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 :-

કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા હેઠળની સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫-૨૬ થી અમલમાં આવનાર B.C.A. Sem.- 5 & 6નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા તથા કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિની તા.૧૬/૦૬/૨૦૨૫ની સંયુકત સભાના ઠરાવ ક્રમાંકઃ૦૩ થી મંજૂર કરી એકેડેમિક કાઉન્સિલ ને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૨૪/૧૨/૨૦૨૪ ની સભાનાં ઠરાવ ક્રમાંકઃ૩૫૩ અન્વયે માનનીય કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત એકેડમિક કાઉન્સિલ વતી માન.કુલપતિશ્રીએ મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણઃ ઉપર મુજબ

ક્રમાંકઃઓથો./પરિપત્ર/૧૫૧૮૨/૨૦૨૫
તા.૧૬-૦૬-૨૦૨૫

કુલસચિવ

પ્રતિ,

૧) યુનિવર્સિટી સંલગ્ન તમામ બીસીએ કોલેજોના આચાર્યશ્રીઓ.
.....આપશ્રીની કોલેજ/વિભાગના સંબંધિત શિક્ષકો/વિદ્યાર્થીને જાણ કરી અમલ કરવા સારૂ.

૨) ઈ.ચા.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-V and Semester-VI) of B.C.A.(Honours)

As per NEP-2020

To be implemented from

Academic Year: June, 2025-2026

(Including Winter Session)

Veer Narmad South Gujarat University, Surat
Bachelor of Computer Application (B.C.A.(Honours))
Under the Faculty of
Computer Science and Information Technology

Name of Program:	Bachelor of Computer Application (Honours)
Abbreviation:	B.C.A.(Honours): Four-year Integrated Program. With Multi-Level Entry and Exit option
Multi-level Exit Criteria:	i) Under Graduate Certificate in Computer Application: If the student wish 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) Diploma in Computer Application: If the student wish 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.C.A. (Bachelor's in Computer Application): If the student wish to exit after completion of Third year (Semeste-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.C.A.(Honors) degree program with multi-level exit options at 1st, 2nd and 3rd Year to obtain Certificate, Diploma, Degree and Honours Degree in Computer Application 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. / NIOS 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; having English as 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:	Bachelor of Computer Application (BCA)(Honours) is undergraduate degree program in computer application area. Objective of the program is to open a channel of admission for courses in the field of Computer Science,

	Applications and all relevant fields of information technologies to build career for students who have completed standard 12th (H.S.C.) and are interested in taking computing/computer Application and Information Technology as a career. Main objective is to equip the students with strong foundation in computer programming languages, coding, database handling, software application developments, problem-solving skills and development of analytical and logical skills. The focus is to introduce various programming languages on different platforms and operating systems, interaction with databases available on various platforms, software testing, and development and deployment techniques. It also aim to provide knowledge in latest trends and advancements in field of computer technologies. The program caters to the needs of the students aspiring to excel in the field of computer science, applications and technologies. The program is designed to develop computer professionals versatile in almost all field of computer application. It also aim to enhance communication and interpersonal skills.
Program Outcome:	**PO1:** Ability to analyze a problem, identify and define the Computing requirements appropriate to its solution. **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, modeling, coding and design of computer-based systems. **PO6:** Prepare the aspiring students to become computer software professionals who can work in corporate/software industry at entry to advanced level as well as independent developers. Overall, the program outcomes aim to produce graduates who are: (a) competent in computer application, development and design. (b) Adapt to changing technology and industry trends. (c) Can make significant contributions to the software applications coding, designing, database managements, testing, deployments and ready to adapt any upcoming technologies.

