

DEPARTMENT OF COMPUTER SCIENCE
COURSE CURRICULUM & MARKING SCHEME

B.Sc. VII, VIII Semester

COMPUTER SCIENCE

(Based on Choice Based Credit System)

SESSION : 2025-26



ESTD : 1958

**GOVT. V.Y.T. PG AUTONOMOUS COLLEGE,
DURG, 491001 (C.G.)**

(Former Name – Govt. Arts & Science College, Durg)

NAAC Accredited Grade A⁺, College with CPE - Phase III (UGC), STAR COLLEGE (DBT)

Phone : 0788-2212030

Website - www.govtsciencecollegedurg.ac.in, Email – autonomousdurg2013@gmail.com

Course Structure for CBCS B.Sc. (CS)- VII Semester

Course Code	Course Type	Course Name	Theory Marks	Internal Marks	Practical Marks	Total Marks		Credits
			Max. (A)	Max. (C)	Max. (F)	Max.	Min.	
BCS 701(L)	DSC	Object Oriented Programming using 'C++'	60	15		75	40	3
BCS 702(P)		Lab: Object Oriented Programming using 'C++'			25	25	10	1
BCS 703 (L)	DSE1	Mathematical Foundation of Computer Science	80	20		100	40	4
BCA 704(L)	DSE2	Advance Operating Systems	80	20		100	40	4
BCS 705(L)	DSE3	Data Structure through algorithms using 'C'	60	15		75	30	3
BCS 706(P)		Lab: Data Structure through algorithms using 'C'			25	25	10	1
BCA 707(L)	DSE4	Computer System Architecture	80	20		100	40	4
		TOTAL				500	200	20

The syllabus for B.Sc. (CS) is hereby approved for the session 2025-26.





FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF COMPUTER APPLICATION
COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in C. A. (Certificate / Diploma / Degree/Honors)		Semester - VII	Session: 2026-2027
1	Course Code	CASC-19T	
2	Course Title	Mobile Application Development	
3	Course Type	DSC	
4	Pre-requisite (if, any)	<i>Basic Knowledge of Computer and Programming</i>	
5	Course Learning Outcomes (CLO)	➤ Apply general programming knowledge in the field of developing mobile applications. ➤ Understand the specific requirements, possibilities and challenges when developing for a mobile context. ➤ Interact between user interface and underlying application. ➤ Plan and carry out a design work including developing a prototype that can be evaluated with a specified user group. ➤ Reflect over possibilities and demands in collaborative software development.	
6	Credit Value	3 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 75	Min Passing Marks: 24

PART -B: Content of the Course

Total No. of Teaching-learning Periods (01 Hr. per period) - 45 Periods (45 Hours)

Unit	Topics (Course contents)	No. of Period
I	Introduction to Mobile Applications: History of Android, Android Features, Android Versions, Fundamentals: Basic Building blocks, Activities, Services, Broadcast Receiver & Content providers; UI Components: Views & notifications. Android Development: Java, Android Studio, Eclipse, Virtualization APIs. Android tools Debugging with DDMS, Android File system, Working with emulator and smart devices A Basic Android Application, Deployment. Android Activities: The Activity Lifecycle Lifecycle methods, Creating Activity; Intents, Intent Filters, Activity stack.	12
II	Basic UI Design: Styles & Themes Form widgets, Text Fields, Layouts: Relative Layout Table Layout, Frame Layout, Linear Layout, Nested layouts (dip.dp, sip, sp versus px), styles.xml, Drawable resources for shapes, gradients (selectors), Style attribute in layout file, Alert Dialogs & Toast, Time and Date, Images and media.	11
III	Android Interface: Menus: Option menu, context menu, pop-up menu; Lists and Notifications: creation and display. Input Controls: Buttons, Text Fields, Checkboxes, alert dialogs, Spinners, rating bar, progress bar, Android Threads and Thread handlers, Files, Content Providers and Databases.	11



IV	Messaging and Location-Based Services: Sending SMS Messages Programmatically, Getting Feedback after Sending the Message Sending SMS Messages Using Intent Receiving, sending email, Introduction to location-based service, configuring the Android Emulator for Location-Based Services, Geocoding and Map-Based Activities; Introduction to App Deployment and Testing: Doodlz app, Tip calculator app, Weather viewer app.	11
Keywords	Android, Eclipse, Virtualization, Debugging, Toast, Spinners, Threads, Geocoding, Doodlz.	

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources		
Text Books, Reference Books and Others		
Text Books Recommended –		
➤ Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 3rd edition, 2017. ➤ Rajiv Ramnath, Roger Crawfis, and Paolo Sivilotti, Android SDK 3 for Dummies, Wiley.		
Online Resources–		
➤ Android from SWAYAM/NPTTEL- https://nptel.ac.in/courses/106106147 ➤ Android from tutorialspoint - https://www.tutorialspoint.com/android/android_overview.htm ➤ Android Studio from Javatpoint - https://www.javatpoint.com/android-tutorial ➤ Android App Development - https://developer.android.com/guide ➤ Android Application Development – Udemy- https://www.udemy.com/course/learn-android-application-development-y/ ➤ Android Application Development – Coursera - https://www.coursera.org/specializations/android-app-development		
PART -D: Assessment and Evaluation		
Suggested Continuous Evaluation Methods:		
Maximum Marks: 75 Marks		
Continuous Internal Assessment (CIA): 15 Marks		
End Semester Exam (ESE): 60Marks		
Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 10 Assignment / Seminar - 05 Total Marks - 15	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 15 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-3x10=30 Marks	

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF COMPUTER APPLICATION
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in C.A. (Certificate / Diploma / Degree)		Semester - VII	Session: 2026-2027
1	Course Code	CASC-19P	
2	Course Title	LAB: Mobile Application Development	
3	Course Type	Practical	
4	Pre-requisite (if, any)	<i>Basic Knowledge of Computer and Programming</i>	
5	Course Learning Outcomes (CLO)	➤ Know the components and structure of mobile application development frameworks for Android based mobiles. ➤ Understand how to work with various mobile application development frameworks. ➤ Understand the basic and important design concepts and issues of development of mobile applications. ➤ Understand the capabilities and limitations of mobile devices.	
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field learning/Training</i>
7	Total Marks	Max. Marks: 25	Min Passing Marks: 10
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)		No. of Period
Lab./Field Training/ Experiment Contents of Course	1. Create "Hello World" application. That will display "Hello World" in the middle of the screen in the red color with white background. 2. Create Custom Toast & Dialog Box. 3. Design an application that contains phone contacts in vertical linear manner. Selected contact appears at the top of the list with a large italicized font and a blue background. 4. Create an application that uses Layout Managers and Event Listeners. 5. Develop a standard calculator application to perform basic calculations like addition, subtraction, multiplication and division. 6. Devise an application that draws basic graphical primitives (rectangle, circle) on the screen. 7. Design an android application Using Radio buttons. 8. Create a user registration application that stores the user details in a database table. 9. Build a mobile application that create, save, update and delete data in database.		30




	10. Create an application that takes the name from a text box and shows hello message along with the name entered in text box, when the user clicks the OK button. 11. Devise an application that implements Multi threading. 12. Develop a mobile application that uses GPS location information. 13. Create an application that writes data to the SD card. 14. Implement an application that creates an alert upon receiving message. 15. Devise a mobile application that creates alarm clock. 16. Create a screen that has input boxes for User Name, Password, Address, Gender (radio buttons for male and female), Age (numeric) and a Submit button. On clicking the submit button, print all the data below the Submit Button (use any layout). 17. Design an android application to create page using Intent and one Button and pass the Values from one Activity to second Activity. 18. Design an android application Send SMS using Intent. 19. Create an android application using Fragments. 20. Design an android application for menu.	
Keywords	Android, Eclipse, Virtualization, Debugging, Toast, Spinners, Threads, Geocoding, Doodlz	

Signature of Convener & Members (CBoS) :

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

- Bill Phillips, Chris Stewart, Brian Hardy, and Kristin Marsicano, Android Programming: The Big Nerd Ranch Guide, Big Nerd Ranch LLC, 3rd edition, 2017.
- Rajiv Ramnath, Roger Crawfis, and Paolo Sivilotti, Android SDK 3 for Dummies, Wiley.

