SEMESTER IV

S. Y. B.Sc. (Computer Application) 2025-26

	Semester III Subjects	Credits		Semester IV Subjects	Credits
Major **BCP301** **BCD302** **BCPP303** **BCDP304**	Python Programming Data Structure Python Programming Practical Data Structure Practical	2 2 2 2	**Major** **BCA401** **BCC402** **BCAP403** **BCCP404**	Artificial Intelligence Computer Graphics Artificial Intelligence Practical Computer Graphics Practical	2 2 2 2
Minor **BCO305** **BCOP306**	Operating System Operating System Practical	2 2	**Minor** **BCR405** **BCRP406**	Research Methodology Research Methodology Practical	2 2
OE **BCF307** **BCA307**	Fundamental of Stock Market Data Analysis with Excel - I	2	**OE** **BCN407** **BCM407** **BCD407**	Numerical Methods Basics of Marketing Data Analysis with Excel - II	2
VSC **BCP308**	PHP Programming	2	**SEC** **BCP408**	PL/ SQL	2
AEC **BCH309/BCM309**	Hindi/Marathi	2	**AEC** **BCH409/BCM409**	Hindi/Marathi	2
FP **BCP310**	FP	2	**CEP** **BCP410**	CEP	2
CC **BCN311/BCY311**	NSS/ Sports/ Cultural/ Yoga	2	**CC** **BCN411/BCY411**	NSS/ Sports/ Cultural/ Yoga	2
	Total	**22**			**22**

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Programme Name: **S.Y. B.Sc. (Computer Application)**	**Semester: IV**
Course Category: Major	
Name of the Dept: **Science and Technology**	
Course Title: Artificial Intelligence	
Course Code: **BCA401**	Course Level:5.0
Type: Theory	
Course Credit: 2	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. Comprehensive understanding of intelligent systems, AI problem-solving techniques, search algorithms, and the development of intelligent agents using various search methods and reasoning strategies. 2. To explore uncertainty reasoning, probabilistic models like Bayesian networks, and machine learning techniques, including supervised learning, decision trees, neural networks, and deep learning for solving real-world problems	
Course Outcomes: OC1: students will be able to design and implement intelligent agents, apply various search techniques, and formulate AI problems effectively to solve complex challenges using both uninformed and informed search strategies. OC2: Students will be able to effectively apply uncertainty reasoning and advanced machine learning techniques, including probabilistic models, decision trees, neural networks, and deep learning, to solve complex real-world problems.	
Description the course: **(Including but not limited to)**	This course introduces the fundamentals of Artificial Intelligence (AI), focusing on intelligent agents, problem-solving techniques, and search algorithms. It covers uninformed and informed search methods, uncertainty reasoning using Bayesian networks, and key machine learning concepts like decision trees, neural networks, and support vector machines. Students will learn to apply these techniques in real-world AI applications. The course emphasizes both theoretical understanding and practical implementation.

Unit No.	Content	Hours
I	**Intelligent Systems and Intelligent Agents**: Introduction to AI, AI Problems and AI techniques, Solving problems by searching, Problem Formulation. State Space Representation Structure of Intelligent agents, Types of Agents, Agent Environments PEAS representation for an Agent. **Searching Techniques**: Uninformed Search: DFS, BFS, Uniform cost search, Depth Limited Search, Iterative Deepening. Informed Search: Heuristic functions, Hill Climbing, Simulated Annealing, Best First Search, A*	15
II	**Uncertainity and Reasoning**: Uncertainly, Representing Knowledge in an Uncertain Domain, Bayesian Network, Conditional Probability, Joint Probability, Bayes' theorem, Belief Networks **Machine Learning:** Forms of Learning, Supervised Learning, Learning Decision Trees, Evaluating and Choosing the Best Hypothesis, Theory of Learning, Regression and Classification with Linear Models, Artificial Neural Networks, Support Vector Machines, Introduction to deep learning.	15
	Total Hours	30

