network and storage virtualization.
- To understand and deploy practical virtualization solutions and enterprise solutions
- To gain knowledge on the concept of virtualization that is fundamental to cloud computing
- To understand the various issues in cloud computing
- To be able to set up a private cloud
- To understand the security issues in the grid and the cloud environment

Learning Outcomes:
Upon completion of this course, the students should be able to:
- Employ the concepts of storage virtualization, network virtualization and its management
- Apply the concept of virtualization in the cloud computing
- Identify the architecture, infrastructure and delivery models of cloud computing
- Develop services using Cloud computing
- Apply the security models in the cloud environment

UNIT I:
VIRTUALIZATION
Basics of Virtual Machines - Process Virtual Machines – System Virtual Machines –Emulation –
Interpretation – Binary Translation - Taxonomy of Virtual Machines. Virtualization –Management
Virtualization — Hardware Maximization – Architectures – Virtualization Management – Storage
Virtualization – Network Virtualization

VIRTUALIZATION INFRASTRUCTURE
Comprehensive Analysis – Resource Pool – Testing Environment –Server Virtualization – Virtual
Workloads – Provision Virtual Machines – Desktop Virtualization – Application Virtualization -
Implementation levels of virtualization – virtualization structure – virtualization of CPU, Memory
and I/O devices – virtual clusters and Resource Management – Virtualization for data center
automation.

UNIT II
CLOUD PLATFORM ARCHITECTURE
Cloud deployment models: public, private, hybrid, community – Categories of cloud computing:
Everything as a service: Infrastructure, platform, software- A Generic Cloud Architecture Design –
Layered cloud Architectural Development – Virtualization Support and Disaster Recovery –
Architectural Design Challenges - Public Cloud Platforms : GAE,AWS – Inter-cloud Resource
Management

UNIT III
PROGRAMMING MODEL
Introduction to Hadoop Framework - Mapreduce, Input splitting, map and reduce functions,
specifying input and output parameters, configuring and running a job –Developing Map Reduce
Applications - Design of Hadoop file system –Setting up Hadoop Cluster - Cloud Software
Environments -Eucalyptus, Open Nebula, Open Stack, Nimbus.

UNIT IV
CLOUD SECURITY
Cloud Infrastructure security: network, host and application level – aspects of data security, provider data and its security, Identity and access management architecture, IAM practices in the cloud, SaaS, PaaS, IaaS availability in the cloud - Key privacy issues in the cloud –Cloud Security and Trust Management.

Reference Books:

1. Danielle Ruest, Nelson Ruest, ―Virtualization: A Beginner‟s Guide‖, McGraw-Hill Osborne Media, 2009.
2. Jim Smith, Ravi Nair , "Virtual Machines: Versatile Platforms for Systems and Processes", Elsevier/Morgan Kaufmann, 2005
3. John W.Rittinghouse and James F.Ransome, "Cloud Computing: Implementation,Management, and Security", CRC Press, 2010.
4. Kai Hwang, Geoffrey C Fox, Jack G Dongarra, "Distributed and Cloud Computing, From Parallel Processing to the Internet of Things", Morgan Kaufmann Publishers, 2012.
5. Tim Mather, Subra Kumaraswamy, and Shahed Latif ,"Cloud Security and Privacy", O'Reilly Media, Inc.,2009.
6. Toby Velte, Anthony Velte, Robert Elsenpeter, "Cloud Computing, A Practical Approach", McGraw-Hill Osborne Media, 2009.
7. Tom White, "Hadoop: The Definitive Guide", Yahoo Press, 2012.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
3	4	5	30	70	50	150

Practical list :

1. Paas - Platform as A Service
   Web Based Desktop System   : (A) Icloud (B) Cloudo (C) Eyeos (D) Youos
2. Colloboration On Schedule,Task Management
      - Yahoo Calender , Calenderhub, Famundo
3. Colloboration on Contact Management
      - Salesforce.Com A Cloud Base Software As A Service
      - Force.Com, E-Studio Contact Manager, Bconnections
4. Colloboration on Word Documents
      - Google Doc, Ajaxwrite, Docly, Glide Write, Inetword, Peepel Webwriter
5. Colloboration on Spreadsheet Management
      - Google Spreadsheet
      - Editgrid
      - Thinkfree Calc
6. Colloboration on Projects
      - @Task
      - Aceproject