Online Resources–

- Android from SWAYAM/NPTEL - <https://nptel.ac.in/courses/106106147>
- Android from tutorialspoint - https://www.tutorialspoint.com/android/android_overview.htm
- Android Studio from Javatpoint - <https://www.javatpoint.com/android-tutorial>
- Android App Development - <https://developer.android.com/guide>
- Android Application Development – Udemy - <https://www.udemy.com/course/learn-android-application-development-y//>
- Android Application Development – Coursera- <https://www.coursera.org/specializations/android-app-development>
- <https://pesitsouth.pes.edu/pdf/2019/July/MCA/android%20Lab%20manual.pdf>
- <https://mrctet.com/pdf/Lab%20Manuals/MOBILE%20APPLICATION%20DEVELOPMENT%20LAB.pdf>
- <https://www.vvitengineering.com/lab/CS6611-MOBILE-APPLICATION-DEVELOPMENT-LABORATORY.pdf>

➤ http://www.jnit.org/wp-content/uploads/2020/04/SDL-II-android.pdf

Name and Signature of Convener & Members of CBoS:

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
Department of Computer Application
Course Curriculum

PART- A: Introduction			
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)		Semester - VII	Session: 2026-2027
1	Course Code	CASE-05T	
2	Course Title	Theory of Computation	
3	Course Type	DSE	
4	Prerequisite (if, any)	NO	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: 1. Understanding of the core concepts in automata theory and formal languages. 2. Understanding and analyzing the fundamentals of compiler designing. 3. Design grammars and automata (recognizers) for different language classes. 4. Design the pushdown automata. 5. Design the Turing machine.	
6	Credit Value	4 Credits	Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)			

Unit	Topics (Course contents)	No. of Period
I	Introduction to automata: Definition and types of automata: Finite Automata, Pushdown Automata, Turing Machine, introduction to Grammar and languages according to the types of automata. Finite Automata: Introduction to Finite State Automata (FSA): Formal definition, simpler notations (state transition diagram, transition table). Types of FSA: Deterministic Finite Automata (DFA), Nondeterministic Finite Automata (NFA), Finite Automata with Epsilon Transitions, Elimination of Epsilon transitions, Conversion of NFA to DFA, Equivalence of NFA and DFA. Applications of Finite Automata, Minimization of Deterministic Finite Automata. Mealy machine, Moore machine.	15
II	REGULAR EXPRESSIONS (RE): Introduction to RE, Identities of Regular Expressions, Finite Automata and Regular Expressions- Converting from DFA to Regular Expressions, Converting Regular Expressions to Automata, applications of Regular Expressions. REGULAR GRAMMARS: Definition, regular grammars and FA, FA for regular grammar, Regular grammar for FA. Proving languages to be non-regular -Pumping lemma, applications, Closure properties of regular languages.	15
III	CONTEXT FREE GRAMMAR (CFG): Introduction to CFG's, Properties of CFG's, Derivation Trees, Sentential Forms, Rightmost and Leftmost derivations of Strings. Ambiguity in CFG, Minimization of CFG, Chomsky Normal Form (CNF), Greibach Normal Form (GNF), Pumping Lemma for CFLs. PUSHDOWN AUTOMATA: Introduction of PDA and its model, types of PDA, Languages accepted by the PDA, Acceptance by Final State and Acceptance by Empty stack and its Equivalence, Equivalence of CFG and PDA.	15
IV	TURING MACHINES (TM): Formal definition and model of Turing Machine, Types of TMs, Languages of a TM, TM as acceptors, Properties of recursive and recursively enumerable languages, Universal Turing machine, The Halting problem, Undecidable problems about TMs. Context sensitive language and linear bounded automata (LBA).	15
Keywords	Finite Automata, Regular Expression, Regular Grammar, Context Free Grammar, Pushdown Automata, Turing Machine.	

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended –

1. John E. Hopcroft, Rajeev Motwani, Jeffrey D. Ullman (2007), Introduction to Automata Theory Languages and Computation, 3rd edition, Pearson Education, India.
2. K. L. P Mishra, N. Chandrasekaran (2003), Theory of Computer Science-Automata Languages and Computation, 2nd edition, Prentice Hall of India, India
3. A.M. Padma Reddy, Finite Automata and Formal languages, Pearson Education India
4. Michael Sipser, Third Edition, Introduction to the Theory of Computation, Cengage Learning.

Online Resources–

1. NPTEL YouTube Channel: Lectures on Theory of Computation
https://youtube.com/playlist?list=PLbMVogVj5nJSd25WnSU144ZyGmsqjuKr3&si=EvuSjnO_T1oTHjn

2. NPTEL YouTube Channel: Lectures on Theory of Automata, Formal Languages and Computation
<https://youtube.com/playlist?list=PL85CF9F4A047C7BF7&si=SBm-gIkmlkjOBDscB>
3. NPTEL YouTube Channel: Lectures on Theory of Computation and Automata
<https://youtube.com/playlist?list=PL3-wYxht4yCgBHUpwXDTLos3JStecGlax&si=TbYH91hmlOrtUEnN>
4. SWAYAM YouTube Channel: Introduction to Automata, Languages and Computations
https://youtube.com/playlist?list=PLbRMhDVUMngcwWkzVTm_kFH6JW4JCtAUM&si=RbTG3WZ0Jf6Zx_pu

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 30 Marks

End Semester Exam (ESE): 70 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 & 20 Assignment / Seminar - 10 Total Marks - 30	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 30 Marks
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End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1out of 2 from each unit-4x10=40 Marks
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FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)

DEPARTMENT OF COMPUTER APPLICATION

COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Computer Application

(Certificate / Diploma / Degree/Honors)

Semester – VII

Session: 2026-2027

1	Course Code	CASE-06T
2	Course Title	Advanced Java
3	Course Type	DSC (Discipline Specific Course)
4	Prerequisite	As per program
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: - Understand the concepts underlying technologies in JAVA. - Work with Swings and multithreading. - Configuring Apache tomcat server. - Understand the concept of JSP. - Understand the concepts underlying client-server communication.
6	Credit Value	3 Credits Credit = 15 Hours - learning & Observation
7	Total Marks	Max. Marks: 75 Min Passing Marks: 32

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Networking: Classes to be covered Socket, ServerSocket, IPAddress, URL connections – Swing controls – JDBC – Writing JDBC applications using select, insert, delete, update.	15
II	SERVLETS: Introduction to Servlets (Life cycle of servlets, Java Servlets Development Kit, creating, Compiling and running servlet). The servlet API: javax. servlet package. Reading the servlet Parameters, Reading Initialization parameter. The javax.servlet.http.	15
III	JAVA SERVER PAGES: Configuring Tomcat JSP/Servlet server. Brief Introduction to J2EE Architecture. Advantage of JSP technology. JSP Architecture, JSP Access Model. JSP Syntax Basic (Directions, Declarations, Expression, Scriptlets, Comments) JSP Implicit Object (Out, HttpServlet Request, Http Servlet Respose, Exception Handling, Session Management.	15
IV	Package Handling HTTP Request and Response (GET/ POST Request), Using Cookies, Session Tracking. Exception Handling. Introduction to EJB – Understanding MVC – Building Controllers, models and views – Integrating hibernate with spring.	15
Keywords	Socket, JDBC, Servlet, Java Server page (JSP), Hibernnet.	