References:

Sr. No	Title	Author	Publisher	Edition	Year
1.	Artificial Intelligence: A Modern Approach	Stuart J. Russell and Peter Norvig	Pearson	Fourth Edition	2020
2.	Artificial Intelligence: Foundations of Computational Agents	David L Poole, Alan K. Mackworth	Cambridge University Press	Second Edition	

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<table>
<tr><td colspan="2">Programme Name: S.Y.B.Sc (Computer Application) Semester: IV</td></tr>
<tr><td colspan="2">Course Category: Major</td></tr>
<tr><td colspan="2">Name of the Dept: Science and Technology</td></tr>
<tr><td colspan="2">Course Title: Computer Graphics</td></tr>
<tr><td colspan="2">Course Code: BCC402 Course Level:5.0</td></tr>
<tr><td colspan="2">Type : Theory</td></tr>
<tr><td colspan="2">Course Credit: 02</td></tr>
<tr><td colspan="2">Hours Allotted: 30 Hours</td></tr>
<tr><td colspan="2">Marks Allotted: 50 Marks</td></tr>
<tr><td colspan="2">Course Objectives:
1. The course introduces the basic concepts of computer graphics & animations.
2. It provides the necessary theoretical background and demonstrates the application of computer science to graphics.</td></tr>
<tr><td colspan="2">Course Outcomes:
After the completion of the course, the learners would be able to:
OC1. 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.
OC2 . Understand the basics of 3D viewing , hidden surface removal algorithms, basics of curve representations.(the core concepts of computer animations & image manipulations)</td></tr>
<tr><td>Description of the course:</td><td>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.</td></tr>
</table>

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

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Programme Name: **S.Y. B.Sc (Computer Application)**	**Semester: IV**
Course Category: Major	
Name of the Dept: **Science and Technology**	
Course Title: Artificial Intelligence Practical	
Course Code: **BCAP403**	Course Level: 5.0
Course Credit: 02	
Total Hours: 60 Hours	
Total Marks: 50 Marks	

Course Objectives:

1. To teach students how to implement search algorithms and AI techniques to solve problems like the Water Jug Problem, N-Queen, and machine learning tasks such as decision trees and classification.
2. To provide practical experience in applying AI algorithms and creating PL/SQL triggers and packages for efficient problem-solving and database management.

Course Outcomes: Learners will be able to,

OC1: Implement various search algorithms and AI techniques to solve complex problems and optimize solutions in real-world scenarios.

OC2: Gain practical skills in machine learning, decision trees, and PL/SQL, enabling them to build intelligent systems and manage databases effectively.

Course Description:	This course focuses on advanced AI techniques and algorithms, emphasizing search strategies, problem-solving, and decision-making. Students will learn and implement both uninformed and informed search algorithms like DFS, BFS, Hill Climbing, and A*. The course also covers machine learning techniques, including linear regression, classification, and decision trees, along with game theory concepts like Alpha-Beta pruning. Practical applications include solving classic AI problems like the N-Queens, map coloring, and the water jug problem. By the end, students will be equipped with the tools to apply AI in real-world scenarios and optimization problems.

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

Sr No.	Content	Hours
1	**Generate the state-space possibilities for the following problems** a. Water jug problem b. Number puzzle	
2	**Write the program to compute the following Uninformed Search Algorithms for suitable problem** a. Depth First Search b. Breadth First Search	
3	**Write the program to compute the following Informed Search Algorithms for suitable problem** **a.** Hill Climbing b. Simulated Annealing **c.** A* algorithm	
4	**Write the program to compute the following Algorithms for suitable problem** a. Simulate solution for 4-Queen / N-Queen problem **b.** Constraint satisfaction problem: Map Coloring	
5	**Write the program to compute the following Search Algorithms for suitable problem** a. Alpha Beta Pruning **b.** Water jug problem	
6	**Write the program to compute the following Algorithms for suitable problem** **a.** Simple Inferencing	
7	**Write the program to compute the following Algorithms for suitable problem** a. Linear Regression **b.** Classification problem	
8	**Write the program to implement decsion tree for suitable problem.** a. Two Class decision **b.** Multi Class decision	
	Total Hours	**60**

