SIES COLLEGE OF COMMERCE & ECONOMICS
AUTONOMOUS
UG DEPARTMENT OF INFORMATION TECHNOLOGY

Date of BOS meeting: 18th April 2024

Name of BOS Chairperson: Mrs. Bhavini Deepak Shah

Sr. No.	Heading	Particulars
1	Title of the course	B. Sc. (Information Technology)
2	Eligibility for admission	HSC or Equivalent with Mathematics as Compulsory Subject
3	Minimum percentage	45 %
4	Semesters	III & IV
5	Level	UG
6	Pattern	03 years & 06 semesters CBGS
7	To be implemented from	From Academic year 2024-25 in a progressive manner

SIES COLLEGE OF COMMERCE & ECONOMICS
(AUTONOMOUS)
(Affiliated to University of Mumbai)
RE-ACCREDITED GRADE "A" BY NAAC

BOARD OF STUDIES
UG DEPARTMENT OF INFORMATION TECHNOLOGY

(WITH EFFECT FROM THE ACADEMIC YEAR 2024-2025)

Semester III			
Course Code	**Course Type**	**Course Title**	**Credits**
BSIT-MJS3-101	Major	Computer Networks	3
BSIT-MJPS3-101	Major Practical	Computer Networks Lab	1
BSIT-MJS3-102	Major	Python Programming	3
BSIT-MJPS3-102	Major Practical	Python Programming Lab	1
BSIT-MNS3-103	Minor	Computer Oriented Statistical Techniques	3
BSIT-MNPS3-103	Minor Practical	Computer Oriented Statistical Techniques with R Programming	1
BSIT-OES3-104	Open Electives(OE)	Organisational Behaviour	2
BSIT-OES3-105	Open Electives(OE)	Intellectual Property Rights	2
BSIT-VSCS3-106	Vocational Skill Courses (VSC)	Microprocessors & Microcontrollers	2
BSIT-AECS3-107	Ability Enhancement Courses (AEC)	Hindi	2
BSIT-FPS3-108	Field Project (FP)	Environment Sustainability in IT	2
BSIT-CCS3-109	Co-curricular Courses (CC)	Yoga	2
		Total Credits	22

SYBSc (IT)
Semester III

B. Sc. (Information Technology)		Semester – III	
Course Name: Computer Networks		Course Code: BSIT-MJS3-101	
Periods per week (1 Period is 60 minutes)		3	
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2	50
	Internal	--	25

Course Objectives:

- To help students acquire basic knowledge about data communications and computer networking.
- To assist student to learn about the different models and devices related to networks.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction**: Data communications, networks, network types, **Network Models:** Protocol layering, TCP/IP protocol suite, The OSI model. **Introduction to Physical layer:** Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance. **Digital and Analog transmission:** Digital-to-digital conversion, analog-to-digital conversion, transmission modes, digital-to-analog conversion, analog-to-analog conversion.	15
2.	**Bandwidth Utilization**: Multiplexing & Spectrum Spreading. **Transmission media:** Guided Media, Unguided Media **Switching:** Introduction, circuit switched networks, packet switching, **Introduction to the Data Link Layer**: Link layer addressing, Data Link Layer Design Issues, Error detection and correction, block coding. **Data Link Control:** DLC services, data link layer protocols, HDLC, Point-to-point protocol. **Media Access Control:** Random access, controlled access, channelization, Wired LANs – Ethernet Protocol, standard ethernet, fast ethernet, gigabit ethernet, 10 gigabit ethernet, Wireless LANs: Introduction, IEEE 802.11 project, Bluetooth, WiMAX, Cellular telephony, Satellite networks.	15
3.	**Introduction to the Network Layer:** IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP **Unicast Routing:** Introduction, routing algorithms, unicast routing protocols. **Next generation IP:** IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition from IPv4 to IPv6. **Introduction to the Transport Layer**: Introduction, Transport layer protocols, User datagram protocol, Transmission control protocol,	15

	Application Layer: World wide-web and HTTP, FTP, Electronic mail, Telnet, Secured Shell, Domain name system, MIME, IMAP, DHCP.	

REFERENCE BOOKS:

1. Data Communication & Networking, Behrouz A. Forouzan, Tata McGraw Hill.
2. TCP/IP Protocol Suite, Behrouz A. Forouzan, Tata McGraw Hill.
3. Computer Networks, Andrew Tanenbaum, Pearson.

B. Sc. (Information Technology)		Semester – III	
Course Name: Computer Networks Lab		Course Code: BSIT-MJPS3-101	
Periods per week (1 Period is 60 minutes)		2	
Credits		1	
		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- To enable students to simulate the working of a network topology.
- To enable students to analyze packets in a network

Practical No	Details
1	**IPv4 Addressing and Subnetting.**
2	**Use of ping and tracert / traceroute, ipconfig / ifconfig, route and arp utilities.**
3	**Configure IP static routing.**
4	**Configure IP routing using RIP.**
5	**Configuring Simple OSPF.**
6	**Configuring DHCP server and client.**
7	**Create virtual PC based network using virtualization software and virtual NIC.**
8	**Configuring DNS Server and client.**
9	**Configuring OSPF with multiple areas.**
10	**Use of Wireshark to scan and check the packet information of following protocols.**
a.	HTTP
b.	ICMP
c.	TCP
d.	SMTP
e.	POP3
11	**Case study on Current trends in Networking.**

B. Sc. (Information Technology)		Semester – III	
Course Name: Python Programming		Course Code: BSIT-MJS3-102	
Periods per week (1 Period is 60 minutes)		3	
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2	50
	Internal	--	25

Course Objectives:

- The learner will be able to describe the structure and components of a Python program effectively.
- The learner will be able to explain and demonstrate the fundamental concepts in python such as functions, strings, regular expressions, multithreading, object oriented programming.
- The learner will be able to apply different data structures such as list, tuples and dictionaries.
- The learner will be able to select the concepts in order to solve real world problems in python.
- The learner will be able to compare python with other classical programming languages.
- The learner will be able to design different kinds of applications in Python.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction**: The Python Programming Language, History, features, Installing Python, Running Python program, Debugging : Syntax Errors, Runtime Errors, Semantic Errors, Experimental Debugging, Formal and Natural Languages, The Difference Between Brackets, Braces, and Parentheses, Variables and Expressions Values and Types, Variables, Variable Names and Keywords, Type conversion, Operators and Operands, Expressions, Interactive Mode and Script Mode, Order of Operations. Conditional Statements: if, if-else, nested if –else **Looping**: for, while, nested loops Control statements: Terminating loops, skipping specific conditions **Functions**: Function Calls, Type Conversion Functions, Math Functions, Composition, Adding New Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters Are Local, Stack Diagrams, Fruitful Functions and Void Functions, Why Functions? Importing with from, Return Values, Incremental Development, Composition, Boolean Functions, More Recursion, Leap of Faith, Checking Types	15
2.	**Strings**: A String Is a Sequence, Traversal with a for Loop, String Slices, Strings Are Immutable, Searching, Looping and Counting, String Methods, The in Operator, String Comparison, String Operations.	15

	Lists: Values and Accessing Elements, Lists are mutable, traversing a List, Deleting elements from List, Built-in List Operators, Concatenation, Repetition, In Operator, Built-in List functions and methods Tuples and Dictionaries: Tuples, Accessing values in Tuples, Tuple Assignment, Tuples as return values, Variable-length argument tuples, Basic tuples operations, Concatenation, Repetition, in Operator, Iteration, Built-in Tuple Functions Creating a Dictionary, Accessing Values in a dictionary, Updating Dictionary, Deleting Elements from Dictionary, Properties of Dictionary keys, Operations in Dictionary, Built-In Dictionary Functions, Built-in Dictionary Methods Files: Text Files, The File Object Attributes, Directories Exceptions: Built-in Exceptions, Handling Exceptions, Exception, with Arguments, User-defined Exceptions	
3.	**Classes and Objects**: Overview of OOP (Object Oriented Programming), Class Definition, Creating Objects, Instances as Arguments, Instances as return values, Built-in Class Attributes, Inheritance, Method Overriding, Data Encapsulation, Data Hiding Modules: Importing module, Creating and exploring modules, Math module, Random module, Time module **Web Scraping:** Project: MAPIT.PY with the web browser Module, Downloading Files from the Web with the requests Module, Saving Downloaded Files to the Hard Drive, HTML. **Working with Excel Spreadsheets**: Excel Documents, Installing the openpyxl Module, Reading Excel Documents, Project: Reading Data from a Spreadsheet, Writing Excel Documents, Project: Updating a Spreadsheet, Setting the Font Style of Cells, Font Objects, Formulas, Adjusting Rows and Columns, Charts. **Introduction to Django Framework**:Initial Set Up, Hello World App	15