- Basecamp
- Wrike
-Google Sites

7. Colloboration on Database
   - Blist
   - Cebase
   - Mywebdb

8. Colloboration on Event Management
   - Conference.Com
   - Cevent
   - Eventsbot
   - Tendenci

9. Image Hosting Coludbase Service
   - Unifi By Real Network
   - Picasa By Google
   - Pixenate
   - Fotoflexer

10. Cloudbase Music Service
    - Sony's Qriocity
    - Google "Music Beta"
    - Apple's Icloud

11. Cloudbase Printing
    - Google Cloud Print
                - Cloud Based Communication Service
              - Web Based Email Service By Google, Yahoo, Rediff

Elective II
Subject   : IoT and Applications
Subject Code : ITEC03 (B)

Objective:

The subject explains Vision and Introduction to IoT. Students understand IoT Market perspective, data and Knowledge Management and use of Devices in IoT Technology.

Students understand State of the Art – IoT Architecture. Real World IoT Design Constraints, Industrial Automation and Commercial Building Automation in IoT.

Learning Outcomes:

After studying this subject, student will be able to
1. Understand the vision of IoT from a global context.
2. Determine the Market perspective of IoT.
3. Use of Devices, Gateways and Data Management in IoT.
4. Building state of the art architecture in IoT.
5. Application of IoT in Industrial and Commercial Building Automation and Real World Design Constraints.

Unit -I   25%
IoT & Web Technology
The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

No. of Lectures: 11
Unit -II   25%
M2M to IoT: A Basic Perspective– Introduction, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT.
IoT Technology and Architecture
Introduction (Design and Infrastructure), Basic Communication Flow, Hardware Requirements, Functional View, Information View, Deployment, Operational View, Other relevant architectural views.

No. of Lectures: 10

25%

Unit -III
Sensors and Actuators: Definition, Properties, Types of Sensors and its Application.
Communication Flow: Basic IoT Protocols
   a) **Node to Gateway:** ZigBee, ZWave, RF, BT, BLE
   b) **Gateway to Node:** HTTP/HTTPS, MQTT, CoAP, GPRS and Wi-Fi.
Definition and its Application: RESTFUL Web Services, Cloud Computing and Data & Visual Analytics.

No. of Lectures: 11

Unit -IV 25%
IoT Applications and Case Studies for Value Creations
Introduction, IoT applications for industry: Future Factory Concepts, Brownfield IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT For Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management, eHealth.

No. of Lectures: 10
Total No. of Lectures: 42

Text Books:
1 Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1st Edition, VPT, 2014
2. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1 st Edition, Apress Publications, 2013
3. CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011, ISBN: 978-1-4493- 9357-1

Major Equipment:
Raspberry pi, Arduino
List of Open Source Software/learning website:
- https://github.com/connectIOT/iottoolkit
- https://www.arduino.cc/
- http://www.zettajs.org/
- Contiki (Open source IoT operating system)
- Arduino (open source IoT project)
- IoT Toolkit (smart object API gateway service reference implementation)

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	Total Marks
3	4	5	30	70	50	150

Practical List:
1. Define and Explain IoT Technology and Architecture.
2. Demo: IoT architecture (Design-Infrastructure)-Toolkit (Board: Arduino Genuine Basic)
3. Demo: Sensors and Actuators (Temperature, Humidity, LDR-PIR, POWER, Reed Switch)
4. Practical based on GSM, Wi-Fi, MQTT Extension.
5. Demo: Gateway deployment in IoT toolkit. (Accessing Third Party Osmosis)
6. Practical: Device Management, Cloud, Data Analytics. (Accessing Third Party Osmosis)
7. Case Studies: IoT Applications

Elective II
Subject   : Image Processing
Subject Code : ITEC03 (C)

Objective:
This Subject will provide students with more techniques in the digital image processing for image enhancement as well as restoration of noisy images. Emphasis is given more on implementation of various algorithms so that students will able to develop their own algorithm. The techniques covered in the syllabus have wide applicability in any field which needs to handle the image data.

Learning Outcomes:
After studying this subject, student will be able to

- Understand the basic image enhancement techniques in spatial & frequency domains
- Understand the various kind of noise present in the image and how to restore the noisy image.
- Understand the basic multi-resolution techniques and segmentation methods.
- To apply this concepts for image handling in various fields.