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<tr><td colspan="2">Programme Name: S.Y.B.Sc (Computer Application) Semester:IV</td></tr>
<tr><td colspan="2">Course Category: Major</td></tr>
<tr><td colspan="2">Name of the Dept: Science and Technology.</td></tr>
<tr><td colspan="2">Course Title: Computer Graphics Practical</td></tr>
<tr><td colspan="2">Course Code: BCCP404 Course Level: 5.0</td></tr>
<tr><td colspan="2">Type : Practical</td></tr>
<tr><td colspan="2">Course Credit: 02</td></tr>
<tr><td colspan="2">Hours Allotted: 60 Hours</td></tr>
<tr><td colspan="2">Marks Allotted: 50 Marks</td></tr>
<tr><td colspan="2">Course Objectives:
1. The course introduces the implementation of basic concepts of computer graphics & animations.
2. It provides the necessary hands-on experience and demonstrates the application of computer science to graphics.</td></tr>
<tr><td colspan="2">Course Outcomes:
After the completion of the course, the learners would be able to:
OC1. Implement basics functions of Graphics, various scan conversion algorithms, Filling algorithms.
OC2 . Apply geometric transformations on graphics objects and Use of geometric transformations on graphics objects and their application in composite form.</td></tr>
<tr><td>Description the course:
(Including but not limited to)</td><td>Provide hands-on experience in implementing various Graphics functions, scan conversion algorithms, geometric transformation and animations using programming languages such as C/C++/Java or Python.</td></tr>
</table>

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

Sr. No.	Content
1.	Implement the following:
A.	Study and enlist the basic functions used for graphics in C / C++ / Python language. Give an example for each of them.
B.	Draw a co-ordinate axis at the center of the screen.
2.	Implement the following:
A.	Divide your screen into four region, draw circle, rectangle, ellipse and half ellipse in each region with appropriate message.
B.	Draw a simple hut on the screen.
3.	Implement the following:
A.	Draw the following basic shapes in the center of the screen : i. Circle ii. Rectangle iii. Square iv. Concentric Circles v. Ellipse vi. Line
4.	Implement the following:(Scan conversion algorithms)
A.	Develop the program for DDA Line drawing algorithm.
B.	Develop the program for Bresenham's Line drawing algorithm.
5	Implement the following:
A.	Develop the program for the mid-point circle drawing algorithm.
B.	Write a program to perform 2D translation
6.	Implement the following:(2D Transformations)
A.	Write a program to implement 2D scaling.
B.	Perform 2D Rotation on a given object about an arbitrary point.
7.	Implement the following filling algorithms
A.	Write a program to fill a circle using Flood Fill Algorithm.
B.	Write a program to fill a circle using Boundary Fill Algorithm.
8.	Implement the following practicals of computer animations
A.	Perform smiling face animation using graphic functions.
B.	Draw the moving car on the screen.

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Programme Name: **S.Y. B. Sc(Computer Application)**	**Semester:IV**
Course Category: Minor	
Name of the Dept: **Science and Technology**	
Course Title: Research Methodology	
Course Code**:** **BCR405**	Course Level: 5.0
Type : Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	

Course Objectives:

1. To impart analytical skill in solving complex problems and to foster the ability to critically think in developing robust, extensible and highly maintainable solutions to simple and complex problems.
2. To explore the unknown and unlock new possibilities in different dimensions of the System and to portray accurately the characteristics of a particular individual, situation or a group under study.