REFERENCE BOOKS:

1.Think Python, Allen Downey, O'Reilly, 1st, 2012
2.An Introduction to Computer Science using Python 3, Jason Montojo, Jennifer Campbell, and Paul Gries, SPD, 1st 2014
3.Python GUI Programming Cookbook, Burkhard A. Meier, Packt,2015
4.Introduction to Problem Solving with Python, E. Balagurusamy, TMH, 1st,2016
5.Murach's Python programming, Joel Murach, Michael Urban, SPD, 1st,2017
6.Object-oriented Programming in Python, Michael H. Goldwasser, David Letscher, Pearson Prentice Hall, 1st,2008
7.Exploring Python, Budd, TMH, 1st,2016
8.Al Sweigart, "Automate the Boring Stuff with Python", William Pollock, 2015, ISBN: 978-1593275990.
9.Django for Beginners: Build websites with Python and Django, William S. VincentWilliam S. Vincent, 2020

B. Sc. (Information Technology)		Semester – III	
Course Name: Python Programming Lab		Course Code: BSIT-MJPS3-102	
Periods per week (1 Period is 60 minutes)		2	
Credits		1	
		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- To demonstrate the principles of object oriented programming in well-written modular code.
- To enable students to solve problems requiring the writing of well-documented programs in the Python language.

List of Practical	
1.	**Write the program for the following:**
a.	Create a program that asks the user to enter their name and their age. Print out amessage addressed to them that tells them the year that they will turn 100 years old.
b.	Enter the number from the user and depending on whether the number is even orodd, print out an appropriate message to the user.
c.	Write a program to generate the Fibonacci series.
d.	Write a function that reverses the user defined value.
e.	Write a function to check the input value is Armstrong and also write the function for Palindrome.
f.	Write a recursive function to print the factorial for a given number.
2.	**Write the program for the following:**
a.	Write a function that takes a character (i.e. a string of length 1) and returns Trueif it is a vowel, False otherwise.
b.	Define a function that computes the *length* of a given list or string.
c.	Define a *procedure*histogram() that takes a list of integers and prints a histogram to the screen. For example, histogram([4, 9, 7])should print thefollowing: **** ********* *******
3.	**Write the program for the following:**
a.	A *pangram* is a sentence that contains all the letters of the English alphabet at least once, for example: *The quick brown fox jumps over the lazy dog*. Your task here is to write a function to check a sentence to see if it is a pangram or not.
b.	Take a list, say for example this one: a=[1,1,2,3,5,8,13,21,34,55,89] and write a program that prints out all the elements of the list that are less than 5.

4.	**Write the program for the following:**
a.	Write a program that takes two lists and returns True if they have at least onecommon member.
b.	Write a Python program to print a specified list after removing the 0th, 2nd, 4thand 5th elements.
c.	Write a Python program to clone or copy a list
5.	**Write the program for the following:**
a.	Write a Python script to sort (ascending and descending) a dictionary by value.
b.	Write a Python script to concatenate following dictionaries to create a new one. Sample Dictionary : dic1={1:10, 2:20} dic2={3:30, 4:40} dic3={5:50,6:60} Expected Result : {1: 10, 2: 20, 3: 30, 4: 40, 5: 50, 6: 60}
c.	Write a Python program to sum all the items in a dictionary.
6.	**Write the program for the following:**
a.	Write a Python program to read an entire text file.
b.	Write a Python program to append text to a file and display the text.
c.	Write a Python program to read last n lines of a file.
7.	**Write the program for the following:**
a.	Design a class that store the information of student and display the same
b.	Implement the concept of inheritance using python
c.	Create a class called Numbers, which has a single class attribute called MULTIPLIER, and a constructor which takes the parameters xand y(these shouldall be numbers). i. Write a method called addwhich returns the sum of the attributes xand y. ii. Write a class method called multiply, which takes a single number parameter a and returns the product of a and MULTIPLIER. iii. Write a static method called subtract, which takes two number parameters, band c, and returns b - c. iv. Write a method called value which returns a tuple containing the values of xand y. Make this method into a property, and write a setter and a deleter for manipulating the values of xand y.
8.	**Write the program for the following:**
a.	Open a new file in IDLE (“New Window” in the “File” menu) and save it as geometry.py in the directory where you keep the files you create for this course. Then copy the functions you wrote for calculating volumes and areas in the “Control Flow and Functions” exercise into this file and save it. Now open a new file and save it in the same directory. You should now be able to import your own module like this: import geometry

	Try and add print dir(geometry)to the file and run it. Now write a function pointyShapeVolume(x, y, squareBase) that calculates the volume of a square pyramid if squareBase is True and of a right circular cone if squareBase is False. x is the length of an edge on a square if squareBase is True and the radius of a circle when squareBase is False. y is the height of the object. First use squareBase to distinguish the cases. Use the circleArea and squareArea from the geometry module to calculate the base areas.
b.	Write a program to implement exception handling.
9.	Write the program for the following:
a.	Implementing Web Scraping in Python with BeautifulSoup.
b.	Downloading files from web using Python.
10.	Write the program for the following:
a.	Reading an excel file using Python openpyxl module
b.	Writing to an excel file using openpyxl module
c.	Arithmetic operations in excel file using openpyxl
d.	Plotting charts in excel sheet using openpyxl module
11.	Design a small application in Django Framework

B. Sc. (Information Technology)		Semester – III	
Course Name: Computer Oriented Statistical Techniques		Course Code: BSIT-MNS3-103	
Periods per week (1 Period is 60 minutes)		3	
Credits		3	
		Hours	Marks
Evaluation System	Theory Examination	2	50
	Internal	--	25

Course Objectives:

- To make students learn Measures of Central Tendency and dispersion.
- To make students learn Elementary Sampling Theory and Statistical Estimation Theory
- To make students learn a test of the hypothesis as well as calculate a confidence interval for a population parameter and few Statistical distributions.
- To make students learn to compute and interpret results of bivariate and multivariateregression and correlation analysis for forecasting.

Sr. No	Modules/Units	No of Lectures
1.	**Measures of Central Tendency**: Introduction, Arithmetic Mean andits Properties (Simple and Weighted), Geometric mean and Harmonic mean, Quantiles (Median, Quartiles, Deciles, and Percentiles), Mode, Empirical Relation Between Mean, Median, and Mode,Relation Between the Arithmetic, Geometric, and HarmonicMean, The Root Mean Square. Merits, Demerits and Uses of Mean, Median, Mode, G.M. and H.M	09
2.	**Measures of Dispersion**: Introduction, Absolute and Relative Measures: Range, Interquartile Range, 10–90 Percentile Range , Quartile Deviation Mean Absolute Deviation, Standard Deviation, Variance and their relative measures. Empirical Relations Between Measures of Dispersion.	09
3.	**Elementary Sampling Theory** : Sampling Theory, Random Samplesand Random Numbers, Sampling With and Without Replacement, Sampling Distributions, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distributions of Differences and Sums, Standard Errors. **Statistical Estimation Theory**: Estimation of Parameters, Unbiased Estimates, Efficient Estimates, Point Estimates and Interval Estimates,	09

	Confidence-Interval Estimates of Population Parameters, Probable Error.	
4.	**Introduction to Statistical Hypothesis Testing:** Statistical Hypotheses, Tests of Hypotheses and Significance, or Decision Rules, Type I and Type II Errors, Level of Significance, Critical Region, Two-Tailed and One-Tailed Tests, The Power of a Test, p-Values for Hypotheses Tests. **Tests Involving Normal Distributions:** Test for Single Mean, Single Proportion, Test of Significance for Differences of Means, Test of Significance for Differences of Proportion. **Statistical Distributions** , 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. Observed and Theoretical Frequencies, Definition of Chi-Square, The Chi-Square Test for Goodness of Fit and Independence of Attributes, Contingency Tables, Yates' Correction, Coefficient of Contingency, Correlation of Attributes, Additive Property of Chi-Square.	09
5.	**Correlation:** Introduction, Types of Correlation, Determination of Correlation using Scatter Diagram, Karl Pearson'sCoefficient of Correlation and Spearman's Rank Correlation Coefficient. **Regression:** Introduction, Regression Lines and Regression Coefficients, Relation between Coefficient of Correlation and Regression Coefficients.	09

REFERENCE BOOKS:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	Theory and Problems of Statistics	Schaum's Outlines Series, Murray R. Spiegel, Larry J. Stephens	McGraw-Hill	Sixth	2008
2.	Fundamental of Mathematical Statistics	S.C. Gupta and V.K. Kapoor	Sultan Chand and Sons	First	2011
3.	Introduction to Mathematical Statistics	Robert V. Hogg	Allen T. Craig	First	2010
4.	A Practical Approach using R	R.B. Patil, H.J. Dand and R. Bhavsar	Shroff Publishers and Distributors	First	2017

B. Sc. (Information Technology)		Semester – III	
Course Name: Computer Oriented Statistical Techniques with R Programming		Course Code: BSIT-MNPS3-103	
Periods per week (1 Period is 60 minutes)		2	
Credits		1	
		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- To make students learn basic syntax of R programming.
- To make students learn to analyze data using statistical functions in R.
- To make students learn to import, review, manipulate and summarize data-sets in R.
- To make students learn to perform appropriate statistical tests using R.