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Deitel&Deitel, "Java How to program", Prentice Hall, 4 th Edition, 2000.
- Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press, 1999.
- Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications", 1998.

Reference Books Recommended:

- Steven Holzner, Java2, Swing, Servlets, JDBC and JAVA Beans Programming Black Book Dreamtech press
- Herbert Schildt, The Complete Reference JAVA, Tata McGraw Hill publication, 5th Edition.
- Gajendra Gupta, Advance JAVA, Firewall Media, 1st Edition, 2006.
- Elliotte Rusty Harold, JAVA network programming, O'Reilly Publication, 3rd Edition.
- Bruce W. Perry, Java Servlet and JSP Cookbook, O'Reilly Publication, 1st Edition.
- Andrew Lee Rubinger and Bill Burke, Enterprise JAVA beans 3.1, O'Reilly Publication, 6th Edition.
- Sue Spielman, The Struts Frameworks: Practical guide for Java Programmers, Murgan Kaufmann publisher.
- Chuck Cavaness, Programming Jakarta Struts, O'Reilly Publication, 1st Edition.
- K.Santosh Kumar, Spring and Hibernate, McGraw Hill Education (India) Pvt. Limited, 2nd edition.
- John Dean, Raymond Dean, Introduction to Programming with JAVA – A Problem Solving Approach, Tata Mc Graw Hill.
- Core and Advanced JAVA (Black Book), Dreamtech Press.
- Justin Edelson, Brett McLaughlin, JAVA and XML: Solutions to real world problem, O'Reilly Publication, 6th Edition.
- Rashmi Kanta Das, Core Java for Beginners, Vikas Publishing House Pvt. Ltd.
- David Flanagan, JAVA in a Nutshell, O'Reilly Publication, 5th Edition.
- Patrik Niemeyer and Jonathan Knudsen, Learning JAVA, O'Reilly Publication, 3rd edition.

Online Resources:

- <https://www.edureka.co/blog/advanced-java-tutorial>
- <https://www.javatpoint.com/what-is-advance-java>
- <https://www.w3schools.in/java>
- <https://www.tutorialspoint.com/java/index.htm>
- <https://www.jigsawacademy.com/blogs/tutorial/advanced-java>
- <https://enos.itcollege.ee/~jpoial/allalaadimised/reading/Advanced-java.pdf>

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PART D: ASSESSMENT AND EVALUATION		
Suggested Continuous Evaluation Methods:		
Maximum Marks:		75 Marks
Continuous Comprehensive Evaluation (CCE):		15 Marks
Semester End Exam (SEE):		60 Marks
Internal Assessment:		Internal Test of 15 Marks each and Assignment of 15 Marks
Continuous Comprehensive Evaluation (CCE)		
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit	
	Question - A & B: (Compulsory) Very short answer type (02 each) 02 x 5 = 10 Marks	
	Question - C: Short answer type question 03 x 5 = 15 Marks	
	Question -D: Long answer type question 07 x 5 = 35 Marks	
	Total = 60 Marks	

Name & Signature of Members of Board of Studies

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF COMPUTER APPLICATION
COURSE CURRICULUM

PART- A: Introduction		
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)		Semester - VII Session: 2026-2027
1	Course Code	CASE-06P
2	Course Title	Lab 13: Advanced Java
3	Course Type	Practical
4	Prerequisite	As per program

5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Understand the concepts underlying technologies in JAVA. • Work with Swings and multithreading. • Configuring Apache tomcat server. • Understand the concept of JSP. • Understand the concepts underlying client-server communication.		
6	Credit Value	1 Credits	<i>Credit =30 Hours Laboratory or Field Learning/Training</i>	
7	Total Marks	Max. Marks: 25	Min Passing Marks: 10	

PART -B: Content of the Course

Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)

Module	Topics (Course contents)	No. of Period
List of Practical Experiments	1. Program to demonstrate Swing components. 2. Program to implement Address Book using Swing components. 3. Program to demonstrate loading of file in an Swing Component. 4. Multithreading program, one of the threads print a....z and other thread print 1...26. 5. Example: 1a2b3c.... 26z. 6. Multithreading program to schedule two jobs. 7. Client Server Socket Programming. 8. Server Socket which receives data from a java client program using JSON 9. Program to fetch a particular Website tags when an URL is specified. 10. Implement stack, queue, hashmap, hashtable, enumeration, ArrayList. 11. Create a table from a java program. 12. Update a table from a java program. 13. Load a table data in Swing components. 14. Delete a record from a table, drop table from a java file. 15. Program which shows use of Statement, Prepared Statement and Callable Statement. 16. Configure Apache Tomcat and write a hello world jsp page. 17. Configure Apache Tomcat server to deploy Servlets. 18. Exceptional handling in a JSP page. 19. Create a login page and authenticate a user in a JSP page using database. 20. Write a program to implement a simple servlet which writes a Welcome HTML page in the web browser. 21. A servlet should receive a parameter from JSP page and process it.	30

22. Servlet program to implement parameter handling.
23. Servlet program to handle GET and POST request.
24. A website hit counter data which has to be saved in a cookie.
25. Implement a Java Beans to set and get values.
26. Program to illustrate the procedure of handling session and print a Hello world using Java Bean.
27. Enterprise Session Beans, deploy, and run a simple Java EE application which does add, subtract, multiply and division using stateless session bean.
28. An application named account using stateful session bean. The purpose of account is to perform transaction operations (deposit and withdraw) for the customer.
29. The account application consists of an enterprise bean, which performs the transactions, and two types of clients: an application client and a web client. How the user to properly close the frame

Keywords

Socket, JDBC, Servlet, Java Server page (JSP), Hibernnet.

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Deitel&Deitel, "Java How to program", Prentice Hall, 4 th Edition, 2000.
- Gary Cornell and Cay S. Horstmann, "Core Java Vol 1 and Vol 2", Sun Microsystems Press, 1999.
- Stephen Asbury, Scott R. Weiner, Wiley, "Developing Java Enterprise Applications", 1998.

Reference Books Recommended:

- Steven Holzner, Java2, Swing, Servlets, JDBC and JAVA Beans Programming Black Book Dreamtech press
- Herbert Schildt, The Complete Reference JAVA, Tata McGraw Hill publication, 5th Edition.
- Gajendra Gupta, Advance JAVA, Firewall Media, 1st Edition, 2006.
- Elliotte Rusty Harold, JAVA network programming, O'Reilly Publication, 3rd Edition.
- Bruce W. Perry, Java Servlet and JSP Cookbook, O'Reilly Publication, 1st Edition.
- Andrew Lee Rubinger and Bill Burke, Enterprise JAVA beans 3.1, O'Reilly Publication, 6th Edition.
- Sue Spielman, The Struts Frameworks: Practical guide for Java Programmers, Murgan Kaufmann publisher.
- Chuck Cavaness, Programming Jakarta Struts, O'Reilly Publication, 1st Edition.