Course Outcomes:

After the completion of the course, the learners would be able to:

OC 1: Learner understands the reasons for doing research, the applications of research, characteristics and requirements of the research process, types of research and Research paradigms and also applying major approaches to information gathering, the relationship between attitudinal and measurement scales Methods for exploring attitudes in research.

OC 2: Learner is able to analyze data in qualitative and quantitative studies, application of IT in data analysis and to write a research report and use Information Technology in Research

Description the course:	Research methodology is a systematic framework that outlines the techniques and procedures used to conduct research, ensuring the study remains objective and unbiased, and allows readers to evaluate the validity and reliability of the research.

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

Unit No.	Content	Hours
I	**Research Methodology-An Introduction:** Meaning of Research, Objectives of Research, Motivation in Research, Types of Research, Research Approaches, Significance of Research, Research Methods versus Methodology, Research and Scientific Method, Importance of Knowing How Research is Done, Research Process, Criteria of Good Research, Problems Encountered by Researchers in India **Defining the Research Problem:** What is a Research Problem?, Selecting the Problem, Necessity of Defining the Problem, Technique Involved in Defining a Problem, An Illustration **Research Design:** Meaning of Research Design, Need for Research Design,Features of a Good Design, Important Concepts Relating to Research Design, Different Research Designs, Basic Principles of Experimental Designs. **Sampling Design:** Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design, Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs, How to Select a Random Sample?, Random Sample from an Infinite Universe, Complex Random Sampling Designs **Measurement and Scaling Techniques:** Measurement in Research, Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling, Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques **Methods of Data Collection:** Collection of Primary Data, Observation Method, Interview Method, Collection of Data through Questionnaires, Collection of Data through Schedules, Difference between Questionnaires and Schedules, Some Other Methods of Data Collection, Collection of Secondary Data, Selection of Appropriate Method for Data Collection, Case Study Method,	15
II	**Processing and Analysis of Data:** Processing Operations, Some Problems in Processing, Elements/Types of Analysis, Statistics in Research, Measures of Central Tendency, Measures of Dispersion, Measures of Asymmetry (Skewness), Measures of Relationship, Simple Regression Analysis, Multiple Correlation and Regression, Partial Correlation, Association in Case of Attributes, Other Measures, Summary Chart Concerning Analysis of Data **Sampling Fundamentals:** Need for Sampling, Some Fundamental Definitions, Important Sampling Distributions, Central Limit Theorem, Sampling Theory, Sandler‘s *A*-test, Concept of Standard Error, Estimation, Estimating the Population Mean (m), Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on	15

	Precision Rate and Confidence Level, Determination of Sample Size through the Approach, Based on Bayesian Statistics **Testing of Hypotheses:** What is a Hypothesis? Basic Concepts Concerning Testing of Hypotheses, Procedure for Hypothesis Testing, Flow Diagram for Hypothesis Testing, Measuring the Power of a Hypothesis Test, Tests of Hypotheses, Important Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Limitations of the Tests of Hypotheses **Interpretation of Data and Paper Writing** – Layout of a Research Paper, Journals in Computer Science, Impact factor of Journals, When and where to publish ?, UGC-CARE, Web of Science, SCOPUS, IEEE, ACM, Ethical issues related to publishing, Copyright, Data Privacy, Plagiarism and Self-Plagiarism, Software for detection of Plagiarism. ShodhShudhhi (PDS), smallseotools.com Use of Encyclopedias, Research Guides, Handbook etc., Academic Databases for Computer Science and Information Technology Discipline. Google Scholar, shodhganga, IEEE Xplore, ResearchGate, IDELS, DASH	
	Total Hours	30

Books and References:

Sr. No	Title	Author/s	Publisher	Edition	Year
1.	Research Methodology – Methods and techniques	C. R. Kothari	New Age International (P) Ltd., Publishers	---	---
2.	Business Research Methods	Donald R. Cooper Pamela Schindler	McGraw-Hill/Irwin	McGraw-Hill/Irwin	
3.	Business Research Methods	Allan Bryman Emma Bell	OXFORD University Press	---	---
4.	Research Methods for Business Students	Mark Saunders Philip Lewis Adrian Thornhill	Pearson Education Limited	---	---