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 analytical and applied concepts using various 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:** Develop students to address and work on the real-world problems as an individual and as part of team. Understand the business problems and ability to work on their solutions by applying various software technologies. **PSO7:** To enhance development skills at various level including problem analysis, data analysis, logical and critical analysis of the problems and implementing the solutions by imparting various recent and upcoming technologies. **PSO8:** Enhance the passion among the students for updating knowledge, innovative ideas, upskilling and 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.
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	PSO8
PO1	■	■						
PO2	■	■		■		■		
PO3	■	■	■		■		■	
PO4			■	■	■	■	■	■
PO5						■	■	■
PO6			■	■	■	■		■

Veer Narmad South Gujarat University, Surat

Program Structure: T.Y.B.C.A. (SEM – 5 and SEM – 6)

(w.e.f. Academic Year June, 2025-2026)

Bachelor of Computer Application (B.C.A.) – Three Year Program

Bachelor of Computer Application (B.C.A.(Hon.)) – Four Year Integrated Program

Program Structure	Semester-wise break up for the courses :

SEMESTER – 5

Course Code	**Course Title**	**Course Category**	**Level of Course**	**Course Credits**	**Teaching Hours/week**	
				Th.+Pra.	Theory	Practical/ Fieldwork /Project/ Internship
501	Linux Operating System (LOS) (Minor-04)	Minor Corse	200-299 Intermediate Level Course	4	3	2
502	Network Technology (Minor-05)	Minor Course	200-299 Intermediate Level Course	4	4	0
503-01	Advance Web Designing (Major-11-01)	Major Course	400-499 Advanced Courses	4	2	4
			OR			
503-02	Advance Mobile Technology-I (Major-11-02)	Major Course	400-499 Advanced Courses	4	2	4
504	Web Framework and Services (Major-12)	Major Course	400-499 Advanced Courses	4	2	4
505	.NET Technology (Major-13)	Major Course	400-499 Advanced Courses	4	2	4
	Project-01 (Based on course code: 503-01/503-02)	Project will be developed in group of maximum three students based on approved definition by the concerned faculty members. The project report will be submitted by the students regularly. The final evaluation will be based on Project presentation, E-report and viva-voce.				
	Project-02 (Based on course code: 504)	Project will be developed in group of maximum three students based on approved definition by the concerned faculty members. The project report will be submitted by the students regularly. The final evaluation will be based on Project presentation, E-report and viva-voce.				
	Practical (Based on Course Code:501 and 505)	Students will prepare separate practical journals for both courses. The final Practical exam/viva-voce will be based on Courses-501 and 504 separately.				
506	**Skill Enhancement Course-V (SEC-05)** [The student will undergo field training/ internship training OR Select minimum one University approved and recognized 2 credit certificate course from the skill based courses list offered by the respective institute/department. / approved MOOC courses as per the guidelines of KCG] (The student need to enrol separately and pay the fees as decided by the respective institute/department)	Skill Enhancement Course	200-299 Intermediate Level Course	2	2	-
Other Activities	The student is expected to participate in activities related to National Service Scheme (NCC), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, Elderly literacy program/ Environment preservation activities and other similar activities.			-	-	-
Total				22	15	14

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
501	Linux Operating System (LOS) (Minor-04) **	4	Theory/ Written : Practical :	1 Hours 2 Hours	25 25	25 25	100
502	Network Technology (Minor-05)	4	Theory/ Written	2 Hours	50	50	100
503-01	Advance Web Designing (Major-11-01)**	4	Theory/ Written : Project :	1 Hours 2 Hours	25 25	25 25	100
503-02	Advance Mobile Technology-I (Major-11-02)**						
504	Web Framework and Services (Major-12)**	4	Theory/ Written : Project :	1 Hours 2 Hours	25 25	25 25	100
505	.NET Technology** (Major-13)	4	Theory/ Written : Practical :	1 Hours 2 Hours	25 25	25 25	100
506	Skill Enhancement Course-V# (SEC-05)	2	-	-	25	25	50#
Total		22			275	275	550

For Practical and Project:

- Batch Size: Maximum 40 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 45 numbers.
- Practical includes Lab. sessions for course-501 and course-505.
- Project hours includes Lab. sessions of 2 Hours each for the course-503-01/503-02 and course 504 per week. The students can work on project in-house/out-house as per their internal guide's guidance. Group of maximum three students can work on a project definition. One Internal Project guide will be allocated to each group. Each group is expected to work minimum 4 hours each on Project-1 and Project-2 per week. Out of which 2 hours will be in supervised mode and balance hours in un-supervised mode.
- The Practical journal/Project final reports 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/Project Examination. Student will submit softcopy of Project duly certified by the internal guide.