- K.Santosh Kumar, Spring and Hibernate, McGraw Hill Education (India) Pvt. Limited, 2nd edition.
- John Dean, Raymond Dean, Introduction to Programming with JAVA – A Problem Solving Approach, Tata Mc Graw Hill.
- Core and Advanced JAVA (Black Book), Dreamtech Press.
- Justin Edelson, Brett McLaughlin, JAVA and XML: Solutions to real world problem, O'Reilly Publication, 6th Edition.
- Rashmi Kanta Das, Core Java for Beginners, Vikas Publishing House Pvt. Ltd.
- David Flanagan, JAVA in a Nutshell, O'Reilly Publication, 5th Edition.
- Patrik Niemeyer and Jonathan Knudsen, Learning JAVA, O'Reilly Publication, 3rd edition.

Online Resources:

- <https://www.edureka.co/blog/advanced-java-tutorial>
- <https://www.javatpoint.com/what-is-advance-java>
- <https://www.w3schools.in/java>
- <https://www.tutorialspoint.com/java/index.htm>
- <https://www.jigsawacademy.com/blogs/tutorial/advanced-java>
- <https://enos.itcollege.ee/~jpoial/allalaadimised/reading/Advanced-java.pdf>

Name & Signature of Members of Board of Studies

FOUR YEAR UNDERGRADUATE PROGRAM (2024 – 28)
DEPARTMENT OF INFORMATION TECHNOLOGY
COURSE CURRICULUM



PART- A: Introduction

Program: Bachelor in C. A. (Certificate / Diploma / Degree/Honors)		Semester – VII	Session: 2026-2027
1	Course Code	CASE-07	
2	Course Title	Cryptography and Network Security	
3	Course Type	DSE (Discipline Specific Elective)	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Formulate information security governance, and related legal and regulatory issues. • Device how threats to an organization are discovered, analyzed, and dealt with. • Understand a variety of generic security threats and vulnerabilities, and identify and analyze particular security problems for a given application. • Understand various protocols for network security to protect against the threats in a network • Know the fundamentals of network and information security issues, laws, and various security technologies which can be applied in the workplace.	
6	Credit Value	4 Credits	Credit = 15 Hours - Learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) - 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Information Security: Introduction to information security, The need for security, CIA triad (Confidentiality, integrity, and availability), Principles of Security, Types of Attacks, Cryptographic Techniques: Plain Text and Cipher Text, Substitution Techniques, Transposition Techniques, Encryption and Decryption, Steganography, Key Range and Key Size, Possible Types of Attacks.	15
II	Computer-based Symmetric Key Cryptographic Algorithms: Algorithm Types and Modes, An overview of Symmetric Key Cryptography, DES, International Data Encryption Algorithm (IDEA), RC5, Blowfish, AES, Differential and Linear Cryptanalysis.	15
III	Computer-based Asymmetric Key Cryptography: Brief History of Asymmetric Key Cryptography, An overview of Asymmetric Key Cryptography, The RSA algorithm, Symmetric and Asymmetric Key Cryptography Together, Digital Signatures, Knapsack Algorithm.	15
IV	Network Security Protocols and Different Security: Secure Socket Layer (SSL) and	15

	Transport Layer Security (TLS), PCT, IPsec and Virtual Private Networks (VPNs), Secure Shell (SSH) and Secure File Transfer Protocol (SFTP), Different Security: Web Security, Email Security, Cloud Security, Social Media Security, Smartphone Security.	
Keywords	<i>Information Security, Network Security, public Key, Private key, Network Security Protocols.</i>	
Na		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Cryptography and Network Security: Principles and Practice 5th Edition, William Stallings, Pearson, 2010
- "Network Security: Private Communication in a Public World" by Charlie Kaufman, Radia Perlman, and Mike Speciner.
- "Principles of Computer Security: CompTIA Security+ and Beyond" by Wm. Arthur Conklin, Greg White, Dwayne Williams, Chuck Cothren, and Roger L. Davis.
- Cryptography and Network Security – by Atul Kahate – TMH.

Reference Books Recommended:

- Cryptography and Network security, Behrouz A. Forouzan, Debdeep Mukhopadhyay, McGraw Hill Education, 2nd Edition, 2011
- Cryptography and Network Security, Atul Kahate, Tata McGraw-Hill, 2013. 2)
- Cryptography and Network, Behrouz A. Fourouzan, Debdeep Mukhopadhyay, 2nd Edition, TMH, 2011
- Cyber Security Operations Handbook – by J.W. Rittiaghous and William M. Hancock – Elseviers.

Online Resources:

- *Network Defense Essentials*: <https://www.eccouncil.org/academia/network-defense-essentials-nde/>
- Cyber Security for Beginners: https://heimdalsecurity.com/pdf/cyber_security_for_beginners_ebook.pdf
- Cyber Awareness: https://mdu.ac.in/UpFiles/UpPdfFiles/2021/Jun/4_06-13-2021_15-34-38_e-BOOK%20Cyber%20Security%20Awareness%20Hand%20Book%2010%20june%202021.pdf
- Cyber Security Operations Handbook – by J.W. Rittiaghous and William M. Hancock – Elseviers, <https://shop.elsevier.com/books/cybersecurity-operations-handbook/rittinghouse-phd-cism/978-1-55558-306-4>
- Types of internet security protocols: <https://www.geeksforgeeks.org/types-of-internet-security-protocols/>
- Fundamental of Cyber Security by Dr. Jitendra Pandey: <http://www.uou.ac.in/sites/default/files/slm/FCS.pdf>

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PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks each and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks

FOUR YEAR UNDERGRADUATE PROGRAM (2025 – 26)
Department of Computer Science
Course Curriculum



PART- A: Introduction						
Program: Bachelor in C. A. (Certificate / Diploma / Degree/Honors)			Semester – VIII		Session: 2025-2026	
1	Course Code	CASE-08				
2	Course Title	Advanced Operating Systems				
3	Course Type	DSE (Discipline Specific Elective) 3				
4	Prerequisite	As per program				
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Knowledge about advanced concepts in OS. • Ability to develop OS for distributed systems. • Understand process synchronisation and concurrency control. • Understand the architecture and functioning of mobile operating system. • Ability to develop modules for mobile devices.				
6	Credit Value	4 Credits	Credit = 60 Hours - Learning & Observation			
7	Total Marks	Max. Marks:	100	Min Passing Marks:	40	
PART -B: Content of the Course						
Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)						
Unit	Topics (Course contents)				No. of Period	
I	Multiprocessor Operating Systems: System Architectures, Structures of OS, OS design issues, Process synchronization, Process Scheduling and Allocation, memory management.				15	
II	Distributed Operating Systems: System Architectures, Design issues, Communication models, clock synchronization, mutual exclusion, election algorithms, Distributed Deadlock detection, Distributed scheduling, Distributed shared memory, Distributed File system, Multimedia file systems, File placement, Caching.				15	
III	Database Operating Systems: Requirements of Database OS, Transaction process model, Synchronization primitives, Concurrency control algorithms.				15	
IV	Mobile Operating Systems: ARM and Intel architectures, Power Management, Mobile OS Architectures, Underlying OS, Kernel structure and native level programming, Runtime issues, Approaches to power management.				15	
Keywords	Multiprocessor operating system, Distributed operating system, Database operating System, Mobile Operating system.					

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Mukesh Singhal, Niranjana Shivaratri, "Advanced Concepts in Operating Systems", TMH, 2001 □
- William Stallings, "Operating Systems – Operating System: Internals and Design Principles", Prentice Hall, 2005.

Reference Books Recommended:

- Andrew S. Tanenbaum, "Distributed Operating Systems", Pearson Education, 1995.
- Abraham Silberschatz, Peter Baer Galvin, Greg Gagne, "Operating System Principles", John Wiley & Sons Inc., 2006.