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<table>
<tr><td colspan="2">Programme Name: S.Y. B. Sc (Computer Application) Semester:IV</td></tr>
<tr><td colspan="2">Course Category: Minor</td></tr>
<tr><td colspan="2">Name of the Dept: Science and Technology.</td></tr>
<tr><td colspan="2">Course Title: Research Methodology Practical</td></tr>
<tr><td colspan="2">Course Code: BCRP406 Course Level: 5.0</td></tr>
<tr><td colspan="2">Type : Practical</td></tr>
<tr><td colspan="2">Course Credit: 02</td></tr>
<tr><td colspan="2">Hours Allotted: 60 Hours</td></tr>
<tr><td colspan="2">Marks Allotted: 50 Marks</td></tr>
<tr><td colspan="2">Course Objectives:
The primary course objectives of a research methodology practical are to equip students with the practical skills and knowledge to design, conduct, and analyze research projects, including understanding research methodologies, selecting appropriate methods, and interpreting findings.</td></tr>
<tr><td colspan="2">Course Outcomes:
After the completion of the course, the learners would be able to:
OC1. Implement basics functions of LaTex ,
OC2 . Implement the art of interpretation and the art of writing research reports.</td></tr>
<tr><td>Description the course:
(Including but not limited to)</td><td>Provide hands-on experience in implementing various LaTex functions and implement the art of interpretation and the art of writing research reports.</td></tr>
</table>

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

Sr. No.	Content
1.	**Introduction to LaTex**
A.	**Report Writing:** report style having chapter, section and subsection, article style having section, subsection and subsubsection, Automatic generation of table of contents, toc file to store the information that goes into the table of contents, Automatic numbering of section numbers
B.	**Equations and Numbering Equations:** Creating an equation, writing multiple equations, Aligning multiple equations, creating matrices in Latex, label command, Cross referencing with ref command
C.	**Tables and Figures:** Tables and Figures Creating tables and figures in LaTeX
D.	**Bibliography:** Bibliography Creating Bibliography in LaTeX
2.	**Introduction to EndNote, Zotero or Mendeley**
A.	Integration with Word and adding citation and creating bibliographies
B.	Creating your own library
C.	Creating references from website
D.	Creating references manually
3.	Visit the college library or nearby research center or from internet collect 5 tittles of research papers/thesis and classify them according to types of research, Discuss how the problems are delineated, how they are relevant to scientific method etc.
4.	Identify 2 researchable problems relevant to your context and knowledge disciplines and justify the significance of their study.
5.	Preparation of a review article
6.	Identification of variables of a research study and their classification in terms of functions and level of measurement
7.	Preparation of a sampling design given the objectives and research questions/hypotheses of a research study
8.	Preparation of questionnaire for micro-level educational survey.
9.	Prepare 1 proposal on an identified research problem
10	Checking and removing plagiarism using Plagiarism Detection Software

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<tr><td colspan="2">Course Category: Open Electives</td></tr>
<tr><td colspan="2">Name of the Dept: Science and technology</td></tr>
<tr><td colspan="2">Course Title: Numerical Methods</td></tr>
<tr><td colspan="2">Course Code: BCN407 Course Level: 5.0</td></tr>
<tr><td colspan="2">Course Credit: 02</td></tr>
<tr><td colspan="2">Type: Theory</td></tr>
<tr><td colspan="2">Hours Allotted: 30 Hours</td></tr>
<tr><td colspan="2">Marks Allotted: 50 Marks</td></tr>
<tr><td colspan="2">Course Objectives:
1. To be able to precisely solve problems using mathematical modeling & find solution for a solvable to unsolvable problems.
2. To find an answer or solution close to answer, without even knowing what the answer is</td></tr>
<tr><td colspan="2">Course Outcomes: Learners will be able to,
OC 1: understand the numerical technique to find the roots of non linear equation & difference operator
with use of interpolation
OC2: Understand the numerical differentiation & integration.</td></tr>
<tr><td>Description the course: (Including but not limited to)</td><td>As a Computer Application student, learning numerical methods gives you a strong foundation in mathematical modeling and computational approaches, which are useful in a variety of fields and occupations.</td></tr>
</table>

