S.Y.B.Sc (Information Technology) 2025-26

	Semester III Subjects	Credits		Semester IV Subjects	Credits
Major			**Major**		
BSP301	Python Programming	2	**BSC401**	Core Java	2
BSD302	Data Structure	2	**BSS402**	Software Engineering	2
BSPP303	Python Programming	2	**BSCP403**	Core Java Practical	2
BSDP304	Data Structure Practical	2	**BSSP404**	Software Engineering Practical	2
Minor			**Minor**		
BSC305	Computer network	2	**BSE405**	Embedded System	2
BSCP306	Computer network Practical .	2	**BSEP406**	Embedded System Practical	2
OE		2	**OE**		
BSA307	Applied Mathematics		**BST407**	Computer Oriented Statistical Technique	2
BSM307	Basics of Marketing - I		**BSM407**	Basics of Marketing - II	
VSC **BSPL308** **BSOS308**	PL/SQL Operating System	2	**SEC** **BSTP408** **BSCG408**	Mobile Programming Practical Computer Graphics	2
AEC			**AEC**		2
BSH309/BSM309	Hindi/Marathi	2	**BSH409/BSM409**	Hindi/Marathi	
FP			**CEP**		
BSFP310	FP	2	**BSCP410**	CEP	2
CC			**CC**		2
BSN311/BSY311	NSS/ Sports/ Cultural/ Yoga	2	**BSN411/BSY411**	NSS/ Sports/ Cultural/ Yoga	
	Total	**22**			**22**

SEMESTER IV

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Programme Name: **S.Y.B.Sc(Information Technology)**	**Semester:IV**
Course Category: Major	
Name of the Dept: **Science & Technology**	
Course Title: **Core Java**	
Course Code: **BSC401**	Course Level:5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • To design and program stand-alone Java applications. To learn how to design a graphical user interface (GUI) with Java Swing. T • To understand how to use Java APIs for program development. To learn how to extend Java classes with inheritance and dynamic binding.	
Course Outcomes: After the completion of the course, the learners would be able to: CO1 : Ability to understand the compilation process of Java, role of JVM as an emulator and various types of instructions. Ability to learn and apply concepts of Java programming, exceptional handling and inheritance. CO2 : Ability to understand the use of multi-threading, AWT components and event handling mechanism in Java. Ability to understand JDBC.	
Description the course: **(Including but not limited to)**	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Introduction:** 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, Lambda Expressions, 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. **Classes:** 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. **Inheritance:** 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? How Is An Interface Different From An Abstract Class?, Multiple Inheritance, Default Implementation, Adding New Functionality, Method Implementation, Classes Vs Interfaces, Defining An Interface, Implementing Interfaces. Packages: Creating Packages, Default Package, Importing Packages, Using A Package	15
II	**Enumerations,Arrays:** Two Dimensional Arrays, Multi-Dimensional Arrays, Vectors, Adding Elements To A Vector, Accessing Vector Multithreading: the thread control methods, thread life cycle, the main thread, creating a thread, extending the thread class. Exceptions: Catching Java Exceptions, Catching Run-Time Exceptions, Handling Multiple Exceptions, The finally Clause, The throws Clause Byte streams: 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 **Event Handling:** Delegation Event Model, Events, Event classes, Event listener interfaces, Using delegation event model, adapter classes and inner classes. Abstract Window Toolkit: Window Fundamentals, Component, Container, Panel, Window, Frame, Canvas.Components – Labels, Buttons, Check Boxes, Radio Buttons, Choice Menus, Text Fields, Text, Scrolling List, Scrollbars, Panels, Frames Layouts: Flow Layout, Grid Layout, Border Layout, Card Layout.	15
	Total Hours	30

References:

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

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Programme Name: **B. Sc. (Information Technology)**	**Semester: IV**
Course Category/Vertical: Major	
Name of the Dept: **Science and Technology**	
Course Title: Software Engineering	
Course Code: **BSS402**	Course Level: 5.0
Type: Theory	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives (CO): 1. Be able to explain and understand concept of Software Engineering and Software Requirements, Software Process Model, Critical system, Requirements Engineering Processes 2. Be able to understand Concept of the User Interface Design, Project Management, software testing, software measurements and cost estimation and process improvement.	
Course Outcomes (OC): **OC 1.** Understand concept of the Software Engineering, Software Process Model, Critical system, Requirements Engineering Processes **OC 2.** Understand Concept of the User Interface Design, Project Management, software testing, software measurements and cost estimation and process improvement.	
Description the course: **(Including but not limited to)**	Software Engineering, Software Process Model, Critical system, Requirements Engineering Processes, User Interface Design, Project Management, software testing, software measurements and cost estimation and process improvement.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Introduction to Software Engineering and Software Requirements:** What is software engineering? Software Development Life Cycle, Requirements Analysis, Software Design, Coding, Testing, Maintenance etc. Functional and Non-functional requirements, User Requirements, System Requirements, Interface Specification, Documentation of the software requirements. **Software Development Process Models.** Waterfall Model, Spiral Model, Prototyping, Iterative Development. Rational Unified Process, The RAD Model, Time boxing Model. Software Processes, Process and Project, Component Software Processes. Agile software development, Agile methods, Plan-driven and agile development, Extreme programming, Agile project management, Scaling agile methods. **Socio-technical system and Critical 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. **Requirements Engineering Processes and System Models:** Feasibility study, Requirements elicitation and analysis, Requirements Validations, Requirements Management. System Models, Models and its types, Context Models, Behavioral Models, Data Models, Object Models, Structured Methods, Architectural Design Decisions, System Organization, Modular Decomposition Styles, Control Styles, Reference Architectures.	15
II	**User Interface Design and Project Management** Need of UI design, Design issues, The UI design Process, User analysis, User Interface Prototyping, Interface Evaluation, Project Management Software Project Management, Management activities, Project Planning, Project Scheduling, Risk Management. **Software Testing and Quality Management:** Planning Verification and Validation, Software Inspections, Automated Static Analysis, Verification and Formal Methods. Software Testing, System Testing, Component Testing, Test Case Design, Test Automation. Quality Management, Process and Product Quality, Quality assurance and Standards, Quality Planning, Quality Control, Software Measurement and Metrics. **Software Measurement and Software Cost Estimation** Size-Oriented Metrics, Function-Oriented Metrics, Extended Function Point Metrics Software Cost Estimation, Software Productivity, Estimation Techniques, Algorithmic Cost Modelling, Project Duration and Staffing **Process Improvement and Software reuse:** Process and product quality, Process Classification, Process Measurement, Process Analysis and Modeling, Process Change, The CMMI Process Improvement Framework. Service Oriented Software Engineering, Services as reusable components, Service Engineering, Software Development with Services.	15

	Software reuse, The reuse landscape, Application frameworks, Software product lines, COTS product reuse. Distributed software engineering, Distributed systems issues, Client–server computing, Architectural patterns for distributed systems, Software as a service	
	Total Hours	**30**

References:

Books and References:				
Sr. No.	**Title**	**Author/s**	**Publisher**	**Edition**
1.	Software Engineering, edition,	Ian Somerville	Pearson Education.	Ninth
2.	Software engineering, a practitioner's approach	Roger Pressman	Tata Mcgraw-hill	Seventh
3.	Software Engineering Concept and Applications	Subhajit Datta	Oxford Higher Education	Third
4.	Software Design	D.Budgen	Pearson education	Second
5.	Software Engineering	KL James	PHI	One

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Programme Name: **S.Y.B.Sc (Information Technology)** **Semester:IV**	
Course Category: Major	
Name of the Dept: **Science and Technology**	
Course Title: Core Java Practical	
Course Code: **BSCP403** Course Level:5.0	
Type : Theory	
Course Credit: 02	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • Learners must understand basic java programming and concept of java programming • Learners must understand basics of multithreading, exception handling, JDBC and AWT & Swing Control	
Course Outcomes: After the completion of the course, the learners would be able to: CO1 : Implement object-oriented programming concepts, Use and create package and interfaces in a java program. CO2: Implement of advance website development tools. and Use Graphical user interface in java program. and Creates applets. .	
Description the course: **(Including but not limited to)**	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.