Online Resources:

- Advanced Concepts in Operating Systems:

https://books.google.co.in/books/about/Advanced_Concepts_in_Operating_Systems.html?id=ajx9NAEACAAJ&redir_esc=y

- Distributed Operating System: <https://www.javatpoint.com/distributed-operating-system>
- Mobile Operating System <https://www.sciencedirect.com/topics/computer-science/mobile-operating-system> https://baou.edu.in/assets/pdf/PGDMAD_101_slm.pdf □ Database operating System:

- [https://www.redswitches.com/blog/database-operatingsystem/#:~:text=A%20Database%20Operating%20System%20\(DBOS,storage%2C%20retrieval%2C%20and%20manipulation.](https://www.redswitches.com/blog/database-operatingsystem/#:~:text=A%20Database%20Operating%20System%20(DBOS,storage%2C%20retrieval%2C%20and%20manipulation.)

<https://www.ibm.com/docs/en/psfa/7.2.1?topic=logs-database-operating-system> <https://eecs.berkeley.edu/230426-2/>

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PART D: ASSESSMENT AND EVALUATION	
Suggested Continuous Evaluation Methods:	
Maximum Marks:	100 Marks
Continuous Comprehensive Evaluation (CCE):	20 Marks
Semester End Exam (SEE):	80 Marks
Internal Assessment:	Internal Test of 20 Marks each and Assignment of 20 Marks
Continuous Comprehensive Evaluation (CCE)	
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 04 x 5 = 20 Marks Question - C: Short answer type question 05 x 5 = 25 Marks Question -D: Long answer type question 07 x 5 = 35 Marks Total = 80 Marks

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Course Structure for CBCS BCA- VIII Semester

Course Code	Course Type	Course Name	Theory Marks		Internal Marks		Practical Marks		Total Marks		Teaching Load per Week			Credits
											L	T	P	
			Max. (A)	Min. (B)	Max. (C)	Min. (D)	Max. (E)	Min. (F)	Max	Min				
CASC-20 T	DSC	Machine Learning	60	24	15	6			75	30	3	1		3
CASC-20 P		Lab: Machine Learning					25	10	25	10			1x2	1
CASE-09	DSE1	Soft Computing	80	32	20	08			100	40	3	1		4
CASE-10	DSE2	Digital Image Processing	80	32	20	08			100	40	3	1		4
CASE-11	DSE3	Big Data Analytics	80	32	20	08			100	40	3	1		4
CASE-12	DSE4	Major Project-2					100	40	100	40			4x2	4
		TOTAL							500	200				20

The syllabus for BCA is hereby approved for the session 2025-26.





FOUR YEAR UNDERGRADUATE PROGRAM (2025 – 26)
DEPARTMENT OF COMPUTER APPLICATION
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)		Semester – VIII	Session: 2025-26
1	Course Code	CASC-20T	
2	Course Title	Machine Learning	
3	Course Type	DSC (Discipline Specific Course)	
4	Prerequisite	As per Program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Gain a deep understanding of advanced AI and machine learning principles. • Acquire skills for conducting a thorough literature review and formulating research problems. • Learn to design and implement advanced AI and machine learning algorithms. • Can understand and design generative AI techniques. • Can apply AI and machine learning techniques to solve real-world problems.	
6	Credit Value	3 Credits	Credit = 45 Hours - Learning & Observation
7	Total Marks	Max. Marks: 60	Min Passing Marks: 24
PART -B: Content of the Course			
Total No. of Teaching–Learning Periods (01 Hr. per period) - 45 Periods (45 Hours)			
Unit	Topics (Course contents)		No. of Period
I	Introduction: Concept of Machine Learning, Applications of Machine Learning, Key elements of Machine Learning, Supervised vs. Unsupervised Learning, "I'traditional programming Vs. Machine learning Statistical Learning: Bayesian Method, The Naive Bayes Classifier.		10
II	Linear Regression: Prediction using Linear Regression, Gradient Descent, Linear Regression with one variable, Linear Regression with multiple variables, Polynom ial Regression, Feature Selection and Feature Extraction. Logistic Regression: Classification using Logistic Regression, Logistic Regression vs. Linear Regression, Logistic Regression with one variable and with multiple variables.		11
III	Regularization: Regularization and its utility: The problem of Over fitting, Application of Regularization in Linear and Logistic Regression, Regularization and Bias/Variance. Neural Networks: Introduction, Model Representation, Gradient Descentvs. Perceptron11 Training, Stochastic Gradient Descent, Multilayer Perceptrons, Multiclass Representation, Back propagation Algorithms.		11

IV	Deep Learning: Introduction basics, various architectures of Deep learning: CNN, LSTM, Generative AI. Machine learning tools: Introduction of MATLAB, WEKA as machine learning tools, Using GUI of MATLAB and WEKA to develop Machine learning based models. Write programs to Implement machine learning models.
Keywords	List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.
Name & Signature of Members of Board of Studies:	

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Machine learning, Anuradha Srinivasaraghavan, Viney Joseph, Wiley publication, India, 2019 edition.
- Introduction to Machine Learning with python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly.

Reference Books Recommended:

- Understanding machine learning: From theory to algorithms, shai shalev-shwartz, shai ben-david, Cambridge University press.
- Machine learning with python, Abhishek Vijayvargia, BPB publication.
- Machine learning using python, U Dinesh Kumar, Manaranjan Pradhan, Wiley publication.
- Deep learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, Adaptive computation and machine learning series.
- Machine learning, Tom M. Mitchell, McGraw Hill, Indian Edition.

Online Resources:

- Overview of Machine Learning:
<https://www.youtube.com/watch?v=whSKA8a06xQ&list=PLygSpQzTE6M-SlSTunGRBRiZk7opYBfK&index=3>
- Introduction to Artificial Intelligence:
<https://www.youtube.com/watch?v=12KeVMlkFgRc&list=PLwdnzlV3ogoXaceHrrFVZCJkb111laSHcH&index=1>
- Deep Learning specialization:
<https://www.coursera.org/specializations/dee12-learning>
- Learning Material for Artificial Intelligence and Machine Learning
<https://onlinecourses.n12tel.ac.in/noc24ce107/greview>
- Learning Material for Machine Learning using Python

- <https://www.coursera.org/specializations/machine-learning-introduction>

Learning Material for Artificial Intelligence

<https://www.coursera.org/learn/ai-for-everyone>

- Learning Material for Machine Learning

- <https://coursera.org/specializations/machine-learning-introduction>

Learning Material for deep Learning

<https://coursera.org/specializations/deep-learning>

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Comprehensive Evaluation (CCE): 15 Marks

Semester End Exam (SEE): 60 Marks

Internal Assessment:

Continuous Comprehensive Evaluation (CCE)

Internal Test of 15 Marks each and
Assignment of 15 Marks

Semester End Exam (SEE)

Pattern -FOUR Questions (A, B, C, D) from each Unit

Question - A & B: (Compulsory) Very short answer type (02 each) 02 x 5 = 10 Marks