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

Unit No.	Content	Hours
I	**Introduction**: Errors and Approximations, Iterative Methods, Truncation error, Taylor's series. **Numerical Solution of Equations of a Single Variable:** Numerical Solution of Equations, Bisection Method, Regular Falsi Method, Fixed Point Method, Newton's raphson Method, Secant Method **Numerical Solution of Systems of Equations:** Linear Systems of Equations, Numerical Solution of Linear Systems, Gauss Elimination Method. **Interpolation**: forward difference, Backward difference, Newton's forward difference interpolation, Newton's Backward difference Interpolation, Polynomial Regression, and Polynomial Interpolation.	15
II	**Numerical Differentiation and Integration:** Numerical Differentiation, Numerical Integration: Trapezoidal, Simpson 1/3rd rule, Simpsons 3/8th rule. **Numerical solution of 1st & 2nd Order differential equation:** Euler's method, Modified Euler's method, Runge-katta method for 1st and 2nd order differential equation	15
	Total Hours	**30**

References:

Sr.No	Title	Authors	Publisher	Edition	Year
1	Numerical Methods for Engineers and Scientists Using MATLAB	Ramin S. Esfandiar	CRC Press	2nd	2017
2	Introductory Methods of Numerical Method	S. S. Sastry	PHI	5th	2012
3.	Numerical methods	T Veerarajun T Ramachadran	Tata Mc Graw Hill	7th	2011

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Program Name: S.Y. B.Sc. (Computer Science)	**Semester: IV**
Course Category/Vertical: Open Elective	
Name of the Dept: **B.Com. (Management Studies)**	
Course Title: Basics of Marketing	
Course Code: **BCM407**	Course Level: 5.0
Type: Theory	
Course Credit: 02	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): (List the course objectives) 1. To make learners aware of the basic concepts of marketing 2. Make learners aware about the importance of marketing research	
Course Outcomes (OC): (List the course outcomes) OC1.Gain knowledge about the concepts of marketing and its implications in the business OC2. Understand the importance of marketing research and its contribution in analysing the market and decision making	
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 to Marketing** **Introduction to Marketing**: Definition, features, advantages and scope of marketing. The 4P's and 4C's of marketing. Marketing v/s Selling, functions of marketing **Concepts of Marketing**: Needs, wants and demands, transactions, transfer and exchanges **Orientations of a firm:** Production concept; Product concept; selling concept and marketing concept, social relationship, Holistic marketing	15
II	**Marketing Environment, Research and Consumer Behaviour** **The micro environment of business:** Management structure; Marketing Channels; Markets in which a firm operates; competitors and stakeholders. **Macro environment:** Political Factors; Economic Factors; Socio-Cultural Factors , Technological Factors (PEST Analysis) **Marketing research**: Meaning, features, Importance of marketing research. Types of marketing research: Product research; Sales research; consumer/customer research; production research **MIS:** Meaning, features and Importance **Consumer Behaviour:** Meaning, feature, importance, factors affecting Consumer Behaviour	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**: B.Sc. (Computer Application)**	**Semester: IV**
Course Category: OE	
Name of the Dept: **Science and Technology**	
Course Title: Data Analysis with Excel II	
Course Code: **BCD407**	Course Level: 5.0
Type: Practical	
Course Credit: 2	
Hours Allotted:60 Hours	
Marks Allotted: 50 Marks	
Course Objectives(CO): (List the course objectives) 1. To deepen students' understanding of statistical analysis and predictive modeling techniques using Excel, enabling them to work with large datasets, apply advanced analysis, and make data-driven predictions. 2. To equip students with the skills to work with complex datasets using Excel's advanced features and to perform comprehensive data analysis, including scenario modeling, optimization, and creating interactive reports.	
Course Outcomes (OC): (List the course outcomes) OC 1: students will be able to apply advanced statistical analysis techniques in Excel, including regression analysis, correlation analysis, and time series forecasting. They will be able to build predictive models and make data-driven predictions using Excel's built-in functions and Data Analysis. OC 2: students will be proficient in using advanced Excel tools like Scenario Manager, PowerPivot, and Solver for data analysis and optimization. They will be able to create complex dashboards, work with large datasets, and apply Monte Carlo simulations to model uncertainty and make informed decisions.	
Description of the course: (Including but not limited to)	Data Analysis with Excel II builds upon the foundational skills acquired in the first module by delving into advanced statistical techniques and predictive modeling. The course covers a range of topics including regression analysis, time series forecasting, and correlation analysis, allowing students to interpret complex data patterns and make predictions. Students will also learn to utilize advanced Excel features such as PowerPivot, Scenario Manager, and Solver for optimizing decision-making. Additionally, the course introduces Monte Carlo simulations and advanced data visualization techniques to create dynamic reports and dashboards, empowering students to perform comprehensive data analysis and present actionable insights.