Syllabus: NEP 2020 w.e.f 2025-26

Sr. No	Content	
1.	a. Write a program to create a class and implement a default, overloaded and copy Constructor. b. Write a program to create a class and implement the concepts of Method Overloading c. Write a program to create a class and implement the concepts of Static methods	
2.	**OOPs concepts in Java – 2** a. Write a program to implement the concepts of Inheritance and Method overriding b. Write a program to implement the concepts of Abstract classes and methods c. Write a program to implement the concept of interfaces.	
3.	**Exceptions** a. Write a program to raise built-in exceptions and raise them as per the requirements b. Write a program to define user defined exceptions and raise them as per the requirements	
4.	**Multithreading:** Write a java application to demonstrate 5 bouncing balls of different colors using threads.	
5.	**JDBC**	
a.	Write a JDBC program that displays the data of a given table in a GUI Table	
b.	Write a JDBC program to Show the details of a specified product from a given table selected using Combo box.	
c.	Write a GUI application to Navigate forward and reverse result set data.	
6.	**Swing**	
a.	Create a swing application that randomly changes color on button click.	
b.	Create a Swing application to demonstrate use of TextArea using scrollpane to show contest of text file in textarea selected using file chooser	
c.	Create a Swing application to demonstrate use of scrollpane to change its color selected using colour chooser	
7.	**Layouts: Write programs for the following layouts:**	
a.	Flow Layout	
b.	Grid Layout	
c.	Border Layout	
8.	**Events: Write programs to demonstrate the following events**	
a.	Action Event	
b.	Mouse Event	
c.	Key Event	
d.	Focus Event	
e.	Selection Event	
9.	**Demonstrate the use of Adapter Class in Event Handling**	
10.	**Demonstrate the use of Anonymous Inner Class in Event Handling**	
	Total Hours	**60**

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Programme Name: **B.Sc (Information Technology)**	**Semester: IV**
Course Category/Vertical: Major	
Name of the Dept: **Science and Technology**	
Course Title: Software Engineering Practical	
Course Code: **BSSP404**	Course Level: 5.0
Type: **Practical**	
Course Credit: 2 credits	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives (CO): 3. Be able to explain and understand concept of Software Engineering and Software Requirements, Software Process Model, Critical system, Requirements Engineering Processes 4. Be able to understand Concept of the User Interface Design, Project Management, software testing, software measurements and cost estimation and process improvement.	
Course Outcomes (OC): **OC 1.** Understand concept of the Software Engineering, Software Process Model, Critical system, Requirements Engineering Processes **OC 2**. Understand Concept of the User Interface Design, Project Management, software testing, software measurements and cost estimation and process improvement.	
Software Using: Star UML	

Syllabus: NEP 2020 w.e.f 2025-26

Sr.NO	Content	Hours
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.	
	Total Hours	**60**

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Proramme Name: S.Y.B.Sc(Information Technology)	**Semester:IV**
Course Category: Minor	
Name of the Dept: **Science and Technology**	
Course Title: Embedded System	
Course Code: **BSE405** Course Level: 5.0	
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. To Educate in Various microcontrollers used in Embedded Development and to Introduce Bus Communication in processors, Input/output interfacing. 2. To impart knowledge in sensors and actuators and to familiar with the real world application development using embedded system.	
Course Outcomes: OC1 . Design and develop embedded systems OC2 . Use different types of sensors for appropriately	
Description the course:	An embedded system is a specialized computing system designed to perform specific tasks within a larger system. This subject explores the fundamental concepts, including hardware and software integration, microcontrollers, sensors, actuators, and real-time operating systems, essential for designing and developing embedded systems.

Unit No.	Content	Hours
I	**PIC MICROCONTROLLER:** Architecture – memory organization – addressing modes – instruction set – PIC programming in Assembly & C –I/O port, Data Conversion, RAM & ROM Allocation, Timer programming **Communication Protocol & Implementation:** Introduction to Communication Protocol, I2C, I2C devices – RTC, Memory, ADC-DAC, Port Expander, SPI (Serial Peripheral Interface), Bluetooth, Wi-Fi and RFID. Understanding Serial, Communication, Bluetooth Communication, SPI Interface ZigBee, Wi-Fi, I2C, Infrared, RFID, GSM, GPS, PDH/SDH/Ethernet **Getting Started with Arduino:** Introduction, Arduino Variants, Install the Drivers, Arduino IDE	15
II	**Basic Functions:** Structure, Digital I/O Functions, Analog I/O Functions, Advanced I/O Functions, Timer Functions, Communication Functions, Interrupt Functions, Math Functions. **Using Sensors with the Arduino:** Light Sensitive Sensors, Temperature Sensors, Temperature and Humidity Sensor, Line Tracking Sensor, Ultrasonic Sensors, Digital Infrared Motion Sensor, Gas Sensor, Color Sensor. **Wireless Control Using the Arduino:** Infrared Transmitter and Receiver, Wireless Radio Frequency, Bluetooth, GSM/GPRS, Wi-Fi Case Studies: • Air Quality Monitor Using Arduino • A Fire-Fighting Robot Using Arduino • Intelligent Lock System Using Arduino	15
	Total Hours	30

