



**JAI HIND COLLEGE
BASANTSING INSTITUTE OF SCIENCE
&
J.T.LALVANI COLLEGE OF COMMERCE
(AUTONOMOUS)**

"A" Road, Churchgate, Mumbai - 400 020, India.

**Affiliated to
University of Mumbai**

Program :BSc IT

Proposed Course :S.Y.BSc. IT

**Credit Based Semester and Grading System (CBCS) with
effect from the academic year 2019-20**

S.Y.BSc. IT

Academic year 2019-2020

Semester IV			
Course Code	Course Title	Credits	Lectures /Week
SBIT401	Advanced Web Programming	2	5
SBIT402	Embedded Systems	2	5
SBIT403	Computer Oriented Numerical and Statistical Techniques.	2	5
SBIT404	Software Methodologies and Management	2	5
SBIT405	Advanced Networks and Security	2	5
SBIT401 PR	Advanced Web Programming Practical	2	3
SBIT402 PR	Embedded Systems Practical	2	3
SBIT403 PR	Computer Oriented Numerical and Statistical Techniques Practical	2	3
SBIT404 PR	Software Methodologies and Management Practical	2	3
SBIT405 PR	Advanced Networks and Security Practical	2	3

Semester IV – Theory

Course: SBIT401	Course Title: Advanced Web Programming (Credits : 02 Lectures/Week:05)	
	<p>Objectives:</p> <ul style="list-style-type: none"> ➤ Understand the .NET framework ➤ Develop a proficiency in the C# programming language ➤ Proficiently develop ASP.NET web applications using C# ➤ Use ADO.NET for data persistence in a web application ➤ To develop web sites and applications with XML AND AJAX <p>Outcomes: This course is designed to provide the knowledge of Dot Net Frameworks along with ASP.Net and C#.</p>	
Unit I	<p>Introduction to C#: C# Language Basics, Variables and Data Types, Variable Operations, Object-Based Manipulation, Conditional Logic, Loops, Methods. The Basics About Classes, Understanding Namespaces and Assemblies, Advanced Class Programming, Inheritance, Delegates, Debugging and Error Handling</p> <p>Introducing .NET: The .NET Framework, C#, VB, and the .NET Languages, The Common Language Runtime, The .NET Class Library.</p> <p>XML: XML Explained The XML Classes, XML Validation, XML Display and Transforms.</p>	15 L
Unit II	<p>Web Form Controls: Writing Code, Using the Code-Behind Class, Introducing Server Controls, List Controls, Table Controls, Web Control Events and AutoPostBack,</p> <p>Validation Control: Understanding Validation, Using the Validation Controls</p> <p>Rich Controls: The Calendar, The AdRotator, Pages with Multiple Views, User Controls and Graphics,</p> <p>Navigation Controls: Site Maps, The SiteMapPath Control, The TreeView Control, The Menu Control.</p> <p>Research Component: Designing a Website with implementation of Validation controls</p>	15 L
Unit III	<p>State Management: Understanding the Problem of State, Using View State, Transferring Information Between Pages, Using Cookies, Managing Session State, Configuring Session State, Using Application State, Comparing State Management Options</p> <p>Master Page, Styles and Themes: Simple Master Page, Nested Master Page, Configuring Master Page, Creating Themes, Applying Themes, Applying Stylesheet</p> <p>ADO.NET: Understanding Databases, Configuring Your Database, Understanding SQL Basics, Understanding the Data Provider Model, Using Direct Data Access, Using Disconnected Data Access.</p> <p>Data Binding: Introducing Data Binding, Using Single-Value Data Binding, Using Repeated-Value Data Binding, Working with Data Source Controls</p> <p>Research Component: Connecting Database with the frontend</p>	15 L

Unit IV	<p>Data Controls: The GridView, Formatting the GridView, selecting a GridView Row, Editing with the GridView, Sorting and Paging the GridView, Using GridView Templates, The DetailsView and FormView</p> <p>ASP.NET AJAX: Understanding Ajax, Using Partial Refreshes, Using Progress Notification, Implementing Timed Refreshes, Working with the ASP.NET AJAX Control Toolkit.</p> <p>ASP.NET Web Services: Creating Web Service, Declaring WebService, Setting the WebService Attribute Deploying the Web Service Simple Object Access Protocol</p> <p>Security Fundamentals: Understanding Security Requirements, Authentication and Authorization, Forms Authentication</p> <p>Research Component: Applying Security features to the Website</p>	15 L
<p>Textbook:</p> <ol style="list-style-type: none"> 1. Beginning Visual C#, Wrox Publication 2. Professional Visual C#, Wrox Publication 3. Inside C#, by Tom Archer ISBN: 0735612889 Microsoft Press © 2001 4. Programming ASP.NET 3.5 by Jesse Liberty, Dan Maharry, Dan Hurwitz, O'Reilly 5. ADO.NET Examples and Best Practices for C# Programmers, By Peter D. Blackburn Apress Pub. 		