Question - C: Short answer type question 04 x 5 = 20 Marks

Question -D: Long answer type question 06 x 5 = 30 Marks

Total = 60 Marks

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FOUR YEAR UNDERGRADUATE PROGRAM (2025– 26)
DEPARTMENT OF COMPUTER APPLICATION
COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)		Semester – VIII	Session: 2025-26
1	Course Code	CASC-20P	
2	Course Title	Lab - Machine Learning	
3	Course Type	Practical	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: ● Define the structure and components of a Python program. ● Demonstrate proficiency in handling of loops and creation of functions. Identify the methods to create and manipulate lists, tuples and dictionaries. ● Discover the commonly used operations involving regular expressions and file system. ● Determine the need for scraping websites and working with CSV, JSON and other file formats. ● Interpret the concepts of Object-Oriented Programming as used in Python.	
6	Credit Value	1 Credits	Credit =15 Hours Laboratory or Field Learning/Training
7	Total Marks	Max. Marks: 25	Min Passing Marks: 10
PART -B: Content of the Course			
Total No. of learning-Training/performance Periods: 30 Periods (30 Hours)			
Module	Topics (Course contents)	No. of Period	
List of Practical Experiments	Topics (Course contents) 1. Use command to compute the size of a matrix, size/length of a particular row/column, load data from a text file, store matrix data to a text file, finding out variables and their features in the current scope. 2. Perform basic operations on matrices (like addition, subtraction, multiplication) and 3. Display specific rows or columns of the matrix. 4. Perform other matrix operations like converting matrix data to absolute values, taking the negative of matrix values, adding/removing rows/columns from a matrix, finding the maximum or minimum values in a matrix or in a row/column, and finding the sum of some/all elements in a matrix. 5. Create various type of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix. Further label different axes in a plot and data in a plot. 6. Generate different subplots from a given plot and color plot data. 7. Use conditional statements and different type of loops based on simple example/s. I	15	





	8. Perform vectorized implementation of simple matrix operation like finding the transpose of a matrix, adding, subtracting or multiplying two matrices. 9. Implement Linear Regression problem. For example, based on a dataset comprising of existing set of prices and area/size of the houses, predict the estimated price of a given house. 10. Based on multiple features/variables perform Linear Regression. For example, based on a number of additional features like number of bedrooms, servant room, number of balconies, number of houses of years a house has been built - predict the price of a house. 11. Implement a classification/ logistic regression problem. For example based on different features of students data, classify, whether a student is suitable for a particular activity. Based on the available dataset, a student can also implement another classification problem like checking whether an email is spam or not. 12. Use some function for neural networks, like Stochastic Gradient Descent or back propagation - algorithm to predict the value of a variable based on the dataset of problem. Note: List of experiments may be changed by the concerned teacher.	
Keywords	<i>List, Tuple, Dictionary, Panda, Numpy, TensorFlow, Scikit-Learn, Keras, PyTorch, SciPy.</i>	
Name & Signature of Members of Board of Studies:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

Machine learning, Anuradha Srinivasaraghavan, Vincy Joseph, Wiley publication, India, 2019 edition.
 Introduction to Machine Learning with python A guide for data scientists, Andreas, C. Muller & Sarah Guido, O'Reilly.

Reference Books Recommended:

Understanding machine learning: From theory to algorithms, Shai shalev-shwartz, Shai ben-david, Cambridge University press.
 Machine learning with python, Abhishek Vijayvargia, BPB publication.
 Machine learning using python, U Dinesh Kumar, Manaranjan Pradhan, Wiley publication.
 Deep learning, Ian Goodfellow, Yoshua Bengio, Aaron Courville, Adaptive computation and machine learning series.

Machine learning, Tom M. Mitchell, McGraw Hill, Indian Edition.

Online Resources

Overview of Machine Learning:

- <https://www.youtube.com/watch?v=whSKA8a06xQ&list=PLyGSpQzTE6M-SLSTunGRBRiZk7opYBfK&index=3>
- <http://www.jnit.org/wp-content/uploads/2020/04/Machine-Learning-Lab-Manual.pdf>
- <https://nthu-datalab.github.io/ml/>
- <https://www.deeplearning.ai/courses/>,
- [https://www.jncc.org/labmanuals/csc/tc/scm I /Machine%20Learningcy:20LAB%20MANUAL01, ! 20\(I \).pdf](https://www.jncc.org/labmanuals/csc/tc/scm I /Machine%20Learningcy:20LAB%20MANUAL01, ! 20(I).pdf)

- <https://c\eeepakclvallur.weebly.com/nrnchine-learning-laboralorv.html>

PART D: ASSESSMENT AND EVALUATION

Suggested Continuous Evaluation Methods:

Maximum Marks: 75 Marks

Continuous Comprehensive Evaluation (CCE): 15 Marks

Semester End Exam (SEE): 60 Marks

Internal Assessment: Continuous Comprehensive Evaluation (CCE)	Internal Test of 15 Marks each and Assignment of 15 Marks
Semester End Exam (SEE)	Pattern -FOUR Questions (A, B, C, D) from each Unit Question - A & B: (Compulsory) Very short answer type (02 each) 02 x 5 = 10 Marks Question - C: Short answer type question 04 x 5 = 20 Marks Question -D: Long answer type question 06 x 5 = 30 Marks Total = 60 Marks

Name & Signature of Members of Board of Studies





FOUR YEAR UNDERGRADUATE PROGRAM (2025 – 26)

DEPARTMENT OF COMPUTER APPLICATION COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)			Semester – VIII	Session: 2025-2026
1	Course Code	CASE-09		
2	Course Title	Soft Computing		
3	Course Type	DSE (Discipline Specific Elective)		
4	Prerequisite	As per program		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: - Analyze and appreciate the applications which can use fuzzy logic. - Understand the difference between learning and programming and explore practical applications of Neural Networks (NN). - Students would understand the efficiency of a hybrid system and how Neural Network and fuzzy logic can be hybridized to form a Neuro-fuzzy network and its various applications - Ability to appreciate the importance of optimizations and its use in computer engineering fields and other domains.		
6	Credit Value	4 Credits	Credit = 15 Hours - Learning & Observation	
7	Total Marks	Max. Marks: 80	Min Passing Marks: 32	
PART -B: Content of the Course				
Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)				
Unit	Topics (Course contents)			No. of Period
I	Introduction: Soft computing, Different tools of soft computing: Fuzzy logic, Artificial Neural Network, Genetic Algorithm), Area of application. Fuzzy Logic: Introduction to Classical Sets and Fuzzy Sets, Membership Function, properties and operations of classical set and Fuzzy set, α -cuts, Properties of α -cuts, Linguistic Variables, Membership function, Classical relation and Fuzzy Relation and its properties and operations, Defuzzification and its methods, Fuzzy rule base.			15
II	Artificial Neural Network(ANN): Architecture, Introduction, Evolution of Neural Network, Biological Neural Network Vs ANN, Basic Model of ANN, Different types of ANN, Single layer Perceptron, Solving XOR problem, Activation function, Linear severability, Supervised and unsupervised learning, perceptron learning, delta learning, Feed-forward and Feedback networks, Error Back Propagation Network (EBPN), Associative memories and its types, Hopefield Network, Kohenenself-organizing Map.			15
III	Genetic Algorithm: What is Optimization?, Introduction, Application, GA operators: selection, crossover and mutation, different techniques of selection, crossover and mutation, different types of chromosomes, Application of GA.			15
IV	Hybrid soft commuting: Design of Neuro-Fuzzy model like ANFIS, Neuro-Genetic, Fuzzy-Genetic Neuro-Fuzzy-Genetic model.			15

Keywords Soft Computing, Fuzzy Logic, ANN, Genetic Algorithm.