References:

Sr.No.	Title	Author/	Publisher	Edition	Year
1	Programming Embedded Systems in C and C++	Michael Barr	O'Reilly	First	1999
2	Introduction to embedded systems	Shibu K V	Tata Mcgraw-Hill	First	2012
3	Embedded Systems	Rajkamal	Tata Mcgraw-Hill		

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Programme Name:**S.Y.B.Sc (Information Technology)**	**Semester: IV**
Course Category/Vertical: Minor	
Name of the Dept: **Science and Technology**	
Course Title: Embedded System Practical	
Course Code: **BSEP406**	Course Level: 5.0
Type: **Practical**	
Course Credit: 2 credits	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): 1. To provide students with practical experience in using Arduino platforms, breadboarding techniques, and integrating various sensors to build real-world embedded applications 2. To develop the skills necessary to design, implement, and test programs that interact with different types of sensors, enabling students to create responsive systems that can monitor and control environmental variables in real time.	
Course Outcomes (OC): OC 1. To gain practical knowledge in designing and programming embedded systems using Arduino. OC 2. To develop the ability to apply sensor-based data to real-world scenarios, enhancing their understanding of embedded systems and sensor interfacing.	
Description the course:	This practical subject focuses on hands-on experience with Arduino-based embedded systems. Students will learn to design circuits, integrate various sensors (such as light, temperature, humidity, ultrasonic, infrared, and gas), and develop programs to interact with these sensors, gaining practical skills in real-time data processing and embedded system applications.

Syllabus: NEP 2020 w.e.f 2025-26

Sr. No.	Content	Hours
	List of Practical: All practical's to be done online using TinkerCAD	
1	**Introduction to Arduino:** a. Introduction to Arduino circuits and breadboarding. b. Blinking of LEDs.	
2	Program using Light Sensitive Sensors.	
3	Program using temperature sensors.	
4	Programs using humidity sensors.	
5	Programs using Line tracking sensors.	
6	Programs using Ultrasonic Sensors.	
7	Programs using digital infrared motion sensors.	
8	Programs using gas sensors.	
		60

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Programme Name: **S.Y.B.Sc(Information Technology)**	**Semester:IV**
Course Category: Open Elective	
Name of the Dept: **Science and Technology**	
Course Title: Computer Oriented Statistical Technique	
Course Code: **BST407**	Course Level:5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: • To learn the different methods of calculating the central tendencies and introduce the moments, skewness and kurtosis. • To learn scientific view to conduct the survey in proper way to collect the data about specific perspective. • To learn the sampling theory and testing of hypothesis and making inferences and to introduce the students with understanding of the curve fitting, regression and correlation techniques.	
Course Outcomes: After the completion of the course, the learners would be able to: **CO 1:** To calculate and apply measures of central tendencies and measures of dispersion -- grouped and ungrouped data cases and also to calculate the moments, skewness and kurtosis by various methods. **CO 2:** Perform Test of Hypothesis and calculate confidence, understand the concept of p-values and apply simple linear regression and correlation model to real life examples.	
Description the course:	Statistical techniques are helpful in providing insights about data. For example, statistical techniques such as extreme values, mean, median, standard deviations, interquartile ranges, and distance formulas are useful in exploring, summarizing, and visualizing data. These techniques, though relatively simple, are a good starting point for exploratory data analysis.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**The Mean, Median, Mode, and Other Measures of Central Tendency**: 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. **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, Properties of the Standard Deviation, Empirical Relations Between Measures of Dispersion, Absolute and Relative Dispersion; Coefficient of Variation, Standardized Variable; Standard Scores. **Moments, Skewness, and Kurtosis** : Moments , Moments for Grouped Data ,Relations Between Moments , Computation of Moments for Grouped Data, Moments in Dimensionless Form, Skewness, Kurtosis, Population Moments, Skewness, and Kurtosis. **Elementary Sampling Theory** : Sampling Theory, Random Samples and Random Numbers, Sampling With and Without Replacement, Sampling Distributions, Sampling Distribution of Means, Sampling Distribution of Proportions, Sampling Distributions of Differences and Sums, Standard Errors, Software Demonstration of Elementary Sampling Theory.	15
II	**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. **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. **Small Sampling Theory**: Small Samples, Student's t Distribution, Confidence Intervals, Tests of Hypotheses and Significance, The Chi-Square Distribution, Confidence Intervals for Sigma , Degrees of Freedom, The F Distribution. **The Chi-Square Test**: Observed and Theoretical Frequencies, Definition of chi-square, Significance Tests, The Chi-Square Test for Goodness of Fit, Contingency Tables, **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 Correlation Theory: Correlation and Regression, Linear Correlation, Measures of Correlation, The Least-Squares Regression Lines,	15
	Total Hours	30