Evaluation Scheme

[A] Evaluation scheme for Theory courses

I. Continuous Assessment (C.A.) - 40 Marks

(i) C.A.-I : Test – 20 Marks of 40 mins. duration

(ii) C.A.-II : Mini Project- 20 Marks

II. Semester End Examination (SEE)- 60 Marks

Q.1 Answer any two -10 Marks

Q.2 Answer any two -10 Marks

Q.3 Answer any two -10 Marks

Q.4 Answer any two -10 Marks

Q.5 Answer any four -20 Marks

[B] Evaluation scheme for Practical courses

(i) Internal Practical – 20 marks

(ii) External Practical – 30 marks

Course: SBIT402	Course Title: Embedded Systems (Credits : 02 Lectures/Week: 05)	
	<p>Objectives:</p> <ul style="list-style-type: none"> ➤ This course is structured to combine lectures, for the students to gain an in-depth understanding of fundamental concepts on embedded systems. ➤ To provide in-depth knowledge about embedded processor, its hardware. ➤ To explain programming concepts and embedded programming in C ➤ To explain real time operating systems. <p>Outcomes: With these course the students should be able to:</p> <ul style="list-style-type: none"> ➤ Understand the hardware and software components as well as their development cycles. ➤ Understand the deployment of embedded processors and supporting devices. 8051 programming in C designing of embedded system with 8051. 	
Unit I	<p>Introduction: Embedded Systems and general purpose computer systems, history, classifications, applications and purpose of embedded systems</p> <p>Core of embedded systems: microprocessors and microcontrollers, RISC and CISC controllers, Big endian and Little endian processors, Application specific ICs, Programmable logic devices, COTS, sensors and actuators, communication interface, embedded firmware, other system components.</p> <p>Characteristics and quality attributes of embedded systems: Characteristics, operational and non-operational quality attributes.</p> <p>Embedded Systems – Application and Domain Specific: Application specific – washing machine, domain specific - automotive.</p>	15 L
Unit II	<p>Embedded Hardware: Memory map, i/o map, interrupt map, processor family, external peripherals, memory – RAM, ROM, types of RAM and ROM, memory testing, CRC Flash memory.</p> <p>Peripherals: Control and Status Registers, Device Driver, Timer Driver - Watchdog Timers.</p> <p>Designing Embedded System with 8051 Microcontroller: Factors to be considered in selecting a controller, why 8051 Microcontroller, Designing with 8051.</p>	15 L
Unit III	<p>The 8051 Microcontrollers: Microcontrollers and Embedded processors, Overview of 8051 family. 8051 Microcontroller hardware, Input/output pins, Ports, and Circuits, External Memory.</p> <p>Programming embedded systems: structure of embedded program, infinite loop, compiling, linking and debugging.</p> <p>8051 Programming in C: Data Types and time delay in 8051 C, I/O Programming, Logic operations, Data conversion Programs.</p> <p>Real Time Operating System (RTOS): Operating system basics, types of operating systems, Real-Time Characteristics, Selection Process of an RTOS.</p>	15 L

Unit IV	<p>Design and Development: Embedded system development Environment – IDE, types of file generated on cross compilation, disassembler/ de-compiler, simulator, emulator and debugging, embedded product development life-cycle, trends in embedded Industry</p> <p>Research: Home Automation, Fuzzy logics , Security systems.</p> <p>Internet of Things: Introduction, Design Principles for connected Devices.</p>	15 L
<p>Textbook:</p> <ol style="list-style-type: none"> 1. Michael Barr. (1999). <i>Programming Embedded Systems in C and C++</i>:O'Reilly. 2. Shibu K V. (2012). <i>Introduction to embedded systems</i>: TataMcgraw-Hill. 3. Muhammad Ali Mazidi. (2011). <i>The 8051 Microcontroller and Embedded Systems</i>: Pearson. 4. Rajkamal. <i>Embedded Systems</i>: TataMcgraw-Hill. 		

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II. Semester End Examination (SEE)- 60 Marks

