

C P PATEL AND F H SHAH COMMERCE (AUTONOMOUS) COLLEGE, ANAND

(Managed by SARDAR PATEL EDUCATION TRUST, ANAND)

AFFILIATED TO SARDAR PATEL UNIVERSITY, V V NAGAR

An ISO 9001 2015 Certified / An ISO 14001-2015 Certified / An ISO 21001-2018 Certified

GUJARAT INSTITUTIONAL RATING FRAMEWORK (4 STAR)

AAA Reaccredited CGPA 3.56 – GRADE **A⁺** KCG-Dept of Edu. Govt of Gujarat-April 2017

NAAC Reaccredited - CGPA 3.30 - GRADE **'A⁺'** UGC – MHRD, Govt of India – June 2022

Syllabus as per NEP 2020 with effect from the Academic Year 2024-2025

Bachelor of Computer Applications (BCA)

PROGRAMME OUTCOME

At the end of the BCA programme the students will be able to:

- Understand the fundamental concepts of computers, software hardware and peripheral devices and evolution of computer technologies.
- Work in the IT sector as system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.
- Apply standard software engineering practices and strategies in software project development using open source programming environment to deliver a quality of product for business success.

PROGRAM SPECIFIC OUTCOMES

- Equip themselves to potentially rich & employable field of computer applications.
- Pursue higher studies in the area of Computer Science/Applications.
- Take up self-employment in Indian & global software market.
- Meet the requirements of the Industrial standards.

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With Effective from June 2024**Course Structure under NEP – 2020(BCA) Semester-IV**

Subject	Subject Code	Subject Title	Theory/ Practical	Credits	WCH	Exam Duration	Marking Scheme			
							Int	Ext	Total	
Discipline Specific Course Core (Major)	Core Course-1	US4MABCA01	Data Structure	T	4	4	2	50/18	50/18	100/36
	Core Course-2	US4MABCA02	Object Oriented Programming - II	T	4	4	2	50/18	50/18	100/36
	Practical of Core Course-1 and Core Course-2	US4MABCA03	Practical Based on Data Structure and Object Oriented Programming - II	P	4	4	2	50/18	50/18	100/36
Minor	Minor Course-1	US4MIBCA04	Web Page Designing with Bootstrap	T	2	2	1	25/09	25/09	50/18
	Practical of Minor Course-1	US4MIBCA05	Practical Based on Web Page Designing with Bootstrap	P	2	4	1	25/09	25/09	50/18
Ability Enhancement Course	Ability Enhancement Course-1	US4AEBCA06	System Analysis and Design	T	2	2	1	25/09	25/09	50/18
Skill Enhancement Course	Skill Enhancement Course-1	US4SEBCA07	Cyber Security	T	2	2	1	25/09	25/09	50/18
IKS/Value Added Course (Any One)		US4VABCA08	E-Commerce	T	2	2	1	25/09	25/09	50/18
		US4VABCA09	NCC II	T						
		US4VABCA10	NSS II	T						
Minimum Qualifying Credits				22						

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BCA (Bachelor of Computer Applications)

(Semester-IV)

Course Code	US4MABCA01	Title of the Course	Data Structure
Total Credits of the Course	04	Hours per Week	04

Course Objectives	<ul style="list-style-type: none">• To gain understanding of data structure and their application.• 2. To impart knowledge on fundamental concepts of popular data structure such as stack, queue, tree and Sorting & searching techniques and File organization.
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Course Content		
Unit	Description	Weightage (%)
1.	<p><u>Introduction to Data Structures</u></p> <ul style="list-style-type: none">- Definition, Types of Data Structures, applications and advantages,- Primitive and non-primitive data structures and operations on them,- Introduction to arrays, one and two-dimensional arrays,- Representation of arrays in memory : row-major & column-major,- Address calculation of elements of one and two-dimensional arrays,- Applications of arrays.	25

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2.	<u>Stack & Queues</u> <ul style="list-style-type: none">- Introduction to stack,(Push, Pop, Peep, Change)- Applications of Stack,- Introduction to Queue(Simple, Circular, Queue& Priority)- Algorithm on Simple and Circular Queues : Insert and Delete,- Applications of Queues.- Introduction to linked-list and its type- Algorithm on linked-list(singly)	25
3.	<u>Sorting and Searching techniques</u> <ul style="list-style-type: none">- Sorting – Introduction, Applications of sorting- Sorting Techniques - Bubble Sort, Quick Sort and Merge Sort- Searching – Introduction, Applications of searching- Searching Techniques - Sequential search and Binary search- Sorting vs. searching	25
4.	<u>Tree & File Organizations</u> <ul style="list-style-type: none">- Definitions of basic terms : Tree, Root node, Leaf node, level, branch node, lexical order tree, Binary search tree,- Applications of a tree- Binary trees : Introduction, linear and linked representations,- Traversal of a binary tree: Preorder, Inorder and Postorder (Recursive)- File Organization: Terminologies and concept- Sequential file: Structure and Processing,- Indexed Sequential files: Structure and Processing,- Hashing Functions: The Division Method, The Midsquare Method, The Folding Method, Digit Analysis, The length-Dependent Method	25

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Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written	50%
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%
Course Outcomes		
<ul style="list-style-type: none">• To get the idea about popular data structures such as stack, queue, tree and File organization.• Understanding of the fundamentals of sorting and searching techniques and file organization.		
Suggested References		

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Sr. No.	References
1	Tremblay J. & Sorenson P. G.: An Introduction to Data Structures with Applications, 2nd Edition, Tata McGraw-Hill Edition, 1991.
2	Singh Bhagat & Naps Thomas : Introduction to Data Structures, Tata McGraw-Hill Publishing Co.Ltd.,1985.
3	R. B. Patel: Data Structure using C – Khanna Publications. ISBN: 81-87522-41-0.
4	D. Samanta - Classic Data Structures, 2nd Edition – PHI Publication
5	G. S. Baluja - Data Structures through C, 4th Edition – DhanpatRai & Co.

BCA (Bachelor of Computer Applications)

(Semester-IV)

Course Code	US4MABCA02	Title of the Course	Object Oriented Programming – II
Total Credits of the Course	04	Hours per Week	04

Course Objectives	To study the fundamentals of <ol style="list-style-type: none">1. To describe exception handling and Input Output Management.2. To understand Applet programming using Abstract Windows Toll Kit (AWT).3. To study the fundamental concepts related to JDBC.4. To acquire knowledge about basic concepts of Servlets, JSP and
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	multithreading.
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Course Content		
Unit	Description	Weightage (%)
1.	<p><u>Exception Handling, I/O Management, Packages and Applet Programming</u></p> <ul style="list-style-type: none">- Managing errors & exceptions: introduction, types of errors, exceptions, syntax of exception handling construct, multiple catch statements, the finally clause, defining and throwing user-defined exceptions, the throw statement- Managing I/O files: introduction, concept of streams- Character stream classes – Introduction to the concept of a package, Java API packages, using the System package- Applet architecture and skeleton- java.awt package (Button, Checkbox, Checkbox Group, Choice, Color, Label, List, Text Area, Text Field)- HTML applet tag, display techniques (Drawstring, Lines, Rectangle, Ellipses, Circles, Arcs, Polygons, Color)	25

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	<ul style="list-style-type: none">- Introduction to event handling	
2.	<p><u>JDBC, Collection Frame work and Net beans</u></p> <ul style="list-style-type: none">- Basic JDBC program Concept- Introduction to Netbeans IDE and environment setting- Architecture of JDBC- Making the Connection, Statement & its types- Executing queries- List Interface (Array List, Vector List, Iterator)- Wrapper Class (Integer, Float and Double) and Methods	25
3.	<p><u>Servlet and JSP</u></p> <ul style="list-style-type: none">- Introduction – Types of servlet- Life cycle of servlet- Execution process of Servlet Application- Session Tracking- Cookie Management- Introduction to JSP and Lifecycle- Components of JSP- Directives, Tags, Scripting Elements- Execution process of JSP Application- Building a simple application using JSP /Servlet	25
4.	<p><u>Multithreading</u></p> <ul style="list-style-type: none">- Introduction- Thread Life Cycle	25

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	<ul style="list-style-type: none">- Creating Thread- Thread Methods- Thread Synchronization	
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Teaching-Learning Methodology	Multiple teaching approaches: lecture and discussion, exploration and cooperative group work, demonstrations, and presentations.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written	50%
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%
Course Outcomes		
1.	Ability to describe exception handling and Input Output Management.	
2.	Understanding of Applet programming using Abstract Windows Toll Kit (AWT).	
3.	Understand of the fundamental concepts related to JDBC.	
4.	Gain knowledge about basic concepts of Servlets, JSP and multithreading.	

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Suggested References	
Sr. No.	References
1	The Complete Reference – JAVA Herbert Schildt.
2	Core java –II By Cay S. Horstmann and Gary Cornell
3	Complete Reference J2EE – Jim Keogh.
4	Programming with Java- A Primer by E. Balaguruswami, 3rd Edition, TMH Publication.
5	Programming with Java- A Primer by E. Balaguruswami, 3rd Edition, TMH Publication. Java 2 Programming Black Book, Steven Holzner
6	The Complete Reference – Java 2 7th Edition Herbert Schildt. TMH Publication.
7	Saba Zame , Handbook of Object technology, CRC Press, Washington DC, 1999.
8	Mary Champion and Kathy Walrath, Java tutorial, Second Edition, Addison Wesley Pun. 1998.

On-line Resources
<ul style="list-style-type: none">• C++ Tutorial (geeksforgeeks.org)• https://www.w3schools.com/• Java Tutorial (geeksforgeeks.org)• https://www.javatpoint.com/

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BCA (Bachelor of Computer Applications)

(Semester–IV)

Course Code	US4MABCA03	Title of the Course	Practical Based on Data Structure and Object Oriented Programming - II
Total Credits Of the Course	4	Hours per Week	4

Course Objectives:	To understand 1. To implement Applet Programming. 2. To implement the advanced features of Java Programming Language.
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Course Content		
	Description	Weightage*(%)
	Practical Based on Problem	100%

Teaching-Learning Methodology	Hands on training through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written/Practical Examination	50%
2.	Internal Continuous Assessment in the form of Practical, Viva-voce, Quizzes, Seminars, Assignments, Attendance	
3.	External Examination	50%

Course Out comes	
1.	Gain knowledge to implement Applet Programming.
2.	Gain the knowledge of advanced features of Java Programming Language.

BCA (Bachelor of Computer Applications) Semester – IV

Course Code	USMIBCA04	Title of the Course	Web Page Designing with Bootstrap
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Total Credits of the Course	02	Hours per Week	02
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Course Objectives	Bootstrap is a sleek, intuitive, and powerful, mobile first front-end framework for faster and easier web development. It uses HTML, CSS and JavaScript.
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Course Content		
Unit	Description	Weightage (%)
1.	<u>Introduction to Bootstrap</u> <ul style="list-style-type: none">- Concept of Bootstrap and Bootstrap Framework- Versions of Bootstrap- Responsive web page designing- Bootstrap Containers, GridSystem, Text/Typography, Colors, Tables, Images, Jumbotron- Alerts- Bootstrap Buttons, Button Groups- Bootstrap Badges	50%
2.	<u>Bootstrap Components</u> <ul style="list-style-type: none">- Progress Bars, Spinners, Pagination- List Groups and Cards- Forms, Form Inputs, Dropdowns, Scrollspy- Navigation Bar, Icons, Filters	50 %

Teaching-Learning Methodology	Multiple teaching approaches: lecture and discussion, exploration and cooperative group work, demonstrations, and presentations.
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Evaluation Pattern

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Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written	50%
2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	
3.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to

- Built-in Support for layout, grids, fluid grids, and responsive designs.
- Pre-built CSS: Contains global CSS classes for typography, tables, grids, forms, buttons, images, and more.
- Components: Contains lots of reusable components including Icons, Dropdowns, Navbars, Alerts, and many more.

Suggested References:

Sr. No.	References
1.	Bootstrap Reference Guide by Jacob let, Bootstrap Creative
2.	Responsive Web Design with HTML5 and CSS - Fourth Edition by Ben Frain, Packt Publishing
3.	Web Technologies: HTML, JAVASCRIPT, PHP, JAVA, JSP, ASP.NET, XML and Ajax, BlackBook: HTML, Javascript, PHP, Java, Jsp, XML and Ajax, Black Book, Dreamtech Press

On-line Resources

- Bootstrap · The most popular HTML, CSS, and JS library in the world. (getbootstrap.com)
- <https://www.w3schools.com/>
- Bootstrap Tutorial ([geeksforgeeks.org](https://www.geeksforgeeks.org))
- <https://www.javatpoint.com/>

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BCA (Bachelor of Computer Applications) Semester - IV

Course Code	USMIBCA05	Title of the Course	Practical Based on Web Page Designing with Bootstrap
Total Credits of the Course	02	Hours per Week	02

Course Objectives	Bootstrap is a sleek, intuitive, and powerful, mobile first front-end framework for faster and easier web development. It uses HTML, CSS and JavaScript.
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Course Content		
	Description	Weightage*(%)
	Practical Based on Web Page Designing with Bootstrap	100%

Teaching-Learning Methodology	Demonstrating through required ICT tools.
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written	

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2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	50%
3.	University Examination	50%

Course Outcomes	<ul style="list-style-type: none">- Built-in Support for layout, grids, fluid grids, and responsive designs.- Pre-built CSS: Contains global CSS classes for typography, tables, grids, forms, buttons, images, and more.- Components: Contains lots of reusable components including Icons, Dropdowns, Navbars, Alerts, and many more.
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BCA (Bachelor of Computer Applications) Semester - IV

Course Code	US4AEBCA06	Title of the Course	System Analysis & Design
Total Credits of the Course	02	Hours per Week	02

Course Objectives	<ol style="list-style-type: none">1. To study the concept of a system and learn the System Development Life Cycle (SDLC).2. To impart knowledge on fact-finding techniques, input/output design and Data Flow Diagrams.
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Course Content		
Unit	Description	Weight age (%)

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1.	<u>Introduction to System Analysis and Design</u> <ul style="list-style-type: none">– System and Characteristic of System– System Elements and System Concepts,– Types of Systems and Integrated system,– Systems Analyst- Knowledge and Qualities and Objective– Role of Systems Analyst,– Systems Approach and Systems Analysis,– Fact Gathering Techniques– (Interviews, Questionnaires, Record In section and Observation)	50%
2.	<u>System Development Model</u> <ul style="list-style-type: none">– Introduction to Various Methodologies of Systems Development– SDLC(System Development Life Cycle) Model, Prototype Model– Difference between System Analysis and System Design,– Decision Tree Decision Table– DFDs and Symbols used, Rules for drawing DFDs,– Physical and Logical DFDs ,Examples of DFD	50%

Teaching-Learning Methodology	Material for this course will be presented using multiple teaching approach: lecture and discussion, exploration and inquiry, cooperative group work, demonstrations, and presentations
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written	

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2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	50%
3.	External Examination	50%

Course Outcomes	<ol style="list-style-type: none">1. Gain knowledge about Systems and System Development Life Cycle (SDLC).2. Understand the concepts of fact finding techniques, input/output design and Data Flow Diagrams.
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Suggested References:	
S r .No.	References
1	Prof.S.ParthaSarathy,Prof.B.W.Khalkar,“System Analysis, Design And Introduction to Software Engineering (SADSE)”, 9th Ed.
2	James A.Senn:“Analysis & Design of Information System”, 2 nd Ed.,McGraw-Hill Int.

Online Reference :
<ul style="list-style-type: none">• JavaTpoint ,• w3school,• Tutorials Point

Bachelor of Computer Applications (BCA) Semester –IV

Course Code	US4SEBCA07	Title of the Course	Cyber Security
Total Credits of the Course	02	Hours per Week	02

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NAAC Reaccredited - CGPA 3.30 - GRADE **'A⁺'** UGC – MHRD, Govt of India – June 2022

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Course Objectives	<ul style="list-style-type: none">- On completion of this course, students should be able to appreciate various privacy and Cyber security concerns on online Social media and understand the reporting procedure of inappropriate content, underlying legal aspects and best practices for the use of Social media platforms.- After the completion of this module, students would be able to understand the basic concepts related digital payments.- They will become familiar with various digital payment modes and related cyber security aspects.
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Course Content		
Unit	Description	Weight age (%)
1.	<p><u>Introduction to Cyber Security</u></p> <ul style="list-style-type: none">- Defining Cyberspace and Overview of Computer and Web-technology- Architecture of cyberspace, Communication and web technology, Internet,- World wide web, Internet infrastructure for data transfer- Internet society, Regulation of cyberspace,- Concept of cyber security, Issues and challenges of cyber security. <p><u>Cyber-crime and Cyber</u></p> <ul style="list-style-type: none">- Classification of cybercrimes, Common cyber- Crimes- cyber-crime targeting computers and mobiles- Cybercrime against financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks- Cybercriminals modus-operandi, Reporting of cyber-crimes, Remedial and mitigation measures,	50%