List of Practical:	
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, interquartile 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.	Using R import the data from Excel / .CSV file and draw the skewness.
7.	Using R perform the binomial and normal distribution on the data.
8.	Import the data from Excel / .CSV and perform the hypothetical testing.
9.	Import the data from Excel / .CSV and perform the Chi-squared Test.
10.	Perform the Linear Regression using R.

B. Sc. (Information Technology)		Semester – III	
Course Name: Organisational Behaviour		Course Code: BSIT-OES3-104	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To understand basic concepts, theories and techniques in the field of Organizational Behavior and its significance in organizational contexts.
- To understand how job related attitudes impact organizations.
- To understand the factors influence of attitudes and motivation on individual behavior in organizational context
- To understand how to effectively manage emotions in organizational contexts.

Sr. No	Modules/Units	No of Lectures
1.	• Introduction to Organizational Behavior • Importance and relevance of OB in modern organizations • Theoretical frameworks in OB: Classical, Human Relations, and Modern Approaches • Challenges and opportunities of Organisational Behaviour • Attitude: Meaning and Components. • Job related attitudes – Job involvement, Organisational Commitment, Perceived Organisational support, Employee Engagement. • Job satisfaction – Measurement, Determinants and Impact.	15
2.	• **Motivation**: Meaning, Importance, Types, Theories of Motivation (Maslow's hierarchy of needs, Theory X, Theory Y and William Ouchi's Theory Z, Herzberg's Two factor theory, McClelland's theory of needs, Goal setting theory, Expectancy theory) and Impact on organisation. • Workplace Emotions: Meaning of Emotions, Cognitive Dissonance, Emotional Dissonance, Managing Emotions at Work (Emotional Labor) - The Six Universal Emotions, Martin Seligman's PERMA model.	15

REFERENCES

- Organisational behaviour, S.Robbins, Prentice Hall
- Organisational behaviour, John W.Newstrom and Keith Davis, Tata McGrawhill
- Organisational behaviour, Fred Luthans, McGrawhill,Newyork
- Organisational behaviour, K.Aswathappa, Himalaya Publishing House
- Essentials of management, Koontz,Harold, Tata McGrawhill

B. Sc. (Information Technology)		Semester – III	
Course Name: Intellectual Property Rights		Course Code: BSIT-OES3-105	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To recognize the importance of IP and to educate the pupils on basic concepts of Intellectual Property Rights.
- To identify the significance of practice and procedure of Patents.
- To make the students to understand the statutory provisions of different forms of IPRs in simple forms.
- To learn the procedure of obtaining Patents, Copyrights, Trademarks &Industrial Design

Sr. No	Modules/Units	No of Lectures
1.	**Basic Principles and Acquisition of Intellectual Property Rights:** Focus on the: Philosophical Aspects of Intellectual Property Laws, Basic Principles of Patent Law, Patent Application procedure, Drafting of a Patent Specification, Understanding Copyright Law, Basic Principles of Trade Mark, Basic Principles of Design Rights, International Background of Intellectual Property **Information Technology Related Intellectual Property Rights** Computer Software and Intellectual Property-Objective, Copyright Protection, Reproducing, Defences, Patent Protection. Database and Data Protection-Objective, Need for Protection, UK Data Protection Act, 1998,US Safe Harbor Principle, Enforcement. Protection of Semi-conductor Chips-Objectives Justification of protection, Criteria, Subject-matter of Protection, WIPO Treaty, TRIPs, SCPA. Domain Name Protection-Objectives, domain name and Intellectual Property, Registration of domain names, disputes under Intellectual Property Rights, Jurisdictional Issues, and International Perspective.	15
2.	**Patents (Ownership and Enforcement of Intellectual Property)** Patents-Objectives, Rights, Assignments, Defences in case of Infringement Copyright-Objectives, Rights, Transfer of Copyright, work of employment Infringement, Defences for infringement Trademarks-Objectives, Rights, Protection of good will, Infringement, Passing off, Defences. Designs-Objectives, Rights, Assignments, Infringements, Defences of Design Infringement Enforcement of Intellectual Property Rights - Civil Remedies, Criminal	15

	Remedies, Border Security measures. Practical Aspects of Licencing – Benefits , Determinative factors, important clauses, licensing clauses. Patent Treaties / Acts	

REFERENCE BOOKS:

1. Peter Weill , Jeanne Ross “IT Governance: How Top Performers Manage IT Decision Rights for Superior Results”

2. Jeanne W. Ross “Enterprise Architecture As Strategy: Creating a Foundation for Business Execution”

3. Peter Weill “IT Savvy: What Top Executives Must Know to Go from Pain to Gain

4. www.wipo.org

5. IT Act 2000 with amendments in 2008

6. How To Register Your Own Copyright by Marx Warda, Sphinx Publishing

7. Licensing Art & Design by Caryn R. Leland, Allworth Press

8. Managing Intellectual Property: The Strategic Importance, (2 ed.) V. V. Sopale (PHI)

B. Sc. (Information Technology)		Semester – III	
Course Name: Microprocessors and Microcontrollers		Course Code:BSIT-VSCS3-106	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To introduce the Building Blocks of Embedded System
- To Educate in Various microcontrollers used in Embedded Development
- To Introduce Bus Communication in processors, Input/output interfacing.
- To impart knowledge in sensors and actuators.
- To familiar with the real world application development using embedded system.
- To enable the students to learn the concept of assembly languages and acquire knowledge about 8085 microprocessor.
- To educate the students about different microprocessors.

Sr. No	Modules/Units	No of Lectures
1.	**Microprocessor, microcomputers, and Assembly Language:** Microprocessor Architecture and its operation's, Memory, I/O Devices, Microcomputer System, Logic Devices and Interfacing. **8085 Microprocessor Architecture and Memory Interface:** 8085 Microprocessor unit,8085 Machine Cycles & Bus Timings, Memory Interfacing **Introduction to 8085 Instructions:** Data Transfer Operations, Arithmetic Operations, Logic Operation, Branch Operation, Writing Assembly Languages Programs, Debugging a Program. Arithmetic Instruction Related to Memory.	10
2.	**Introduction:** Embedded Systems and general purpose computer systems,classifications, applications and purpose of embedded systems. **Characteristics and quality attributes of embedded systems:** Characteristics, operational and non-operational quality attributes. **Communication Protocol & Implementation**:I2C - Interfacing with micro controller using bit-banking method, I2C devices – RTC, ADC-DAC, Port Expander,Bluetooth, Wi-Fi and RFID. Bluetooth Communication,Wi-Fi, RFID, GSM, GPS, Ethernet.	10
3.	**PIC microcontroller:** overview of the PIC18 family, the wreg register in the pic, the pic file register , using instructions with the default access bank, pic status register, pic data format and directives	

	Branch, call, and time delay loop :branch instructions and looping,call instructions and stack ,pic18 time delay and instruction pipeline	10

REFERENCE BOOKS:

Sr No.	Title	Author	Publisher
1.	PIC MICROCONTROLLER AND EMBEDDED SYSTEMS Using Assembly and C for PIC18	Muhammad Ali Mazidi Rolin D. McKinlay Danny Causey	Pearson
2.	Introduction to embedded systems	Shibu K V	Tata Mcgraw-Hill
3.	The 8051 Microcontroller and Embedded Systems	Muhammad Ali Mazidi	Pearson
4.	Embedded Systems	Rajkamal	Tata Mcgraw-Hill
5.	Microprocessors Architecture, Programming and Applications with the 8085	Ramesh Gaonkar	PENRAM, Fifth, 2012