Books and References:

Sr. No	Title	Author/s	Publisher	Edition	Year
1.	STATISTICS	Murray R. Spiegel, Larry J. Stephens.	McGRAW – HILL ITERNATIONAL	FOURTH	---
2.	FUNDAMENTAL OF MATHEMATICAL STATISTICS	S.C. GUPTA and V.K. KAPOOR	SULTAN CHAND and SONS	ELEVENTH REVISED	2011
3.	MATHEMATICAL STATISTICS	J.N. KAPUR and H.C. SAXENA	S. CHAND	TWENTIETH REVISED	2005

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Programme Name: **S.Y.B.Sc(Information Technology)**	**Semester:IV**
Course Category: **Open Elective**	
Name of the Dept: **B.Com (Management Studies)**	
Course Title: **Basics of Marketing-II**	
Course Code: **BSM407**	Course Level: 5.0
Type: Theory	
Course Credit: **02**	
Hours Allotted: **30 Hours**	
Marks Allotted: **50 Marks**	
Course Objectives(CO): (List the course objectives) CO.1 Train the learners to make effective use of marketing mix for developing marketing plans CO. 2 Introduce them to various modern trends in marketing and core marketing concepts	
Course Outcomes (OC): (List the course outcomes) OC 1.Learners would be able to make effective use of marketing mix while developing marketing plans OC 2.Understand the importance of core marketing concepts and various modern trends in marketing and its role in changing business scenario	
Description the course: **(Including but not limited to)** The course introduces the learners to the concept of marketing and its practical application in the current competitive world. The learners could upgrade their current understanding of marketing and get themselves ready for the workforce. Students would be able to explore new areas of marketing, such as executive MIS, marketing research, and much more, which are in high demand right now in the business world.	Introduction, relevance, Usefulness, Application, interest, connection with other courses, demand in the industry, job prospects etc.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Marketing Mix** **Marketing mix:** Meaning –elements of Marketing Mix. **Product**-product mix-product line lifecycle-product planning – New Product development- failure of new product-levels of product. **Branding** –Packing and packaging – role and importance **Pricing** – objectives- factors influencing pricing policy and Pricing strategy. **Physical distribution** – meaning – factor affecting channel selection-types of marketing channels Promotion – meaning and significance of promotion and tools	15
II	***Segmentation, Targeting and Positioning and Trends In Marketing*** **Segmentation** – meaning , importance , basis **Targeting** – meaning , types **Positioning** – meaning – strategies **New trends in marketing** – E-marketing , Internet marketing and marketing using Social network Social marketing/ Relationship marketing	15
	Total Hours	**30**

References:

1. Saxena, Rajan. Marketing Management. Fourth edition, Tata McGraw Hill Publishing Co., New Delhi
2. Ramaswamy V.S. and Namakumari S. Marketing Management – Planning, Implementation and Control. Fourth edition, Macmillan
3. Kumar Arun & N Meenakshi. Marketing Management. Second Edition; Vikas Publications
4. Michael Vaz – Manan Prakashan
5. Kale – Vipul Publication

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Programme Name: **S.Y.B.Sc(Information Technology)**	**Semester: IV**
Course Category/Vertical: **SEC**	
Name of the Dept: **Science and Technology**	
Course Title: **Mobile Programming Practical**	
Course Code: **BSTP408**	Course Level: 5.0
Type: Practical	
Course Credit: 2	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives (CO): CO1: To discuss and understand Development of Mobile Applications with Core Features and Functionality. CO2: To discuss and understand backend services such as API and databases in mobile Programming.	
Course Outcomes (OC): After completion of the course, learners would be able to: OC1: Learner is able to Demonstrate the ability to design, develop, and deploy mobile applications, applying user- centered design principles. OC2: Learner is able to Implement backend services such as API and databases to ensure mobile apps can fetch, store, and process data efficiently	