Q.1 Answer any two -10 Marks

Q.2 Answer any two -10 Marks

Q.3 Answer any two -10 Marks

Q.4 Answer any two -10 Marks

Q.5 Answer any four -20 Marks

[B] Evaluation scheme for Practical courses

(i) Internal Practical – 20 marks

(ii) External Practical – 30 marks

Course: SBIT403	Course Title: Computer Oriented Numerical and Statistical Techniques (Credits : 02 Lectures/Week: 05)	
	Objectives: Statisticians help to design data collection plans, analyze data appropriately and interpret and draw conclusions from those analyses. The central objective of the undergraduate major in Statistics is to equip students with consequently requisite quantitative skills that they can employ and build on in flexible ways. Outcomes: <ul style="list-style-type: none"> ➤ The fundamentals of probability theory. ➤ Statistical reasoning and inferential methods. ➤ Statistical computing. ➤ Statistical modeling and its limitations, and have skill in Description, interpretation and exploratory analysis of data by graphical and other means. 	
Unit I	Measures of Central Tendency: Index, or Subscript, Notation, Summation Notation, Averages, or Measures of Central Tendency ,The Arithmetic Mean , The Weighted Arithmetic Mean ,Properties of the Arithmetic Mean ,The Arithmetic Mean Computed from Grouped Data ,The Median ,The Mode, The Empirical Relation Between the Mean, Median, and Mode, The Geometric Mean G, The Harmonic Mean H ,The Relation Between the Arithmetic, Geometric, and Harmonic Means, Quartiles, Deciles, and Percentiles, Software and Measures of Central Tendency. The Standard Deviation and Other Measures of Dispersion: Dispersion, or Variation, The Range, The Mean Deviation, The Semi Inter quartile Range, The 10–90 Percentile Range, The Standard Deviation, The Variance, Short Methods for Computing the Standard Deviation, Properties of the Standard Deviation, Charlie’s Check, Sheppard’s Correction for Variance, Empirical Relations Between Measures of Dispersion, Absolute and Relative Dispersion; Coefficient	15 L
Unit II	Moments, Skewness, and Kurtosis : Moments , Moments for Grouped Data ,Relations Between Moments , Computation of Moments for Grouped Data, Charlie’s Check and Sheppard’s Corrections, Moments in Dimensionless Form, Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis, Software Computation of Skewness and Kurtosis Elementary Sampling Theory : Sampling Theory, Random Samples and Random Numbers, Sampling With and Without Replacement, Sampling Distributions, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distributions of Di ff and Sums, Standard Errors, Software Demonstration of Elementary Sampling Theory. Truncation Errors: Approximations and Round-Off Errors, Accuracy and Precision, The Bisection Method, The Newton-Raphson Method, The Regula-falsi method, The Secant Method. Interpolation: Forward Difference, Backward Difference, Newton’s	15 L

	Forward Difference Interpolation, Newton's Backward Difference Interpolation, Lagrange's Interpolation.	
Unit III	<p>Distributions: Discrete distributions: Uniform, Binomial, Poisson, Bernoulli, Continuous distributions: uniform distributions, exponential, (derivation of mean and variance only and state other properties and discuss their applications) Normal distribution state all the properties and its applications.</p> <p>Statistical Decision Theory: Statistical Decisions, Statistical Hypotheses, Tests of Hypotheses and Significance, or Decision Rules, Type I and Type II Errors, Level of Significance, Tests Involving Normal Distributions, Two-Tailed and One-Tailed Tests, Special Tests, Operating-Characteristic Curves; the Power of a Test, p-Values for Hypotheses Tests, Control Charts, Tests Involving Sample Difference Tests Involving Binomial Distributions.</p> <p>Small Sampling Theory: Small Samples, Student's t Distribution, Confidence Intervals, Tests of Hypotheses and Significance, The Chi-Square Distribution, Confidence Intervals for Sigma, Degrees of Freedom, The F Distribution.</p>	15 L
Unit IV	<p>The Chi-Square Test: Observed and Theoretical Frequencies, Definition of chi-square, Significance Tests, The Chi-Square Test for Goodness of Fit, Contingency Tables, Yates' Correction for Continuity, Simple Formulas for Computing chi-square, Coefficient of Contingency, Correlation of Attributes, Additive Property of chi-square.</p> <p>Curve Fitting and the Method of Least Squares: Relationship Between Variables, Curve Fitting, Equations of Approximating Curves, Freehand Method of Curve Fitting, The Straight Line, The Method of Least Squares, The Least-Squares Line, Nonlinear Relationships, The Least-Squares Parabola, Regression, Applications to Time Series, Problems Involving More Than Two Variables.</p> <p>Correlation Theory: Correlation and Regression, Linear Correlation, Measures of Correlation, The Least-Squares Regression Lines, Standard Error of Estimate, Explained and Unexplained Variation, Coefficient of Correlation Remarks Concerning the Correlation Coefficient Product-Moment Formula for the Linear Correlation Coefficient, Short Computational Formulas, Regression Lines and the Linear Correlation Coefficient, Correlation of Time Series, Correlation of Attributes, Sampling Theory of Correlation,</p>	15 L
Research Component	<ol style="list-style-type: none"> 1. Data Mining 2. Simulation 3. Neural Networks 4. Business Analytics. 5. Machine Learning. 6. Operational Research. 	