Internship: A student who wish to exit after successfully completion of Third year (Semester-5 and Semester-6) without any backlog is required to obtain Four credits at the end of the year either through the internship/field-work or university approved two skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For Internship, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the internship training, the Institute head will recommend to the university to grant four credits for summer training. [All expenses for the internship/skill course/field-work will be bear by the student.]

Skill Enhancement Course: As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit skill enhancement course out of the choices given by the college/institute (From available basket of courses as per University norms) or 2-credit MOOCs approved by the KCG. It will be mandatory for the student to opt minimum one 2-credit Skill enhancement/2-credit KCG approved MOOCs courses out of offered courses recognised by University during semester-1 to semester-5.

(If a student chooses to pursue an SEC (Skill Enhancement Course) other than the one offered by the institute/college—which is a 2-credit course approved as per the norms of KCG and NEP-2020—they must enroll for it separately, fulfill all necessary requirements, and submit a valid completion certificate in order to earn the required SEC credits.)

 # Marks: : The students will enrol for the course from the given university approved list of certificate courses offered by the respective college/department. The student will select and enrol separately for any of the offered list of courses at college/department/institute and obtain respective credits. The institute will evaluate the performance (preferably continuous evolution) as per the SOP of certificate courses and on successfully completion of the course, the student will be eligible to obtain respective credits for the course. These credits will be considered and reflect in student's mark-sheet as well as in ABC(Academic Bank of Credit). These courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

** Minor/Major Practical based Subjects: Course 503-01/503-02,504 and 505 are 4-credit major courses consists of two components: Theory and Practical/Project. Course-501 is minor course and carry 4 credits consists of two components: Theory and Practical.

For Course-503-01/503-02 and Coruse-504: 2 Hours of Theory and 4 hours of Project contact hours per week are allocated.

For Course 501: 3 Hours of theory and 2 hours of practical per week are allocated.

For Course 505: 2 Hours of theory and 4 hours of practical per week are allocated.

Major courses carry 100 marks of exam weightage (50 theory and 50 practical/project). 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-501 (2 hours duration), course-505(2 hours duration) and 25 marks each.

Project Exam: For course-503-01/503-02 and Coruse-504 – Separate project presentation and viva-voce will be conducted. External Theory/Practical/Project exam marks (25 marks each for course-501, course-503-01/503-02,504 and 505.) Division of marks for External Practical: Exam evaluation: 20 marks + Viva-voce: 5 Marks. Students are required to pass in both components (Theory and Practical/Project) collectively for course 501, 503-01/503-02, 504 and 505 as combined head (Theory + Practical/Project). It is mandatory for Students to appear for internal and external theory and practical exams for all courses. Similarly, In case a student remain absent in any of the component of Theory or Practical of minor/major course, the student will be considered fail.	
Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2025-26)	Semester Tuition Fees : As per norms of University Semester Laboratory Utilization fees : As per norms of University [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, Skill Enhancement Courses / Value Addition Courses; fees will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the university.]
Internal Marks Distribution :	For All Theory subjects (Out of 25) : Home Assignment (3 marks) + Class Assignment (3 Marks) + Attendance (4 Marks) + Internal Test (15 marks) For All Practical/Project subjects (Out of 25) : Lab. work (3 marks) + Lab. Journal (3 Marks) + Attendance (4 Marks) + Internal Test (15 marks) For All Theory subjects (Out of 50) : Home Assignment (6 marks) + Class Assignment (6 Marks) + Attendance (8 Marks) + Internal Test (30 marks) For All Practical/Project subjects (Out of 50) : Lab. work (6 marks) + Lab. Journal (6 Marks) + Attendance (8 Marks) + Internal Test (30 marks)

[Subject Code for theory- 2511000905044001]

[Subject Code for Practical-2511000905044002]

Course Code: 501
Course Title: Linux Operating System

Course Code	501
Course Title	Linux Operating System (LOS)
Credits	4
Course Category	Minor Course
Level of Course	200-299 (Intermediate Level)
Teaching per Week	4 Hrs. (3 Hours Theory + 2 Hours Practical work)
Minimum Hours/ Semester	45 hours of Theory + 15 Hours of Practical (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	Learn the architecture and features of Linux systems. Get familiar with the Linux file system, processes, and user management. Use basic and advanced Linux commands for file manipulation, text processing, permissions, networking, etc., Navigate the file system, manage files/directories, and control user access.
Course Objective	1. Understand the structure, design, and usage of Linux systems. 2. Gain hands-on experience with commands for file handling, process control, text processing, and system management. 3. Learn how to write, debug, and execute shell scripts using Bash or other shells to automate tasks. 4. Understand file types, directory structures, permissions, and access control. 5. Concepts of background/foreground jobs. 6. Use standard input/output effectively for chaining commands and redirecting data streams. 7. Apply logic and scripting to solve practical problems and streamline system operations.
Pre-requisite	Understanding of operating systems, files, and general computer usage, Basic understanding of variables, loops, conditionals, and functions, Experience with any programming language (like C, Python, or Java) is helpful but not always required, Concepts like processes, memory, and file systems give a better context to Linux systems.
Course Outcomes	**CO1:** Understand: Explain the structure and components of Linux systems. **CO2:** Apply: Use Linux commands for file handling, text processing, and system tasks. **CO3:** Create: Write and execute shell scripts to automate operations. **CO4:** Analyze: Analyze file types, permissions, and directory structures. **CO5:** Apply: Use redirection and pipes to control input/output streams.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

Course Content	**Unit 1 : Introduction to Linux Operating System** 1.1 Features of Linux OS 1.2 Components of Linux OS (Hardware, Kernel, Shell, GNU Utilities & Applications) 1.3 Shell in Linux (Bash, Zsh, Dash – Features and Differences) 1.4 Introduction to Files and File Types in Linux (text, binary, special files) 1.5 Linux Directory Structure and File System Hierarchy Standard (FHS) **Unit 2 : Basic Linux Commands** 2.1 Directory Navigation Commands (pwd, cd, mkdir, rmdir, ls, tree)

	2.2 File Management Commands (cat, rm, cp, mv, touch) 2.3 File Permissions and Ownership (chmod, chgrp, chown, umask) 2.4 Common System Commands (who, whoami, man, echo, date, clear) 2.5 Text Processing Commands (head, tail, cut, sort, cmp, tr, uniq, wc, tee) 2.6 Introduction to Process 2.7 Process Control commands : ps, fg, bg, kill, sleep 2.8 Job Scheduling commands : at, batch, crontab **Unit 3 : Shell Scripting in Linux** 3.1 Creating and Executing Shell Scripts (nano, vi, ./script.sh) 3.2 Shell Metacharacters and Operators 3.2.1 Filename Expansion (wildcards: *, ?, []) 3.2.2 Input/Output Redirection (>, >>, <) 3.2.3 Pipes (|) 3.2.4 Command Substitution ($(...), ...) 3.3 Control Flow Structures (if-else, case, for, while, until) 3.4 Logical Operators (&&, ||, !) 3.5 test and [ ] command for Condition Testing (file, numeric, string) 3.6 Arithmetic Operations (expr, $(( ))) **Unit 4 : Advanced Text Processing Tools** 4.1 Introduction to Regular Expressions (Basic and Extended) 4.2 Pattern Matching using grep, egrep, and fgrep 4.3 Stream Editing with sed (search, replace, line deletion, insertion)
Reference Books	1. Operating System: Unix and Linux, Behrouz A. Forouzan and Richard F. Gilberg, Cengage India Pvt. Ltd., ISBN:9788131502980 2. UNIX Concepts and Applications, Sumitabha Das, McGraw Hill Education (India), ISBN:9781259006382 3. Introduction to UNIX and Shell Programming, M. G. Venkateshmurthy, Pearson Education India, ISBN:9788131704377 4. Linux Programming and Administration, N.B. Venkateswarlu, BPB Publications, ISBN:9788176567813 5. UNIX and Shell Programming, B.A. Forouzan & F. Gilberg, Cengage Learning India, ISBN:9788131508050 6. Linux Command Line and Shell Scripting Bible, Richard Blum and Christine Bresnahan, Wiley India Pvt. Ltd., ISBN:9788126562169 7. How Linux Works: What Every Superuser Should Know, Brian Ward, No Starch Press, ISBN:9781593275679 8. The Linux Programming Interface, Michael Kerrisk, No Starch Press, ISBN:9781593272203 9. Linux Pocket Guide, Daniel J. Barrett, O'Reilly Media, ISBN:9781491927571 10. UNIX and Linux System Administration Handbook, Evi Nemeth, Garth Snyder, Trent R. Hein, Ben Whaley, Dan Mackin, Pearson Education, ISBN:9780134277554
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment, Unit tests. - Practical exam, viva-voce, E-Journal 50% External assessment. - Written Theory exam - Practical Exam, viva-voce

Course Code: 502
Course Title: Network Technology

Course Code	502
Course Title	Network Technology (Minor-5)
Credits	4
Course Category	Minor Course (Minor-05)
Level of Course	200-299 (Intermediate Level Course)
Teaching per Week	4 Hours
Minimum Hours per Semester	60 hours of Theory (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	To provide students with a foundational understanding of computer networks, covering basic concepts, architectures, protocols, and services. It aims to equip learners with the knowledge of both traditional and emerging network technologies, including Internet, Intranet, and Mobile Ad hoc Networks (MANET), essential for careers in Computer and IT industries.
Course Objective	1) To introduce students to the fundamental concepts and types of computer networks and topologies. 2) To explain the architecture and functioning of the Internet and Intranet, including various networking devices and media. 3) To explore the structure and functions of the OSI model and important network protocols. 4) To provide knowledge of modern networking trends such as Mobile Ad hoc Networks (MANET), VANET, FANET, and SPANC. 5) To demonstrate the working of application layer services such as email communication and web access through case studies.
Pre-requisite	Learner should have a basic understanding of computer fundamentals and operating systems. Familiarity with hardware components and general internet usage will be beneficial for better comprehension of networking concepts.
Course Outcomes	**CO1** (Remembering & Understanding)**:** Identify and describe types of computer networks, topologies, and related terminologies. **CO2** (Understanding & Applying)**:** Explain the working of Internet and Intranet and identify common networking devices and cables. **CO3** (Understanding & Applying)**:** Describe Mobile Ad hoc Networks (MANET, VANET, SPANC, FANET) and explain the OSI model and its layers. **CO4** (Applying): Apply knowledge of networking protocols, data packets, and addressing schemes (IP, HTTP, HTTPS) in basic scenarios. **CO5** (Analyzing): Analyze the role of application layer services in email communication and URL structure. **CO6** (Evaluating & Creating): Evaluate how different network protocols function across layers and create logical interpretations of data flow in web and email transactions.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■							
CO2		■		■				
CO3	■						■	
CO4	■	■	■		■			
CO5					■	■	■	
CO6	■				■			■

Course Content	**Unit-1: Introduction to Network** 1.1 Basics of network 1.1.1 Types of networks 1.1.2 Different topologies (Bus, ring, star, mesh, tree) 1.2 Types of networks (LAN, MAN, WAN) 1.3 Terminologies (Intranet, Internet, Unicast, Broadcast, Multicast) **Unit-2: Internet and Intranet** 2.1 Concepts of Internet and Intranet 2.1.1 Working of Internet and its architecture 2.1.2 Working of Intranet and its architecture

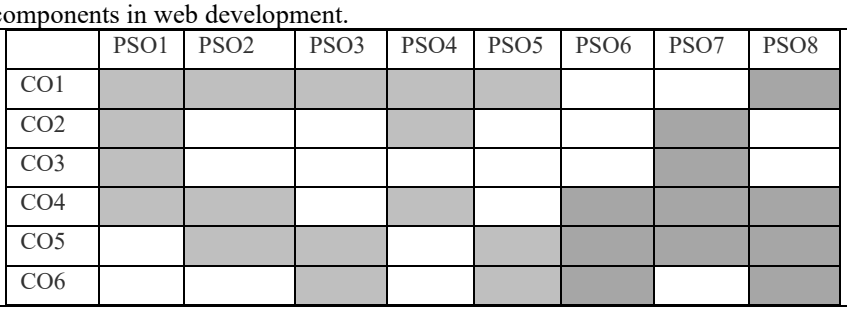
	2.1.3 Network Devices terminologies: Hub, modem, switch, Routers, Gateways, Access point 2.2 Types of Cables: co-axial, UTP, Fiber Optic cable **Unit-3: Mobile Ad hoc network** 3.1 Concepts and types of MANET (Mobile Ad hoc network) 3.1.1 VANET (Vehicular Ad hoc Network) 3.1.2 Smart phone Ad hoc Network (SPANC) 3.1.3 Flying Ad hoc network (FANET) 3.2 concepts of OSI(Open Source Interconnection) layers 3.2.1 types of layers 3.2.2 Introduction of OSI Layers and their purpose: Physical layer, Data link layer and Network Layer, Transport layer and Session Layer. 3.3 Important protocols of Network layers 3.3.1 Concepts of Data packets and Datagram 3.3.2 Presentation layer protocols and their purpose: 3.3.2.1 SSL, HTTP, FTP, Telnet 3.3 Concepts of IP address 3.4 Difference between http and https **Unit-4: Mail Services** 4.1 Application Layer services: 4.1.1 concepts of email 4.1.2 working of email account and services 4.1.3 URL and URL types (Absolute, Relative) 4.2 Case study of email: 4.2.1 From sender to receiver (Mailer, Mail Server, Mailbox) 4.2.2 Functionality and use of protocols at different layers 4.3 Case study of locating Website: 4.3.1 URL and locating URL 4.3.2 Steps and protocols involved in accessing URL 4.3.3 Concepts of search engine and purpose.
Reference Books	1. Computer Networks**,** Andrew S. Tanenbaum, Pearson, ISBN: 9780132126953 2. Computer Networking: A Top-Down Approach, James F. Kurose & Keith W. Ross, Pearson, ISBN: 9780133594140 3. Data Communications and Networking, Behrouz A. Forouzan, McGraw-Hill Education, ISBN: 9780071326285 4. Computer Networking: Principles, Protocols and Practice, Olivier Bonaventure, Self-published, ISBN: 9780994000403 5. Computer Networks: A Systems Approach, Larry L. Peterson & Bruce S. Davie, Elsevier, ISBN: 9780123850591 6. Networking: A Beginner's Guide, Bruce Hallberg, McGraw-Hill Education, ISBN: 9780072226786 7. Data and Computer Communications, William Stallings, Pearson, ISBN: 9780133506488 8. Computer Networks and Internets, Douglas E. Comer, Pearson, ISBN: 9780136067416 9. Network Warrior, Gary A. Donahue, O'Reilly Media, ISBN: 9781449387866 10. High-Performance Browser Networking, Ilya Grigorik, O'Reilly Media, ISBN: 9781449344760
Teaching Methodology	Class Work, Discussion, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Class attendance, class assignment, home assignment, Unit Tests. 50% External assessment. - Theory/Written examination

[Subject Code for Theory- 2511000905011001]

[Subject Code for Practical-2511000905011002]

Course Code: 503-01

Course Title: Advance Web Designing

Course Code	503-01
Course Title	Advance Web Designing (Major-11-01)
Credits	4
Course Category	Major Course
Level of Course	400-499 (Advance Level)
Teaching per week	2 Hours Theory + 4 Hours of Lab/interactive Project work.
Minimum Hours per Semester	90 Hours (30 Hours Theory + 60 Hours of Project work (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Cognitive Skills of the Course	Understand the technical foundations, as well as the non-programming / administrative skills needed to be a successful web developer. This course reveals the reasons why a truly successful website developer does more than write code. The course deals with both the Frontend (client-side) and Backend (server-side) of a tech product. This course deals with designing of websites and building the Applications.
Course Objective	The students will learn the whole React WebApp building process, from pc to the server. They will work with NoSQL databases. They will learn the whole process of building your App using React.js. At the end of the course, they will develop modern, complex, responsive and scalable web applications with Angular.
Pre-requisite	Paper-305-01 (Web Designing -I) in Semester-3. Paper-405-01 (Web Designing -II -2) in Semester-4.
Course Outcomes	**CO1** (Understanding)**:** Understand core concepts of web development and their applications in modern digital environments. **CO2** (Understanding & Applying)**:** Identify career relevance of web technologies in development, design, and entrepreneurship. **CO3** (Applying)**:** Apply knowledge through hands-on exercises to build interactive and functional websites. **CO4** (Analyzing)**:** Analyze user and system requirements to plan and structure effective web solutions. **CO5** (Creating)**:** Develop responsive, scalable, and modern websites using appropriate design and coding practices. **CO6** (Understanding & Applying)**:** Understand and implement key client-side and server-side components in web development.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	
Course Content	**Unit-1: Concepts of NoSQL: MongoDB** 1.1 concepts of NoSQL. Advantages and features. 1.1.1 MongoDB Datatypes (String, Integer, Boolean, Double, Arrays, Objects) 1.1.2 Database creation and dropping database 1.2 create and Drop collections 1.3 CRUD operations (Insert, update, delete, find, Query and Projection operators) 1.4 Operators (Projection, update, limit(), sort()) and Aggregation commands **Unit-2: Fundamentals of React.js** 2.1 Overview of React 2.1.1 Concepts of React. 2.1.2 Using React with HTML 2.1.3 React Interactive components: Components within components and Files 2.1.3 Passing data through Props 2.2 Class components