Syllabus: NEP 2020 w.e.f 2025-26

Sr. No.	Content	Hours
1.	Program to demonstrate the features of Dart language.	
2.	Designing the mobile app to implement different widgets.	
3.	Designing the mobile app to implement different Layouts.	
4.	Designing the mobile app to implement Gestures.	
5.	Designing the mobile app to implement the theming and styling	
6.	Designing the mobile app to implement the routing.	
7.	Designing the mobile app to implement the animation.	
8.	Designing the mobile app to implement the state management.	
9.	Designing the mobile app working with SQLite Database	
10.	Designing the mobile app working with Firebase.	
	Total Hours	60

Note:

- The practical's will be based on HTML5, CSS, Flutter. (Android will be introduced later after they learn Java).
- Setting up Flutter, PhoneGAP Project and environment.

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Programme Name: **S.Y.B.Sc(Information Technology)** **Semester:IV**	
Course Category: SEC	
Name of the Dept: **Science and Technology**	
Course Title: Computer Graphics	
Course Code: **BSCG408** Course Level:5.0	
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: ● The course introduces the basic concepts of computer graphics & animations. ● It provides the necessary theoretical background and demonstrates the application of computer science to graphics.	
Course Outcomes: After the completion of the course, the learners would be able to: CO1. Understand the basics of computer graphics, different graphics systems and applications of computer graphics, various scan conversion algorithms, Use of geometric transformations on graphics object. CO2 . Understand the basics of 3D viewing , hidden surface removal algorithms, basics of curve representations.(the core concepts of computer animations & image manipulations)	
Description of the course:	This course introduces fundamental concepts and techniques in computer graphics, including 2D and 3D transformations, scan conversion algorithms, and visible-surface determination. Students will learn about key algorithms like DDA, Bresenham's, and Midpoint methods, as well as advanced topics such as curve and surface representation, computer animation, and image manipulation. The course also covers the principles of 3D viewing, including the Canonical View Volume and techniques like the z-buffer and painter's algorithms for efficient rendering. Practical applications in animation and image processing, including compression and enhancement, will be explored.

Syllabus: NEP 2020 w.e.f 2025-26

Unit No.	Content	Hours
I	**Introduction to Computer Graphics:** Overview of Computer Graphics, Computer Graphics Application and Software. Active and Passive Graphics Devices, Raster-Scan and Random-Scan Displays . **Scan conversion :** Digital Differential Analyzer (DDA) algorithm, Bresenhams' Line drawing algorithm. Bresenhams' method of Circle drawing, Midpoint Circle Algorithm, Midpoint Ellipse Algorithm. **Two-Dimensional Transformations:** Transformations and Matrices, Transformation Conventions, 2D Transformations, Homogeneous Coordinates and Matrix Representation of 2D Transformations, Translations and Homogeneous Coordinates, Rotation, Reflection, Scaling, Combined Transformation, Rotation About an Arbitrary Point.	15
II	**Viewing in 3D :** Stages in 3D viewing, Canonical View Volume (CVV), Specifying an Arbitrary 3D View, Examples of 3D Viewing. **Visible-Surface Determination:** Techniques for efficient Visible-Surface Algorithms, Categories of algorithms, Back face removal, The z-Buffer Algorithm, Scan-line method, Painter's algorithms (depth sorting). **Computer Animation:** Principles of Animation, Key framing, Deformations, Character Animation, Physics-Based Animation, Procedural Techniques, Groups of Objects. **Image Manipulation and Storage:** What is an Image? Digital image file formats, Image compression standard – JPEG, Image Processing - Digital image enhancement, contrast stretching, Histogram Equalization, smoothing and median Filtering.	15
	Total Hours	30

Books and References:

Sr. No	Title	Author/s	Publisher	Edition	Year
1.	Principles of Interactive computer Graphics	William M. Newman and Robert F. Sproull	TMH	2nd	
2.	Computer Graphics - Principles and Practice	J. D. Foley, A. Van Dam, S. K. Feiner and J. F. Hughes	Pearson	2nd	
3.	Fundamentals of Computer Graphics	Steve Marschner, Peter Shirley	CRC press	4th	2016

Sheth T. J. Education Society's
Sheth N.K.T.T College of Commerce and
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(Autonomous)