Textbook:

5. STATISTICS, Murray R. Spiegel, Larry J. Stephens., McGRAW – HILL INTERNATIONAL
6. Numerical Methods for Engineers, S. S. Shastri, PHI
7. FUNDAMENTAL OF MATHEMATICAL STATISTICS, S.C. GUPTA and V.K. KAPOOR, SULTAN CHAND and SONS

Evaluation Scheme**[A] Evaluation scheme for Theory courses****I. Continuous Assessment (C.A.) - 40 Marks**

(i) C.A.-I : Test – 20 Marks of 40 mins. duration

(ii) C.A.-II :Assignment- 20 Marks

II. Semester End Examination (SEE)- 60 Marks

Q.1 Answer any two -10 Marks

Q.2 Answer any two -10 Marks

Q.3 Answer any two -10 Marks

Q.4 Answer any two -10 Marks

Q.5 Answer any four -20 Marks

[B] Evaluation scheme for Practical courses

(i) Internal Practical – 20 marks

(ii) External Practical – 30 marks

Course: SBIT404	Course Title: Software Methodologies and Management (Credits : 02 Lectures/Week: 05)	
	Objectives: <ul style="list-style-type: none"> ➤ Understanding time management, project and resource management. ➤ Learning Development methodologies, architecture and designing of software systems Outcomes: This course is aimed at helping students build up an understanding of how to develop a software system from scratch by guiding them thru the development process and giving them the fundamental principles of system development with object oriented	
Unit I	Introduction: What is software engineering? Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance etc. Socio-technical system: Essential characteristics of socio technical systems, Emergent System Properties, Systems Engineering, Components of system such as organization, people and computers, Dealing Legacy Systems. Critical system: Types of critical system, A simple safety critical system, Dependability of a system, Availability and Reliability, Safety and Security of Software systems. Software Processes: Process and Project, Component Software Processes. Software Development Process Models: Waterfall Model, Prototyping, Iterative Development, Rational Unified Process, The RAD Model, Time boxing Model, DevOps Software Development Life Cycle, Lean Software Development Life Cycle, Feature Driven Development, Joint Application Development, Dynamic System Development. Agile software development: Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods, Scrum, Sprint. Software Requirements: Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements.	15 L
Unit II	Requirements Engineering Processes: Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management. System Models: Models and its types, Context Models, Behavioural Models, Data Models, Object Models, Structured Methods. Architectural Design: System Organisation, Modular Decomposition Styles, Control Styles, Reference Architectures. User Interface Design: The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation. Software Project Management: Introduction, What is Project	15 L

	<p>Management? Management activities, Project Planning, Project Scheduling, Risk Management, Boehm's top 10, WBS, PERT, Monte Carlo, Critical chain. Management Control, Project Management Life Cycle, Plans, Methods and Methodologies, Some Ways of Categorizing Software Projects, Project Charter, Stakeholders, Setting Objectives, The Business Case, Project Success and Failure, Traditional versus Modern Project Management Practices.</p> <p>10 Steps of Project Planning: : Step 0: Select Project, Step 1: Identify Project Scope and Objectives, Step 2: Identify Project Infrastructure, Step 3: Analyse Project Characteristics, Step 4: Identify Project Products and Activities, Step 5: Estimate Effort for Each Activity, Step 6: Identify Activity Risks, Step 7: Allocate Resources, Step 8: Review/Publicize Plan, Steps 9 and 10: Execute Plan/Lower Levels of Planning</p> <p>Selection of an Appropriate Project Approach based on Software Development Process Models: Introduction, Build or Buy? Choosing Methodologies and Technologies, Software Processes and Process Models, Choice of Process Models, Structure versus Speed of Delivery, Selecting the Most Appropriate Process Model.</p>	
Unit III	<p>Quality Management: Process and Product Quality, Quality assurance and, Quality Control.</p> <p>Software Testing: Introduction to testing, What is a test case? Why testing is important? Types of testing: System Testing and Components Testing, What is Verification and Validation?</p> <p>Software Measurement and Metric: Size-Oriented Metrics, Function-Oriented Metrics, Extended Function Point Metrics, Software effort estimation, Albrecht Function Point, Analysis, Function Points Mark II, COSMIC Full Function Points, COCOMO and COCOMO II: Introduction, types, classes, A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating Rules of Thumb.</p> <p>Software Cost Estimation: Estimation, Project Duration and Staffing</p>	15 L
Unit IV	<p>Process Improvement: Process and product quality, Process Classification, Process Measurement, Process Analysis and Modeling, Process Change, The CMMI Process Improvement Framework.</p> <p>Service Oriented Software Engineering: Service Oriented Architecture(SOA), Services as reusable components, Service Engineering, Software Development with Services.</p> <p>Software reuse: The reuse landscape, Application frameworks, Software product lines, COTS product reuse, Component Based Software Engineering(CBSE).</p> <p>Distributed software engineering: Distributed systems, Distributed systems issues, Client-server computing, Architectural patterns for distributed systems, Software as a service (Saas), infrastructure as a service (IaaS) and platform as a service (PaaS).</p>	15 L

Research Component	Research has to be done for the following : 1) Methodology (unit 1) 2) Risk identification and analysis (unit 2) 3) Decision Making for cost, efforts, benefit estimation(unit 4)	
Textbook: <ol style="list-style-type: none"> 1. Software Engineering, Ian Somerville ,Pearson Education,Ninth Edition 2. Software Engineering, PankajJalote ,Narosa Publication 3. Software engineering, a practitioner’s approach, Roger Pressman,TataMcgraw-hill, Seventh Edition, 2018 4. Project Management and Tools & Technologies , ShaileshMehta,SPD,First 2017 5. Software Project Management, Walker Royce, Pearson, 2005 		

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- Q.5 Answer any four -20 Marks

[B] Evaluation scheme for Practical courses

- (i) Internal Practical – 20 marks
- (ii) External Practical – 30 marks

Course: SBIT405	Course Title: Advanced Networks and Security (Credits : 02 Lectures/Week: 05)	
	<p>Objectives: This course is designed to:</p> <ul style="list-style-type: none"> ➤ Provide an in-depth view of the advanced technologies used in enterprise-wide computer networks. ➤ Provide the theoretical foundation and practical skills of advanced computer networks. ➤ Understanding Wireless LAN Design, WAN Technologies and the Enterprise Edge ➤ Students will learn the basic concepts in computer security including software vulnerability analysis and defense, networking and wireless security, applied cryptography, as well as ethical, legal, social and economic facets of security. <p>Outcomes: Upon completion of the course, students will be able to:</p> <ul style="list-style-type: none"> ➤ Analyze state-of-the-art real-world enterprise-wide networks. ➤ Design and build advanced enterprise-wide computer networks. ➤ Analyze Enterprise LAN, Wireless LAN, WAN technologies design. ➤ Identify some of the factors driving the need for Computer security ➤ Identify physical points of vulnerability in simple networks ➤ Design and implement appropriate security technologies and policies to protect computers and digital information 	
Unit I	<p>General Network Design: Network Design Methodology, Architectures for the Enterprise, Borderless Networks Architecture, Collaboration and Video Architecture, Data Center and Virtualization Architecture, Design Lifecycle: Plan, Build, Manage Plan Phase Build Phase Manage Phase Prepare, Plan, Design, Implement, Operate, and Optimize Phases Prepare Phase Plan Phase Design Phase Implement Phase Operate Phase Optimize Phase Summary of PPDIIO Phases Project Deliverables Design Methodology Identifying Customer Design Requirements Characterizing the Existing Network Steps in Gathering Information Network Audit Tools Network Checklist Designing the Network Topology and Solutions Top-Down Approach Pilot and Prototype Tests Design Document.</p> <p>Network Design Models: Hierarchical Network Models Benefits of the Hierarchical Model, Hierarchical Network Design, Core Layer, Distribution Layer, Access Layer, Hierarchical Model Examples, Hub-and-Spoke, Design Collapsed Core, Design Enterprise Architecture Model, Enterprise Campus Module, Enterprise Edge Area, E-Commerce Module, Internet Connectivity Module, VPN/Remote Access, Enterprise WAN, Service Provider Edge Module, Remote Modules, Enterprise Branch Module, Enterprise Data Center Module, Enterprise Teleworker Module, High Availability Network Services, Workstation-to-Router Redundancy and LAN, High Availability Protocols, ARP Explicit Configuration, RDP, RIP, HSRP, VRRP, GLBP, Server Redundancy, Route Redundancy, Load Balancing, Increasing Availability, Link Media</p>	15 L

