

Resolution No.: AC/ 2021

Bharatiya Vidya Bhavan's

**M. M. College of Arts, N.M. Institute of Science, H.R.J. College of Commerce.
(Bhavan's College) Autonomous**

(Affiliated to University of Mumbai)



Syllabus for: S. Y. B. Sc (Information Technology)

Program: B. Sc (Information Technology)

Program Code: B. Sc. IT

Course Code: (BH.USITS)

Choice Based Credit System (CBCS)

with effect from academic year 2022-23

**Approved at Board of Studies meeting Resolution number 1,2 BSCIT/SY /2022
dated 02/12/2021, 27/12/2021**



PROGRAM OUTCOMES

	PO Description
PO	A student completing Bachelor's Degree in Science program will be able to:
PO-1	Create, select, and apply appropriate current techniques, resources in the core areas of information management, programming, networking, and cyber security, web systems and green technologies.
PO-2	Identify, formulate, use research literature, analyze information technology related problems and design the system or provide the solution for the problem.
PO-3	Apply ethical principles and commit to professional ethics and responsibilities and norms of the Information Technology practice.
PO-4	Understand the impact of the Information Technology solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO-5	Design solutions for system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the societal, and environmental considerations.
PO-6	Function in multidisciplinary teams by working cooperatively, creatively and responsibly as a member of a team.

PROGRAM SPECIFIC OUTCOMES

	Description
PSO	A student completing a Bachelor's Degree in BSc. Program with the subject of Information Technology will be able to
PSO-1	think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
PSO-2	analyze a problem, design, implement the computing requirements, and evaluate computer-based system, process, component, or program to meet desired needs.
PSO-3	manage complex IT projects with consideration of the human, financial and environmental factors
PSO-4	adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct



PSO-5	communicate effectively with a range of audiences both technical and non-technical.
PSO-6	develop an aptitude to engage in continuing professional development



Existing Syllabus		Revised Syllabus		Rationale
Course titles	Semester	Course titles	Semester	
Python Programming	3	Core Java	3	After learning Imperative programming skills in first year , GUI development using java is introduced in semester 3 .
Data Structures	3	Data Structures using Python	3	Python Programming is taught in semester 2 of revised syllabus. Focus is on Implementation of data structures using python language
Computer Networks	3	Computer Networks	3	Additional concept are introduced in Session and application layer of OSI framework
Database Management Systems	3	Operating System	3	This course was earlier in semester 1. Its shifted to semester 3.At semester Learners find difficulty in learning and understanding. Continuity is maintained by having Linux System administration in semester 4



Applied Mathematics	3	Computer Oriented Statistical Techniques	3	<p>Applied Mathematics is shifted to semester 1.</p> <p>After learning Mathematics at 10 +2 level , the gap of relearning Mathematics concepts after one year is eliminated by shifting Course from semester 3 to semester 1.</p> <p>Numerical and statistical methods is taught in semester 2 .</p> <p>Further learners shall be learning techniques in semester 3 using R software</p>
Core Java	4	Business Intelligence	4	<p>Semester 4 main focus is given on Implementation techniques.</p> <p>Fundamentals of Digital Marketing using Web Analytics is new course introduced .</p> <p>Other courses are from semester 5,6 which will be taught in semester 4</p>
Introduction to Embedded Systems	4	Advanced Web Programming	4	
Computer Oriented Statistical Techniques	4	Fundamentals of Digital Marketing using Web Analytics	4	
Software Engineering	4	Linux Administration	4	
Computer Graphics and Animation	4	Software Engineering and Management Practices	4	



**PROGRAM OUTLINE
FOR BSc. Information Technology**

Sem ester	Core course 16 CREDIT(T+P) =2+2 /COURSE	Ability enhancemen t course CREDIT 2	Skill enhanceme nt course CREDIT 2	Discipline specific elective* CREDIT 2	Generic elective CREDIT0 2	TOT AL CRE DITS
I	Imperative Programming BH. USITS101	Communication Skills BH. USITS105				20
I	Digital Electronics BH. USITS102					
I	Microprocessor & Microcontroller BH. USITS103					
I	Applied Mathematics BH. USITS104					
II	Python Programming BH. USITS201	Green Computing BH. USITS205				20
II	Database Management System BH. USITS202					
II	Web Programming BH. USITS203					
II	Numerical & Statistical Methods BH. USITS204					
III	Computer Oriented Statistical Techniques BH. USITS302		Core Java BH. USITS301			20
III	Computer Networks BH. USITS303					
III	Data Structures using Python BH. USITS304					
III	Operating System BH. USITS305					
IV	Advanced Web Programming BH. USITS402		Fundamenta ls of Digital Marketing			20



IV	Business Intelligence BH. USITS403		using Web Analytics BH. USITS401			
IV	Linux Administration BH. USITS404					20
IV	Software Engineering and Management Practices BH. USITS405					



YE A R	SEMESTE R	COURSE TYPE	COURSE CODE	COURSE TITLE	CRED ITS
S.Y.B. Sc IT	III	Skill Enhancement Course	BH. USITS301	Core Java	02
S.Y.B. Sc IT	III	Core Course	BH. USITS302	Computer Oriented Statistical Techniques	02
S.Y.B. Sc IT	III	Core Course	BH. USITS303	Computer Networks	02
S.Y.B. Sc IT	III	Core Course	BH. USITS304	Data Structures using Python	02
S.Y.B. Sc IT	III	Core Course	BH. USITS305	Operating System	02
S.Y.B. Sc IT	III	Skill Enhancement Course Practical	BH. USITS3P 1	Core Java Practical	02
S.Y.B. Sc IT	III	Core Course Practical	BH. USITS3P 2	Computer Oriented Statistical Techniques Practical	02
S.Y.B. Sc IT	III	Core Course Practical	BH. USITS3P 3	Computer Networks Practical	02
S.Y.B. Sc IT	III	Core Course Practical	BH. USITS3P 4	Data Structures using Python Practical	02
S.Y.B. Sc IT	III	Core Course Practical	BH. USITS3P 5	Operating System Practical	02
S.Y.B. Sc IT	IV	Skill Enhancement Course	BH. USITS401	Fundamentals of Digital Marketing using Web Analytics	02
S.Y.B. Sc IT	IV	Core Course	BH. USITS402	Advanced Web Programming	02



S.Y.B. Sc IT	IV	Core Course	BH. USITS403	Business Intelligence	02
S.Y.B. Sc IT	IV	Core Course	BH. USITS404	Linux Administration	02
S.Y.B. Sc IT	IV	Core Course	BH. USITS405	Software Engineering and Management Practices	02
S.Y.B. Sc IT	IV	Skill Enhancemen t Course Practical	BH. USITS4P 1	Fundamentals of Digital Marketing using Web Analytics Practical	02
S.Y.B. Sc IT	IV	Core Course Practical	BH. USITS4P 2	Advanced Web Programming Practical	02
S.Y.B. Sc IT	IV	Core Course Practical	BH. USITS4P 3	Business Intelligence Practical	02
S.Y.B. Sc IT	IV	Core Course Practical	BH. USITS4P 4	Linux Administration Practical	02
S.Y.B. Sc IT	IV	Core Course Practical	BH. USITS4P 5	Software Engineering and Management Practices	02



DETAILED SYLLABUS

SEMESTER III & IV

PREAMBLE

Keeping an eye on the industry and to modernize the curriculum, the Board of Studies members of Information technology department has initiated syllabus to include industry oriented syllabus.

The main objective of this program is to inculcate among the students, the technical as well as the theoretical knowledge about information technology and its applications in different domain area.

The syllabus aims to focus on enabling the students to familiarize with upcoming technologies, enhance and strengthen the fundamental knowledge in Information Technology Applications, Mathematics, and Statistics. This programme will equip the students with the necessary knowledge and skills for the existing and emerging challenges that a career in computing and software technology will entail. In addition it prepares graduates to show high quality of independent thought, flexibility and maturity based on a sound technical knowledge of the field.

On completion of the program students should be able to,

- Use a range of programming languages and tools to develop computer programs and systems that are effective solutions to problems. Students employable and impart industry oriented training.
- to think analytically, creatively and critically in developing robust, extensible and highly maintainable technological solutions to simple and complex problems.
- to apply their knowledge and skills to be employed and excel in IT professional careers and/or to continue their education in IT and/or related postgraduate programmes.
- to adhere to the highest standards of ethics, including relevant industry and organizational codes of conduct.
- to communicate effectively with a range of audiences both technical and non-technical.
- to develop an aptitude to engage in continuing professional development.



DETAILED SYLLABUS
SEMESTER III & SEMESTER IV

Programme: B. Sc. IT				Semester: III	
Course: Core Java				Course Code: BH.USITS301	
Teaching Scheme				Evaluation Scheme (Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	(Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	4	-	2+2	40	60
Pre-requisites: Logic for problem solving, mathematical solution driving.					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. Gain knowledge about basic Java language syntax and semantics to write Java programs , use concepts such as variables, conditional and iterative constructs 2. Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods . 3. To apply Reusability concepts , Identify inheritance type and test , Use and create packages and interfaces 4. Basic GUI design using java swing. 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Create simple java applications 2. Apply the concepts of classes, methods and inheritance to design java programs 3. Design user defined Packages 4. Develop GUI applications using java swing and Event Handling. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods



<p>1</p>	<p>Introduction [Lecture 04]: History, architecture and its components, Java Class File, Java Runtime Environment, The Java Virtual Machine, JVM Components, The Java API, java platform, java development kit</p> <p>Lambda Expressions [Lecture 04]: Methods References, Type Annotations, Method Parameter Reflection, setting the path environment variable, Java Compiler And Interpreter, java programs, java applications, main(), public, static, void, string[] args, statements, white space, case sensitivity, identifiers, keywords, comments, braces and code blocks, variables, variable name primitive data types, Object Reference Types, Strings, Auto boxing.</p> <p>Operators [Lecture 04]: properties of operators, Arithmetic operators, assignment operators, increment and decrement operator, relational operator, logical operator, bitwise operator, conditional operator.</p> <p>Control Flow Statements [Lecture 04]: The If...Else If...Else Statement, The Switch...Case Statement Iterations: The While Loop, The Do ... While Loop, The For Loop, The Foreach Loop, Labeled Statements, The Break And Continue Statements, The Return Statement</p>	<p>12</p>
<p>2</p>	<p>Classes [Lecture 06]: Types of Classes, Scope Rules, Access Modifier, Instantiating Objects From A Class, Initializing The Class Object And Its Attributes, Class Methods, Accessing A Method, Method Returning A Value, Method's Arguments, Method Overloading, Variable Arguments [Varargs], Constructors, this Instance, super Instance, Characteristics Of Members Of A Class, constants, this instance, static fields of a class, static methods of a class, garbage collection.</p> <p>Inheritance [Lecture 06]: Derived Class Objects, Inheritance and Access Control, Default Base Class Constructors, this and super keywords. Abstract Classes And Interfaces, Abstract Classes, Abstract Methods, Interfaces, What Is An Interface? Difference between abstract class and interface, Defining An Interface, Implementing Interfaces Multiple Inheritance , Default Implementation, Adding New Functionality, Method Implementation, Classes V/s Interfaces,</p>	<p>12</p>



3	<p>Packages [Lecture 02]: Creating Packages, Default Package, Importing Packages, Using A Package.</p> <p>Enumerations, Arrays [Lecture 02]: Two Dimensional Arrays, Multi-Dimensional Arrays</p> <p>Vectors [Lecture 02]: Adding Elements To A Vector, Accessing Vector Elements, Searching For Elements In A Vector, Working With The Size of The Vector.</p> <p>Multithreading [Lecture 02]: the thread control methods, thread life cycle, the main thread, creating a thread, extending the thread class.</p> <p>Exceptions [Lecture 02]: Catching Java Exceptions, Catching Run-Time Exceptions, Handling Multiple Exceptions, The finally Clause, The throws Clause</p> <p>Byte streams [Lecture 02]: reading console input, writing console output, reading file, writing file, writing binary data, reading binary data, getting started with character streams, writing file, reading file</p>	12
4	<p>Event Handling [Lecture 03]: Delegation Event Model, Events, Event classes, Event listener interfaces, Using delegation event model, adapter classes and inner classes.</p> <p>Abstract Window Toolkit [Lecture 03]: Window Fundamentals, Component, Container,</p> <p>Swing UI controls [Lecture 03]: JLabel, JButton, JCheckBox, JRadioButton, JList, JComboBox, Choice, JTextField, JOptionpane, JPasswordField, JTextArea, JScrollBar, JFileChooser, Layout</p>	12
	Total	48
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Core Java 8 for Beginners Vaishali Shah, Sharnam Shah SPD 1st 2015 2. Java: The Complete Reference Herbert Schildt McGraw Hill 9th 2014 3. Murach's beginning Java with Net Beans Joel Murach , Michael Urban SPD 1st 2016 4. Core Java, Volume I: Fundamentals Hortsman Pearson 9th 2013 5. Core Java, Volume II: Advanced Features Gary Cornell and Hortsman Pearson 8th 2008 6. Core Java: An Integrated Approach R. Nageswara Rao DreamTech 1st 2008 <p>Self study Material: Version Upgrade Documentation Review / New technology research review</p>		
<p>PRACTICALS : Core JAVA practical BH.USITS3P1</p>		
Unit No.	Description	



<p>1</p>	<p>Java Basics</p> <p>a. Write a Java program that takes a number as input and prints its multiplication table upto 10.</p> <p>b. Write a Java program to display the following pattern.</p> <pre> ***** **** *** ** *</pre> <p>c. Write a Java program to print the area and perimeter of a circle.</p>
<p>2.</p>	<p>Use of Operators</p> <p>a. Write a Java program to add two binary numbers.</p> <p>b. Write a Java program to convert a decimal number to binary number and vice versa. c. Write a Java program to reverse a string.</p>
<p>3.</p>	<p>Java Data Types</p> <p>a. Write a Java program to count the letters, spaces, numbers and other characters of an input string.</p> <p>b. Implement a Java function that calculates the sum of digits for a given char array consisting of the digits '0' to '9'. The function should return the digit sum as a long value.</p> <p>c. Find the smallest and largest element from the array</p>
<p>4.</p>	<p>Methods and Constructors</p> <p>a. Designed a class SortData that contains the method asc() and desc().</p> <p>b. Designed a class that demonstrates the use of constructor and destructor.</p> <p>c. Write a java program to demonstrate the implementation of abstract class.</p>
<p>5.</p>	<p>Programs to illustrate Inheritance</p> <p>a. Write a java program to implement single level inheritance.</p> <p>b. Write a java program to implement method overriding</p> <p>c. Write a java program to implement multiple inheritance.</p>



<p>6.</p>	<p>Packages and Arrays</p> <p>a. Create a package, Add the necessary classes and import the package in java class.</p> <p>b. Write a java program to add two matrices and print the resultant matrix.</p> <p>c. Write a java program for multiplying two matrices and print the product for the same</p>
<p>7.</p>	<p>Vectors and Multithreading</p> <p>a. Write a java program to implement the vectors.</p> <p>b. Write a java program to implement thread life cycle.</p> <p>c. Write a java program to implement multithreading.</p>
<p>8.</p>	<p>File Handling</p> <p>a. Write a java program to open a file and display the contents in the console window.</p> <p>b. Write a java program to copy the contents from one file to other file.</p> <p>c. Write a java program to read the student data from user and store it in the file.</p>
<p>9</p>	<p>Swing controls and Exception Handling</p> <p>a. Design a program to print the factorial for an input value.</p> <p>b. Design an program to perform various string operations like reverse string, string concatenation etc.</p> <p>c. Write a java program to implement exception handling</p>
<p>10</p>	<p>Programs to illustrate Swing controls.</p> <p>a. Design an application that contains the interface to add student information and display the same.</p> <p>b. Design an application to generate result marks sheet</p>
<p>Practical's Reference Books:</p> <p>1. Core Java 8 for Beginners Vaishali Shah, Sharnam Shah SPD 1st 2015</p> <p>2. Java: The Complete Reference Herbert Schildt McGraw Hill 9th 2014</p> <p>3. Murach's beginning Java with Net Beans Joel Murach , Michael Urban SPD 1st 2016</p>	



Programme: BSC(IT)				Semester: III	
Course: Computer Oriented Statistical Techniques				Course	Code:
				BH.USITS302	
Teaching Scheme				Evaluation Scheme (Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	2 (2 batches) =4	---	2+2	40	60
Pre-requisites: -					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. To lay the mathematical foundation for Technical courses such as data structures, algorithms, relational database theory, automata theory and formal languages, compiler design, and cryptography, and for mathematics courses such as linear and abstract algebra, combinatorics, probability, logic and set theory, and number theory. By combining discussion of theory and practice. 2. To help students develop the ability to think abstractly. 3. To build up “recursive thinking.” 4. To solve a problem on a computer, it is necessary to find an algorithm or step-by-step sequence of instructions for the computer to follow. Designing an algorithm requires an understanding of the mathematics underlying the problem to be solved 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Think abstractly 2. Interpret mathematical theory and practice. 3. understand and analyze algorithms, based on different Relations. 4. Easily develop problem solving algorithms. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods



<p>1</p>	<p>The Mean, Median, Mode, and Other 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, The Root Mean Square, Quartiles, Deciles, and Percentiles, Software and Measures of Central Tendency.</p> <p>The Standard Deviation and Other Measures of Dispersion: Dispersion, or Variation, The Range, The Mean Deviation, The Semi-Interquartile 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 of Variation, Standardized Variable; Standard Scores, Software and Measures of Dispersion.</p>	<p>12</p>
<p>2</p>	<p>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.</p> <p>Elementary Probability Theory: Definitions of Probability, Conditional Probability; Independent and Dependent Events, Mutually Exclusive Events, Probability Distributions, Mathematical Expectation, Relation Between Population, Sample Mean, and Variance, Combinatorial Analysis, Combinations, Stirling’s Approximation to n!, Relation of Probability to Point Set Theory, Euler or Venn Diagrams and Probability.</p>	<p>12</p>
<p>3</p>	<p>Statistical Estimation Theory: Estimation of Parameters, Unbiased Estimates, Efficient Estimates, Point Estimates and Interval Estimates; Their Reliability, Confidence-Interval Estimates of Population Parameters, Probable Error.</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 Differences, Tests Involving Binomial Distributions.</p>	<p>12</p>



4	<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, Sampling Theory of Regression.</p>	12
Total		48

Reference Books:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	STATISTICS	Murray R. Spiegel, Larry J. Stephens.	McGRAW – HILL INTERNATIONAL	FOURTH	
2.	A Practical Approach using R	R.B. Patil, H.J. Dand and R. Bhavsar	SPD	1 st	2017
3.	FUNDAMENTAL OF MATHEMATICAL STATISTICS	S.C. GUPTA and V.K. KAPOOR	SULTAN CHAND and SONS	ELEVENTH REVISED	2011
4.	MATHEMATICAL STATISTICS	J.N. KAPUR and H.C. SAXENA	S. CHAND	TWENTIETH REVISED	2005

PRACTICALS : Computer Oriented Statistical Techniques practical BH.USITS3P2

Unit No.	Description
1	Using R execute the basic commands, array, list and frames.
2	Create a Matrix using R and Perform the operations addition, inverse, transpose and multiplication operations.
3	Using R Execute the statistical functions: mean, median, mode, quartiles, range, inter quartile range histogram
4	Using R import the data from Excel / .CSV file and Perform the above functions.



5	Using R import the data from Excel / .CSV file and Calculate the standard deviation, variance, co-variance.	
6	Perform the Linear Regression using R.	
7	Compute the Least squares means using R.	
8	Compute the Linear Least Square Regression	
Reference Books:		
Sr. No.	Title	Author/s
1.	A Practical Approach to R Tool	R.B. Patil, H.J. Dand and R. Dahake
2.	STATISTICS	Murray R. Spiegel, Larry J.



Programme: BSc.IT				Semester: III	
Course: Computer Networks				Course Code: BH.USITS303	
Teaching Scheme				Evaluation Scheme (Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	4	-	2+2	40	60
Pre-requisites: - Understanding of basic computers . Knowledge of basic C/Java					
COURSE OBJECTIVES: : 1. To understand networking models and features of the physical layer. 2. To describe data link and network layer protocols. 3. To study routing algorithms, advanced IP and transport layer protocols. 4. To learn session , presentation and application layer protocols.					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to 1.Recognize the technological trends of Computer Networking. 2.Realize working of data link and network protocols. 3. Develop a thorough understanding of the working of networks . 4.Understand and implement network programmes for various protocols					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	<p>Introduction [Lecture 03]: Data communications, networks, network types, Internet history, standards and administration. Network Models: Protocol layering, TCP/IP protocol suite, The OSI model.</p> <p>Physical layer [Lecture 03]: Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance, types of transmission media.</p> <p>Bandwidth Utilization [Lecture 03]: Multiplexing and Spectrum Spreading: Multiplexing, Spread Spectrum</p> <p>Switching [Lecture 03]: Introduction, circuit switched networks, packet switching networks.</p>				12



<p>2</p>	<p>Data Link Layer [Lecture 02]: Link layer addressing, Data Link Layer Design Issues, Error detection and correction, block coding, cyclic codes, checksum, forward error correction, error correcting codes, error detecting codes</p> <p>Data Link Control [Lecture 02]: DLC services, data link layer protocols, HDLC, Point-to-point protocol.</p> <p>Media Access Control [Lecture 02]: Random access, controlled access, channelization.</p> <p>Wired LANs [Lecture 02]: Ethernet Protocol</p> <p>Wireless LANs [Lecture 02]: Introduction, IEEE 802.11 project, Bluetooth</p> <p>Network Layer [Lecture 02] : Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP</p>	<p>12</p>
<p>3</p>	<p>Unicast Routing [Lecture 04]: Introduction, routing algorithms, unicast routing protocols.</p> <p>Next generation IP [Lecture 04]: IPv6 addressing, IPv6 protocol, transition from IPv4 to IPv6.</p> <p>Transport Layer [Lecture 04]: Introduction, Transport layer protocols (Simple protocol, Stop-and-wait protocol, Go-Back-n protocol, Selective repeat protocol, Bidirectional protocols) Transport layer services, User datagram protocol, Transmission control protocol.</p>	<p>12</p>
<p>4</p>	<p>Application Layer [Lecture 04]: World wide-web and HTTP, FTP, Electronic mail, Telnet, Secured Shell, Domain name system.</p> <p>Client-Server Programming [Lecture 04]: Application Program Interface, Using Services of the transport layer, Iterative Communication using UDP, Iterative communication using TCP, Concurrent Communication.</p> <p>Overview of Session Layer Protocols [Lecture 04]: AppleTalk Data Stream Protocol (ADSP) , Real-time Transport Control Protocol (RTCP), Point-to-Point Tunneling Protocol (PPTP) , Password Authentication Protocol (PAP) , Remote Procedure Call Protocol (RPCP) , Sockets Direct Protocol (SDP)</p>	<p>12</p>
	<p>Total</p>	<p>48</p>
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Data Communication and Networking, Fifth Edition, Behrouz Forozzaun. 2. Computer Networks Fifth Edition, Tanenbaum, Wetherall. 3. Online tutorials for computer networks eg: 		



PRACTICALS : Computer Networks practical BH.USITS3P3	
Unit No.	Description
1	a) IPv4 Addressing and Subnetting b) Given an IP address and network mask, determine other information about the IP address such as: <ul style="list-style-type: none"> • Network address • Network broadcast address • Total number of host bits • Number of hosts
2	Given an IP address and network mask, determine other information about the IP address such as: <ul style="list-style-type: none"> • The subnet address of this subnet • The broadcast address of this subnet • The range of host addresses for this subnet • The maximum number of subnets for this subnet mask • The number of hosts for each subnet • The number of subnet bits • The number of this subnet. The above practical will be performed using basic examples and case studies.
3	Use of network commands: ping and tracet / traceroute, ipconfig / ifconfig, route and arp utilities
4	Draw a network layout with its topology for network setup for different case studies.
5	a) Using Cisco Packet tracer configure IP static routing b) Using Cisco Packet tracer configure IP routing using RIP
6	Using Cisco Packet tracer configure Simple OSPF
7	Using Cisco Packet tracer configure DHCP server and client
8	Using Cisco Packet tracer configure DNS Server and client and analyzing the packets
9	Using Cisco Packet tracer configuring OSPF with multiple areas
10	a) Use of Wireshark to scan and check the packet information of following protocols <ul style="list-style-type: none"> • HTTP • ICMP • TCP • SMTP • POP3 b) Client Server Programming using C/Java
Reference Books: <ol style="list-style-type: none"> 1. Data Communication and Networking, Fifth Edition, Behrouz Forozan. 2. Computer Networks Fifth Edition, Tanenbaum, Wetherall. 	



Programme: BSc.IT				Semester: III	
Course: Data Structures using Python				Course Code: BH.USITS304	
Teaching Scheme				Evaluation Scheme (Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	4	-	2+2	40	60
Pre-requisites: -					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. To Generate various Lists, Dictionaries and Regular expressions and basic concepts in Python. 2. To Know the searching and sorting is performed in Python. 3. To Learn the linear and non-linear data structures work. 4. To Learn the fundamentals of writing Python scripts. 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Examine python syntax and semantics and apply python flow control and functions. 2. Create, run and manipulate python programs using core data structures like Linked Lists. 3. Learn the fundamentals of writing Python scripts for stacks,queues and hash tables. 4. Learn the fundamentals of writing Python scripts for graphs. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	Data Structures [Lecture 06]: Definition,Linear Data Structures ,Non-Linear Data Structures Python Specific Data Structures, Arrays vs List. Algorithm Analysis [Lecture 06]: Complexity Analysis, Big-ONotation, Evaluating Python Code Searching - Linear Search and Binary Search.				12
2	Sorting [Lecture 06]: Bubble Sort, Selection Sort, Insertion Sort, Merge Sort, Quick Sort. Linked Lists [Lecture 06]: Implementation of Single Linked Lists, Double Linked Lists, Circular Linked Lists.				12
3	Stacks [Lecture 04]: Overview of Stack, Implementation of Stack (List & Linked list), Applications of Stack. Queues [Lecture 04]: Overview of Queue, Implementation of Queue(List & Linked list), Applications of Queues, Priority Queues. Hash Tables [Lecture 04]: Introduction ,Hashing , separate Chaining ,Hash Functions ,Hash map abstract data type.				12



4	<p>Graphs [Lecture 03]: Introduction, Directed vs Undirected Graphs, Weighted vs Un-weighted Graphs, Representations, Breadth First Search, Depth First Search.</p> <p>Trees [Lecture 03]: Overview of Trees, Tree Terminology, Binary Trees: Introduction, Implementation, Applications. Tree Traversals, Binary Search Trees [Lecture 03]: Introduction, Implementation, AVL Trees: Introduction, Rotations, Implementation</p>	12
Total		48

Reference Books:

1. Data structures and algorithms in python by Michael T. Goodrich.
2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi.
3. Data Structures and Algorithm with python by Kent D. Lee and Steve Hubbard.
4. Hands-On data Structures and Algorithms with Python: Write complex and powerful code using the latest features of python 3.7, 2nd edition by Dr Basant Agarwal, Benjamin Baka.
5. Core Python programming-Second edition, R. Nageshwara Rao, Dreamtech press.
6. Problem solving with Algorithm and data Structures using python by Bradley N Miller and David L. Ranum
7. Data structures and algorithms using python by Rance D. Necaie.

PRACTICALS : Data Structures using Python practical BH. USITS3P4

Unit No.	Description
1	Implement the following searching techniques: a. Write a program to search the element using sequential search. b. Write a program to search the element using binary search.
2	Implement the following sorting techniques: a. Write a program to implement bubble sort. b. Write a program to implement selection sort.
3	Implement the following sorting techniques: a. Write a program to implement insertion sort. b. Write a program to implement merge sort.
4	Write a program to create a single linked list and display the node elements in reverse order
5	Write a program to create double linked list and sort the elements in the linked list.



6	Write a program to implement the concept of Stack with Push, Pop, Display and Exit operations.
7	Write a program to implement the concept of Queue with Insert, Delete, Display and Exit operations.
8	Write program to implement the graph.
9	Implement the following data structure techniques: a. Write a program to create the tree and display the elements. b. Write a program to construct the binary tree.
10	. Write a program for inorder, postorder and preorder traversal of tree
Reference Books: <ol style="list-style-type: none">1. Data structures and algorithms in python by Michael T. Goodrich.2. Data Structures and Algorithmic Thinking with Python by Narasimha Karumanchi.3. Data Structures and Algorithm with python by Kent D. Lee and Steve Hubbard.4. Hands-On data Structures and Algorithms with Python: Write complex and powerful code using the latest features of python 3.7, 2nd edition by Dr Basant Agarwal, Benjamin Baka.5. Core Python programming-Second edition, R. Nageshwara Rao, Dreamtech press.6. Problem solving with Algorithm and data Structures using python by Bradley N Miller and David L. Ranum..	



Programme: BSc IT				Semester: III	
Course: Operating Systems				Course Code: BH.USITS305	
Teaching Scheme				Evaluation Scheme (Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory + Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Term End Examination (TEE) (Marks: 60)
4	4	-	2+2	40	60
Pre- requisites: -					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. To Learn the mechanisms adopted by operating systems for process management and IPC. 2. To Make the learners clear with various views and management policies adopted by O.S. as pertaining with Memory Management, File and I/O operations, Deadlocks. 3. To Make the learners clear with various views and management policies adopted by O.S. as pertaining with I/O operations, Deadlocks. 4. To brief the learners about functionality of various OS like Linux and Windows XP and Multiple Processors 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Analyze the structure of OS and basic architectural components involved in OS design. 2. Describe the various Data Structures and algorithms used for File Management, Memory M 3. Describe the various Data Structures and algorithms used for Deadlocks and I/O management 4. Conceptualize the components involved in designing a contemporary as well as modern OS. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	<p>Introduction [Lecture 06]: What is an operating system? History of operating system: Five Generations of Operating system, different operating systems, operating system concepts, system calls, operating system structure.</p> <p>Processes and Threads [Lecture 06]: The Process Model, Process States, Process Control block, Thread Usage The Classical Thread Model, Implementing Threads in User Space, Implementing Threads in the Kernel, Race Conditions, Critical Regions, Mutual Exclusion with Busy Waiting, Sleep and Wakeup, Semaphores, Mutexes, Message Passing. interprocess communication, scheduling algorithms , IPC problems.</p>				12



2	<p>Memory Management [Lecture 06]: Memory abstraction: address spaces, virtual memory, page replacement algorithms, design issues for paging systems, implementation issues, and segmentation.</p> <p>File Systems [Lecture 06]: Files, directories, file system implementation, file-system management and optimization, MS-DOS file system, UNIX V7 file system, CD ROM file system</p>	12
3	<p>Input-Output [Lecture 06]: Principles of I/O hardware, Principles of I/O software, I/O software layers, disks, clocks, user interfaces: keyboard, mouse, monitor, thin clients, power management.</p> <p>Deadlocks[Lecture 06]: Resources, introduction to deadlocks, the ostrich algorithm, deadlock detection and recovery, deadlock avoidance, deadlock prevention, issues</p>	12
4	<p>Virtualization [Lecture 04]: History, requirements for virtualization, type 1 and 2 hypervisors, techniques for efficient virtualization, hypervisor microkernels, memory virtualization, I/O virtualization, Clouds.</p> <p>Case Study on LINUX ,Windows and Android [Lecture 04]: History Overview, Processes, Memory management, I/O, file system, security.</p> <p>Case Study on Multiple Processor System [Lecture 04]: Multiprocessors, multicomputers, distributed systems.</p>	12
	Total	48

Reference Books:

1. Modern Operating Systems, Andrew S Tanenbaum, Herbert Bos, Pearson publisher, 4 edition.
2. Operating Systems – Internals and Design Principles : Willaim Stallings
3. Operating System Concepts : Abraham Silberschatz, Peter B. Galvineg Gagne Wiley publisher

PRACTICALS : Operating Systems practical BH. USITS3P5

Unit No.	Description
1	Installation of virtual machine software.
2	Installation of Linux operating system (RedHat / Ubuntu) on virtual machine.
3	Installation of Windows operating system on virtual machine.
4	Linux commands: Working with Directories: a. pwd, cd, absolute and relative paths, ls, mkdir, rmdir, b. file, touch, rm, cp, mv, rename, head, tail, cat, tac, more, less, strings, chmod



5	Linux commands: Working with files: a. ps, top, kill, pkill, bg, fg, b. grep, locate, find, locate. c. date, cal, uptime, w, whoami, finger, uname, man, df, du, free, whereis, which. d. Compression: tar, gzip.
6	Windows (DOS) Commands – 1 a. Date, time, prompt, md, cd, rd, path. b. Chkdsk, copy, xcopy, format, fidsk, cls, defrag, del, move.
7	Windows (DOS) Commands – 2 a. Diskcomp, diskcopy, diskpart, doskey, echo b. Edit, fc, find, rename, set, type, ver
8	Working with Windows Desktop and utilities a. Notepad b. Wordpad c. Paint d. Taskbar e. Adjusting display resolution f. Using the browsers g. Configuring simple networking h. Creating users and shares
9	Working with Linux Desktop and utilities a. The vi editor. b. Graphics c. Terminal d. Adjusting display resolution e. Using the browsers f. Configuring simple networking g. Creating users and shares
10	Installing utility software on Linux and Windows
<p>Reference Books:</p> <ol style="list-style-type: none"> 1. Modern Operating Systems, Andrew S Tanenbaum, Herbert Bos, Pearson publisher, 4 edition. 2. Operating Systems – Internals and Design Principles : Willaim Stallings 3. Operating System Concepts : Abraham Silberschatz, Peter B. Galvineg Gagne Wiley publisher 	



SEMESTER IV

Programme: BSc.IT				Semester : IV	
Course: Fundamentals of Digital Marketing using Web Analytics				Course Code: BH.USIT401	
Teaching Scheme				Evaluation Scheme(Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	2 (2 batches) = 4	---	2+2	40	60
Pre-requisites : Basic Programming Concepts.					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. To Create a structured digital marketing plan and budget, Identify the correct measures to set objectives and evaluate digital marketing, 2. To Review and prioritize the strategic options for boosting customer acquisition, conversion, and retention using digital marketing. 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Develop a digital marketing plan that will address common marketing challenges. 2. Articulate the value of integrated marketing campaigns across SEO, Paid Search, Social, Mobile, Email, Display Media, Marketing Analytics. 3. Recognize Key Performance Indicators tied to any digital marketing program. 4. Improve Return on Investment for any digital marketing program 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	Introduction & origin of Digital Marketing [Lecture 12]: Traditional v/s Digital Marketing. Digital Marketing Strategy, The P-O-E-M Framework, Segmenting & Customizing Messages, The Digital landscape, Digital Advertising Market in India. Skills required in Digital Marketing. Digital Marketing Plan.				12
2	Social Media Marketing [Lecture 04]: Meaning, Purpose, types of social media websites. Blogging: Types of blogs, Blogging platforms & recommendations. Social Media Engagement, Target audience, Sharing content on social media, Do's and don'ts of social media. Search Engine Optimization [Lecture 04]: Meaning, Common SEO techniques, Understanding Search Engines, basics of Keyword search, Google rankings, Link Building, Steps to optimize website.				12



	Basics of Email Marketing [Lecture 04]: Types of Emails, Mailing List, Email Marketing tools, Email Deliverability & Email Marketing automation.	
3	Basics [Lecture 06]: Introduction to Web Analytics, Importance of Web Analytics, Web Analytics Process. Google Analytics [Lecture 06]: Google Analytics, Audience Analysis, Acquisition Analysis, Behavior Analysis, Conversion Analysis.	12
4	Understanding Web Analytics [Lecture 06]: Purpose, History, Goals & objectives, Web Analytic tools & Methods. Web Analytics Mistakes and Pitfalls Tools of web analytics [Lecture 06]: Optimizely, Kissmetrics, Crazyegg, Key Metrics, Conversion, Data Sources: Server Logs, Visitors' Data, Search Engine Statistics, Conversion Funnels, Web Analytics Visualizes Data, Acquisition and Conversions	12
	Total	48

Reference Books:

1. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation
by Damian Ryan, Kogan Page Publisher
2. Marketing 4.0: Moving from Traditional to Digital by Philip Kotler, Publisher Wiley
3. Digital Marketing by Seema Gupta, McGraw Hill Education
4. Fundamentals of Digital Marketing by Punit Singh Bhatia, Pearson
5. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and
6. Measurable Online Campaigns by Ian Dodson, Wiley Publisher.
7. Digital Marketing: Cases from India by Rajendra Nargundkar and Romi Sainy, Notion Press, Inc

PRACTICALS (Section 1): Fundamentals of Digital Marketing using Web Analytics
BH.USIT4P1

Unit No.	Description
1	Practical using google analytics tool such as google Optimize
2	Practical using google analytics tool such as data studio
3	Practical using google analytics tool such as google adz
4	Practical using google analytics tool such as google data studio
5	Practical using web analytics tool OWA.
6	Practical using web analytics tool Clicky.
7	Practical using web analytics tool Piwik.



8	Practical using web analytics tool Heap Analytics.
Reference Books:	
<ol style="list-style-type: none">1. Digital Marketing: Cases from India by Rajendra Nargundkar and Romi Sainy, Notion Press, Inc.2. Understanding Digital Marketing: Marketing Strategies for Engaging the Digital Generation by Damian Ryan, Kogan Page Publisher3. Marketing 4.0: Moving from Traditional to Digital by Philip Kotler, Publisher Wiley4. Digital Marketing by Seema Gupta, McGraw Hill Education5. Fundamentals of Digital Marketing by Punit Singh Bhatia, Pearson6. The Art of Digital Marketing: The Definitive Guide to Creating Strategic, Targeted, and Measurable Online Campaigns by Ian Dodson, Wiley Publisher.	



Programme: BSc.IT				Semester : IV	
Course: Advanced Web Programming				Course Code: BH.USITS402	
Teaching Scheme				Evaluation Scheme(Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	4	-	2+2	40	60
<p>COURSE OBJECTIVES: Use Visual studio (C#) to</p> <ol style="list-style-type: none"> 1. learn c# fundamentals and object oriented programming 2. understand server side controls ,its working for web forms 3. Apply concept of master pages CSS,data access to design, processing, presenting information in web pages. 4. Incorporate web controls, navigation practices,AJAX and , content to design websites 					
<p>COURSE OUTCOMES: After successful completion of the course, the learner should be able to</p> <ol style="list-style-type: none"> 1. In-corporate website layout design concept using web controls that effectively communicate.. 2. Design web forms 3. Develop the ability to analyze , identify the technology required to build and Implement server-side a web pages. 4 manage Site Navigation, data access, transfer and manipulate data , add interactive components to web pages. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	<p>Introducing .NET [Lecture 04]: The .NET Framework, C#, VB, and the .NET Languages, The Common Language Runtime, The .NET Class Library. The C# Language: C# Language Basics, Variables and Data Types, Variable Operations,</p> <p>Object-Based Manipulation [Lecture 04]: Conditional Logic, Loops, Methods. Types, Objects, and Namespaces: The Basics About Classes, Building a Basic Class, Value Types and Reference Types, Understanding Namespaces and Assemblies, Advanced Class Programming.</p> <p>Error Handling, Logging, and Tracing [Lecture 04]: Avoiding Common Errors, Understanding Exception Handling, Handling Exceptions, Designing and throwing custom Exceptions</p>				12



<p>2</p>	<p>Web Form Fundamentals [Lecture 04]: Writing Code, Using the Code-Behind Class, Adding Event Handlers, Understanding the Anatomy of an ASP.NET Application, Introducing Server Controls, Using the Page Class, Using Application Events, Configuring an ASP.NET Application. Form Controls: Stepping Up to Web Controls, Web Control Classes, List Controls, Table Controls, Web Control Events and AutoPostBack,</p> <p>Validation [Lecture 04]: Understanding Validation, Using the Validation Controls. Rich Controls, The Calendar, The AdRotator, Pages with Multiple Views, User Controls and Graphics, User Controls, Dynamic Graphics, The Chart Control,</p> <p>Website Navigation [Lecture 04]: Site Maps, URL Mapping and Routing, The SiteMapPath Control, The TreeView Control, The Menu Control.</p>	<p>12</p>
<p>3</p>	<p>Styles, Themes, and Master Pages [Lecture 03]: Styles, Themes, Master Page Basics, Advanced Master Pages.</p> <p>ADO.NET Fundamentals [Lecture 03]: 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 [Lecture 03]: Introducing Data Binding, Using Single-Value Data Binding, Using Repeated-Value Data Binding, Working with Data Source Controls.</p> <p>The Data Controls [Lecture 03]: 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>12</p>



4	<p>XML [Lecture 02]: XML Explained, The XML Classes, XML Validation, XML Display and Transforms.</p> <p>JSON [Lecture 02]: Documenting a JSON element, Document element nesting, JSON Array, JSON Datatypes, JSON Objects, JSON Schema</p> <p>AJAX [Lecture 02]: Understanding Ajax, Using Partial Refreshes, Using Progress Notification, Implementing Timed Refreshes, Working with the ASP.NET AJAX Control Toolkit.</p> <p>State Management [Lecture 04]: 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 Security Fundamentals: Understanding Security Requirements.</p> <p>Authentication and Authorization[Lecture 02]: Forms Authentication, Windows Authentication. ASP.NET</p>	12
Total		48
Reference Books:		
<p>Unit 1 -</p> <ol style="list-style-type: none"> 1.Beginning ASP.NET 4.5 in C# Matthew MacDonald Apress 2012 2. C# 2015 Anne Bohem and Joel Murach Murach Third 2016 <p>Unit 2,3</p> <ol style="list-style-type: none"> 1. -Murach's ASP.NET 4.6 Web Programming in C#2015 Mary Delamater and Anne Bohem SPD Sixth 2016 2. Programming ASP.NET D.Esposito Microsoft Press (Dreamtech) 2011. <p>Unit 4- ASP.NET 4.0 programming J. Kanjilal Tata McGrawHill 2011 Self study Material: Version Upgrade Documentation Review / New technology research review</p>		
PRACTICALS : Advanced Web programming practical BH. USITS4P2		
Unit No.	Description	



<p>1</p>	<p>Working with basic C# and ASP .NET</p> <p>a. Create an application that obtains four int values from the user and displays the product.</p> <p>b. Create an application to demonstrate string operations.</p> <p>c. Create an application that receives the (Student Id, Student Name, Course Name, Date of Birth) information from a set of students. The application should also display the information of all the students once the data entered</p> <p>d. Create an application to demonstrate following operations</p> <p style="padding-left: 40px;">i. Generate Fibonacci series. ii. Test for prime numbers. iii. Test for vowels.</p>
<p>2</p>	<p>Working with Object Oriented C# and ASP .NET</p> <p>a. Create simple application to perform following operations</p> <p style="padding-left: 20px;">i. Finding factorial Value</p> <p style="padding-left: 20px;">ii. Money Conversion</p> <p>b. Create simple application to demonstrate use of following concepts</p> <p style="padding-left: 20px;">i. Inheritance (all types)</p> <p style="padding-left: 20px;">ii.. Interfaces</p> <p>c. Create simple application to demonstrate use of following concepts</p> <p style="padding-left: 20px;">i. Delegates</p> <p style="padding-left: 20px;">ii. Exception handling</p>
<p>3</p>	<p>Working with Web Forms and Controls</p> <p>a. Create a simple web page with various sever controls to demonstrate setting and use of their properties</p> <p>b. Demonstrate the use of Calendar control to perform following operations.</p> <p style="padding-left: 20px;">i) Display messages in a calendar control</p> <p style="padding-left: 20px;">ii) Display vacation in a calendar control</p> <p style="padding-left: 20px;">iii) Select day in a calendar control using style</p> <p style="padding-left: 20px;">iv) Difference between two calendar dates</p> <p>c. Demonstrate the use of Treeview control perform following operations.</p> <p style="padding-left: 20px;">i) Treeview control and datalist</p> <p style="padding-left: 20px;">ii) Treeview operations</p>
<p>4</p>	<p>Working with Form Controls</p> <p>a. Create a Registration form to demonstrate use of various Validation controls.</p> <p>b. Create Web Form to demonstrate use of Adrotator Control.</p> <p>c. Create Web Form to demonstrate use of User Controls.</p>



5	<p>Working with Navigation, Beautification and Master page.</p> <p>a. Create Web Form to demonstrate use of Website Navigation controls and Site Map.</p> <p>b. Create a web application to demonstrate use of Master Page with applying Styles and Themes for page beautification.</p> <p>c. Create a web application to demonstrate various states of ASP.NET Pages.</p>
6	<p>Working with Database</p> <p>a. Create a web application bind data in a multiline textbox by querying in another textbox.</p> <p>b. Create a web application to display records by using database.</p> <p>c. Demonstrate the use of Datalist link control.</p>
7	<p>Working with Database</p> <p>a. Create a web application to display Databinding using dropdownlist control.</p> <p>b. Create a web application for to display the phone no of an author using database.</p> <p>c. Create a web application for inserting and deleting record from a database.</p>
8	<p>Working with data controls</p> <p>a. Create a web application to demonstrate various uses and properties of SqlDataSource.</p> <p>b. Create a web application to demonstrate data binding using DetailsView and FormView Control.</p> <p>c. Create a web application to display Using Disconnected Data Access and Databinding using GridView.</p>
9	<p>Working with GridView control</p> <p>a. Create a web application to demonstrate use of GridView control template and GridView hyperlink.</p> <p>b. Create a web application to demonstrate use of GridView button column and GridView events.</p> <p>c. Create a web application to demonstrate GridView paging and Creating own table format using GridView.</p>
10	<p>Working with AJAX and XML ,JSON</p> <p>a. Create a web application to demonstrate reading and writing operation with XML.</p> <p>b. . Create a web application to demonstrate JSON objects</p> <p>c. Create a web application to demonstrate use of various Ajax controls</p>

Reference Books:

1. Beginning ASP.NET 4.5 in C# Matthew MacDonald Apress 2012
2. C# 2015 Anne Bohem and Joel Murach Murach Third 2016
3. Murach's ASP.NET 4.6 Web Programming in C#2015 Mary Delamater and Anne Bohem SPD Sixth 2016
4. ASP.NET 4.0 programming J. Kanjilal Tata McGrawHill 2011
5. Programming ASP.NET D.Esposito Microsoft Press (Dreamtech) 2011



Programme: BSc.IT				Semester: IV	
Course: Business Intelligence				Course Code: BH.USITS403	
Teaching Scheme				Evaluation Scheme (Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	2 (2 batches) = 4	---	2+2	40	60
Pre-requisites: Basic Programming Concepts.					
COURSE OBJECTIVES:					
1.To Understand the basic components that make up BI Environment and Decision making process.					
2. To Understand the structure of classification and clustering problems.					
3. To Learn a comprehensive overview of mathematical models for pattern recognition and data mining.					
4. To Get an illustration of various applications of data mining.					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
1. Implement BI systems and DSS systems					
2. Evaluate different models					
3. Make them capable of transforming data into information/knowledge and use them for taking effective decisions to achieve competitive advantage.					
4. Understand the role of IT in Knowledge management					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	Business intelligence [Lecture 06]: Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence. Decision support systems [Lecture 06]: Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system.				12
2	Mathematical models for decision making [Lecture 04]: Structure of mathematical models, Development of a model, Classes of models. Data mining [Lecture 04]: Definition of data mining,				12



	Representation of input data , Data mining process, Analysis methodologies. Data preparation [Lecture 04]: Data validation, Data transformation, Data reduction	
3	Classification [Lecture 06]: Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines Clustering [Lecture 06]: Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models Business intelligence applications.	12
4	Knowledge Management [Lecture 06]: Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management Artificial Intelligence and Expert Systems [Lecture 06]: Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems	12
	Total	48

Reference Books:

1. Business Intelligence: Data Mining and Optimization for Decision Making Carlo Vercellis Wiley
2. Decision support and Business Intelligence Systems Efraim Turban, Ramesh Sharda, Dursun Delen Pearson
3. Fundamental of Business Intelligence Grossmann W, Rinderle-Ma Springer.