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2.	<p><u>Social Media Overview and Security</u></p> <ul style="list-style-type: none"> - Introduction to Social networks - Types of Social media / Platforms & monitoring - opportunities and pitfalls in online social network, Security issues related to social media <p><u>Introduction to digital payments</u></p> <ul style="list-style-type: none"> - Components of digital payment and stake holders, Modes of digital payments - Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), - Digital payments related common frauds and preventive measures. RBI guidelines on digital payments <p><u>Device and Mobile phone security</u></p> <ul style="list-style-type: none"> - Password policy, Security patch management, - Data backup, Downloading and management of third-party software - Device security policy, Cyber Security best practices, Significance of host firewall and Ant-virus, Management of host firewall and Anti-virus 	50%
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Teaching-Learning Methodology	Material for this course will be presented using multiple teaching approach: lecture and discussion, exploration and inquiry, cooperative group work, demonstrations, and presentations
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Evaluation Pattern		
Sr. No.	Details of the Evaluation	Weightage
1.	Internal Written	

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2.	Internal Continuous Assessment in the form of Quizzes, Seminars, Assignments, Attendance	50%
3.	External Examination	50%

Course Outcomes	<ul style="list-style-type: none">• Explain the core issues in cyber security such as security, privacy, and interoperability.• Choose the appropriate technologies, tools, and approaches for the given application.
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Suggested References:	
S r .No.	References
1	Cyber Crime Impact in the New Millennium, by R. C Mishra, Auther Press. Edition 2010
2	Fundamentals of Network Security by E. Maiwald, McGraw Hill.
3	Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011)
4	Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.

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**Bachelor of Computer Applications (BCA)
(Semester –IV)**

Course Code	US4VABCA08	Title of the Course	E-Commerce
Total Credits of the Course	2	Hours per Week	2

Course Objectives:	1. To study basics of E-Commerce and its classifications and models. 2. To understand basics of Electronic Marketplace and Customer Relationship Management.
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Course Content		
Unit	Description	Weightage*(%)

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Syllabus as per NEP 2020 with effect from the Academic Year 2024-2025

1.	Introduction To E-Commerce <ul style="list-style-type: none">– Definition, communication perspective, business process perspective, service perspective– Classification by nature of transaction : B2B, B2C, C2C, C2B, Non business EC, Intra-business EC– Classification of EC Applications: electronic market, inter organizational system, customer services– Benefits to organizations, consumers, and Society– Limitations of EC, framework of EC, future of EC– E-Commerce Business Models– Introduction, eight key ingredients of a business model, major B2C and B2B business models, Introduction to M-Commerce	50
2.	Electronic Marketplaces <ul style="list-style-type: none">– Marketplace components, types of electronic markets (electronic storefronts, electronic malls, types of stores and malls)– Portals and their types, Role of intermediaries in E- markets, E-market success factors, competitive factors, Impact of E-Market on organizations (marketing, HR, manufacturing, finance and accounting)– Customer Relationship Management (CRM)– CRM : meaning, types of CRM, benefits and limitations of CRM, issues in CRM implementation, classifications of CRM applications, one-to-one marketing (personalization, collaborative filtering, customer loyalty, trust)	50

Teaching-Learning Methodology	Blended learning approach incorporating both traditional classroom teaching as well as usage of ICT tools.
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Evaluation Pattern

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Sr. No.	Details of the Evaluation	Weightage
1.	Internal Examination	50%
2.	University Examination	50%

Course Outcomes: Having completed this course, the learner will be able to	
1.	Understand the basics of E-Commerce and its classifications and models.
2.	Understand the basics of Electronic Marketplace and Customer Relationship Management.

Suggested References:	
Sr. No.	References
1.	Jason G. Miles, E-Commerce Power, Morgan James Publishing, 2021.
2.	Brett Standard, E-Commerce Business, Novelty Publishing, 2019.
3.	P. T. Joseph, S. J. : E-Commerce An Indian Perspective, 3 rd Edition, Prentice Hall of India (PHI), 2009.
4.	Kenneth C. Laudon, Carol Guercio Traver : E-Commerce - Business, Technology, Society, 4 th Edition, Pearson, 2008.