	<p>Redundancy.</p> <p>Information Security Overview : The Importance of Information Protection, The Evolution of Information Security, Justifying Security Investment, Security Methodology, How to Build a Security Program, The Impossible Job, The Weakest Link, Strategy and Tactics, Business Processes vs. Technical Controls.</p> <p>Risk Analysis: Threat Definition, Types of Attacks, Risk Analysis.</p>	
Unit II	<p>Enterprise LAN Design: LAN Media, Ethernet Design Rules, 100Mbps Fast Ethernet Design Rules, Gigabit Ethernet Design Rules, 1000BASE-LX Long-Wavelength Gigabit Ethernet, 1000BASE-SX Short-Wavelength Gigabit Ethernet, 1000BASE-CX Gigabit Ethernet over Coaxial Cable, 1000BASE-T Gigabit Ethernet over UTP 86, 10 Gigabit Ethernet Design Rules, 10GE Media Types, EtherChannel, Comparison of Campus Media LAN Hardware, Repeaters, Hubs, Bridges, Switches, Routers, Layer 3 Switches, Campus LAN Design and Best Practices Best Practices for Hierarchical Layers, Access Layer Best Practices, Distribution Layer Best Practices, Core Layer Best Practices, STP Design Considerations, STP Toolkit, PortFast, UplinkFast, BackboneFast, Loop Guard, Root Guard, BPDU Guard, BPDU Filter, VLAN and Trunk Considerations, Unidirectional Link Detection (UDLD) Protocol, Large-Building LANs, Enterprise Campus LANs, Edge Distribution, Medium-Size LANs, Small and Remote Site LANs, Server Farm Module, Server Connectivity Options, Enterprise Data Center Infrastructure, Campus LAN QoS Considerations, Multicast Traffic Considerations, CGMP, IGMP Snooping.</p> <p>Data Center Design: Enterprise DC Architecture, Data Center Foundation Components, Data Center Topology Components, Data Center Network Programmability, SDN, Controllers, APIs, ACI, Challenges in the DC, Data Center Facility Aspects, Data Center Space, Data Center Power, Data Center Cooling, Data Center Heat, Data Center Cabling, Enterprise DC Infrastructure, Data Center Storage, Data Center Reference Architecture, Defining the DC Access Layer, Defining the DC Aggregation Layer, Defining the DC Core Layer, Security in the DC, Fabric Extenders, Virtualization Overview, Challenges, Defining Virtualization and Benefits, Virtualization Risks, Types of Virtualization, Virtualization Technologies, VSS, VRF, vPC, Device Contexts, Server Virtualization, Server Scaling, Virtual Switching, Network Virtualization Design Considerations, Access Control, Path Isolation, Services Edge, Data Center Interconnect, DCI Use Cases, DCI Transport Options, DCI L2 Considerations, Load Balancing in the DC, Application Load Balancing, Network Load Balancing.</p>	15 L
Unit III	<p>Wireless LAN Design: Wireless LAN Technologies, WLAN Standards, ISM and UNII Frequencies, Summary of WLAN Standards, Service Set Identifier, WLAN Layer 2 Access Method, WLAN Security, Unauthorized Access, WLAN Security Design Approach, IEEE 802.1X-2001 Port-Based Authentication, Dynamic WEP Keys and LEAP, Controlling WLAN Access to Servers, WLAN Authentication,</p>	15 L

	<p>Authentication Options, WLAN Controller Components, WLC Interface Types, AP Controller Equipment Scaling, Roaming and Mobility Groups, Intracontroller Roaming, Layer 2 Intercontroller Roaming, Layer 3 Intercontroller Roaming, Mobility Groups, WLAN Design, Controller Redundancy Design: Deterministic vs. Dynamic, N+1 WLC Redundancy, N+N WLC Redundancy, N+N+1 WLC Redundancy, Radio Management and Radio Groups, RF Groups, RF Site Survey, Using EoIP Tunnels for Guest Services, Wireless Mesh for Outdoor Wireless, Mesh Design Recommendations, Campus Design Considerations, Power over Ethernet (PoE), Wireless and Quality of Service (QoS), Branch Design Considerations, Local MAC, REAP, Hybrid REAP, Branch Office Controller Options.</p> <p>WAN Technologies and the Enterprise Edge: WAN and Enterprise Edge Overview, Definition of WAN, WAN Edge Module, Enterprise Edge Modules, WAN Transport Technologies, ISDN, ISDN BRI Service, ISDN PRI Service, Digital Subscriber Line, Cable, Wireless, Frame Relay, Time-Division Multiplexing, Metro Ethernet, SONET/SDH, Multiprotocol Label Switching (MPLS), Dark Fiber, Dense Wavelength-Division Multiplexing, Ordering WAN Technology and Contracts, WAN and Edge Design Methodologies, Response Time, Throughput, Reliability, Bandwidth Considerations, WAN Link Categories, Optimizing Bandwidth Using QoS, Queuing, Traffic Shaping and Policing, Classification, Congestion Management, Priority Queuing, Custom Queuing, Weighted Fair Queuing, Class-Based Weighted Fair Queuing, Low-Latency Queuing, Traffic Shaping and Policing, Link Efficiency, Window Size, DMZ Connectivity, Segmenting DMZs, DMZ Services, Internet Connectivity, Centralized Internet (Branch) vs. Direct Internet (Branch), High Availability for the Internet Edge, VPN Network Design.</p>	
<p>Unit IV</p>	<p>Secure Design Principles: The CIA Triad and Other Models, Defense Models, Zones of Trust, Best Practices for Network Defense.</p> <p>Authentication and Authorization: Authentication, Authorization</p> <p>Encryption: A Brief History of Encryption, Symmetric-Key Cryptography, Public Key Cryptography, Public Key Infrastructure.</p> <p>Firewalls: Overview, The Evolution of Firewalls, Core Firewall Functions, Additional Firewall Capabilities, Firewall Design.</p> <p>Wireless and WAN Security: Radio Frequency Security Basics, Data-Link Layer Wireless Security Features, Flaws, and Threats, Wireless Vulnerabilities and Mitigations, Wireless Network Hardening Practices and Recommendations, Wireless Intrusion Detection and Prevention, Wireless Network Positioning and Secure Gateways.</p> <p>Intrusion Detection and Prevention Systems: IDS Concepts, IDS Types and Detection Models, IDS Features, IDS Deployment Considerations, Security Information and Event Management (SIEM).</p> <p>Research Component: On Network Design</p>	<p>15 L</p>