Name and Signature of Convener & Members:

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Principles of soft computing, S.N. Shivanandan and S.N. Deepa , Wiley publication, Wiley India Edition.
- Neural network and Learning Machines, Simon Haykin, Pearson Education, 2011.
- Artificial Neural Networks, Robert J. Scholkoff, McGraw Hill Education (India) Pvt. Limited, 1997.
- Fuzzy Sets, Uncertainty and Information, G. J. Klir and T.A. Folger, PHI learning private limited. Publisher– Pearson 3Edition 1999

Reference Books Recommended:

- Neural Networks and Fuzzy Systems, A dynamical Systems Approach to Machine Learning, Bart Kosko, PHI learning private limited.
- Neural Networks, Fuzzy Logic and Genetic Algorithm: Synthesis and Applications, S. Rakasekaran, G.A. VijayalakshmiPai, PHI learning private limited, 14th Edition. 2003.
- Neural Networks and Fuzzy Logic, K. Vinoth Kumar, R. Saravana Kumar, S. K. Kataraiya and Sons publication.
- Artificial Neural Networks, B.Yegnanarayana Prentice Hall of India (P) Limited.
- Introduction to Artificial Neural Systems, Jacek M. Zurada, Jaico Publication House.

Online Resources:

- Introduction to Soft computing: [What is soft computing - Javatpoint](#)
- Need for Soft Computing: [Need for Soft Computing - GeeksforGeeks](#)
- Introduction To Soft Computing: [Introduction To Soft Computing - Course \(nptel.ac.in\)](#)

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 & 20 Assignment / Seminar Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
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End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-5x10=50 Marks
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Name and Signature of Convener & Members :

FOUR YEAR UNDERGRADUATE PROGRAM (2025 – 26)

DEPARTMENT OF COMPUTER APPLICATION COURSE CURRICULUM

PART- A: Introduction

Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)		Semester – VIII	Session: 2025-26
1	Course Code	CASE-10	
2	Course Title	Digital Image Processing	
3	Course Type	DSE (Discipline Specific Elective)	
4	Prerequisite (if, any)	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Learn and understand the digital image processing. • Learn and understand various image transform used in digital image processing. • Learn and understand various image enhancement technique used in digital image processing. • Learn and understand various image restoration technique and methods used in digital image processing. • Learn and understand various image compression and Segmentation used in digital image processing.	
6	Credit Value	4 Credits	Credit = 15 Hours - Learning & Observation
7	Total Marks	Max. Marks: 80	Min Passing Marks: 32

PART -B: Content of the Course

Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)

Unit	Topics (Course contents)	No. of Period
I	Introduction to digital image processing, Elements of Digital Image Processing system, Visual perception and properties of human eye, Image representation, A simple image model, Some basic relationship between pixels, Image geometry.	15
II	Introduction to Fourier Transform, DFT & FFT, Properties of 2D Fourier Transform, Separable Image Transforms –Walsh, Hadamard Transform, Discrete Cosine Transform, Haar Transform	15
III	Image Enhancement - Histogram Modeling, Equalization and modification, Image smoothing, Image sharpening, Spatial Filtering, Homomorphic filtering for image enhancement, Model of Image Degradation/Restoration process, Inverse filtering, Least Mean Square (Wiener) filtering, Constrained least mean square restoration, Singular value decomposition, Recursive filtering.	15
IV	Image compression models, Lossless compression: Variable length coding, LZW coding, Lossy Compression: Transform coding, Wavelet coding, Image Segmentation:	15





	Detection of discontinuities, Edge linking and boundary detection, Thresholding-Region oriented segmentation and Texture.	
Keywords	<i>Digital Image, Image Transform, Image Enhancement, Image compression.</i>	
<i>Name and Signature of Convener & Members:</i>		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Rafael C Gonzalez, Richard E Woods, "Digital Image Processing" - 2nd Edition, Pearson Education 2003
- Jain A.K., "Fundamentals of Digital Image Processing", Pearson education.

Reference Books Recommended:

- William K Pratt, "Digital Image Processing", John Willey 2001
- Millman Sonka, Vaclav Hlavac, Roger Boyle, Broos/Colic, "Image Processing Analysis and Machine Vision" - Thompson Learning, 1999.
- Chanda S., Dutta Majumdar - "Digital Image Processing and Applications", Prentice Hall of India, 2000.

Online Resources:

- Digital Image Processing Basics: <https://www.geeksforgeeks.org/digital-image-processing-basics/>
- Digital Image Processing: <https://www.javatpoint.com/digital-image-processing-tutorial>
- Digital Image Processing: <https://www.tutorialspoint.com/dip/index.htm>
- Digital Image Processing: <https://in.mathworks.com/discovery/digital-image-processing.html>
- NPTEL: https://onlinecourses.nptel.ac.in/noc19_ee55/preview

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 Assignment / Seminar - Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts.,1 out of 2 from each unit-5x10=50 Marks	

Name and Signature of Convener & Members:

FOUR YEAR UNDERGRADUATE PROGRAM (2025 – 26)
DEPARTMENT OF COMPUTER APPLICATION
COURSE CURRICULUM

PART- A: Introduction				
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)			Semester – VIII	Session: 2025-26
1	Course Code	CASE-11		
2	Course Title	Big Data Analytics		
3	Course Type	DSE (Discipline Specific Elective)		
4	Prerequisite	As per Program		
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Explore the fundamental concepts of data analytics • Recognize and conduct statistical inference to solve engineering problems. • Appreciate the science of statistics and the scope of its potential applications • Summarize and present data in meaningful ways • Select the appropriate statistical analysis depending on the research question at hand • Form testable hypotheses that can be evaluated using common statistical analyses.		
6	Credit Value	4 Credits	Credit = 15 Hours - learning & Observation	
7	Total Marks	Max. Marks: 80	Min Passing Marks: 20	
PART -B: Content of the Course				
Total No. of Teaching–Learning Periods (01 Hr. per period) – 60 Periods (60 Hours)				
Unit	Topics (Course contents)			No. of Period
I	Introduction to Data Analytics: Evolution of Data Analytics, Data Analytics Overview, Types of Data Analytics –Descriptive Analytics -Diagnostic Analytics -Predictive Analytics - Prescriptive Analytics, Importance and Benefits of Data Analytics. Different Applications of Analytics in Business, Text Analytics and Web Analytics, Skills for Business Analytics			15
II	Probability and Statistical Methods: Sample Space, Types of Events, Measures of probability, conditional probability, Bayes’ theorem, Random variable, Probability Distributions- Binomial, Poisson and Normal, Sampling Distributions, Estimation and Hypothesis Testing- t-test, Analysis of variance (ANOVA) and Chi-square test, Correlation Analysis-Simple Correlation coefficient, Interpretation, Scatter plot. Linear Regression-Simple and Multiple, Polynomial Regression, Logistic Regression- with one variable and with multiple variables, Logistic Regression vs. Linear Regression.			15
III	Data Visualization: Introduction to data visualization, Visualization foundations, Introduction to Power BI, Power BI – Advantages and Scalable Options, Power BI Architecture and Data Access, Visualization Techniques for Spatial Data, Geospatial Data, Time-Oriented Data,			15





	Multivariate Data, Trees, Graphs, and Networks, Text and Document Visualization, Power Query & M Language.	
IV	Case Study: Importance and types of case studies: case study of Amazon, Twitter, Netflix, Uber, COVID- 19: for understanding business scenarios and how they applied the analytics to improve their decision making, cost reduction, logistics planning and other benefits.	15
Keywords	Data Analytics, Probability, Statistical Method, Data Visualization.	
Name and Signature of Convener & Members:		

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Kumar, U.D.: Business Analytics – The Science of Data – Driven Decision Making, Wiley.
- Dr Anil Maheshwari, Data Analytics Made Accessible, Publisher: Amazon.com Services LLC.
- Johnson, R.A., Miller, I. and Freund, Probability and Statistics for Engineers, Pearson.