Programme Name: **S.Y. B.Sc. (Information Technology)** **Semester:IV**
Course Category: CC
Name of the Department: **Sociology**
Course Title: **National Integration and Communal Harmony**
Course Code: **BSN411** Course Level: 5.0
Type: Theory / Practical
Course Credit: 2 credits (1 credit = 15 Hours for Theory or 30 Hours of Practical work in a semester)
Hours Allotted: 30 Hours
Marks Allotted: 50 Marks
Course Objectives: 1. To develop an understanding of the significance of National Integration and Communal Harmony. 2. To enable students to appreciate the role of youth in fostering unity and peace in society.
Course Outcomes: 1. Understand the principles of National Integration and Communal Harmony. 2. Develop leadership and teamwork skills through NSS activities focused on unity and peace.
Introduction: National Integration and Communal Harmony are essential for a diverse country like India. This course introduces students to the importance of unity in diversity and the role of NSS in promoting peace, social justice, and inclusive development. Students will engage in activities and discussions to strengthen their commitment to harmony and national unity. Relevance and Usefulness: Given the challenges of communal tensions and social divisions, fostering National Integration is crucial. This course empowers students with the knowledge and skills to actively participate in building a more inclusive and peaceful society. Interest and Connection with Other Courses:This course complements subjects such as Sociology, Political Science, and Social Work, reinforcing the importance of civic responsibility, human rights, and peacebuilding in a democratic society.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**UNIT I: Concept and Importance of National Integration and Communal Harmony** A. Meaning and Significance of National Integration B. Factors Affecting National Integration in India C. Challenges to Communal Harmony	15
II	UNIT II: Role of NSS in Promoting National Integration and Communal Harmony A. NSS and Its Role in Community Development B. Social Service as a Tool for Unity C. Case Studies of Successful NSS Interventions for National Integration	15
	Total Hours	30

References:

1. National Service Scheme Manual (Revised) 2006, Government of India, Ministry of Youth Affairs and Sports, New Delhi.
2. University of Mumbai National Service Scheme Manual 2009.
3. http://nss.nic.in
4. https://www.rccmindore.com/wp-content/uploads/2023/04/NSS-Notes-II.pdf

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Programme Name: S.Y. B.Sc. (Information Technology)	**Semester: IV**
Course Category/Vertical: **Co-Curricular (CC)**	
Name of the Dept: **Psychology**	
Course Title: **Yoga**	
Course Code: **BSY411**	Course Level: 5.0
Type: Theory / Practical	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	

Learning Objectives:

3. To impart to the students the knowledge of teachings and philosophy of yoga tradition.
4. To provide the knowledge of various Yoga therapy practices like asana (posture), pranayama (voluntarily regulated breathing techniques).

Course Outcomes (CO):

OC 3. Students will be able to understand the basic principles and applications of Yoga.
OC 4. Students will be able to use the Practical knowledge in their day to day life.

Description the course: **(Including but not limited to)**	Yoga practices will be important for the upcoming lifestyle hence students can seek a career in the same. Students will understand the importance of yoga in life. Students will be having practical exposure. Hence, practicing yoga will help students to maintain their health.

Syllabus: NEP 2020 w.e.f 2024-25

Unit No.	Content	Hours
I	**Theory of Yoga** C) Yogic Sanchalan (Yogic Movements), Kapalbhati (Cleansing Breath Technique), Suryanamaskar (Sun Salutation) D) Anulom-Vilom (Alternate Nostril Breathing), Dirgha Shwasan (Deep Breathing), Bhramari (Humming Bee Breath)	**15**
II	**Practical** C) Vajrasana (Thunderbolt Pose), Paschimottanasana (Seated Forward Bend), Parivritta Janushirasana (Revolved Head-to-Knee Pose), Vakrasana (Twisting Pose), Marjarasana (Cat Pose), Naukasana (Boat Pose) D) Shalabhasana (Locust Pose), Dronasana (Warrior Boat Pose), Pavanmuktasana (Wind-Relieving Pose), Bramha Mudra (Sacred Gesture for Neck Strength), Utthita Dwipadasana (Raised Two-Leg Pose), Netra Sanchalan - 1 (Eye Movement Exercise - 1), Netra Sanchalan - 2 (Eye Movement Exercise - 2)	**15**
	Total Hours	**30**

References:

4. G. V Kadam - Yoga Life Sutra, Girish Vasant Kadam (2012)
5. ajayoga - Swami Vivekananda - Ramakrishna Ashrama Publications
6. C.D. Sharma: Critical Survey of Indian Philosophy, Motilal Banarsidass Publications 2003