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

Unit No.	Content	Hours
I	**Module I: Advanced Statistical Analysis and Predictive Modeling in Excel** 1.1 **Advanced Statistical Analysis** • Introduction to advanced statistical functions in Excel • Descriptive statistics (skewness, kurtosis, percentile) • Inferential statistics: Confidence intervals and hypothesis testing • Correlation analysis and determining relationships between variables • Using the Analysis Toolpak for statistical functions 1.2 **Regression Analysis** • Simple linear regression and multiple regression • Regression analysis using Excel's Data Analysis Toolpak • Interpreting regression outputs and statistical significance • Creating and analyzing regression models for predictions 1.3 **Time Series Forecasting** • Introduction to time series data and forecasting • Moving averages, exponential smoothing, and trend analysis • Forecasting using Excel's FORECAST and TREND functions • Handling seasonality and cyclical data 1.4 **Introduction to Predictive Modeling** • Using Excel to build predictive models • Building and validating models for future predictions • Evaluating model performance using error metrics (e.g., MSE, RMSE)	15
II	**Module II: Advanced Excel Features for Data Analysis** 2.1 **What-If Analysis and Scenario Modeling** • Introduction to Scenario Manager and its applications • Data Tables for performing sensitivity analysis • Using Goal Seek for reverse calculations • Optimization with Solver for decision analysis • Creating multiple scenarios to visualize outcomes 2.2 **Advanced PivotTables and PowerPivot** • Advanced PivotTable functionalities for large datasets • Using PowerPivot to work with external data sources • Combining multiple datasets in PivotTables • Calculated fields, KPIs, and custom aggregations in PowerPivot 2.3 **Advanced Data Visualization and Dashboards** • Creating advanced chart types (scatter plots, radar charts, histograms) • Using dynamic charts and adding interactive elements • Using sparklines to show trends within cells	15

	• Creating interactive dashboards with slicers and timelines • Designing and formatting complex reports for decision-making 2.4 **Monte Carlo Simulation** • Introduction to Monte Carlo simulation in Excel • Using RAND and RANDBETWEEN for creating simulations • Running Monte Carlo simulations to model uncertainty • Interpreting and visualizing simulation results	
	Total Hours	**30**

References:

1. Walkenbach, John. Excel 2019 Bible, Wiley.
2. Harvey, Greg. Excel for Dummies (Excel 2021 or latest edition), Wiley.
3. Simon, Jinjer L. Excel Data Analysis: Your visual blueprint for analyzing data, charts, and PivotTables, Wiley.
4. McFedries, Paul. Microsoft Excel Data Analysis and Business Modeling, Microsoft Press.