B. Sc. (Information Technology)		Semester – III	
Course Name: Hindi		Course Code:BSIT-AECS3-107	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

पाठ्यक्रम के उद्देश्य:

1. छात्रों को हिंदी भाषा की सामान्य प्रकृति और उपयोग से अवगत कराना।
2. हिंदी में सामाजिक, व्यावसायिक और तकनीकी संचार को बढ़ाना।
3. हिंदी में प्रभावी ढंग से पढ़ने, लिखने, बोलने और सुनने के कौशल का विकास करना।

पाठ्यक्रम परिणाम:

1. छात्र संचार माध्यम के रूप में हिंदी के प्रयोग से परिचित होंगे।
2. छात्रों को हिंदी में मौखिक और लिखित संचार का व्यावहारिक अनुभव मिलेगा।
3. छात्र औपचारिक और अनौपचारिक दोनों स्थितियों में प्रभावी पारस्परिक संचार के माध्यम के रूप में हिंदी का उपयोग करने में आत्मविश्वास हासिल करेंगे।

क्रमांक	मॉड्यूल (मापांक)	व्याख्यानों की संख्या
१	**इकाई १: पठन कौशल** अ) भाषागत कौशल को विकसित करने के लिए ● भारतीय संस्कृति और शिष्टाचार पर आधारित हिंदी के अनुच्छेदों का वाचन , आकलन और सारांश । ● विज्ञान और तकनीकी पर आधारित हिंदी के अनुच्छेदों का वाचन ,आकलन और सारांश। आ) संस्कृति शिष्टाचार,चिकित्सा, विज्ञान ,तकनीकी इत्यादि क्षेत्रों में दैनिक जीवन में उपयोग में आने वाले हिंदी शब्दों व उनके अंग्रेजी रुप से परिचित कराना।	१०
२	**इकाई २: लेखन कौशल** ● **अनुच्छेद लेखन:** पहले ड्राफ्ट की तैयारी, पुनरीक्षण और स्व-संपादन, वर्तनी के नियम। ● **पत्र लेखन** : सामाजिक पत्र (बधाई, संवेदना, निमंत्रण एवं धन्यवाद पत्र)	१०
३	**इकाई ३ : श्रवण और सभाषण** ● दैंनदिन जीवन से जुड़े अलग-अलग विषयों पर- ● वक्तृत्व कौशल का विकास ● वाद-विवाद कौशल का विकास ।	०५

४	**इकाई ४ : व्याकरण और शब्दावली** • वचन • कहावतें और मुहावरे • वाक्यों का रूपान्तरण (सरल, संयुक्त एवं जटिल)	०५
	कुल	**30**

B. Sc. (Information Technology)		Semester – III	
Course Name: Environment Sustainability in IT		Course Code:BSIT-FPS3-108	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- Learners will be able to identify how to our daily lifestyle creates bad impact on environment.
- Learners will be able to interpret initiatives taken by various countries to reduce and recycle e-waste.
- Learners will be able to relate the impact of e-waste on environment and human health.
- Learners will be able to select various methods to reduce power usage, save paper etc.
- Learners will be able to evaluate the green methods implemented in business.
- Learners will be able to plan and develop ideas for e-waste management.

Module No	Modules/Units	No of Lectures
1	**Going Paperless:** Paper Problems, The Environment, Costs: Paper and Office, Practicality, Storage, Destruction, Going Paperless, Organizational Realities, Changing Over, Paperless Billing, Handheld Computers vs. the Clipboard, Unified Communications, Intranets, What to Include, Building an Intranet, Microsoft Office SharePoint Server 2007, Electronic Data Interchange (EDI), Nuts and Bolts, Value Added Networks, Advantages, Obstacles. **Recycling:** Problems, China, Africa, Materials, Means of Disposal, Recycling, Refurbishing, Make the Decision, Life Cycle, frombeginning to end, Life, Cost, Green Design, Recycling Companies, Finding the Best One, Checklist, Certifications, Hard Drive Recycling, Consequences, cleaning a Hard Drive, Pros and cons of each method, CDs and DVDs, good and bad about CD and DVDs disposal, Change the mind-set, David vs. America Online	10

2	**Hardware Considerations**: Certification Programs, EPEAT, RoHS, Energy Star, Computers, Monitors, Printers, Scanners, All-in-Ones, Thin Clients, Servers, Blade Servers, Consolidation, Products, Hardware Considerations, Planned Obsolescence, Packaging, Toxins, Other Factors, Remote Desktop, Using Remote Desktop, Establishing a Connection, In Practice **Greening Your Information Systems:** Initial Improvement Calculations, Selecting Metrics, Tracking Progress, Change Business Processes, Customer Interaction, Paper Reduction, Green Supply Chain, Improve Technology Infrastructure, Reduce PCs and Servers, Shared Services, Hardware Costs, Cooling.	10
3	**Staying Green:** Organizational Check-ups, Chief Green Officer, Evolution, Sell the CEO, SMART Goals, Equipment Check-ups, Gather Data, Tracking the data, Baseline Data, Benchmarking, Analyse Data, Conduct Audits, Certifications, Benefits, Realities, Helpful Organizations. **Other Organizations:** University of Wisconsin–River Falls, University Center, Power and Water, Community Development, Wal-Mart, Partners, Experimental Stores, Products, Waste Reduction	10

REFERENCE BOOKS:

1. Green IT , Toby Velte, Anthony Velte, Robert Elsenpeter , McGraw Hill .

B. Sc. (Information Technology)		Semester – III	
Course Name: Yoga		Course Code:BSIT-CCS3-109	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Learning Objectives: Cocurricular Course in Yoga Education

- To make students aware of historical and cultural background of Yoga
- To create awareness about different aspects of Yoga
- To acquaint students with the tenets of Patanjali Yoga

Learning Outcomes: Cocurricular Course in Yoga Education

- Students will become familiar with Indian Yoga traditions
- Students will acquire knowledge of different types of Yoga
- Students will be acquainted with the tenets of Patanjali Yoga

Sr No.	Modules	Number of lectures
1	History and Relevance of Yoga a) Brief History of Yoga b) Definition, Importance, Need and Uses of Yoga	10
2	Types of Yoga a) Jnana Yoga, Karma Yoga, Bhakti Yoga, Mantra Yoga b) Seven Chakras	10
3	Patanjali Yoga a) Hatha Yoga, Kundalini Yoga, Patanjali's Yoga Sutras: A Summary b) Patanjali's Yoga as a solution to the problems of modern society	10
	Total Lectures	30

Bibliography:

Yoga sutra simplified- Vasudev Murthy- Jaico
Patanjali Yoga Sutras- Swami Vivekananda- Srishti Publishers
The complete book of Yoga: Karma Yoga, Bhakti Yoga, Raja Yoga, Jnana Yoga Swami Vivekanand Fingerprint publishing

Light on Yoga- B.K.S. Iyengar
Yoga Sutra of Patanjali- Dr. Jayadeva Yogendra- Zen Publications
Yoga Darshan: Vision of the Yoga Upanishads- Swami Niranjananda Saraswati, Yoga publication trust, Munger, Bihar, India
Four chapters on Freedom: Commentary on the yoga sutra of Patanjali- Yoga publications Trust
Indian Philosophy, Dr. S. Radhakrishnan

Semester IV			
Course Code	**Course Type**	**Course Title**	**Credits**
BSIT-MJS4-101	Major	Introduction to Data Structures	3
BSIT-MJPS4-101	Major Practical	Introduction to Data Structures Lab	1
BSIT-MJS4-102	Major	Database Management Systems	3
BSIT-MJPS4-102	Major Practical	Database Management Systems Lab	1
BSIT-MNS4-103	Minor	Applied Mathematics	3
BSIT-MNPS4-103	Minor Practical	Applied Mathematics with SAGEMATH	1
BSIT-OES4-104	Open Electives(OE)	Introduction to Financial Planning	2
BSIT-OES4-105	Open Electives(OE)	Cyber Laws	2
BSIT-SECPS4-106	Skill Enhancement Courses (SEC)	Core Java Lab	2
BSIT-AECS4-107	Ability Enhancement Courses (AEC)	Hindi	2
BSIT-CEPS4-108	Community Engagement(CE)	Digital Literacy	2
BSIT-CCS4-109	Co-curricular Courses (CC)	Yoga	2
		Total Credits	22

SYBSc (IT)
Semester IV

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Introduction to Data Structures		**Course Code: BSIT-MJS4-101**	
Periods per week (1 Period is 60 minutes)		**3**	
Credits		**3**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**2**	**50**
	Internal	**--**	**25**

Course Objectives:

- Learners will be able to identify how various data structures are helpful in data management and data organization.
- Learners will be able to understand the usage of data structures in various domains.
- Learners will be able to use various functions on data structures.
- Learners will be able to compare and differentiate between various data structures.
- Learners will be able to discriminate and assess appropriate data structures for various applications.
- Learners will be able to write codes to implement various data structures in Python.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction:** Data and Information, Data Structure, Classification of Data Structures, Primitive Data Types, Abstract Data Types, Operations on Data Structure **Array:** Introduction, One Dimensional Array, Memory Representation of One Dimensional Array, Traversing, Insertion, Deletion, Searching, Sorting, Merging of Arrays, Multidimensional Arrays, Memory Representation of Two Dimensional Arrays, Sparse Arrays, SparseMatrix, Memory Representation of Special kind of Matrices, Advantages and Limitations of Arrays. **Stack:** Introduction, Operations on the Stack, Memory Representation of Stack, Array Representation of Stack, Applications of Stack, Evaluation of Arithmetic Expression, Matching Parenthesis, infix and postfix operations, Recursion.	15
2.	**Queue:** Introduction, Queue, Operations on the Queue, Memory Representation of Queue, Array representation of queue, Linked List Representation of Queue, Circular Queue,Some special kinds of queues, Deque, Priority Queue, Application of Priority Queue, Applications of Queues. **Linked List:** Linked List, One-way Linked List, Traversal of Linked List, Searching, Insertion in Linked List, Deletion from Linked List, Copying a List into Other List, Merging Two Linked Lists, Splitting a List into Two Lists, Reversing One way linked List, Circular Linked List, Applications of Circular Linked List, Two way Linked List, Header Linked List, Applications of the Linked list, Representation of Polynomials, Storage of Sparse Arrays.	15

3.	**Sorting and Searching Techniques** Bubble, Selection, Insertion, Merge Sort, Radix sort. Searching: Sequential, Binary Search. **Tree:** Tree, Binary Tree, Properties of Binary Tree, Memory Representation of Binary Tree, Operations Performed on Binary Tree, Binary Search Tree, Operations on Binary Search Tree, Heap, Introduction to Advanced Tree Structures : Red Black Tree, AVL Tree, 2-3 Tree, B-Tree **Graph:** Introduction, Graph, Graph Terminology, Adjacency Matrix Representation of Graph, Adjacency List or Linked Representation of Graph, Graph Traversal. **Hashing Techniques**: Common hashing functions, Collision resolution, Linear probing, Static and Dynamic Hashing	15

REFERENCE BOOKS:

1. A Simplified Approach to Data Structures Lalit Goyal, Vishal Goyal, Pawan Kumar SPD 1st 2014
2. An Introduction to Data Structure with Applications Jean – Paul Tremblay and Paul Sorenson Tata MacGraw Hill 2nd 2007
3. Data Structure and Algorithm Maria Rukadikar SPD 1st 2017
4. Schaum's Outlines Data structure Seymour Lipschutz Tata McGraw Hill 2nd 2005
5. Data structure – A Pseudocode Approach with C AM Tanenbaum, Y Langsamand MJ Augustein Prentice Hall India 2nd 2006
6. Data structure and Algorithm Analysis in C Weiss, Mark Allen Addison Wesley 1st 2006

B. Sc. (Information Technology)		Semester – V	
Course Name: Introduction to Data Structures Lab		Course Code: BSIT-MJPS4-101	
Periods per week (1 Period is 60 minutes)		2	
Credits		1	
		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- To help students to learn programming various inserting, deleting, sorting, searching, traversing mechanisms with various data structures.

NOTE: Practical's can be implemented using C,C++, Python or Java

List of practicals :	
1.	a) Write a program to store the elements in 1-D array and perform the operations like searching, sorting and reversing the elements b) Read the two arrays from the user and merge them and display the elements in sorted order.[Menu Driven] c) Write a program to perform the Matrix addition, Multiplication and Transpose Operation. [Menu Driven]
2.	Write a program to implement Stacks and Queues.
3.	Write a program to implement Singly Linked List.
4.	Write a program to implement Doubly Linked list.
5.	a) Write a program to create the tree and display the elements. b) Write a program to construct the binary tree. c) Write a program for inorder, postorder and preorder traversal of tree
6.	Write a program for shortest path diagram.
7.	Write a program to implement Bubble Sort, Selection Sort, Insertion Sort and Merge Sort
8.	Write a program to search the element using sequential search and binary search

REFERENCE BOOKS:

1. Data Structures and Algorithms Using Python RanceNecaise Wiley First 2016.
2. Data Structures and Algorithms in Java, Micheal T Goodrich, Roberto Tamassi, Wiley, Fourth Edition.
3. Data Structures Using C and C++ Langsam,Augenstein, Tanenbaum Pearson First 2015.

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Database Management Systems		**Course Code: BSIT-MJS4-102**	
Periods per week (1 Period is 60 minutes)		**3**	
Credits		**3**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**2**	**50**
	Internal	**--**	**25**

Course Objectives:

- To help students to learn database management system with an emphasis on how to organize, maintain and retrieve information from a DBMS.
- To help students to learn about ER Diagram and their relationships.
- To help students learn the concepts of integrity and security.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction to Databases and Transactions :** What is database system, purpose of database system, view of data, relational databases, database architecture, transaction management **Data Models:** The importance of data models, Basic building blocks, Business rules, The evolution of data models, Degrees of data abstraction. **Database design and ER Model:** overview, ER Model, Constraints, ER Diagrams, ERD Issues, weak entity sets, Codd‟s rules, Relational Schemas, Introduction to UML	15
2.	**Relational database model:** Logical view of data, keys, integrity rules, Relational Database design: features of good relational database design, atomic domain and Normalization (1NF, 2NF, 3NF, BCNF). **Relational Algebra and Calculus** **Relational algebra:** introduction, Selection and projection, set operations, renaming, Joins, Division, syntax, semantics. Operators, grouping and ungrouping, relational comparison. **Relational Calculus:** Tuple relational calculus, Domain relational Calculus, calculus vs algebra, computational capabilities	15

3.	**Constraints, Views and SQL Constraints,** types of constrains, Integrity constraints, Views: Introduction to views, data independence, security, updates on views, comparison between tables and views SQL: data definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers. **Transaction management and Concurrency Control Transaction management:** ACID properties, serializability and concurrency control, Lock based concurrency control (2PL, Deadlocks), Time stamping methods, optimistic methods, database recovery management. **Introduction to PL-SQL**	15

REFERENCE BOOKS:

1. Database System and Concepts A Silberschatz, H Korth,Sudarshan, McGrawHill Fifth Edition
2. Database Systems Rob Coronel Cengage Learnin gTwelfth Edition
3. Programming with PL/SQL for Beginners H. Dand, R. Patil and T. Sambare X –Team First 2011
4. Introduction to Database System, C.J.Date, Pearson First, 2003

B. Sc. (Information Technology)		Semester – IV	
Course Name: Database Management Lab		Course Code: BSIT-MJPS4-102	
Periods per week (1 Period is 60 minutes)		2	
Credits		1	
		Hours	Marks
Evaluation System	Practical Examination	--	25

Course Objectives:

- To make students learn basic SQL queries to retrieve, delete, update and insert the data in database.
- To make students learn to develop skills for query processing and optimization.

1.	Draw E-R diagram and convert entities and relationships to relation table for a given scenario
a.	Bank
b.	College
2.	**Write relational algebra queries for a given set of relations**
3.	**Defining data**
a.	Using CREATE statement
b.	Using ALTER statement
c.	Using DROP statement
d.	Using TRUNCATE statement
e.	Using RENAME statement
4.	**Manipulating data**
a.	Using INSERT statement
b.	Using UPDATE statement
c.	Using DELETE statement
d.	Using SELECT statement
5.	**Creating and managing the tables**
a.	Creating table with contraints: NOTNULL, UNIQUE, PRIMARY KEY ,FOREIGN KEY
6.	**Restricting and sorting data**
a.	Using DISTINCT,IN, AS, SORT,LIKE,ISNULL, OR
b.	Using Group By, Having clause, Order By clause
7.	**Aggregate and Mathematical functions:**
a.	AVG,MIN,MAX,SUM,COUNT
b.	ABS,SQRT,ROUND,TRUNCATE,SIGN,POWER,MOD,FLOOR,CEIL
8.	**Views and Joins: For a given set of relation tables perform the following**
a.	Creating view
b.	Dropping view
c.	Selecting from a view
9.	**Database trigger**
a.	Using CREATE OR REPLACE TRIGGER
10.	**Index**
a.	Create index
b.	Drop index

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Applied Mathematics		**Course Code: BSIT-MNS4-103**	
Periods per week (1 Period is 60 minutes)		**3**	
Credits		**3**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**2**	**50**
	Internal	**--**	**25**

Course Objectives:

- To make students learn the basic concepts of matrices and complex numbers.
- To make students learn to solve linear and higher order differential equations.
- To make students learn the concepts of Laplace and inverse Laplace transform and their applications
- To make students learn Multiple Integrals and their applications

Sr. No	Modules/Units	No of Lectures
1.	**Matrices:** Introduction, Types of Matrices, Determinant, Transposeof a Matrix, Conjugate of a Matrix, Transposed Conjugate of a Matrix, Operations of Matrices and Properties, Elementary Transformation, Inverse of a Matrix, Rank of a Matrix, Echelon or Normal Form of a Matrix, Linear Equations, Linear Dependence and Linear Independence of Vectors, Linear Transformation, Characteristics Roots and Characteristics Vectors, Properties of Characteristic Roots and Characteristic vectors, Cayley-Hamilton Theorem, Similarity of Matrices, Reduction of a Matrix to a Diagonal Matrix which has Elements as Characteristics Values.	09
2.	**Complex Numbers:** Introduction, Equality of Complex Numbers, Graphical Representation of Complex Number (Argand's Diagram), Polar Form of Complex Numbers, Polar Form of x + iy for Different Signs of x, y, Exponential Form of Complex Numbers,Mathematical Operation with Complex Numbers and their Representation on Argand's Diagram, Circular Functions of Complex Angles, Definition of Hyperbolic Function, Relations between Circular and Hyperbolic Functions. **Functions of Single variable**: Increasing and Decreasing functions, Basics of Optimization - Maxima and Minima.	09
3	**Differential Equations of the First Order and of the First Degree:** Introduction, Order, and Degree of a Differential Equations,Separation of Variables, Equations Homogeneous in x and y, Non- Homogeneous Linear Equations, Exact Differential Equation, Integrating Factor, Linear Differential Equations and Differential Equations Reducible to this form, Method of Substitution. **Linear Differential Equations with Constant Coefficients:** Introduction, The Differential Operator, Linear Differential Equation f(D) y = 0, Different Cases	09

	Depending on the Nature of theRoot of Equation f(D) = 0, Linear Differential Equation f(D) y = X, TheComplimentary Function, The Inverse Operator 1/f(D) and the Symbolic Expiration for the Particular Integral 1/f(D) X; The General Methods, Particular Integral: Short Methods, Particular Integral: Other Methods, Differential Equations Reducible to the Linear Differential Equations with Constant Coefficients.	
4.	**The Laplace Transform:** Introduction, Definition of the Laplace Transform, Table of Elementary Laplace Transforms, Theorems on Important Properties of Laplace Transformation, First Shifting Theorem, Second Shifting Theorem, The Convolution Theorem, Laplace Transform of an Integral, Laplace Transform of Derivatives. **Inverse Laplace Transform:** Shifting Theorem, Partialfraction Methods, Use of Convolution Theorem, Solution of Ordinary Linear Differential Equations with Constant Coefficients, Solution of Simultaneous Ordinary Differential Equations, Laplace Transformation of Special Functions, Periodic Functions, HeavisideUnit Step Function, Dirac-delta Function (Unit Impulse Function).	09
5.	**Multiple Integrals**: Double Integral, Change of the order of the integration, Double integral in polar coordinates, Applications of integration: Areas. **Beta and Gamma Functions:** Definitions**,** Properties and Problems. Duplication formula. **Differentiation Under the Integral Sign , Error Functions.**	09

REFERENCE BOOKS:

Sr. No.	Title	Author/s	Publisher	Edition	Year
1.	A Textbook of Applied Mathematics Vol I	P. N. Wartikar and J. N.Wartikar	Vidhyarthi Graha,	1st	2010
2.	A Textbook of Applied Mathematics Vol II	P. N. Wartikar and J. N.Wartikar	Vidhyarthi Graha,	1st	2010
3.	Higher Engineering Mathematics	Dr. B. S. Grewal	Khanna Publication	2nd	2012

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Applied Mathematics with SAGEMATH		**Course Code: BSIT-MNPS4-103**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**1**	
		Hours	**Marks**
Evaluation System	**Practical Examination**	**--**	**25**

Course Objectives:

- To make students learn to foundational knowledge of SAGEMATH
- To make students learn the matrices and complex numbers and solve the problem using SAGEMATH.
- To make students learn the differential equation, Laplace transformation and solve the problem using SAGEMATH.
- To make students learn to solve integral using SAGEMATH.

List of Practical:	
1.	Using SAGEMATH execute the basic commands, List, basics Arithmetic's and predefined function.
2.	Using SAGEMATH to execute Floor, division, remainder, floor-division, factorial, trigonometric, hyperbolic and logarithmic function.
3.	Plot the 2-D and 3-D graph by using SAGEMATH.
4.	Using SAGEMATH create the matrices and perform the addition, subtraction, multiplication, determinants and transpose.
5.	Using SAGEMATH check matrix is invertible or not. If it's invertible then find its inverse. Also find row space and column space.
6.	Using SAGEMATH find eigen value, eigen vectors, characteristic polynomial, minimal polynomial and solve the system of equation by using matrix.
7.	Using the SAGEMATH perform Derivatives and Integration.
8.	Using the SAGEMATH solves the linear, homogeneous and Exact differentials equations.
9.	Using the SAGEMATH solves the double differentials equations.
10.	Using the SAGEMATH perform the Laplace and inverse Laplace transformation.

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Introduction to Financial Planning		**Course Code: BSIT-OES4-104**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**1**	**30**
	Internal	**--**	**20**

Course Objectives:

- The learner will be able to understand the basic concepts of financial planning.
- The learner will be able to explain various financial products for savers and investors.
- The learner will be able to recognize their financial goals and how to achieve them.
- The learner will be able to understand and analyse the use of personal insurance and tax planning.

Sr. No	Modules/Units	No of Lectures
1.	**Introduction to Financial Planning** - Meaning, importance and objectives - Concept of Savings and Investment - Investment avenues - Goal-based Financial Planning	15
2.	**Personal Insurance and Tax Planning** - Insurance, types and importance - Risk Management using insurance products - Basic Tax Concepts (Definitions, Tax Slabs, Deductions and exemptions) - Tax planning and management	15

B. Sc. (Information Technology)		Semester – IV	
Course Name: Cyber Laws		Course Code: BSIT-OES4-105	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

Course Objectives:

- To introduce the cyber world and cyber law in general.
- To educate about the regulation of cyber space at national and international level.
- Explore The Legal and Policy Developments in Various Countries to Regulate Cyberspace

Sr. No	Modules/Units	No of Lectures
1.	**Cyber Law: Basic Concepts of Technology and Law :** Understanding the Technology of Internet, Scope of Cyber Laws, Cyber Jurisprudence **Law of Digital Contracts :** The Essence of Digital Contracts, The System of Digital Signatures, The Role and Function of Certifying Authorities, The Science of Cryptography **Intellectual Property Issues in Cyber Space:** Domain Names and Related issues, Copyright in the Digital Media, Patents in the Cyber World. **Rights of Netizens and E-Governance :** Privacy and Freedom Issues in the Cyber World, E-Governance, Cyber Crimes and Cyber Laws.	15
2.	**Information Technology Act 2000 :** Information Technology Act-2000-1 (Sec 1 to 13), Information Technology Act-2000-2 (Sec 14 to 42 and Certifying authority Rules), Information Technology Act-2000-3 (Sec 43 to 45 and Sec 65 to 78), Information Technology Act-2000-4(Sec 46 to Sec 64 and CRAT Rules), Information Technology Act-2000-5 (Sec 79 to 90), Information Technology Act2000-6 (Sec 91-94) Amendments in 2008. **International Scenario in Cyber Laws :** Data Protection Laws in EU and USA, Child Abuse Protection Laws in EU and USA, Cyber Laws - the Malaysian Approach. **Cyber Law Issues for Management:** Cyber Law Issues in E-Business Management, Major issues in Cyber Evidence Management, Cyber Law Compliancy Audit.	15