PRACTICALS : Business Intelligence practical BH. USITS4P3

Unit No.	Description
1	Import the legacy data from different sources such as (Excel , SqlServer, Oracle etc.) and load in the target system. (You can download sample database such as Adventureworks, Northwind, foodmart etc.)
2	Perform the Extraction Transformation and Loading (ETL) process to construct the database in the Sqlserver.
3	a. Create the Data staging area for the selected database. b. Create the cube with suitable dimension and fact tables based on ROLAP, MOLAP and HOLAP model.
4	a. Create the ETL map and setup the schedule for execution. b. Execute the MDX queries to extract the data from the datawarehouse.
5	a. Import the datawarehouse data in Microsoft Excel and create the Pivot table and Pivot Chart. b. Import the cube in Microsoft Excel and create the Pivot table and Pivot Chart to perform data analysis.
6	Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data.



7	Perform the data classification using classification algorithm.
8	Perform the data clustering using clustering algorithm.
9	Perform the Linear regression on the given data warehouse data.
10	Perform the logistic regression on the given data warehouse data.
Reference Books: 1. Business Intelligence: Data Mining and Optimization for Decision Making Carlo Vercellis Wiley 2. Decision support and Business Intelligence Systems Efraim Turban, Ramesh Sharda, Dursun Delen Pearson 3. Fundamental of Business Intelligence Grossmann W, Rinderle-Ma Springer.	



Programme: BSc.IT				Semester : IV	
Course: Linux Administration				Course Code: BH.USIT404	
Teaching Scheme				Evaluation Scheme(Theory)	
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
4	2	-	2+2	40	60
Pre-requisites:					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. To learn Linux Operating System, from installation to basic administration. 2. To understand and make effective use of Linux utilities and shell scripting language. 3. To understand the fundamentals of the Linux operating system and be able to apply that knowledge in a practical and useful manner. 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Understand the basic set of commands on Linux Operating System and can write shell scripts. 2. Demonstrate the role and responsibilities of a Linux system administrator. 3. Mastery of at least one Shell scripting language. 4. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	<p>Introduction to Red Hat Enterprise Linux [Lecture 04]: Linux, Open Source and Red Hat, Origins of Linux, Distributions, Duties of Linux System Administrator. Introduction to Basic Linux Commands.</p> <p>Command Line [Lecture 04]: Working with the Bash Shell, Getting the Best of Bash, Useful Bash Key Sequences, Working with Bash History, Performing Basic File System Management Tasks, Working with Directories, Piping and Redirection, Finding Files.</p> <p>Working with Users, Groups, and Permissions [Lecture 04]: Managing Users and Groups, Commands for User Management, Managing Passwords, Modifying and Deleting User Accounts, Configuration Files, Creating Groups, Using Graphical Tools for User, and Group Management, Basic Permissions: Read, Write, and Execute, Advanced Permissions, Working with Access Control Lists.</p>				12



<p>2</p>	<p>System Administration Tasks [Lecture 04]: Performing Job Management Tasks, System and Process Monitoring and Management, Managing Processes with ps, Sending Signals to Processes with the kill Command, Using top to Show Current System Activity, Managing Process Niceness, Scheduling Jobs, Mounting Devices, Working with Links, Creating Backups, Managing Printers.</p> <p>Securing Server with iptables [Lecture 04]: Understanding Firewalls, Setting Up a Firewall with system-config-firewall, Allowing Services, Trusted Interfaces, Masquerading, Configuration Files, Setting Up a Firewall with iptables, Tables, Chains, and Rules, Composition of Rule, Configuration Example, Advanced iptables Configuration, Configuring Logging, The Limit Module, Configuring NAT.</p> <p>Setting Up Cryptographic Services [Lecture 04]: Introducing SSL, Proof of Authenticity: the Certificate Authority, Managing Certificates with openssl, Creating a Signing Request, Working with GNU Privacy Guard, Creating GPG Keys, Key Transfer, Managing GPG Keys, Encrypting Files with GPG, GPG Signing, Signing RPM Files.</p>	<p>12</p>
<p>3</p>	<p>Configuring DNS and DHCP [Lecture 04]: Introduction to DNS, The DNS Hierarchy, DNS Server Types, The DNS Lookup Process, DNS Zone Types, Setting Up a DNS Server, Setting Up a Cache-Only Name Server, Setting Up a Primary Name Server, Setting Up a Secondary Name Server, Understanding DHCP, Setting Up a DHCP Server</p> <p>Setting Up a Mail Server [Lecture 04]: Using the Message Transfer Agent, the Mail Delivery Agent, the Mail User Agent, Setting Up Postfix as an SMTP Server, Working with Mutt, Basic Configuration, Internet Configuration, Configuring Dovecot for POP and IMAP</p> <p>Configuring Apache on Red Hat Enterprise Linux [Lecture 04]: Configuring the Apache Web Server, Creating a Basic Website, Understanding the Apache Configuration Files, Apache Log Files, Working with Virtual Hosts, Securing the Web Server with TLS Certificates, Configuring Authentication, Setting Up Authentication with .htpasswd, Configuring LDAP Authentication, Setting Up MySQL</p>	<p>12</p>



4.	<p>Introducing Bash Shell Scripting [Lecture 04]: Introduction, Elements of a Good Shell Script, Executing the Script, Working with Variables and Input, Understanding Variables, Variables, Subshells, and Sourcing, Working with Script Arguments, Asking for Input, Using Command Substitution, Substitution Operators, Changing Variable Content with Pattern Matching, Performing Calculations, Using Control Structures, Using if...then...else, Using case, Using while, Using until, Using for, Configuring booting with GRUB.</p> <p>High-Availability Clustering [Lecture 04]: High-Availability Clustering, The Workings of High Availability, High-Availability Requirements, Red Hat High-Availability Add-on Software, Components, Configuring Cluster-Based Services, Setting Up Bonding, Setting Up Shared Storage, Installing the Red Hat High Availability Add-On, Building the Initial State of the Cluster, Configuring Additional Cluster Properties, Configuring a Quorum Disk, Setting Up Fencing, Creating Resources and Services, Troubleshooting a Nonoperational Cluster, Configuring GFS2 File Systems.</p> <p>Setting Up an Installation Server [Lecture 04]: Configuring a Network Server as an Installation Server, Setting Up a TFTP and DHCP Server for PXE Boot, Installing the TFTP Server, Configuring DHCP for PXE Boot, Creating the TFTP PXE Server Content, Creating a Kickstart File, Using a Kickstart File to Perform an Automated, Installation, Modifying the Kickstart File with, system-config-kickstart, Making Manual Modifications to the Kickstart File.</p>	12
	Total	48

Reference Books:

1. Red Hat Enterprise Linux6 Administration by Sander van Vugt (John Wiley and Sons 2013 Publisher)
2. Red Hat Linux Networking and System Administration by Terry Collins and Kurt Wall (Wiley 3rd Publisher)

PRACTICALS : Linux Administration BH.USIT4P4

Unit No.	Description
1	Installation of RHEL 6.X
2.	<p>Graphical User Interface and Command Line Interface and Processes</p> <p>a. Exploring the Graphical Desktop b. The Command Line Interface c. Managing Processes</p>
3.	<p>Storage Devices and Links, Backup and Repository</p> <p>a. Working with Storage Devices and Links b. Making a Backup c. Creating a Repository</p>
4.	<p>Working with RPMsm Storage</p> <p>a. Using Query Options b. Extracting Files From RPMs</p>
5.	Working with Users, Groups, and Permissions
6.	<p>Firewall and Cryptographic services</p> <p>a. Securing Server with iptables b. Setting Up Cryptographic Services</p>



7.	Configuring Server for File Sharing a. Configuring NFS Server and Client b. Configuring Samba c. Configuring FTP
8.	DNS, DHCP and Mail Server a. Configuring DNS b. Configuring DHCP c. Setting Up a Mail Server
Reference Books: 1. Red Hat Enterprise Linux6 Administration by Sander van Vugt (John Wiley and Sons 2013 Publisher) 2. Red Hat Linux Networking and System Administration by Terry Collins and Kurt Wall (Wiley 3 rd Publisher)	



Programme: BSc. Information Technology				Semester : IV	
Course: Software Engineering and Management Practices				Course Code: BH. USITS405	
Teaching Scheme			Evaluation Scheme(Theory)		
Lecture (Periods per week)	Practical (Periods per week per batch)	Tutorial (Periods per week per batch)	Credits (Theory +Practical)	Internal Continuous Assessment (ICA) (Marks - 40)	Semester End Examination (SEE) (Marks: 60)
04	04		02+02	40	60
Pre-requisites: Knowledge of structure programming language and Application development. Familiarity with software implementation.					
COURSE OBJECTIVES:					
<ol style="list-style-type: none"> 1. To understand the process of Software Engineering. 2. To conceptualize the Software Development Life Cycle (SDLC) models. 3. To familiarize Project Management framework and Tools. 					
COURSE OUTCOMES: After successful completion of the course, the learner should be able to					
<ol style="list-style-type: none"> 1. Apply use of knowledge of Software Life Cycle to successfully implement the projects in the corporate world 2. Identify the Inputs, Tools and techniques to get the required Project deliverable and Product deliverable using 10 Knowledge areas of Project Management. 3. Implement Project Management Processes to successfully complete projects in IT industry. 4. Realize software quality assurance and quality control. 					
Detailed Syllabus: (per session plan)					
Unit	Description				Periods
1	<p>Introduction to software engineering and project management [Lecture 06]: Introduction to Software Engineering: Software, Evolving role of software, Three “R”-Reuse, Reengineering and Retooling, An Overview of IT Project Management: Define project, project management framework, The role of Project Manager, Systems View of Project Management, Stakeholder management, Project phases and the project life cycle</p> <p>Software Process Models [Lecture 06]: Waterfall Model, Evolutionary Process Model: Prototype and Spiral Model, Incremental Process model: Iterative approach, RAD, JAD model, Concurrent Development Model, RUP, <u>Agile Development</u>: Extreme programming, Scrum</p>				12



2	<p>Software Systems Properties and Requirements [Lecture 06]: 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, Requirement Engineering.</p> <p>Software Project Planning [Lecture 06]: Business Case, Project selection and Approval, Project charter, Project Scope management: Scope definition and Project Scope management, Creating the Work Breakdown Structures, Scope Verification, Scope Control</p>	12
3	<p>Activity Planning [Lecture 04]: Introduction, Objectives of Activity Planning, When to Plan, Project Schedules, Projects and Activities, Sequencing and Scheduling Activities, Network Planning Models, Formulating a Network Model, Adding the Time Dimension, The Forward Pass, Backward Pass, Identifying the Critical Path, Activity Float, Shortening the Project Duration, Identifying Critical Activities, Activity-on-Arrow Networks</p> <p>Software Effort Estimation [Lecture 04]: Introduction, Where are the Estimates Done? Problems with Over- and Under-Estimates, The Basis for Software Estimating, Software Effort Estimation Techniques, Bottomup Estimating, The Top-down Approach and Parametric Models, Expert Judgement, Estimating by Analogy, Albrecht Function Point Analysis, Function Points Mark II, COSMIC Full Function Points, COCOMO II: A Parametric Productivity Model, Cost Estimation, Staffing Pattern, Effect of Schedule Compression, Capers Jones Estimating Rules of Thumb.</p> <p>Software Quality [Lecture 04]: Software and System Quality Management: Overview of ISO 9001, SEI Capability Maturity Model, McCalls Quality Model, Six Sigma, Formal Technical Reviews, Tools and Techniques for Quality Control, Pareto Analysis, Statistical Sampling, Quality Control Charts and the seven Run Rule. Modern Quality Management, Juran and the importance of Top management, Commitment to Quality, Crosby and Striving for Zero defects, Ishikawa and the Fishbone Diagram.</p>	12



4	<p>Software Risk Management and Reliability issues [Lecture 04]: Risk Management: Identify IT Project Risk, Risk Analysis and Assessment, Risk Strategies, Risk Monitoring and Control, Risk Response and Evaluation. Software Reliability: Reliability Metrics, Reliability Growth Modeling.</p> <p>Managing People in Software Environments [Lecture 04]: Introduction, Understanding Behaviour, Organizational Behaviour: A Background, Selecting the Right Person for the Job, Instruction in the Best Methods, Motivation, The Oldham–Hackman Job Characteristics Model, Stress, Stress Management, Health and Safety, Some Ethical and Professional Concerns.</p> <p>Working in Teams [Lecture 04]: Introduction, becoming a Team, Decision Making, Organization and Team Structures, Coordination Dependencies, Dispersed and Virtual Teams, Communication Genres, Communication Plans, Leadership.</p>	12
	Total	48

Reference Books:

1. Software Engineering, 5th and 7th edititon, by Roger S Pressman, McGraw Hill publication.
2. Managing Information Technology Project, 6edition, by Kathy Schwalbe, Cengage Learning publication.
3. Information Technology Project Management by Jack T Marchewka Wiley India publication.
4. Software Engineering 3rd edition by KK Agrawal, Yogesh Singh, New Age International publication.
5. Software Engineering Project Management by Richard H. Thayer Wiley India Publication

PRACTICALS : Software Engineering and Management Practices Practical BH.USIT4P5

Unit No.	Description
1.	Study and implementation of class diagrams
2.	Study and implementation of Use Case Diagrams.
3.	Study and implementation of Entity Relationship Diagrams
4.	Study and implementation of Sequence Diagrams.
5.	Study and implementation of State Transition Diagrams.
6.	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.
11.	Mini Project Covering the Designing of Software.



MODALITY OF ASSESSMENT

Theory Examination Pattern:

A) Internal Assessment- 40%- 40 Marks

Sr No	Evaluation type	Marks
1	Internal Class Test with Objective type questions and Short Notes (CIA-I)	20
2	CIA-II	20
	TOTAL	40

CIA II can include:

1. Research paper review
2. Case study
3. Small project
4. Literature review on recent technologies in IT
5. Preparation of research poster for application of IT

B) External Examination- 60%- 60 Marks Semester End Theory Examination: 60 marks (for offline Mode)

Duration - The examinations shall be of 2 hours duration. Paper Pattern:

1. There shall be 01 question of 20 mark comprising of objective questions and short answer questions.
2. There shall be **04** question of 10 marks each.
3. The first question will be a mixed bag and remaining four questions will be unitized.
4. All questions shall be compulsory with internal choice within questions.
The unitized questions would have subjective and objective type of questions.

Overall Examination & Marks Distribution Pattern Semester I

Course BH. USIT S	301	302	303	304	305	Grand Total



	Inter nal	Exter nal	Inter nal	Exter nal	Inter nal	Exter nal	Inter nal	Exter nal	Inter nal	Exter nal	
Theo ry	40	60	40	60	40	60	40	60	40	60	500
Pract ical		50		50		50		50		50	250
											750

Cour se BH. USIT S	401		402		403		404		405		Gra nd Tot al
	Inter nal	Exter nal	Inter nal	Exter nal	Inter nal	Exter nal	Inter nal	Exter nal	Inter nal	Exter nal	
Theo ry	40	60	40	60	40	60	40	60	40	60	500
Pract ical		50		50		50		50		50	250
											750

Rubrics of evaluation for ESE

Unit	Knowledge	Understanding	Analysis & critical thinking	Total marks/unit
from all units	6	6	8	20
1	3	3	4	10
2	3	3	4	10
3	3	3	4	10
4	3	3	4	10
Total	18	18	24	60
% Weightage	33.33	33.33	33.34	100



Rubrics of evaluation for CIA-2 Assignment: Presentation/debate

Parameters	Max Marks	Excellent/Advanced(4point)	Proficient (3point)	Approaching proficiency(2point)	Beginning scale(1point)
CONTENT	10				
Content: Logic	02				
Content: knowledge	03				
Content: Code Elegance-	03				
Content: Demonstration/ Execution/Testing	02				
Content: Modularity level Specifications	-				
Effective communication skill	10				