Unit - I   **25%**
Digital image fundamentals:
Light and Electromagnetic spectrum, Components of Image processing system, Image formation and digitization concepts, Neighbours of pixel adjacency connectivity, regions and boundaries, Distance measures, Applications.
                                                                                            No. Of Lecture: 11
Unit - II   **25%**
Image Enhancements:
In spatial domain: Basic gray level transformations, Histogram processing, Using arithmetic/Logic operations, smoothing spatial filters, Sharpening spatial filters.
In Frequency domain: Introduction to the Fourier transform and frequency domain concepts, smoothing frequency-domain filters, Sharpening frequency domain filters.
                                                                                            No. Of Lecture: 10
Unit - III   **25%**
Image Restoration:
Various noise models, image restoration using spatial domain filtering, image restoration using frequency domain filtering, Estimating the degradation function, Inverse filtering
  Colour Image processing:
  Colour fundamentals, Colour models, Colour transformation, Smoothing and Sharpening, Colour segmentation
                                                                                            No. Of Lecture: 11
Unit - IV   **25%**
Wavelet and Multi-resolution processing:
Image pyramids, Multi-resolution expansion, wavelet transform.
Image compression:
Introduction, Image compression model, Error-free compression, Lossy compression
Image segmentation:
Detection of discontinuities, Edge linking and boundary detection, thresholding
                                                                                            No. Of Lecture: 11
                                                                                            Total No. Of Lecture: 42

Reference Books:
1. Digital Image Processing, Second Edition by Rafel C. Gonzalez and Richard E. Woods, Pearson Education
2. Digital Image Processing by Bhabatosh Chanda and Dwijesh Majumder, PHI
3. Fundamentals of Digital Image Processing by Anil K Jain, PHI
4. Digital Image Processing Using Matlab, Rafel C. Gonzalez and Richard E. Woods, Pearson Education

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme				Total Marks
			Internal	External			
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)		
3	4	5	30	70	50		150

Practical List:
Experiments will be based on the topics taught in the theory.

Major Equipments:
1. Computer system with high computing power and main memory.

List of Open Source Software/learning website:
1. MATLAB with image processing toolbox.
2. Scilab (SIP)

Open ended problems:
1. Enhance the given degraded image (pick up any suitable degraded image which contains letters also) such that we may be able to read the letter properly. Try to get best possible quality of image.

2. Identify type of the noise present in the image using frequency as well as in spatial domain concepts and judge the basic behavioral characteristics of the various noises.

3. Capture the real time binary photo and apply the various segmentation algorithms to identify the various objects presents in the image (i.e road, trees, river etc.)

4. Assign face recognition problem.

Kadi Sarva Vishwavidyalaya
M.Sc. (IT) Semester – III (Second Year)

Subject   : Project - III
Subject Code : ITCC13

Objective:
This is aimed for learning about real-life application requirements by visiting various organizations and studying and documenting their business applications. Based on the study application design document will be prepared.

Learning Outcomes:
Students will also learn about real-life application requirements and develop their skills of requirement gathering and analysis. They will also learn to prepare technical design document.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
0	4	2	30	0	70	100

Students will visit various organizations/companies and study their business applications. Students will prepare requirement specification document. They will also develop technical design document. Students will be evaluated for their study, analysis, design and documentation skills.

Subject　　:　IT Project
Subject Code :　ITCC14

Objective:
This is aimed to provide practical exposure to students in the actual projects of the industry and various types of other organizations. They need to apply learned concepts, procedures and tools to the project assigned as per the need of the project. The students should be motivated to deliver the expected output as per the requirement of the project and add-value to the project by applying their skills and knowledge. Student should present their work done in the project to the examiners during the evaluation of the projects.

Learning Outcome:
Student will learn how software project development is carried out in the industry. They will learn practically how a real-life project is developed in industry.

Teaching and Examination Scheme:

Teaching Scheme (Per Week)			Examination Scheme			
			Internal	External		Total Marks
Theory (Hours)	Practical (Hours)	Total Credit	MID (Marks)	Theory (Marks)	Practical (Marks)	
0	30	24	250	0	500	750

Minimum four months of the industrial utility project should be carried out at the organization.
The project work can be related one or combination of the following types:
* Software Development
* Software Testing
* Software Maintenance
* ERP - implementation, maintenance, support and customization
* Database Administration and Support
* System and Network Administration
* System Study, Analysis and Design of major applications
* Multimedia Application Development
* Web-site development with database application
* Data Warehousing
* Data Mining
* Data Science
* Big Data Analytics
* Application of Software Tools in Research Project/Organization
* Applications/Work related GIS, GPS, RS
* Applications related to Embedded Systems
* Any industrial utility work in the area of IT – with prior approval of respective HOD/Coordinator/Head of the Institute of M.Sc. IT.

    The work carried out in the project should be well-documented, approved & certified by the respective authorities of the organization.