Reference Books Recommended:

- Gert, H.N., Thorlund, L. and Thorlund, J: Business Analytics for Managers – Taking Business Intelligence Beyond Reporting, Wiley.
- Dr. Gaurav Aroraa, Chitra Lele, Dr. Munish Jindal, Data Analytics: Principles, Tools, and Practices: A Complete Guide for Advanced Data Analytics Using the Latest Trends, Tools, and Technologies

Online Resources:

- Data Analysis Tutorial:
<https://www.geeksforgeeks.org/data-analysis-tutorial/>
- Data Analysis – Overview:
https://www.tutorialspoint.com/excel_data_analysis/data_analysis_overview.htm
- An Introduction to Data Analytics:
<https://careerfoundry.com/en/tutorials/data-analytics-for-beginners/introduction-to-data-analytics>
- Data Analytics Tutorial for Beginners:
<https://data-flair.training/blogs/data-analytics-tutorial/>

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

Continuous Internal Assessment (CIA): 20 Marks

End Semester Exam (ESE): 80 Marks

Continuous Internal Assessment (CIA): (By Course Teacher)	Internal Test / Quiz-(2): 20 & 20 Assignment / Seminar - Total Marks - 20	Better marks out of the two Test / Quiz + obtained marks in Assignment shall be considered against 20 Marks
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End Semester Exam (ESE):	Two section – A & B Section A: Q1. Objective – 10 x1= 10 Mark; Q2. Short answer type- 5x4 =20 Marks Section B: Descriptive answer type qts., 1 out of 2 from each unit-5x10=40 Marks
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FOUR YEAR UNDERGRADUATE PROGRAM (2025 – 26)

DEPARTMENT OF COMPUTER APPLICATION

COURSE CURRICULUM

PART- A: Introduction			
Program: Bachelor in Computer Application (Certificate / Diploma / Degree/Honors)		Semester - VIII	Session: 2025-26
1	Course Code	CASC-12	
2	Course Title	Major Project-2	
3	Course Type	DSE (Discipline Specific Elective)	
4	Prerequisite	As per program	
5	Course Learning Outcomes (CLO)	At the end of this course, the students will be able to: • Enhance knowledge on latest techniques. • Make ready for IT industry. • Upgrade skill knowledge.	
6	Credit Value	4 Credits	Credit = 15 Hours - Learning & Observation
7	Total Marks	Max. Marks: 100	Min Passing Marks: 40
PART -B: Content of the Course			
Total No. of Teaching–Learning hours - 60 Hours			
	Important Guidelines for Project		No. of Period
	A project report has to be submitted as per the rules described below: 1. Number of Copies: The student should submit One hard bound copy of the Project Report with one CD/DVD. 2. No of students: Every student has to submit separate project. 3. Acceptance / Rejection of Project Report: The student must submit a project report to the Head of Department/Project Guide for approval. The Head of Department/Project Guide holds the right to accept the project or suggest modifications for re-submission. 4. Format of the Project Report : The student must adhere strictly to the following De format for the submission of the Project Report I. Paper: The report shall be typed on white paper, A4 size or continuous computer stationary bond, for the final submission. The report to be submitted to the University must be original and subsequent copies may be photocopied on any paper I II. Typing: The typing shall be of standard letter size, double-spaced and on one side of the paper only, using black ribbons and black carbons III. Margins: The typing must be done in the following margins Left -----35mm, Right ----- 20mm Top ----- 35mm, Bottom ----- 20mm IV. Binding: The Report shall be Rexene bound in black. Plastic, spiral bound Project Reports not be accepted,		60





V. Front Cover: The front cover should contain the following details

TOP: The title in block capitals of 6mm to 15mm letters

CENTER: Full name in block capitals of 6mm to 10mm letters

BOTTOM: Name of the University, year of submission- all in block capitals of 6mm to 10mm letters on separate lines with proper spacing and centering,

VI. Blank Sheets: At the beginning and end of the report, two white blank bound papers should be provided, one for the purpose of binding and other to be left blank

5. Abstract: Every report should have an abstract following the Institute's Certificate. The abstract shall guide the reader by highlighting the important material contained in the individual chapters, section, subsection etc

6. Certificates etc: The report should contain the following

I. Institute Certificate: Successful completion of project by competent authority

II. Acknowledgment

III. List of Figures

IV. Tables

V. Nomenclature and Abbreviations

7. Contents of the Project Report: The project report must contain following in form of chapter, however student may include any other relevant chapter(s)

I. **Introduction to the project:** This chapter shall highlight the purpose of project work, it will also define the chapters to be followed in the Project Report.

II. **Scope of work:** Brief scope of the project work done

III. **Existing System and Need for proposed System:** If there is some system already in use, then give brief detail of it in order to help to understand the enhancements carried out by the student in the existing system

IV. **Operating Environment:** Hardware and Software required and used.

V. **Proposed System:** Which may contain following:

a. Objectives to be fulfilled: clearly define the objective(s) of the system
b. User Requirements: State the requirements of the use in an unambiguous manner.

c. Requirements Determination Techniques and Systems Analysis Methods Employed: Use the formal methods to describe the requirements of the use like Fact Finding Methods, Decision Analysis, and Data Flow Analysis etc

d. Prototyping: If the prototypes has been developed prior to the detailed design, then give details of the prototype.

e. System Feature: Which includes as follows:

Module specifications

- D.F.D. and ER

- System flow charts

- Data Dictionary

- Structure charts

- Database /File layouts

- Design of Input Design of Output screens and reports

- User Interfaces

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◦ Design of Control Procedures 8. Testing procedures and Implementation phase 9. Problems encountered, Drawbacks and Limitations 10. Proposed Enhancements/ Future enhancement 11. Conclusions 12. Bibliography 13. Annexure	
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Name and Signature of Convener & Members:

PART-C: Learning Resources

Text Books, Reference Books and Others

Text Books Recommended:

- Database system concept, H. Korth and A. Silberschatz, TMH Publications.
- Data Base Management System, Alexies & Mathews, Vikash publication.
- Roger S. Pressman, Software Engineering, A practitioner's Approach, 6th edition, McGraw Hill International Edition.

Reference Books Recommended:

- The Complete Reference, Kevin Loney, Oracle Press.
- SQL, PL/SQL the Programming Language of Oracle, Ivan Bayross, PustakKosh Publication.
- Microsoft SQL Server Management and Administration, Ross, STM Publications.
- James Rumbaugh, Ivar Jacobson, The unified modelling language user guide Grady Booch, Pearson Education.

Online Resources:

- SWAYAM URL link for DBMS and RDBMS: <https://youtu.be/f6LGtJutWyA>
- SWAYAM URL link for DBMS and RDBMS: <https://swayam.gov.in/courses/4434-data-base-management-system>
- Introduction of RDBMS from SWAYAM : https://onlinecourses.nptel.ac.in/noc19_cs46/preview
- Introduction to DMBS: <https://www.w3schools.in/dbms/intro>
- NPTEL YouTube Channel: Software Engineering Lectures by Prof Rajib Mall, IIT Kharagpur
<https://youtube.com/playlist?list=PLbRMhDVUMngf8oZR3DpKMvYhZKga90JVt&si=tTBITZUdivHpNz1H>
- NPTEL YouTube Channel: Software Engineering Lecture Series
https://youtube.com/playlist?list=PL8751DA481F0F0D17&si=07IfYV7GP8_oc1xZ

PART -D: Assessment and Evaluation

Suggested Continuous Evaluation Methods:

Maximum Marks: 100 Marks

End Semester Exam (ESE): 100 Marks

Name and Signature of Convener & Members:

