Re-Accredited B++ 2.86 CGPA by NAAC
VEER NARMAD SOUTH GUJARAT UNIVERSITY
University Campus, Udhna-Magdalla Road, SURAT - 395 007, Gujarat, India.
વીર નર્મદ દક્ષિણ ગુજરાત યુનિવર્સિટી
યુનિવર્સિટી કેમ્પસ, ઉધના-મગદલ્લા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.
Tel +91 - 261 - 2227141 to 2227146. Toll Free : 1800 2333 011. Digital Helpline No - 0261 2388888
E-mail : info@vnsgu.ac.in, Website : www.vnsgu.ac.in

–: પરિપત્ર :–

યુનિવર્સિટી સંલગ્ન તમામ B.Voc. IT ચલાવતી કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૬–૨૭ થી અમલમાં આવનાર B.Voc. (IT) (Honours) Sem.-7 & 8 નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિના ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી મંજૂર કરી કોમ્પ્યુટર સાયન્સ ફેકલ્ટીને કરેલ ભલામણ કોમ્પ્યુટર સાયન્સ ફેકલ્ટીની તા.૨૯/૦૪/૨૦૨૬ની સભાના ઠરાવ ક્રમાંકઃ૧૬ થી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણને એકેડેમિક કાઉન્સિલની તા.૦૭/૦૫/૨૦૨૬ની સભાનાં ઠરાવ ક્રમાંકઃપ૭ થી મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંકઃઓથો./પરિપત્ર/સિલેબસ/૧૦૦૪૬/૨૦૨૬
તા.૧૨–૦૫–૨૦૨૬

કુલસચિવ ઇન્ચા

પ્રતિ,
૧) યુનિવર્સિટી સંલગ્ન B.Voc. IT ચલાવતી કોલેજોનાં આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકોને જાણ કરી અમલ કરવા સારૂ.
૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા.
૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.
.....તરફ જાણ તેમજ અમલ સારૂ.

Veer Narmad South Gujarat University, Surat

Computer Science and Information Technology Faculty

Syllabus for (Semester-VII and Semester-VIII) of B.Voc.(Information Technology) (Honours)

As per NEP- 2020

To be implemented from Academic Year: June, 2026-2027

(Including Winter Session)

Veer Narmad South Gujarat University, Surat
Bachelor of Vocation in Information Technology
(B.Voc. (IT) (Honours)) Under the Faculty of
Computer Science and Information Technology

Name of Program:	Bachelor of Vocation in Information Technology (Honours)
Abbreviation:	B.Voc.(IT) (Honours): Four-year Integrated Program with Multi-Level Entry and Exit option
Multi-level Exit Criteria:	i) Under Graduate Certificate in Information Technology: If the student wishes to exit after completion of First year (Semester-1 and Semeter-2) without any back- log and secure additional 4 credits from work based skill oriented university approved courses /vocational courses / summer internship / Apprenticeship in addition to 6 credits from skill-based courses earned during first and second semester. ii) Advance Diploma in Information Technology: If the student wishes to exit after completion of Second year (Semester-1 to Semeter-4) without any back-log and secure additional 4 credits from work based skill oriented university approved courses / vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters. iii) B.Voc.(IT) (Bachelor of Vocation in Information Technology: If student wishes to exit after completion of Third year (Semester-1 to semester-6) without any back-log and secure additional 4 credits from work based skill oriented university approved courses / vocational courses / summer internship / Apprenticeship offered at end of first or second year in addition to 6 credits from skill-based courses earned during first four semesters.
Multi-Level Entry Criteria:	As per the norms of the Veer Narmad South Gujarat University.
Duration:	4 year of B.Voc.(IT) (Honors) degree program with multi-level exit options at 1st, 2nd and 3rd Year to obtain Certificate, Diploma, Degree and Honours Degree in Information Technology respectively.
Eligibility:	Candidate must have passed standard 12th (H.S.C.) Examination in Science (Any Group) / Commerce / vocational / General stream from Gujarat Higher Secondary Board (G.H.S.E.B.) or any other equivalent board (C.B.S.E. / I.C.S.E. etc. which must be approved and possess equivalence certificate from Veer Narmad South Gujarat University) with English as one of the subject. In case of candidates passed out from 12th Board from General Stream; Statistics/Economics/Business Mathematics/Accountancy must be one of the subjects. In case of Students passed out with 12th (H.S.C.) vocational stream, Computer and English must be one of the subject.
Objective of the Program:	B.Voc.(IT)(Honours) is skill-based undergraduate degree program in the field of Information Technology. The B.Voc(IT) is specifically designed to equip students with industry need skills and make them to job ready.

	Main objective of this program is to emphasize practical work, industry internships and software development project in various aspect of the area of Computer Science and Information Technology. The program is designed to produce IT professional those who can get technical skills in area of programming, database management, software engineering, networking and web development. It also aims to focus on problem solving, communication skills and critical thinking.
Program Outcome:	**PO1:** Understand, analyse and develop computer programs in the areas related to algorithm, web design and networking for efficient design of computer based system. **PO2:** Enhancing the problem solving, logical, reasoning and analysis capabilities of a problem and integrate the ability with the coding using specific computer programming languages. **PO3:** To generate Understanding regarding the core and fundamental ideas about the computer platforms, operating systems, software design concepts, networking concepts and advanced and emerging technologies. **PO4:** Design, implement and evaluate a computer-based system, processing, component or program to meet desired goal with the help of various programming languages, application software, packages, tools, databases on various platforms. **PO5:** An ability to apply design and development principles in construction of software systems of varying complexity using various algorithmic principles, modelling, coding and design of computer-based systems. **PO6:** 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. Overall, the program outcomes aim to produce graduates who can work in the IT sector as database administrator, system engineer, software tester, junior programmer, web developer, system administrator, software developer etc.
Program Specific Outcome:	**PSO1:** Developing understanding about the fundamentals of core concepts of logic developments, critical thinking and problem solving capabilities. Emphasis on effective communication.

	PSO2: Improving logical and practical concepts using various tools and technologies, coding concepts and implementation of coding to solve the problems. **PSO3:** Development of team building concepts and working in team with positive approach, enhancing the mindset to contribute as an individual to the team. Improving interpersonal skills. **PSO4:** Improving student's Understanding related to technical problems and enhancing their capabilities to address the problems to turn into solutions through various possible ways by enhancing critical thinking ability. **PSO5:** Develop students to capabilities for self-learning, skill development through self-practicing and problem solving abilities. **PSO6:** Enhance the passion among the students for updating knowledge, innovative ideas. Implementing the knowledge in applied areas and research areas by understanding the real world problems, addressing the real world problems and their possible solutions that lead to build a successful Professional career. **PSO7:** Develop students to work effectively with a range of current, standard, Office Productivity software applications.
PO and PSO mapping:	
Medium of Instruction:	English
Program Structure:	Semester-wise Breakup of the course is given as follows:

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
PO1	■	■					
PO2	■	■		■		■	
PO3	■	■	■		■		■
PO4			■	■	■	■	■
PO5						■	■
PO6			■	■	■	■	

Veer Narmad South Gujarat University, Surat

Program Structure: Fourth Year B.Voc.(IT) Honors

(Semester – 7 and Semester – 8)

(w.e.f. Academic Year June,2026-27)

Program Structure		Semester-wise breakup for the courses:				
Semester -7						
Course code	**Course Title**	**Course Category**	**Level of Course**	**Course Credits**	**Teaching Hours/week**	
				Th+Pra	**Theory**	**Practical Fieldwork/ Project/ Internship**
701	User Interface and User Experience Design (minor-7)	Minor Course	300-399	4	4	0
702	Mobile Application Development-I (major-17)	Major Course	400-499	4	2	4
703	Cyber Security (major-18)	Major Course	400-499	4	2	4
704	Bigdata Hadoop (major-19)	Major Course	400-499	4	2	4
705	Project	Major specific Course	400-499	6	-	12
	Practical (Based on Course Code:702, 703 & 704 Equally divided)	No separate credits allocated for practical. Students will prepare separate practical journals for all 3-courses. The Practical exam/viva-voce will be based on Course 702, 703 & 704				
Total				**22**	**10**	**24**

Course Code	**Course Title**	**Course Credit**	**University Exam Type**	**Exam Duration**	**External(SEE) Marks**	**Internal (CCE) Marks**	**Total Marks**
701	User Interface and User Experience Design	4	Theory/ Written	2 Hours	50	50	100
702**	Mobile Application Development-I**	4	Theory/ Written	1 Hour	25	25	100
			Practical	2 Hours	25	25	
703**	Cyber Security**	4	Theory/ Written	1 Hour	25	25	100
			Practical	2 Hours	25	25	
704**	Bigdata Hadoop**	4	Theory/ Written	1 Hour	25	25	100
			Practical	2 Hours	25	25	
705	Project	6	-	-	50	50	100
Total		**22**			**250**	**250**	**500**
For Practical and Project:							

Batch Size – 40 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batch should be considered if the student strength exceeds 45 numbers.
Practical includes Practical sessions for course-702, 703 & 704.**Minimum** Twelve Practical hours (4 hours for course-702, 4 hours for 703 and 4 hours for course-704) per week should be allocated per batch.

The journal must be certified by the concerned faculty and by the Head of the Department, failing which the student will not be allowed to appear for External Practical Examination. Student will submit softcopy/hardcopy of Project duly certified by the internal guide.

Internal/External Evaluation:
CCE (Continuous and Comprehensive Evaluation): To be conducted by college.
SEE (Semester End Evaluation): To be conducted by University.

Major Course: Major discipline is the main focus (Core) dominant subject and the degree will be awarded in that discipline. Students must secure a prescribed number of credits (50% of total credits) through core courses in the major discipline.
Minor Course: Minor discipline is the broader understanding course beyond the major discipline course. It contains generic-electives for students to choose from the pool of courses. It helps students to gain broader knowledge in addition to relevant major disciplines courses as per their choices. Minor subjects may be from same or different disciplines. Student may make choices according to their interest/need, from ODL courses also.

****Major Practical based Subjects**: Course 702, 703 & 704 are major courses. These courses are carrying 4 credits (2 hours of theory and 4 hours of practical per week). These subjects carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Practical exams for course-702 (2 hours duration), 703 (2 hours duration) and course-704 (2 hours duration) will be conducted on same day.

Division of Theory internal marks(CCE):
For courses having 50 marks as Internals:
Class Assignment / Active Learning: 07marks + Home Assignment / Field Assignment: 08 marks + Attendance:10 marks + Class Test*: 25 marks

For courses having 25 marks as Internals :
Class Assignment / Active Learning: 03 marks + Home Assignment / Field Assignment: 03 marks + Attendance: 04 marks + Class Test*: 15 marks

For Practical internal marks(CCE):

Attendance: 5 marks + Viva-voce / Quiz: 10 marks + Lab-work Assessment / Practical: 10 marks

Division of Practical External exam marks(SEE):
For 25 marks Externals:
Division of marks is: Exam evaluation: 20 marks + Viva-voce: 5 Marks.
Practical examination will be conducted for course code-702, 703 and course-704 separately on same day. Students are required to pass in combined head (Theory + Practical) for each course.
Students are required to remain present in internal and external theory and practical exams for course code–702, 703 and course-704 mandatorily.

Program Passing Rules:	As per University rules.

Program Fees: (Per Semester) (One time fees and exam fees are additional as prescribed by the university)	Semester Tuition Fees : As per norms of University Semester Laboratory Utilization fees : As per norms of University [Other one time/affiliation/exam fees and other fees under various heads will be as per the norms of the University.] [The fees for certificate courses will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the University.]

Semester-8						
Course code	**Course Title**	**Course Category**	**Level of Course**	**Course Credits**	**Teaching Hours/week**	
				Th+Pra	**Theory**	**Practical Fieldwork/ Project/ Internship**
801	Block Chain Technology (minor-8)	Minor Course	300-399	4	4	0
802	Mobile Application Development - II (major-20)	Major Course	400-499	4	2	4
803	Software Testing Tools (major-21)	Major Course	400-499	4	2	4
804	Business Analytics (major-22)	Major Course	400-499	4	2	4
805	OJT	Major specific Course	400-499	6	-	12
	Practical (Based on Course Code:802, 803 & 804 Equally divided)	No separate credits allocated for practical. Students will prepare project for 802 and separate practical journals for 803, 804 courses. The Practical/Project exam/viva-voce will be based on Course 802, 803 & 804.				
Total				**22**	**10**	**24**

Course Code	**Course Title**	**Course Credit**	**University Exam Type**	**Exam Duration**	**External Marks**	**Internal Marks**	**Total Marks**
801	Block Chain Technology	4	Theory/ Written	2 Hours	50	50	100
802**	Mobile Application Development – II**	4	Theory/ Written	1 Hour	25	25	100
			Practical/ Project	2 Hours	25	25	
803**	Software Testing Tools**	4	Theory/ Written	1 Hour	25	25	100
			Practical	2 Hours	25	25	
804**	Business Analytics**	4	Theory/ Written	1 Hour	25	25	100
			Practical	2 Hours	25	25	
805	OJT	6	Documentation, Reporting, presentation and viva-voce	Presentation and viva-voce	50	50	100
Total		**22**			**250**	**250**	**500**
For Practical and Project:							

BatchSize–40 Maximum (Desirable). Maximum 45 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 45 numbers.
Practical includes Project/Practical sessions for course-802, 803 & 804. **Minimum** Twelve Practical hours (4 hours for course-802, 4 hours for 803 and 4 hours for course-804) per week should be allocated per batch.

The journal/documentation should be certified by the concerned faculty and by the Head of the Department, failing which the student should not be allowed to appear for External Practical Examination. Student will submit softcopy/hardcopy of Project duly certified by the internal guide.

Internal/External Evaluation:
CCE (Continuous and Comprehensive Evaluation): To be conducted by college
SEE (Semester End Evaluation): To be conducted by University

Major Course: Major discipline is the main focus (Core) dominant subject and the degree will be awarded in that discipline. Students must secure a prescribed number of credits (50% of total credits) through core courses in the major discipline. The number of courses (subjects) in Major may vary from semester to semester.

Minor Course: Minor discipline is the broader understanding course beyond the major discipline course. It contains generic-electives for students to choose from the pool of courses. It helps students to gain broader knowledge in addition to relevant major disciplines courses as per their choices. Minor subjects may be from same or different disciplines. Student may make choices according to their interest/need, from ODL courses also.

****Major Practical based Subjects:** Course 802, 803 and 804 are major courses. These courses are carrying 4 credits (2 Hours of theory and 4 hours of practical per week). These subjects carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Project exams for course-802, Practical exams for 803 (2 hours duration) and course-804 (2 hours duration) will be conducted.

Division of Theory internal marks(CCE):
For courses having 50 marks as Internals:
Class Assignment / Active Learning: 07 marks + Home Assignment / Field Assignment: 08 marks + Attendance:10 + Class Test*: 25

For courses having 25 marks as Internals :
Class Assignment / Active Learning: 03 marks + Home Assignment / Field Assignment: 03 marks + Attendance: 04 + Class Test*: 15

For Practical internal marks(CCE):
For courses having 25 marks Internals :
Attendance: 5 marks + Viva-voce / Quiz: 10 marks + Lab-work Assessment / Practical: 10 marks.

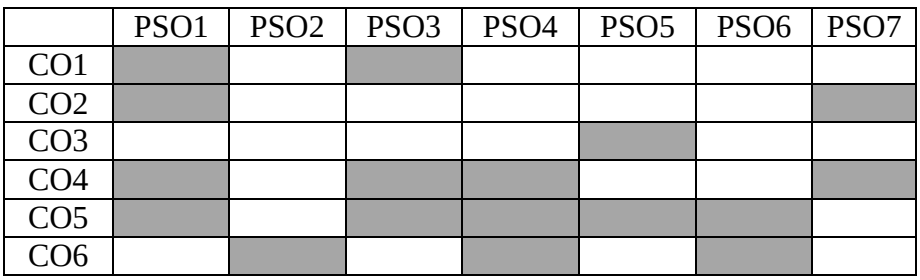
Division of Practical External exam marks(SEE):
For 25 marks Externals:
Division of marks is: Exam evaluation: 20 marks + Viva-voce: 5 Marks
Project/Practical examination will be conducted for course code – 802(Project), 803 and 804 separately. Students are required to pass in combined head (Theory + Practical) for each course.
Students are required to remain present in internal and external theory and project/practical exams for course code –802, 803 and 804 mandatorily.

Program Passing Rules:	As per University rules

Program Fees: (Per Semester) (One time fees and exam fees are additional as prescribed by the university)	Semester Tuition Fees : As per norms of University Semester Laboratory Utilization fees : As per norms of University [Other one time/affiliation/exam fees and other fees under various heads will be as per the norms of the University.] [The fees for certificate courses will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the University.]

Course 701: User Interface and User Experience Design (UI/UX Design)

Program Name	**Bachelor of Vocation (Information Technology) (Honours)**
Semester	**7**
NCrF Credit Level	**6.0**
Course Type	**Minor**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Code	**701**
Course Level	**400-499 (Advanced Level)**
Course Title	**User Interface and User Experience Design (UI/UX Design)**
Credit	**4**
Theory:	**4 Hours**
Effective From:	**A.Y.2026-27**
Purpose of Course	This course introduces UI/UX design principles and methodologies preparing students for further exploration and specialization in the field. The purpose of a UI/UX course is to equip students with the knowledge, skills, and techniques necessary to design user interfaces and experiences that are intuitive, engaging, and effective. Students learn to create user-centric designs that enhance usability, accessibility, and user satisfaction. The course covers comprehensive foundation in the principles and the best practices of UI/UX design. By mastering these skills, students are prepared to pursue careers in various industries, contributing to the creation of seamless and enjoyable digital experiences for users.
Course Objectives	i. Understand the Basics of UI/UX Design: Introduction to the fundamental principles and concepts of user interface (UI) and user experience (UX) design, including the difference between UI and UX, the importance of user-centered design, and the role of UV/UX in product development. ii. Learn User Research Methods: Familiarize with basic user research methods, such as user interviews, surveys, and observation techniques, to understand user needs, behaviors, and preferences. iii. Create Wireframes and Prototypes: Learn how to create low-fidelity wireframes and prototypes using simple design tools or pen and paper to visualize the structure and layout of digital interfaces. iv. Explore Interaction Design Principles: Introduction to interaction design principles, including affordances, feedback, and user flows, to design intuitive and responsive user interfaces that facilitate user interaction and navigation. v. Conduct Usability Testing: An overview of usability testing methods and techniques, such as heuristic evaluations and user testing sessions.to evaluate the effectiveness and usability of UI designs and gather feedback for iteration and improvement.
Pre-requisite	---

Course Outcomes	CO1:Provide students with a foundational understanding of user interface (UI) and user experience (UX)design principles, including usability, accessibility, and user-centered design. CO2: Familiarize students with basic user research methodologies, such as user interviews, surveys, and personas, to identify user needs, behaviors, and preferences. CO3: Develop students' ability to create low-fidelity wireframes and prototypes using industry - standard tools or pen and paper, enabling them to visualize and communicate design concepts effectively. CO4: Introduce students to interaction design principles, including affordances. feedback, and user flows, to design intuitive and responsive digital interfaces that facilitate user interaction and engagement. CO5: Explore fundamental principles of visual design, such as typography, color theory, and layout, to create aesthetically pleasing and visually coherent UI designs that enhance user experience. CO6: Teach students how to plan and conduct usability testing sessions, analyse feedback, and iterate on designs to improve usability and user satisfaction, ensuring that designs meet user needs and expectations.
Mapping between Course Outcomes (CO) with Program Specific Outcomes (PSO)	
Course Content:	**Unit 1: Introduction to UI/UX Design:** 1.1 Overview of UI/UX Design and understanding the role of UI/UX design in product development. 1.2 Introduction to user-centered design principles and methodologies. 1.3 Exploring the significance of UI/UX in enhancing user satisfaction &product success. **Unit 2: User Research and Analysis:** 2.1 Importance of user research in informing design decisions. 2.2 Creating user personas to represent target users and their needs. 2.3 Techniques for conducting effective user interviews to gather insights and feedback. 2.4 Overview of usability testing methods and techniques for evaluating design prototypes. **Unit 3: Interaction Design and Information Architecture:** 3.1 Principles of Interaction Design (affordances, feedback, and user flows). 3.2 Understanding information architecture and organizing content for intuitive navigation. 3.3 Techniques for creating low-fidelity wireframes and interactive prototypes to visualize design concepts. 3.4 Understanding designing effective navigation systems to facilitate user

	interaction and exploration. **Unit 4: Visual Design Essentials:** 4.1 Basics of Visual Design (typography, color theory, and layout). 4.2 Visual hierarchy to guide user attention and emphasize important content. 4.3 Iconography and Imagery to enhance user understanding and engagement. 4.4 Importance of branding and maintaining consistency across UI elements for a cohesive user experience. **Unit 5: Usability Testing, Iteration and case study:** 5.1 Usability Testing Process (planning, conducting, and analyzing usability testing sessions). 5.2 Iterative design process and User feedback for continuous improvement. 5.3 Designing for accessibility 5.4 Case study
Reference Books	1. "Don't Make Me Think, Revisited: A Common Sense Approach to Web Usability", Author: Steve Krug, Publisher: New Riders, ISBN:978-0321965516 2. "The Design of Everyday Things: Revised and Expanded Edition", Author: Don Norman, Publisher: Basic Books, ISBN:978-0465050659 3. "100 Things Every Designer Needs to Know About People", Author: Susan Weinschenk, Publisher: New Riders, ISBN:978-0321767530 4. "About Face: The Essentials of Interaction Design', Author: Alan Cooper: Robert Reimann, and David Cronin, Publisher: Wiley India, ISBN: 978-8126556744 5. "The Elements of User Experience: User-Centered Design for the Web and Beyond", Author: Jesse James Garrett, Publisher. Pearson India, ISBN: 978-8131707918 6. "Universal Principles of Design, Revised and Updated", Author: William Lidwell, Kritina Holden, and Jill Butler, Publisher: Rockport Publishers India.ISBN:978-1631596226 7. "The UX Book: Process and Guidelines for Ensuring a Quality User Experience", Author: Rex Hartson and Pardha S. Pyla, Publisher: Pearson India.ISBN:978-9332518320 8. "Lean UX: Designing Great Products with Agile Teams", Author: Jeff Gothelf and Josh Sciden, Publisher: Wiley IndiaISBN:978-8126561977 9. "Designing for Interaction: Creating Innovative Applications and Devices", Author: Dan Saffer, Publisher: Pearson India,ISBN:978-8131705648 10. "Designing Interfaces: Patterns for Effective Interaction Design", Author: Jenifer Tidwell, Publisher: O'Reilly India, ISBN:978-8184045881 11. "Designing Web Interfaces: Principles and Patterns for Rich Interactions", Author: Bill Scott and Theresa Neil, Publisher: O'Reilly India, ISBN: 978-8184045799

Teaching Methodology	Class Work, Discussion, Self-Study, Case-study, Seminars and/or Assignments
Evaluation Method	Internal assessment: 50 Marks External assessment: 50 Marks 50% Internal assessment - Attendance, class and home assignments, Unit tests 50% External assessment. - Written Theory Examination

[Subject code for Theory-2611001207010001]

[Subject code for Practical-2611001207010002]

Course 702: Mobile Application Development - I

Program Name	**Bachelor of Vocation (IT) (Honours)**
Semester	**7**
NCrF Credit Level	**6.0**
Course Code	702
Course Title	Mobile Application Development – I
Credit	4
Course Type	Major
Course SubType	Nil
Subject Type	Intra-disciplinary
Level of Course	400-499 **(**Advanced Level**)**
Teaching per week	(2 Hours Theory + 4 Hours of Practical work)
Review/ Revision	-
Implementation Year	A.Y. 2026-27
Purpose of Course	Mobile applications have become an essential part of modern computing and digital services. This course introduces students to the fundamentals of Android application development and mobile user interface design. The course focuses on understanding the Android architecture, development environment, and UI components required to design interactive mobile applications. It emphasizes practical knowledge of widgets, layouts, activity lifecycle, navigation, fragments, database management using SQLite, and event handling in Android. The course helps students develop the ability to design, implement, and manage user-friendly and data-driven Android applications using standard development practices.
Course Objective	1. To introduce students to the Android application development environment and architecture. 2. To enable students to design mobile user interfaces using Android widgets and layouts. 3. To understand activity lifecycle, intents, fragments, and navigation mechanisms in Android applications. 4. To provide knowledge of data storage and management using SQLite database in Android. 5. To develop skills in handling user interactions and events to create responsive mobile applications.
Pre-requisites	Basic knowledge of programming concepts, object-oriented programming (Java), and fundamental database concepts.

Course Outcome

After completing this course:

CO1: Students will be able to understand the fundamentals of Android architecture, development environment, and basic UI widgets used in Android applications.

CO2: Students will be able to design and implement user interfaces using advanced widgets and various Android layouts.

CO3: Students will be able to understand and implement activity lifecycle, navigation using intents, fragments, and shared preferences in Android applications.

CO4: Students will be able to implement database operations using SQLite, perform CRUD operations, and retrieve data using Cursor in Android applications.

CO5: Students will be able to develop interactive Android applications by handling user input events, event listeners, and event handlers.

Mapping between Course Outcomes (CO) with Program Specific Outcomes (PSO)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

Course Content

Unit-1: Fundamentals of Android and Basic UI Widgets

1.1 Introduction of Android
- 1.1.1. Architecture of Android
- 1.1.2. Installation of Android and Android Emulator
- 1.1.3. Dalvik VM

1.2 Android Widgets:
- 1.2.1 Button, Toast
- 1.2.2 TextView, Edit Text, Button, RadioButton, CheckBox, Spinner

Unit-2: Advanced Widgets and User Interface Layouts

2.1 Advance Widgets:
- 2.1.1 ListView, AlertDialog , DatePicker, TimePicker, WebView
- 2.1.2 ProgressBar, Vertical and Horizontal ScrollView
- 2.1.3 ImageView, ImageSlider, SearchView

2.2 Layouts
- 2.2.1 LinearLayout, RelativeLayout
- 2.2.2 TableLayout, FrameLayout

Unit-3: Activity Navigation and Fragment Management

3.1 Activity and Intents:
- 3.1.1 Life Cycle
- 3.1.2 Navigation between Activities using Intent

3.2 Android Fragments

3.3 Shared Preferences

Unit-4: Database Management using SQLite in Android

4.1Database handling: SQLite
- 4.1.1Database methods:
  - 4.1.1.1 SQLiteOpenHelper class (onCreate(), onUpgrade(), close() methods)
  - 4.1.1.2 Handling database (create, open, drop, close)
- 4.1.2 SQLiteDatabase class to handle SQLquery: execSQL(), insert(), update(), query(),delete()
  - 4.1.2.1 Performing CRUD

	4.1.3 getWritableDatabase() method 4.2 Handling Cursor 4.2.1 fetching data in list view **Unit 5: Event Handling and User Interaction in Android** 5.1 Event Handling: 5.1.1 Input Events capturing 5.1.2 View Class and Event Listeners 5.2 Callback methods of Event Listener interface: 5.2.1 onClick(), OnKey(), OnTouch() 5.2.2 onLongClick(), onFocusChange(), onCreateContextMenu() 5.3 Event Listeners Registration 5.4 Event Handlers: 5.4.1 onKeyDown(), onKeyUp(), onTrackballEvent() 5.4.2 onTouchEvent(), onFocusChanged()
Reference Books	1. Android Application Development (With Kitkat Support), Author: Pradeep Kothari, Publisher:DreamTech Press.,ISBN:978- 9351194095 2. Android Studio 3.0 Development Essentials: Android 8 Edition Author – Neil Smyth, Publisher: Payload Media, ISBN – 13: 978 – 1977540096 3. Android Programming for Beginners - Second Edition, Author:John Horton, Publisher: Image Short ISBN: 978- 1789538502 4. Android 9 Development Cookbook, Author: Rick Boyer, Publisher: Packet Publishing, ISBN:978-1788991216 5. Professional Android – fourth Edition, Author: Reto Meier, Ian Lake, Publisher: Wrox, ISBN – 13:978-1118949528 6. Android Programming: Pushing the Limits 1st Edition, Author: Erik Hellman, Publisher: Wiley, ISBN – 13: 978-1118717370 7. Fundamentals of Android App Development : Android Development for Beginners to Learn Android Technology, SQLite, Firebase and Unity, Author: Sujit Kumar Mishra, Publisher: BPB Publication, ISBN: 978-93-89845-204 8. Starting with Android: Android application development guide 1st Edition, Author: Dr. M. M. Sharma, Publisher :BPB Publication, ISBN: 978-9386551955 9. Introducing SQLite for Mobile Developers 1st Edition, Author: Jesse Feiler, Publisher: Apress, ISBN : 978-1484217658 Android Programming Unleashed, Author: B. M. Harwani, Publisher: Pearson Education India, ISBN-13: 978-0-672-33628-7
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments, Practical implementation, Application development.
Evaluation Method	Internal Assessment: 25 marks Theory + 25 marks Practical = 50 Marks. External Assessment: 25 marks Theory + 25 marks Practical = 50 Marks. 50% Internal assessment - Attendance, class and home assignment, Unit tests. - Practical exam, viva-voce, Journal 50% External Assessment. - Written theory exam Practical exam, Viva-Voce

[Subject code for Theory-2611001207020001]

[Subject code for Practical-2611001207020002]

Course 703: Cyber Security

Program Name	**Bachelor of Vocation (IT) (Honours)**
Semester	**7**
NCrF Credit Level	**6.0**
Course Code	**703**
Course Title	**Cyber Security**
Credit	**4**
Course Type	**Major**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Level of Course	**400-499 (Advanced Level)**
Course Title	**Cyber Security**
Teaching per Week	**2 Hours Theory + 4 Hours Practical**
Review / Revision	**-**
Implementation Year:	**A.Y. 2026-2027**
Purpose of Course	This course aims to introduce students to the fundamental principles of essential concepts of cyber security. It prepares learners to understand safeguards against cyber threats.
Course Objective	1. To introduce students to the basic concepts of cyber crime and cyber security**,** including different categories of cyber crimes and malware attacks. 2. To develop understanding of cyber threats and networking fundamentals**,** such as IP address, DNS, DHCP, routers, and common types of cyber attacks. 3. To familiarize students with hacking concepts and types of hackers**,** along with common vulnerabilities and techniques used in cyber attacks. 4. To provide knowledge of network security mechanisms and cryptography**,** including encryption, decryption, hashing, and digital signatures. 5. To make students aware of security tools and practices used to detect vulnerabilities and protect computer systems and networks. 6. To build awareness about safe digital practices and cyber security measures to prevent cyber crimes and protect sensitive information.
Pre-requisite	Basic understanding of computer fundamentals, internet technologies, and networking concepts is recommended. Familiarity with web applications and general IT awareness will be beneficial.
Course Outcomes	**CO1:** Explain the basic concepts of cyber crime, categories of cyber crimes, and common malware attacks. **CO2:** Identify and explain various cyber threats, networking terminologies, and common cyber attacks. **CO3:** Analyse different types of hackers, hacking techniques, and system vulnerabilities. **CO4:** Understand network security principles, cryptography techniques, and security tools used to protect systems. **CO5:** Apply basic cyber security awareness and safe practices to protect digital systems and information.

Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)

CO / PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

Course Content

Unit-1: Introduction to Cyber Crimes

1.1 Cyber Crime Basics
- 1.1.1 Definition of Cyber Crime
- 1.1.2 Characteristics of Cyber Crime
- 1.1.3 Category of Cyber Crimes (Crime against individual, Crime against property, Crime against organization, Crime against society)
- 1.1.4 Advantages of Cyber Security

1.2 Malware Attacks
- 1.2.1 Trojan, Virus and Worm Attacks
- 1.2.2 Spyware, Adware, Rootkits and Ransomware

1.3 E-Mail related Crimes: Spoofing, Spamming, Bombing
1.4 Denial of Service Attacks and Distributed Denial of Service Attack
1.5 IPR Violations (Software piracy, Copyright Infringement, Trademarks Violations, Theft of Computer source code, Patent Violations)
1.6 Cyber Squatting, Cyber Smearing, Cyber Stalking
1.7 Financial Crimes: (Banking, credit card, Debit card related)

Unit-2: Cyber Security Fundamentals:

2.1 Types of Threats
2.2 Basic Terminologies:
- 2.2.1 IP Address, MAC Address
- 2.2.2 Domain name Server(DNS)
- 2.2.3 DHCP, Router, Bots 4

2.3 Common Types of Attacks:
- 2.3.1 Man in the Middle attack
- 2.3.2 Password Attack

Unit 3: Hackers and hacking technics

3.1 Definition of hacking and hacker
3.2 Types of Hackers:
(White hat and Black hat, Grey Hat Hackers, Script Kiddies, Hacktivists)
3.3 Various Vulnerabilities:
3.4 SQL Injection attacks, Changes in security settings
3.5 Exposure of Sensitive Data
3.6 Breach in authentication protocol

Unit-4: Network Security and Cryptography

4.1 Network Security Concepts
- 4.1.1 Importance of Network Security
- 4.1.2 Network Security Threats
- 4.1.3 Secure Network Architecture

	4.2 Cryptography Basics 4.2.1 Concepts of Encryption and Decryption 4.2.2 Symmetric Encryption 4.2.3 Asymmetric Encryption 4.2.4 Hashing 4.2.5 Digital Signatures 4.3 Security Tools 4.3.1 Antivirus and Anti-Malware Tools 4.3.2 Vulnerability Scanners 4.3.3 Network Scanning Tools 4.3.4 Password Cracking Tools
Reference Books	**1**. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd. **2**. Cyber Crime in India, Dr M Dasgupta, Centax Publications Pvt Ltd **3**. Cyber Laws and Crimes, Barkha U, Rama Mohan, Universal Law Publishing Co. Pvt Ltd. **4**. Cyber Crime, Bansal S.K., A.P.H. Publishing Corporation **5**. Cyber Security Understanding Cyber Crime, Computer Forensic and Legal Perspectives, Nina Godbole, Sunit Belapur, Willey India Publication
Teaching Methodology	Class Work, Discussion, Lab-work, Self-Study, Seminars and/or Assignments
Evaluation Method	Internal Assessment :25 Marks Theory + 25 Marks Practical = 50 Marks External Assessment :25 Marks Theory + 25 Marks Practical = 50 Marks 50% Internal assessment - Attendance, Class and home Assignment, Unit tests. - Practical exam, viva-voce, Journal 50% External assessment - Written Theory exam - Practical Exam, viva-voce

[Subject code for Theory-2611001207030001]

[Subject code for Practical-2611001207030002]

Course 704: Big Data Hadoop

Program Name	**Bachelor of Vocation (IT) (Honours)**
Semester	**7**
NCrF Credit Level	**6.0**
Course Type	**Major**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Code	**704**
Course Level	**400-499 (Advanced Level)**
Course Title	**Big Data and Hadoop**
Credit	**4**
Teaching per Week	**2 Hours Theory + 4 Hours Practical**
Effective From	**Academic Year : 2026-27**
Course Outcomes	**CO1** - Identify and explain the fundamental concepts of Big Data **CO2** - Analyze the Hadoop architecture and the working of HDFS **CO3** - Demonstrate the MapReduce programming model **CO4** - Utilize Hadoop ecosystem tools like Hive and Pig **CO5** - Evaluate and recommend appropriate Big Data technologies and architectures
Mapping between COs and PSOs	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1			-	-	-		-
CO2					-		-
CO3					-		
CO4	-						
CO5							

Course Content

Unit – 1 Introduction to Big Data

1.1 Big Data Fundamentals
- 1.1.1 Definition of Big Data
- 1.1.2 Evolution of Big Data

1.2 Characteristics of Big data
- 1.2.1 Volume
- 1.2.2 Velocity
- 1.2.3 Variety
- 1.2.4 Veracity
- 1.2.5 Value

1.3 Traditional Data vs Big Data
- 1.3.1 Limitations of Traditional Databases
- 1.3.2 Need for Big Data Technologies

1.4 Application of Big Data
- 1.4.1 Business and Marketing
- 1.4.2 Healthcare
- 1.4.3 Social Media and E-commerce

	Unit – 2 Hadoop Architecture 2.1 Introduction to Hadoop 2.1.1 Need for Hadoop 2.1.2 Features of Hadoop 2.2 Hadoop Distributed File System (HDFS) 2.2.1 HDFS Architecture 2.2.2 NameNode and DataNode 2.2.3 HDFS Block Storage 2.3 Hadoop Components 2.3.1 Hadoop Core 2.3.2 Hadoop Cluster 2.4 Advantages and Limitations of Hadoop **Unit – 3 Hadoop Data Processing (MapReduce)** 3.1 Introduction to MapReduce 3.1.1 Concept of distributed processing 3.1.2 Working of MapReduce 3.2 MapReduce Phases 3.2.1 Map Phase 3.2.2 Shuffle and Sort Phase 3.2.3 Reduce Phase 3.3 MapReduce Architecture 3.3.1 Job Tracker 3.3.2 Task Tracker 3.4 Advantages of MapReduce 3.4.1 Parallel processing 3.4.2 Scalability and fault tolerance **Unit – 4 Big Data Tools and Applications** 4.1 Hadoop Ecosystem 4.1.1 Hive 4.1.2 Pig 4.1.3 HBase 4.2 Big Data Processing Tools 4.2.1 Hive Query Language (HiveQL) 4.2.2 Data Warehousing using Hive 4.3 Big Data Applications 4.3.1 Business and Marketing Analytics 4.3.2 Healthcare Applications 4.3.3 Social Media and E-commerce 4.4 Case Studies 4.4.1 Real-world Big Data examples 4.4.2 Data-driven decision making
Reference Books	1. Hadoop: The Definitive Guide (4th Edition) – Tom White 2. Big Data, Black Book – DT Editorial Services (Wiley India) 3. Big Data Analytics – Raj Kamal and Preeti Saxena (McGraw Hill) 4. Big Data and Hadoop – VK Jain
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. Class attendance, class assignment, home assignment, Unit Tests, Practical exam,

	viva-voce 50% External assessment. Theory/Written examination, Practical exam, viva-voce

[Subject code-2611001207040001]

Course 705: Project

Program Name	**Bachelor of Vocation (IT) (Honours)**
Semester	**7**
NCrF Credit Level	**6.0**
Course Type	**Major**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Code	**705**
Course Level	**400-499 (Advanced Level)**
Course Title	**Project**
Credit	**6**
Effective From	**Academic Year :2026-27**
Course Purpose	This course is designed to provide students with the opportunity to apply the knowledge and skills they have gained throughout their academic journey in web design, mobile applications, and other technologies. It encourages hands-on learning by developing a real world, full-scale project through self-exploration of technologies, structured documentation, and effective presentation. Project is based on Course 702 or 703 or 704 or any combination of these three.
Course Objective	(1). Understand and analyze the given project definition and plan development accordingly. (2). Apply learned and self-acquired knowledge of technologies in designing and implementing project solutions. (3). Demonstrate the use of appropriate tools, frameworks, and platforms in project development. (4). Develop a well-structured project document covering all phases of the development life cycle. (5). Present the project effectively using professional communication and presentation tools.
Pre-requisite	Students must have completed foundational and intermediate courses in web design and web technologies. They should be familiar with programming languages (such as HTML, CSS, JavaScript, Python, or Java, .NET), database concepts, and basic software development practices. Prior experience with mini-projects or assignments involving real-world problem-solving is desirable.
Course Outcomes	**CO1:** Analyze: Students will be able to analyze project requirements, identify suitable tools, and prepare an implementation strategy. **CO2:** Create: Students will develop full-fledged applications using relevant web, mobile, or hybrid technologies. **CO3:** Apply: Students will gain experience in applying the Software Development Life Cycle (SDLC) to real-world problems. **CO4:** Create: Students will prepare and submit a comprehensive project report that meets academic and professional standards. **CO5:** Evaluate: Students will present their project solutions confidently and clearly to technical and non-technical audiences.
Project Development:	**STEP-1: Project Planning and Definition** 1.1. Understanding Problem Statement 1.2. Feasibility Study and Requirement Analysis 1.3. Technology Stack Selection (Web, Mobile, Cloud, Database) 1.4. Project Scheduling and Team Role Allocation

	STEP-2: Project Design and Architecture 2.1. System Design – High Level and Low Level 2.2. Database Design and ER Diagram 2.3. UI/UX Planning and Wireframing 2.4. Data Flow Diagram and Architecture Diagram **STEP-3: Project Development** 3.1. Frontend Development 3.2. Backend Development 3.3. Integration with Database and External APIs 3.4. Testing: Unit Testing, Integration Testing, User Acceptance Testing **STEP-4: Documentation and Deployment** 4.1. Preparing Project Documentation: SRS, Design Document, User Manual 4.2. Deployment on Hosting Platforms (like Firebase, Heroku, GitHub Pages, etc.) 4.3. Project Report Writing in Standard Format 4.4. Preparing and Delivering Project Presentation [Students will submit E-Document/Hardcopy for Project report. One internal guide will be allocated for every ten groups All groups are required to contact their internal guides once a week to endorse their project progress work.]
Project Evaluation Scheme:	**Component** — **Marks** Problem Definition and Planning — 10% Design and Architecture — 15% Implementation and Functionality — 30% Testing and Deployment — 15% Documentation — 10% Final Presentation & Viva — 20% **Total** — **100%**
Teaching Methodology	Applied knowledge, External project work, Lab. Work, hands-on-experience, webinar, seminar, demonstrations, expert lectures.
Evaluation Method	50% Internal assessment. - Attendance and reporting to internal guides - Internal project presentation and demonstration, project documentation and Viva-voce 50% External assessment. - Project presentation and demonstration, viva-voce and e-project/hardcopy report.

Course 801: Block Chain Technology

Program Name	**Bachelor of Vocation (IT) (Honours)**
Semester	**8**
NCrF Credit Level	**6.0**
Credit	**4**
Course Type	**Minor**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Code	**801**
Course Level	**400-499 (Advanced Level)**
Course Title	**Block Chain Technology**
Teaching per Week	**4 Hours Theory**
Implementation Year:	**A.Y. 2026-2027**
Purpose of Course	The purpose of this course is to introduce students to the fundamentals of Blockchain Technology, platforms, and Cryptographic foundation. The students enable to know various types and platforms of Blockchain. Students also enable to know various security aspects and platforms of Blockchain. By integrating real-world applications and case studies, the course enables students to know about Blockchain applications and usage in various sectors.
Course Objectives	1. Understand the fundamentals of blockchain technology and its components. 2. Explore different Blockchain subjects, platforms, and their unique features. 3. Learn how to develop and deploy smart contracts. 4. Analyse the impact of blockchain on various industries. 5. Gain hands-on experience with blockchain development tools and frameworks.
Pre-requisite	Basic understanding of programming concepts Familiarity with web development (HTML, CSS, JavaScript) Introduction to cryptography (optional but recommended)
Course Outcomes	**CO1:** Describe the historical context and development of blockchain technology and understand the core components and concepts of blockchain. **CO2:** Explain the role of cryptography in blockchain. Compare and contrast different blockchain platforms. **CO3:** Utilize blockchain development tools to create and manage blockchain applications. **CO4:** Utilize blockchain development tools to create and manage blockchain applications.

Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1			-	-	-		-
CO2					-		-
CO3					-		
CO4	-						

Course Content

UNIT 1: Introduction to Blockchain Technology

1.1 History and evolution of blockchain
1.2 Basic concepts: decentralization, consensus mechanisms, cryptography
1.3 Key components: blocks, chains, nodes, miners
1.4 Types of blockchains: public, private, consortium

UNIT 2: Cryptographic Foundations and Blockchain Platforms

2.1 Cryptographic hash functions
2.2 Public and private keys
2.3 Digital signatures
2.4 Merkle trees
2.5 Overview of major blockchain platforms: Bitcoin, Ethereum, Hyperledger, Corda
2.6 Comparative analysis of platform features
2.7 Blockchain as a Service (BaaS)
2.8 Case studies of platform applications

UNIT 3: Blockchain Development Tools and Frameworks

3.1 Development environments: Truffle, Remix
3.2 Blockchain APIs and libraries
3.3 Setting up a private blockchain network
3.4 Testing and debugging blockchain applications
3.5 Consensus Mechanisms and Protocols
  3.5.1 Proof of Work (PoW)
  3.5.2 Proof of Stake (PoS)
  3.5.3 Delegated Proof of Stake (DPoS)
  3.5.4 Practical Byzantine Fault Tolerance (PBFT)

UNIT 4: Blockchain Security and Privacy and Application

4.1 Common security threats in blockchain
4.2 Mitigating attacks: 51% attack, Sybil attack, replay attack
4.3 Privacy-enhancing technologies: zk-SNARKs, ring signatures
4.4 Regulatory and compliance considerations
4.5 Application
  4.5.1 Financial services: crypto-currencies, cross-border payments
  4.5.2 Supply chain management
  4.5.3 Healthcare
  4.5.4 Government and public services
  4.5.5 Emerging applications: NFTs, IoT integration

Reference Books	1. "Mastering Bitcoin" by Andreas M. Antonopoulos 2. "Blockchain Basics" by Daniel Drescher 3. "Mastering Bitcoin: Programming the Open Blockchain" by Andreas M. Antonopoulos. 4. "Blockchain: Blueprint for a New Economy" by Melanie Swan 5. "Programming Blockchains in Ethereum" by Kevin Solorio, Randall Kanna, and Dave Hoover.
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	Internal Assessment :50 Marks Theory External Assessment :50 Marks Theory 50% Internal assessment - Class attendance, class assignment, home assignment, Unit Tests. 50% External assessment - Theory/Written examination

[*Subject code for Theory-2611001208010001]*

[Subject code for Practical-2611001208010002]

Course 802: Mobile Application Development - II

Program Name	**Bachelor of Vocational (IT) (Honours)**
Semester	**8**
NCrF Credit Level	**6.0**
Course Code	**802**
Course Title	**Mobile Application Development – II**
Credits	**4**
Course Type	**Major**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Level	**400-499 (Advanced Level)**
Teaching per week	**Total: 6 Hours (2 Hours Theory + 4 Hours Practical)**
Implementation Year	**A.Y. 2026-27**
Purpose of Course	This course introduces students to data communication and cloud integration in Android applications using technologies such as JSON, Firebase, and RESTful APIs. It focuses on implementing authentication, cloud data storage, API integration, and advanced Android features like telephony, location services, and app deployment to develop modern, data-driven mobile applications..
Course Objectives	1. To introduce students to JSON and its role in data exchange. 2. To understand Firebase integration and authentication services. 3. To implement cloud-based data storage and CRUD operations using Firebase. 4. To learn API integration, RESTful services, JSON data parsing. 5. To develop applications using advanced features such as telephony, Google Maps, and app deployment on Play Store.
Pre-requisites	Basic knowledge of Java programming, Android application development, and fundamental database concepts.
Course Outcome	After completing this course, a student should: CO1: Get knowledge of JSON and will learn method to implement the concept JSON in android application. CO2: Understand and explain the functionalities and services provided by Firebase in the context of mobile application development. CO3: Apply Firebase Authentication mechanisms to build secure and user- friendly Android apps with email/password. CO4: Demonstrate the ability to store, read, and update data in Firebase Realtime Database using Android apps. CO5: have knowledge of Android Telephony and Different sensors; also analyse and handle API responses using RESTful architecture, JSON parsing, and Volley libraries in Android
Mapping between Course Outcomes (CO) with Program Specific Outcomes (PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

Course Content	**Unit-1: Introduction to JSON** 1.1 JSON (Javascript Object Notation) 1.1.1 Comparing JSON with XML 1.1.2 Structure of JSON 1.1.3 JSON object, array 1.2 JSON parsing 1.2.1 JSONArray class **Unit-2: Firebase and Android integration** 2.1 Introduction to Firebase and its services 2.2 Setting up firebase project 2.3 Signing into firebase console 2.4 Integrating firebase with android studio 2.5 Overview of firebase authentication 2.5.1 FirebaseAuth Instance 2.5.2 AuthUI instance 2.5.3 FirebaseUser Class 2.5.4 Authentication Provider Class 2.6 Email and password authentication 2.6.1 User Registration 2.6.2 Manage Login/ Logout 2.6.3 Password Reset and E-Mail verification **Unit-3: Firebase Data storage** 3.1 Introduction to NoSQL database and Firebase real-time database 3.2 Writing data into firebase from Android app 3.3 Reading and displaying data from firebase 3.4 CRUD operation on firebase dataset **Unit-4: Working with Data and API in Android** 4.1 Introduction to API and web services 4.2 Introduction to RESTful architecture 4.3 Parsing JSON data in Android 4.4 Testing API 4.5 Introduction to Volley libraries 4.6 Creating GET and POST request in android 4.7 API response handling **Unit 5: Advanced Feature** 5.1 AndriodTelephoning Server 5.2 Androiod telephony: 5.2.1 android.telephony.TelephonyManager class for telephony service 5.2.2 Determining call state 5.2.3 Phone call by invoking default phone calls app using an Intent object. 5.3. Google Map API and location services addCircle(), addPolygon, addTileOverlay(), clear(), getMyLocation(), snapshot() 5.4 Displaying Current location 5.5 Callback methods 5.6 Searching location on Google Map 5.7 Deploying App on Google Playstore

Reference Books	1. Android Application Development (With Kitkat Support), Author: Pradeep Kothari, Publisher: DreamTech Press.,ISBN:978- 9351194095 2. Android Studio 3.0 Development Essentials: Android 8 Edition Author – Neil Smyth, Publisher: Payload Media, ISBN – 13: 978 – 1977540096 3. Android Programming for Beginners - Second Edition, Author:John Horton, Publisher: Image Short ISBN: 978- 1789538502 4. Android 9 Development Cookbook, Author: Rick Boyer, Publisher: Packet Publishing, ISBN:978-1788991216 5. Professional Android – fourth Edition, Author: Reto Meier, Ian Lake, Publisher: Wrox, ISBN – 13:978-1118949528 6. Android Programming: Pushing the Limits 1st Edition, Author: Erik Hellman, Publisher: Wiley, ISBN – 13: 978-1118717370 7. Fundamentals of Android App Development : Android Development for Beginners to Learn Android Technology, SQLite, Firebase and Unity, Author: Sujit Kumar Mishra, Publisher: BPB Publication, ISBN: 978-93-89845-204 8. Starting with Android: Android application development guide 1st Edition, Author: Dr. M. M. Sharma, Publisher :BPB Publication, ISBN: 978-9386551955 9. Introducing SQLite for Mobile Developers 1st Edition, Author: Jesse Feiler, Publisher: Apress, ISBN : 978-1484217658 10. Android Programming Unleashed, Author: B. M. Harwani, Publisher: Pearson Education India, ISBN-13: 978-0-672-33628 11. Firebase Essentials - Android Edition, Neil Smyth, Payload Media, ISBN: 9781946844342 12. Android Application Development Black Book, Pradeep Kothari, Dreamtech Press, ISBN: 9789351194091 13. Learning Firebase, Kato Richardson, Packt Publishing, ISBN: 9781786463567
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments, Project development. Students will develop a project based on the course content during the semester.
Evaluation Method	Internal Assessment :25 Marks Theory + 25 Marks Project = 50 Marks External Assessment :25 Marks Theory + 25 Marks Project = 50 Marks 50% Internal assessment. : - Attendance, Class and home Assignment, Unit tests. - Project demonstration/presentation, viva-voce 50% External assessment. : - Theory/Written examination - Project demonstration/presentation, viva-voce

[Subject code for Theory-2611001208020001]

[Subject code for Practical-2611001208020002]

Course 803: Software Testing Tools

<table>
<tr><td>Program Name</td><td>Bachelor of Vocation (IT) (Honours)</td></tr>
<tr><td>Semester</td><td>8</td></tr>
<tr><td>NCrF Credit Level</td><td>6.0</td></tr>
<tr><td>Course Title</td><td>Software Testing Tools</td></tr>
<tr><td>Credit</td><td>4</td></tr>
<tr><td>Course Type</td><td>Major</td></tr>
<tr><td>Course Subtype</td><td>Nil</td></tr>
<tr><td>Subject Type</td><td>Intra-disciplinary</td></tr>
<tr><td>Teaching per Week</td><td>Total 6 Hours (2 Hours Theory + 4 Hours Practical)</td></tr>
<tr><td>Course Code</td><td>803</td></tr>
<tr><td>Course Level</td><td>400-499 (Advanced Level)</td></tr>
<tr><td>Implementation Year:</td><td>A.Y. 2026-2027</td></tr>
<tr><td>Purpose of Course</td><td>To transition students from manual testing concepts to automated environments, enabling them to improve software quality, speed, and reliability using industry-standard tools.</td></tr>
<tr><td>Course Objectives</td><td>To provide hands-on experience with functional, performance, and defect management tools while understanding the automation lifecycle.</td></tr>
<tr><td>Pre-requisite</td><td>1. Basic knowledge of the Software Development Life Cycle (SDLC).
2. Fundamental understanding of manual Testing concepts.
3. Introductory knowledge of any programming language (Java or Python preferred).</td></tr>
<tr><td>Course Outcomes</td><td>CO1: Identify which test cases are suitable for automation.

CO2: Write and execute scripts using Selenium.

CO3: Perform load and stress testing using JMeter.

CO4: Manage defects and track progress using JIRA.</td></tr>
<tr><td>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</td><td>
<table>
<tr><td></td><td>PSO1</td><td>PSO2</td><td>PSO3</td><td>PSO4</td><td>PSO5</td><td>PSO6</td><td>PSO7</td></tr>
<tr><td>CO1</td><td></td><td></td><td>-</td><td>-</td><td>-</td><td></td><td>-</td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td>-</td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></tr>
<tr><td>CO4</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
</table>

Course Content	**Unit 1: Introduction to Automation & Frameworks** 1.1 Automation Fundamentals 1.1.1 Introduction of automation 1.1.2 Limitations of manual testing, Cost-Benefit Analysis 1.2 The Automation Life Cycle 1.2.1 Tool evaluation 1.2.2 Test design 1.2.3 Environment setup 1.3 Framework Architectures 1.3.1 Introduction to Data-Driven 1.3.2 Keyword-Driven 1.3.3 Hybrid frameworks. 1.4 Continuous Integration Basics 1.4.1 The role of automation in DevOps. **Unit 2: Functional Testing with Selenium** 2.1 Selenium Suite 2.1.1 Fundamental of Selenium IDE 2.1.2 WebDriver 2.1.3 Grid 2.2 Locators 2.2.1 Identifying elements using ID, Name, Xpath, and CSS Selectors 2.3 WebDriver Commands 2.3.1 Handling browser windows, alerts, and navigation **Unit 3: Performance & API Testing Tools** 3.1 Performance Testing with JMeter Thread groups, Samplers, Listeners, and Timers 3.2 Load & Stress Testing 3.2.1 Simulating multiple users 3.2.2 Analysing response times 3.2.3 API Testing with Postman 3.2.3.1 Understanding HTTP methods (GET, POST, PUT, DELETE) and validating JSON responses. **Unit 4: Test Management & Specialized Tools** 4.1 Defect Tracking with JIRA 4.1.1 Creating issues, workflows, and reporting bugs 4.2 Mobile Testing Overview 4.2.1 Introduction to Appium 4.2.2 Mobile-specific challenges 4.3 Version Control 4.3.1 Basic Git commands (Push, Pull, Commit) for managing test scripts

Reference Books	6. "The Art of Software Testing" (3rd Edition) by Glenford J. Myers 7. "Software Testing: A Craftsman's Approach" by Paul C. Jorgensen 8. "The Way of the Web Tester" by Jonathan Rasmusson 9. "API Testing and Development with Postman" by Dave Westerveld 10. "Foundations of Software Testing: ISTQB Certification" by Dorothy Graham
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	Internal Assessment: 25 Marks Theory + 25 Marks Practical = 50 Marks External Assessment: 25 Marks Theory + 25 Marks Practical = 50 Marks 50% Internal assessment: Attendance, Class and home Assignment, Unit tests, Practical work, viva-voce 50% External assessment: Theory/Written examination, Practical examination

[Subject code for Theory-2611001208030001]

[Subject code for Practical-2611001208030002]

Course 804: Business Analytics

Program Name	**Bachelor of Computer Science (Honours)**
Semester	**8**
NCrF Credit Level	**6.0**
Course Code	**804**
Course Title	**Business Analytics**
Credit	**4**
Course Type	**Major**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Level	**400-499 (Advance Level)**
Teaching per Week	**Total: 6 Hours (2 Hours Theory + 4 Hours Practical)**
Effective from	**A.Y. 2026-2027**
Purpose of Course	The purpose of this course is to aware students to the fundamentals of Business Analytics and its role in data-driven decision-making. The course covers the analytics lifecycle, data pre-processing, visualization, predictive modeling, and prescriptive techniques to help students to analyse business data effectively. By integrating real-world applications and case studies, the course enables students to convert data into actionable insights and support strategic business decisions.
Course Objective	1. Understand the concepts, types, and lifecycle of Business Analytics in organizational decision-making. 2. Collect, pre-process, and manage business data from different sources. 3. Apply descriptive analytics techniques for data summarization, visualization, and reporting. 4. Use predictive analytics methods such as regression, classification, and time series forecasting. 5. Evaluate analytical models and interpret results for business insights. 6. Apply prescriptive analytics techniques and case studies to recommend optimal, data-driven business decisions.
Pre-requisite	Basic knowledge of Python programming. Fundamental knowledge of statistics, including mean, median, probability, and correlation. Familiarity with data handling concepts such as datasets, variables, and data types. Introductory understanding of data analysis and visualization concepts.

<table>
<tr><td>Course Outcomes</td><td>CO1: Explain concepts and importance of Business Analytics
CO2: Apply descriptive and predictive analytics techniques
CO3: Analyse business data using analytical tools
CO4: Evaluate analytics results for managerial decision-making</td></tr>
<tr><td>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</td><td>
<table>
<tr><th></th><th>PSO1</th><th>PSO2</th><th>PSO3</th><th>PSO4</th><th>PSO5</th><th>PSO6</th><th>PSO7</th></tr>
<tr><td>CO1</td><td></td><td></td><td>-</td><td>-</td><td>-</td><td></td><td>-</td></tr>
<tr><td>CO2</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td>-</td></tr>
<tr><td>CO3</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></tr>
<tr><td>CO4</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
</td></tr>
<tr><td>Course Content</td><td>UNIT 1: Introduction to Business Analytics
1.1 Business Analytics Fundamentals
1.1.1 Definition and overview of Business Analytics
1.1.2 Importance of Business Analytics in modern organizations
1.2 Types of Analytics
1.2.1 Descriptive Analytics
1.2.2 Predictive Analytics
1.2.3 Prescriptive Analytics
1.3 Analytics Lifecycle
1.3.1 Problem identification and business understanding
1.3.2 Data collection and data preparation
1.3.3 Data analysis and model building
1.3.4 Interpretation, deployment, and monitoring
1.4 Role of Data in Business
1.4.1 Data as a strategic business asset
1.4.2 Data-driven decision-making
1.4.3 Business value creation through analytics

UNIT 2: Descriptive Analytics
2.1 Data Types and Sources
2.1.1 Types of data: structured, semi-structured, and unstructured
2.1.2 Internal and external data sources
2.2 Data Pre-processing
2.2.1 Data cleaning and handling missing values
2.2.2 Data transformation and normalization techniques
2.3 Data Visualization Techniques
2.3.1 Graphical representation of data
2.3.2 Exploratory data analysis using visualization
2.4 Dashboards and Reporting
2.4.1 Dashboard components and design principles
2.4.2 Business reporting and performance measurement</td></tr>
</table>

	UNIT 3: Predictive Analytics 3.1 Introduction to Predictive Analytics 3.1.1 Predictive analytics concepts and objectives 3.1.2 Business use cases of predictive analytics 3.2 Regression Analysis 3.2.1 Simple and multiple regression 3.2.2 Business applications of regression models 3.3 Classification Techniques 3.3.1 Classification concepts and methods 3.3.2 Applications of classification in business 3.4 Time Series Forecasting 3.4.1 Components of time series data 3.4.2 Forecasting techniques and models 3.5 Model Evaluation 3.5.1 Model performance metrics 3.5.2 Model validation and result interpretation **UNIT 4: Prescriptive Analytics & Applications** 4.1 Introduction to Prescriptive Analytics 4.1.1 Concept and importance of prescriptive analytics 4.1.2 Comparison of predictive and prescriptive analytics 4.2 Optimization Techniques 4.2.1 Optimization models for decision-making 4.2.2 Business optimization scenarios 4.3 Decision Trees 4.3.1 Structure and working of decision trees 4.3.2 Decision tree applications in business 4.4 Business Analytics Applications 4.4.1 Applications in marketing, finance, and operations 4.5 Case Studies 4.5.1 Real-world business case analysis 4.5.2 Data-driven solution development
Reference Books	1. Business Analytics (Methods, Models, and Decisions) – James R. Evans, Pearson Education 2. Data Science for Business: What You Need to Know about Data Mining and Data-Analytic Thinking – Foster Provost, Tom Fawcett, O'Reilly Media, Inc. 3. Python for Data Analysis – Wes McKinney, O'Reilly Media 4. Data Analytics – Anil Maheshwari, McGraw Hill Education (India)
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	Internal Assessment :25 Marks Theory + 25 Marks Practical = 50 Marks External Assessment :25 Marks Theory + 25 Marks Practical = 50 Marks 50% Internal assessment Class attendance, class assignment, home assignment, Unit Tests, Practical Examination, Viva-voce 50% External assessment Theory/Written examination, Practical Examination, Viva-voce

[Subject code-2611001208040001]

Course 805: On-the-Job Training

Program Name	**Bachelor of Vocation (IT) (Honours)**
Semester	**8**
NCrF Credit Level	**6.0**
Course Type	**Major**
Course Subtype	**Nil**
Subject Type	**Intra-disciplinary**
Course Code	**805**
Course Level	**400-499 (Advanced Level)**
Course Title	**On-the-Job Training**
Credit	**6**
Effective From	**Academic Year :2026-27**
Duration	180 Hours (including field visits, analysis, mentoring, report writing, and presentation)
Course Purpose	This course aims to provide students with first-hand exposure to the real-time working environment of the software and IT industry. Through structured industry visits and observational learning, students will understand the software development lifecycle, team structures, technology stacks, HR strategies, project methodologies, and company work culture. This immersion will bridge the gap between academic learning and industrial practices, enhancing the student's readiness for employment. The culminating activities—presentation and report—help students synthesize their learning and develop documentation and communication skills.
Course Objectives	The objectives of this course is: • To provide students with real-world exposure to the IT industry through industry visits. • To understand the working environment, roles, and organizational structure of software companies. • To learn about the Software Development Life Cycle (SDLC) and industry practices like Agile. • To observe and analyze team collaboration, tools, and technologies used in real projects**.** • To develop skills in professional communication, observation, and data collection. • To understand HR practices, company culture, and career growth opportunities**.** • To enhance abilities in report writing, documentation, and presentation.
Pre-requisite	Students must have completed the seventh semester of the B.Voc. (IT) (honors) program and should possess fundamental knowledge of software Development and IT concepts.

Course outcome	**CO1**: Understand organizational structure, working hierarchy, and operational workflow in a software company. **CO2**: Identify the technology stack, development practices, and software tools used in real-world environments. **CO3**: Analyze HR functions, team dynamics, and work culture strategies in IT companies. **CO4**: Demonstrate knowledge integration through structured documentation and presentation. **CO5**: Reflect on industry practices and proposes self-improvement plans for better employability.
Course Outcome / Program Specific Outcome mapping:	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1							
CO2							
CO3							
CO4							
CO5							

Phases and components of Course Outcomes:

1:Orientation and Preparation for Industry Visit

1.1. Understanding the Purpose of OJT
1.2. Guidelines for Professional Conduct during Visits
1.3. Basics of Organizational Structures in IT
1.4. Overview of Roles in a Software Company (Developer, QA, Analyst, HR, DevOps, etc.)
1.5. Tools and Templates for Observation, Interview, and Note-Taking

2:Industry Visit and Observation

2.1. Visiting Software Companies (Startups, Mid-size, or Large IT firms)
2.2. Understanding Software Development Life cycle (SDLC/Agile)
2.3. Identifying Technologies, Tools, and Platforms in Use
2.4. Observing Team Collaboration, Roles & Responsibilities
2.5. Collecting Data: Hierarchy Charts, Project Flow, Software Architecture (as allowed)

3:HR, Strategy, and Organizational Analysis

3.1. HR Functions: Hiring Strategies, Performance Appraisal, On boarding
3.2. Employee Benefits and Career Growth Pathways
3.3. Corporate Culture, Diversity, Work-Life Balance Initiatives
3.4. CSR, Sustainability, and Company Vision
3.5. Learning from Employee Interactions: Q & A, Mentorship, Informal Interviews

4:Reporting, Documentation, and Presentation

4.1. Preparing a Structured Industry Visit Report
4.2. Creating Hierarchy Diagrams, Workflows, Tech Stack Documentation
4.3. Analyzing Key Takeaways and Lessons Learned
4.4. Preparing and Delivering Presentation (Team/Individual)
4.5. Viva-Voce or Reflective Discussion with Faculty Panel

<table>
<tr>
<td>Project Evaluation:</td>
<td>50% Internal: Based on presentation on following components and viva-voce.
50% External: Based on presentation on following components and viva-voce.

<table>
<tr><th>Component</th><th>Weightage</th></tr>
<tr><td>Participation & Conduct</td><td>10%</td></tr>
<tr><td>Observation Logs & Notes</td><td>10%</td></tr>
<tr><td>Final Report</td><td>40%</td></tr>
<tr><td>Presentation & Demo</td><td>30%</td></tr>
<tr><td>Reflective Discussion/Viva</td><td>10%</td></tr>
</table>

The evaluation of the external assessment will be carried out by panel of three examiners: (i) One examiner from the same institute (ii) One examiner from software industry/corporate (iii) One examiner from other institute affiliated to the university having minimum 11 years of teaching experience at graduation level in computer faculty.</td>
</tr>
</table>