	2.2.1 React class and class components 2.2.2 Conditional statements, Operators, Lists 2.2.3 React Events: Adding events, Passing arguments, Event objects 2.3 Forms: (Adding forms, Handling forms, Submitting forms) 2.3.1 event.target.name and event.Target.event, React Memo 2.3.2 Components (TextArea, Drop down list (SELECT)) 2.4 Hooks: Concepts and Advantages 2.4.1 useState, useEffect, useContext 2.4.2 useRef, useReducer, useCallback, useMemo 2.4.3 Hook: Building custom hook, advantages and use **Unit-3: Fundamentals of Angular** 3.1 Concepts and Characteristics of Angular 3.1.1 Key Concepts 3.1.1.1 TypeScript Overview, Component-based Architecture 3.1.1.2 Modules, Services, Dependency Injection 3.2 Routing and Navigation3 3.2.1 Setting up Development Environment, Installing Node.js and Angular CLI, Creating and Running Angular Projects, Project Structure and Angular Workspace 3.3 Angular Core Features 3.3.1 Angular Components, Creating Components (@Component) 3.3.2 Component Lifecycle Hooks 3.4 Component Communication (Input, Output, EventEmitter) 3.4.1 Angular Directives, Structural Directives: *ngIf, *ngFor, *ngSwitch 3.4.2 Attribute Directives: ngClass, ngStyle 3.5 Custom Directives 3.5.1 Angular Data Binding 3.5.2 Interpolation, Property Binding, Event Binding, Two-way Binding with [(ngModel)] 3.6 Angular Pipes (Filters in Angular) 3.6.1 Built-in Pipes: uppercase, lowercase, currency, date, percent, titlecase, slice, Creating Custom Pipes 3.7 Angular Forms (Template-driven Forms, Reactive Forms, Form Validation) 3.8 Angular Services and Dependency Injection 3.8.1 Creating and Injecting Services, Using HttpClient to call REST APIs 3.8.2 Observables with RxJS **Unit-4 : Indian knowledge system of Mathematics :** 4.1 Ancient Indian Arithmetic from Lilavati Samhita by Bhaskarachary-I: 4.1.1 Arithmetic rule : Sutra (Verse 1) 4.1.2 Multiplication of Large Numbers: Sutra (Verse 5) 4.1.3 Division: Sutra (Verse 8): 4.2 Ancient Algebra and Geometry operations from Lilavati Samhita: 4.2.1 Algebra : Sutra (Verse 13) 4.2.2 Geometric Relationships: Sutra (Verse 17) 4.2.3 Understanding Lilavati Samhita theorem later taught as Pythagorean theorem (Geometry): Sutra (Verse 23) [Implementation of all sutras in computer Lab. Using C / Python / Any other Prog. Laguage.] [Project development will be based on Unit-1 to Unit-3]
Reference Books	1. Web Development with Node and Express, Ethan Brown, O'Reilly Media, Inc., ISBN: 978-1-491-94930-6