REFERENCE BOOKS:

1. Peter Weill , Jeanne Ross “IT Governance: How Top Performers Manage IT Decision Rights for Superior Results”

2. Jeanne W. Ross “Enterprise Architecture As Strategy: Creating a Foundation for Business Execution”

3. Peter Weill “IT Savvy: What Top Executives Must Know to Go from Pain to Gain

4. www.wipo.org

5. IT Act 2000 with amendments in 2008

6. How To Register Your Own Copyright by Marx Warda, Sphinx Publishing

7. Licensing Art & Design by Caryn R. Leland, Allworth Press

8. Managing Intellectual Property: The Strategic Importance, (2 ed.) V. V. Sopale (PHI)

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Core Java Lab		**Course Code: BSIT-SECPS4-106**	
Periods per week (1 Period is 60 minutes)		**4**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Practical Examination**	**--**	**50**

Course Objectives:

- To teach basic and Object-Oriented programming concept using basic syntaxes of control Structures, strings and function for developing skills of logic building activity.
- To help students to learn AWT and Applet packages for effective GUI creation and Event handling capabilities.

List of Practical	
0	**Discussion of the concepts on which the practicals are based.**
1.	Write a Java program called CozaLozaWoza which prints the number 1 to 110, 11 numbers per line. The program shall print "Coza" in place of the numbers which are multiples of 3, "Loza" for multiples of 5, "Woza" for multiples of 7, "CozaLoza" for multiples of 3 and 5, and so on. The output shall look like: 1 2 Coza 4 Loza Coza Woza 8 Coza Loza 11 Coza 13 Woza CozaLoza 16 17 Coza 19 Loza CozaWoza 22 23 Coza Loza 26 Coza Woza 29 CozaLoza 31 32 Coza
2.	Write a Java program to display the following pattern. A B A C B A D C B A
3.	Write a java program to input a number from user and print the sum of its odd factors only. Example: - If number is 36 then its factors are 1,2,3,4,6,9,12,18 and sum of its odd factors is 1+3+9=13
4.	Write a Java code to input height (in inches) and convert it into feet and inches. Display the final result in feet and inches. For e.g. if height is 77 inches then after conversion it will be 6 feet 5 inches. [1 feet=12 inches]
5.	Write a Java program to input Basic salary of a person and calculate Net salary in Rs. after increasing his salary as per the following criteria and Display the Net Salary 15000+3000 = 18000 **Basic(Rs.)** | **%increase** < 3000 | 2 >=3000 <5000 | 5 >=5000 <10000 | 10 Above 10000 | 20
6.	Design a class to represent a bank account. Include the following members: Data Members:

<table>
<tr><td></td><td>o Name of the depositor
o Account number
o Type of account(Savings/Current)
o Balance amount in the account(Minimum balance account(Savings/Current)
Methods:
▪ To read account number, Depositor name, Type of account
▪ To deposit an amount (Deposited amount should de added with it)
▪ To withdraw an amount after checking balance (Minimum balance must be Rs.500.00)
▪ To display the balance</td></tr>
<tr><td>7.</td><td>Define a class Travel with the following descriptions :
Data members/Instance variable :
TravelCode(long),Place(string),No_of_travellers(int),No_of_buses(inte ger)
Member functions / Methods :
i) A constructor to assign initial values of TravelCode as 201, Place as ‚Nainital‘, No_of_travellers as 10, No_of_buses as 1 .
ii) A method NewTravel() which allows user to enter TravelCode, Place and No_of_travellers through arguments Also, assign the value of No_of_buses as per the following conditions :
<table>
<tr><th>No of Travellers</th><th>No of Buses</th></tr>
<tr><td>Less than 20</td><td>1</td></tr>
<tr><td>Equal to or More Than 20 and less than 40</td><td>2</td></tr>
<tr><td>Equal to 40 or more than 40</td><td>3</td></tr>
</table>
iii) A method ShowTravel( ) to display the content of all the data members on screen. WAP to create an object of class Travel and invoke all its methods</td></tr>
<tr><td>8.</td><td>Create a class player as follows:-
Data members:- pname(String),innings(int),runs(int),notouts(int)
Methods:-
i) void showdata() – to display the details of player.
ii) Void calcAvg() – to calculate batting average of player as follows:- Bat. Avg= runs/(innings-notouts);
Write a Java program to create an object of class Player to input player details and invoke all its methods</td></tr>
<tr><td>9.</td><td>Create a class to calculate the area of triangle using two formulas
1. A = 1/2 × b × h.
2. the area of triangle A = √[s × (s – a) × (s – b) × (s – c)]
where s is semiperimeter</td></tr>
<tr><td>10.</td><td>Create a class "Employee" as follows:-
Instance variables:- empno(long), empname(String), job(String);
Methods:- i) void showinfo() - to display details of employee.
Create another class "Salary"
as follows:- Instance variables:- basic(double), newsal(double)
Methods:- i) void calculate(double perc) – that takes percentage amount ‚perc‘ as argument and calculates newsalary by incrementing the basic salary by that percentage amount. ii) void dispdata() – to display basic salary.
Write a Java program to create an object of class Salary to input details of employee and also invoke showinfo(), calculate() and dispdata() methods.</td></tr>
<tr><td>11.</td><td>Write a Java program to create a class Employee with a name & salary.
Create a class Manager
Add an instance variable department.
Create a class Executive</td></tr>
</table>

<table>
<tr><td></td><td>add an instance variable location.
Write the class definitions, the constructors and methods that read and display the information.</td></tr>
<tr><td>12.</td><td>Write a Java program to compute Area with one method AreaCompute() with 2 float parameters. Design 2 classes Rectangle and Circle. Input should be taken from the user using Scanner class.</td></tr>
<tr><td>13.</td><td>Write a Java program to create</td></tr>
<tr><td>14.</td><td>Write a Java Program to find the largest and smallest element from an array.</td></tr>
<tr><td>15.</td><td>Write a Java program to sort the array in ascending and descending order.</td></tr>
<tr><td>16.</td><td>Write a Java program to multiply two matrices. Before multiplication the matrices should be checked whether they can be multiplied or not.</td></tr>
<tr><td>17.</td><td>Write a java program for swapping of two n dimensional arrays. Accept the array element from user</td></tr>
<tr><td>18.</td><td>Define 2 packages (i) Prime (ii) Factorial. Write a Java program to create a class PrimeFact to import these packages</td></tr>
<tr><td>19.</td><td>Write a Java program for generating 4 threads to do the following operations. (a)getting n numbers (b)printing even numbers (c)printing odd numbers (d)printing square of a numbers</td></tr>
<tr><td>20.</td><td>Write a Java program that prompts the user(using Buffered Reader) for a radius and then prints Area and Circumference of the circle with that radius Volume ((4/3)*Pi*R3))and Surface Area(4*Pi*R2) of the sphere with that radius</td></tr>
<tr><td>21.</td><td>Write a java program to copy the contents from one file to other file</td></tr>
<tr><td>22.</td><td>Write a java program to read the student data from user and store it in the file.</td></tr>
<tr><td>23.</td><td>Write a Java program to create a class student with attributes roll no, name, age and course. Initialize values through parameterized constructor. If age is not between 15 and 21 then raise an error,Age not within the range.</td></tr>
<tr><td>24.</td><td>Design an AWT application to calculate the factorial of a number.</td></tr>
<tr><td>25.</td><td>Write an AWT Program to design the Following GUI The Grade should be calculated based on the following table
<table>
<tr><td>Marks</td><td>Percentage Grade</td></tr>
<tr><td>>=60</td><td>A+</td></tr>
<tr><td>>=45<60</td><td>B</td></tr>
<tr><td>>=33<45</td><td>C</td></tr>
<tr><td><33</td><td>F</td></tr>
</table></td></tr>
<tr><td>26.</td><td>Develop a GUI application using Java AWT to present a set of stationary items (combo box) to the user. When the user clicks on a particular stationary item, display the price of the item.
<table>
<tr><td>Stationery Item</td><td>Price</td></tr>
<tr><td>Ruler</td><td>10</td></tr>
<tr><td>Pencil</td><td>12</td></tr>
<tr><td>Pen</td><td>5</td></tr>
<tr><td>Eraser</td><td>2</td></tr>
</table></td></tr>
<tr><td>27.</td><td>Write a Java Program using AWT Program to design the calculator</td></tr>
<tr><td>28.</td><td>Write a Java code to implement MouseListener and MouseMotionListener</td></tr>
<tr><td>29.</td><td>Mini project</td></tr>
</table>

REFERENCE BOOKS :

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

B. Sc. (Information Technology)		Semester – IV	
Course Name: Hindi		Course Code:BSIT-AECS4-107	
Periods per week (1 Period is 60 minutes)		2	
Credits		2	
		Hours	Marks
Evaluation System	Theory Examination	1	30
	Internal	--	20

पाठ्यक्रम के उद्देश्य:

4. छात्रों को हिंदी भाषा की सामान्य प्रकृति और उपयोग से अवगत कराना।
5. हिंदी में सामाजिक, व्यावसायिक और तकनीकी संचार को बढ़ाना।
6. हिंदी में प्रभावी ढंग से पढ़ने, लिखने, बोलने और सुनने के कौशल का विकास करना।

पाठ्यक्रम परिणाम:

4. छात्र संचार माध्यम के रूप में हिंदी के प्रयोग से परिचित होंगे।
5. छात्रों को हिंदी में मौखिक और लिखित संचार का व्यावहारिक अनुभव मिलेगा।
6. छात्र औपचारिक और अनौपचारिक दोनों स्थितियों में प्रभावी पारस्परिक संचार के माध्यम के रूप में हिंदी का उपयोग करने में आत्मविश्वास हासिल करेंगे।

क्रमांक	मॉड्यूल (मापांक)	व्याख्यानों की संख्या
१	**इकाई १: पठन कौशल** अ) भाषागत कौशल को विकसित करने के लिए • पर्यावरण संबंधी मुद्दे (जैसे बाढ़, सूखा, आपदाएं, प्रदूषण; प्रसिद्ध पर्यावरण आंदोलन , सरकारी पहल, पारंपरिक ज्ञान) से जुड़े अनुच्छेदों का वाचन एवं आकलन। • व्यापार (जैसे उद्योग, पारंपरिक भारतीय व्यापार प्रथाएं, कृषि का महत्व, भारतीय बाजार और उपभोक्ता व्यवहार, डिजिटलीकरण और ई-कॉमर्स) से जुड़े अनुच्छेदों का वचन और आकलन। आ) पर्यावरण, व्यापार, बैंकिंग ,वाणिज्य, कंप्यूटर ,व्यवसाय आदि से जुड़े हिंदी शब्दों व उनके अंग्रेजी रूप से परिचय।	१०
२	**इकाई २: लेखन कौशल** पत्र लेखन: नौकरी आवेदन पत्र, बायो डाटा (आत्मवृत्त) ई-मेल लेखन: अनुवाद अंग्रेजी से हिंदी तथा हिंदी से अंग्रेजी में	१०

३	**इकाई ३ : श्रवण और संभाषण** इकाई ३ : दैनंदिन जीवन से जुड़े अलग-अलग विषयों पर - साक्षात्कार और समूह चर्चा	०५
४	**इकाई ४ :व्याकरण और शब्दावली** • **क्रिया की परिभाषा और उदाहरण** • **पर्यायवाची शब्द** • **विलोम शब्द**	०५
	कुल	**30**

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Digital Literacy		**Course Code:BSIT-CEPS4-108**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**1**	**30**
	Internal	**--**	**20**

Course Objectives:

- The Learner will be able to apply maintenance and troubleshooting techniques of PC.
- The Learner will be able to create an email account, compose an email, reply an email and send the email along with attachments
- The Learner will be able to analyze Social Networking, Instant messaging and blogs.
- The Learner will be able to use e-Governance services, ecommerce & mobile apps.
- The Learner will be able to analyze and use various Digital financial tools & applications.

Sr. No	Modules/Units	No of Lectures
1.	**E-mail, Social Networking and e-Governance Services:** Introduction, Objectives, Structure of E-mail, **Using E-mails:** Opening Email account , Mailbox: Inbox and Outbox, Creating and Sending a new E-mail, Replying to an E-mail message, Forwarding an E-mail message , Searching emails ,Attaching files with email ,Email Signature. **Social Networking & e-Commerce**: Facebook, Twitter, LinkedIn, Instagram , Instant Messaging (WhatsApp, Facebook Messenger, Telegram) , Introduction to Blogs , Basics of E-commerce , Netiquettes . **Overview of e-Governance Services like Railway Reservation, Passport, e-Hospital [ORS]** **Accessing e-Governance Services on Mobile Using "UMANG APP"** **Digital Locker**	10
2.	**Digital Financial tools and Applications:** Introduction , Objectives. **Digital Financial Tools:** Understanding OTP [One Time Password]and QR [Quick Response] Code , UPI [Unified Payment Interface] , AEPS [Aadhaar Enabled Payment System] , USSD[Unstructured Supplementary Service Data] ,Card [Credit / Debit] , eWallet , PoS [Point of Sale] **Internet Banking :** National Electronic Fund Transfer (NEFT) ,Real Time Gross Settlement (RTGS) , Immediate Payment Service (IMPS) **Online Bill Payment**	10
3.	**PC Maintenance, Security and Troubleshooting:** **Computer Maintenance and Security:** Overview of Computer Maintenance and Security, Inbuilt PC Security, tools, Securing documents, Antivirus, Upgrading Operating System and Application software. security;	

	Cleaning the monitor, keyboard, CPU **Deleting unnecessary programs and files:** Disk cleanup, deleting toolbars; defrag hard drive **Computer Maintenance Programs:** Ccleaner, myDefrag, Spinrite etc. **Basic troubleshooting:** restart computer, checking cables, uninstalling a software, start windows in safe mode etc. Windows installation and upgrades, CPUs and motherboards, Memory systems, Expansion cards, Data storage devices, Ports, connectors, and cables, Printers and scanners, Display devices, Portable computers and devices, Networking, Security, Maintaining the PC environment.	10

REFERENCE BOOKS:

1. Ravi Kalkota and Andrec Whinston, Frontiers of Electronic Commerce, Addision Wesley (1998)
2. Bharath Bhaskar, Electronic Commerce, Tata McGraw Hill (2003).
3. https://www.nielit.gov.in/content/digital-literacy-courses

B. Sc. (Information Technology)		**Semester – IV**	
Course Name: Yoga		**Course Code:BSIT-CCS4-109**	
Periods per week (1 Period is 60 minutes)		**2**	
Credits		**2**	
		Hours	**Marks**
Evaluation System	**Theory Examination**	**1**	**30**
	Internal	**--**	**20**

Learning Objectives: Cocurricular Course in Yoga Education

- To create awareness of Yoga philosophy and to understand the importance of Asana, Pranayama and Dhyana
- To explore various applications of yoga for healthy mind and body
- To acquaint students with leading Indian practitioners/ schools of yoga.

Learning Outcomes: Cocurricular Course in Yoga Education

- Students will practice yoga as a way of life.
- Students will expand physical, psychological and spiritual dimensions through Yoga.
- Students will become familiar with the practice of yoga by different schools and masters of Yoga.

Module No.	**Topics**	**Number of lectures**
1	Yoga Education a) Significance of Asanas b) Significance of Pranayama c) Importance of Dhyana	10
2	Applications of Yoga a) Sattvik Ahara: Rules for food and diet b) Yamas and Niyamas c) Pratipaksha Bhavana- 4 Bhavanas: Maitri, Karuna, Mudita, Upeksha	10
3	Different Schools/Masters of Yoga a) B.K.S. Iyengar: Iyengar Yoga b) Pattabhi Jois: Ashtanga Vinyasa Yoga c) Swami Satyananda Saraswati: Bihar School of Yoga	10
	Total Lectures	30

Bibliography

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Saraswati S (1984) Patanjali Raja Yoga, S. S. Saraswati; N Delhi; S Chand & Co
Introduction to Indian Philosophy, Dutta& Chatterji, Rupa & Co, 2015
Outlines of Indian Philosophy by Hiriyanna; Motilal Banarasidass Publisher, 2014
Prana & Pranayama, Niranjananda Saraswati, Paperback, Yoga Publications Trust.
Ashtanga Yoga of Patanjali- B.K.S. Iyengar
Yoga Course for All, Yogacharya Dr. Hansraj Yadav, Bharatiya Vidya Bhavan
Hata Yoga Pradeepika- Yogi Swatmarama