Textbook:

1. CCDA200-310 Official Cert Guide, ANTHONY BRUNO, CCIE No. 2738, STEVE JORDAN, CCIE No. 11293, Cisco Press
2. Network Warrior, Gary A Donabue, O Reilly, 2nd Edition, 2011
3. The Complete Reference: Information Security, Mark Rhodes-Ousley, McGraw-Hill 2nd Edition, 2013

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[B] Evaluation scheme for Practical courses

(i) Internal Practical – 20 marks

(ii) External Practical – 30 marks

Semester IV – Practical

Course: SBIT401PR	Practical Title: Advanced Web Programming Practical (Credits : 02Practicals/Week: 03) 1)Working with basic C# and ASP.NET <ul style="list-style-type: none">a) Create simple application to perform following operations<ul style="list-style-type: none">i. Finding Factorial Valueii. Generate Fibonacci series.iii. Test for prime numbers.iv. Test for vowels.b) Create an application to demonstrate String and Array Operationsc) Create an application that receives the following information from a set of students:StudentId,StudentName,CourseName,Date of Birth. The application should also display the information of all the student once the data entered 2) Working with Object Oriented C# and ASP.NET <ul style="list-style-type: none">a) Create a simple application to perform following operations<ul style="list-style-type: none">i. Function Overloadingii. Inheritance (all types)iii. Constructor overloadingiv. Interfacesb) Create a simple application to demonstrate use of following concepts<ul style="list-style-type: none">i. Using Delegates and eventsii. Exception handling 3) Create a web application to demonstrate use of reading and writing operation with XML 4) Working with ASP.net file types and Assembly <ul style="list-style-type: none">i. Working with global.asax and web.config fileii. Program to create and use DLL 5) Working with Web forms and Controls <ul style="list-style-type: none">i. Create a simple web page with various server controls to demonstrate setting and use of their properties (Example: AutoPostBack)ii. Demonstrate the use of Calendar Control 6) Working with Form Controls <ul style="list-style-type: none">i. Create a registration form to demonstrate use of various Validation Controlsii. Create a web form to demonstrate use of Adrotator Controliii. Create a web form to demonstrate use of User Control 7) Working with Navigation, Master page, Style, themes and States <ul style="list-style-type: none">i. Create a web form to demonstrate use of Website navigation and SiteMap
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- ii. Create a web application to demonstrate use of Master Page and applying styles and Themes for page beautification
- iii. Create a web application to demonstrate various states of ASP.NET pages

8) Working with Database

- i. Create a web application for inserting, Updating and deleting record from a database (Using Execute-Non-Query)
- ii. Create a web application to display Student Name on dropdown list control and on Selection display the phone no of an Student using database

9) Working with Dataset and SQL data source

- i. Create a web application to display disconnected data access and data binding using Grid view
- ii. Create a web application to demonstrate various uses and properties of Sql data source

10) Working with Data Controls

- i. Create a web application to demonstrate data binding using Grid view
- ii. Create a web application to demonstrate data binding using Details view
- iii. Create a web application to demonstrate data binding using form view control

11) Working with AJAX and Security

- i. Create a web application to demonstrate use of various AJAX controls
- ii. Create a web application to demonstrate form Security with Authentication and Authorization Properties