Sheth T. J. Education Society's
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Programme Name: **S.Y. B. Sc (Computer Application)** **Semester: IV**	
Course Category: SEC	
Name of the Dept: **Science and Technology**	
Course Title: PL/SQL	
Course Code: **BCP408** Course Level: 5.0	
Type: Practical	
Course Credit: **02**	
Hours Allotted: 60 Hours	
Marks Allotted: 50 Marks	
Course Objectives: 1. To Understand the basic of PL/SQL 2. To Understand control and conditional statement in PL/SQL. 3. To Understand working of sequence and cursor in PL/SQL. 4. To Understand the concept of stored procedure & functions & trigger.	
Course Outcomes: Learners will be able to, OC1. Write and execute basic PL/SQL program`11s using control statements, sequences, and cursors. OC2. Design and implement stored procedures and functions, trigger in PL/SQL for database management and problem-solving.	
Course Description:	This course covers the fundamentals of PL/SQL, focusing on variables, executable statements, and interacting with the Oracle server. Students will learn control structures, conditional statements, and how to create sequences, cursors, procedures, and functions. The course also includes hands-on experience with triggers, both row-level and statement-level. By the end, students will be able to write efficient PL/SQL code for database management and automation.

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

Sr No.	Content	Hours
1	**PL/SQL Basic:** c. Use of variable d. Write executable statement e. Interacting with Oracle Server f. Create anonymous PL/SQL Block	
2	**Control Statement in PL/SQL:** c. Using While loop d. For Loop e. Use of GOTO Statement	
3	**Create Conditional Statement using PL/SQL:** d. Using if statement e. Using if else statement f. Using elseif ladder **g.** Using case expression	
4	**Creation of Sequence in PL/SQL**	
5	**Create a Cursor in PL/SQL** a. Implicit Cursor b. Explicit Cursor	
6	**Creation of Procedure in PL/SQL**	
7	**Creation of Function in PL/SQL:** a. Computer and return the maximum value b. Compute factorial of given number.	
8	**Create a Recursive function:**	
9	**Creation of Trigger** **a.** Create a Row level trigger **b.** Create Statement level trigger	
10	**Creation of Package in PL/SQL:**	
	Total Hours	**60**

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Programme Name: S.Y. B.Sc.(Computer Application)	**Semester: IV**
Course Category: CC	
Name of the Department: **Sociology**	
Course Title: National Integration and Communal Harmony	
Course Code: **BCN411**	Course Level: 5.0
Type: Theory / Practical	
Course Credit: 2 credits	
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:

OC1. Understand the principles of National Integration and Communal Harmony.
OC2. 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.(Computer Application)	**Semester: IV**
Course Category/Vertical: CC	
Name of the Dept: **Psychology**	
Course Title: Yoga	
Course Code: **BCY411**	Course Level: 5.0
Type: Theory / Practical	
Course Credit: 2 credits	
Hours Allotted: 30 Hours	
Marks Allotted: 50 Marks	

Learning Objectives:

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

Course Outcomes (CO):

OC 1. Students will be able to understand the basic principles and applications of Yoga.
OC 2. 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** A) Yogic Sanchalan (Yogic Movements), Kapalbhati (Cleansing Breath Technique), Suryanamaskar (Sun Salutation) B) Anulom-Vilom (Alternate Nostril Breathing), Dirgha Shwasan (Deep Breathing), Bhramari (Humming Bee Breath)	**15**
II	**Practical** A) Vajrasana (Thunderbolt Pose), Paschimottanasana (Seated Forward Bend), Parivritta Janushirasana (Revolved Head-to-Knee Pose), Vakrasana (Twisting Pose), Marjarasana (Cat Pose), Naukasana (Boat Pose) B) 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:

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