12) Implement a program on Web services

Course: SBIT402PR	Practical Title: Embedded System Practical (Credits : 02 Practicals/Week: 03)
	<p>1.Design and develop a reprogrammable embedded computer using 8051 microcontrollers and to show the following aspects.</p> <p>a. Programming b. Execution c. Debugging</p> <p>2.</p> <p>(a) Configure timer control registers of 8051 and develop a program to generate given time delay.</p> <p>(b) To demonstrate use of general purpose port i.e. Input/ output port of two controllers for data transfer between them.</p> <p>3.</p> <p>(a) Port I / O: Use one of the four ports of 8051 for O/P interfaced to eight LED's. Simulate binary counter (8 bit) on LED's</p> <p>(b) To interface 8 LEDs at Input-output port and create different patterns.</p> <p>(c) To demonstrate timer working in timer mode and blink LED without using any loop delay routine</p> <p>4.</p> <p>(a) Serial I / O: Configure 8051 serial port for asynchronous serial communication with serial port of PC exchange text messages to PC and display on PC screen. Signify end of message by carriage return.</p> <p>(b) To demonstrate interfacing of seven-segment LED display and generate counting from 0 to 99 with fixed time delay.</p> <p>(c) Interface 8051 with D/A converter and generate square wave of given frequency on oscilloscope.</p> <p>5.</p> <p>(a) Interface 8051 with D/A converter and generate triangular wave of given frequency on oscilloscope</p> <p>(b) Using D/A converter generate sine wave on oscilloscope with the help of lookup table stored in data area of 8051.</p> <p>6. Interface stepper motor with 8051 and write a program to move the motor through a given angle in clock wise or counter clock wise direction.</p> <p>7. Generate traffic signal</p> <p>8. Implement Temperature controller.</p> <p>9. Implement Elevator control</p> <p>10. Using FlashMagic</p> <p>(a) To demonstrate the procedure for flash programming for reprogrammable embedded system board using FlashMagic</p> <p>(b) To demonstrate the procedure and connections for multiple controllers programming of same type of controller with same source code in one go, using flash magic.</p>

Course: SBIT403PR	Practical Title: Computer Oriented Numerical and Statistical Technique Practical (Credits : 02 Practicals/Week: 03)
	<p>1. Introduction of R</p> <ul style="list-style-type: none"> a. Using R execute the basic commands, array, list and frames. b. Create a Matrix using R and Perform the operations addition, inverse, transpose and multiplication operations. <p>2. Measures of Dispersion</p> <ul style="list-style-type: none"> a. Using R Execute the statistical functions: mean, median, mode, quartiles, range, inter quartile range histogram b. Using R import the data from Excel / .CSV file and Calculate the standard deviation, variance, co-variance <p>3. Distributions</p> <ul style="list-style-type: none"> a. Program for Uniform distribution. b. Program for Bernoulli distribution c. Program for Negative binomial distribution. <p>4. Interpolation</p> <ul style="list-style-type: none"> a. Program for Newton's forward interpolation. b. Program for Newton's backward interpolation. c. Program for Lagrange's interpolation. <p>5. Using R import the data from Excel / .CSV file and draw the skewness.</p> <p>6. Import the data from Excel / .CSV and perform the hypothetical testing.</p> <p>7. Import the data from Excel / .CSV and perform the Chi-squared Test.</p> <p>8. Perform the Linear Regression using R.</p> <p>9. Compute the Least squares means using R.</p> <p>10. Compute the Linear Least Square Regression.</p>

Course: SBIT404PR	Practical Title: Software Methodologies and Management Practical (Credits : 02 Practicals/Week: 03) <ol style="list-style-type: none">1. Study and implementation of class diagrams.2. Study and implementation of Use Case Diagrams.3. Study and implementation of Entity Relationship Diagrams4. Study and implementation of Sequence Diagrams5. Study and implementation of State Transition Diagrams6. Study and implementation of Data Flow Diagrams.7. Study and implementation of Collaboration Diagrams.8. Study and implementation of Activity Diagrams.9. Study and implementation of Component Diagrams.10. Study and implementation of Deployment Diagrams
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Course: SBIT405PR	Practical Title: Advanced Networks and Security Practical (Credits : 02 Practicals/Week: 03)
	<ol style="list-style-type: none"> 1. Configuring OSPF –I <ol style="list-style-type: none"> a) Single-Area OSPF Link Costs and InterfacePriorities b) Multi-Area OSPF with Stub Areas andAuthentication 2. CONFIGURING OSPF –II <ol style="list-style-type: none"> a) OSPF Virtual Links and AreaSummarization b) OSPF over FrameRelay 3. REDISTRIBUTION AND ADMINISTRATIVEDISTANCES <ol style="list-style-type: none"> a) Redistribution Between RIP andOSPF b) Manipulating AdministrativeDistances 4. BGP <ol style="list-style-type: none"> a) Configuring BGP with Default Routing b) Using the AS_PATHAttribute c) BGP Route Reflectors and Route Filters 5. CONFIGURE NATSERVICES 6. VLANS ANDEETHERCHANNEL <ol style="list-style-type: none"> a) Static VLANS, VLAN Trunking, and VTP Domains andModes b) ConfiguringEtherChannel 7. Layer 2 VLANSecurity 8. Configure Routers <ol style="list-style-type: none"> a)OSPF MD5 authentication. b)NTP. c)to log messages to the syslog server. d)to support SSH connections. 9. Configure AAAAuthentication <ol style="list-style-type: none"> a) Configurea localuser accountonRouterandconfigure authenticate on the console and vty lines using localAAA b) Verify local AAA authentication from the Router console and the PC-Aclient 10. Configuring Extended ACLs <ol style="list-style-type: none"> a)Configure, Apply and Verify an Extended Numbered ACL