	2. Node.js, MongoDB, React, React Native Full-Stack Fundamentals and Beyond, Eric Bush, Blue Sky Productions Inc., ISBN: 978-0-9971966-8-9 3. MongoDB Fundamentals: A hands-on guide to using MongoDB and Atlas in the real world, Amit Phaltankar, Juned Ahsan, Michael Harrison, Liviu Nedov , ISBN:978-1-83921-064-8 4. Sams Teach Yourself NoSQL with MongoDB in 24 Hours, Pearson Education ISBN-13: 9780672337130 5. MongoDB Basics, David Hows, Peter Membrey, Eelco Plugge, Apress, ISBN-13 (electronic): ISBN:978-1-4842-0895-3 6. Fullstack React: The Complete Guide to ReactJS and Friends, Anthony Accomazzo, Lean Publishing, Ari Learner, Clay Allsopp, David Guttman, Tyler McGinnis, Nate Murray, 7. The Road to React: Your journey to master React.js in JavaScript, by Robin Wieruch 8. Beginning React Native with Hooks, Greg Lim 9. Full-Stack React Projects: Learn MERN stack development by building modern web apps using MongoDB, Express, React, and Node.js, 2nd Edition 10. Angular From Theory To Practice, Asim Hussain, Version 1.2.0, 2017-11-24 11. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, O'Reilly Media, Inc. 12. Mastering Web Application Development with AngularJS, Pawel Kozlowski Peter and Bacon Darwin, Packt Publishing
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments, Practical implementation, Application development, Project development
Evaluation Method	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- 2511000905011003]
[Subject code for Practical-2511000905011004]

Course Code: 503-02

Course Title: Advance Mobile Technology - I

Course Code	503-02
Course Title	Advance Mobile Technology-I (Major-11-02)
Credits	4
Course Category	Major Course
Level of Course	400-499 (Advance Level)
Teaching per Week	2 Hours Theory + 4 Hours of Interactive Project work
Minimum Hours per Semester	90 Hours (30 Hours Theory + 60 Hours of Project work (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	The course is aim to give knowledge about Kotlin, object-oriented concept of Kotlin. This course also enhances knowledge of JSON, Intent and storing data into database. It also aims to understand concepts accessing current location and device camera.
Course Objective	1. To build proficiency in Kotlin programming for mobile app development using modern syntax and features. 2. To implement object-oriented concepts in Kotlin for scalable and maintainable Android applications. 3. To develop multi-screen Android apps using intents for seamless data exchange and activity management. 4. To integrate JSON data handling for efficient communication and data storage in mobile apps. 5. To enable persistent data storage and interaction with device features like GPS and camera in Android applications.
Pre-requisite	Paper-305-02 (Mobile Application Development -1) in Semester-3. Paper-405-02 (Mobile Application Development -2) in Semester-4.
Course Outcomes	**CO1:** Understand Kotlin Programming Fundamentals: Explain the basic concepts of Kotlin programming, including variables, data types, conditional statements, arrays, lists, and loops. **CO2:** Develop Kotlin-based programs using object-oriented features such as classes, constructors, inheritance, abstract classes, interfaces, and visibility modifiers. **CO3:** Analyze Data Structures and Control Flow in Kotlin: Examine how different data structures and control statements can be used to optimize logic and performance in Kotlin applications. **CO4:** Utilize JSON for Data Representation and Parsing: Implement JSON structures to represent, parse, and manage data within Android applications. **CO5:** Design Multi-Screen Android Applications Using Intents: Create multi-activity Android applications that use explicit and implicit intents to transfer data, interact with device features, and integrate with other applications. **CO6:** Develop Android Applications with Persistent Storage and Device Capabilities: Build Android applications that store and manage data using SQLite/MySQL databases and access device functionalities like location and camera.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	
Course Content	**Unit-1 : Introduction to Kotlin** 1.1 Concepts of Kotlin and its introduction. 1.2 Downloading IntelliJ and its settings. 1.3 Variables: 1.3.1 val vs. var, Byte, Short, Int, Long, Float, Double, Boolean, and Char. 1.3.2 String, Nullable variables. 1.4 Conditional statements: if and when. Difference between if and when. 1.4.1 ranges, types, values of function calls

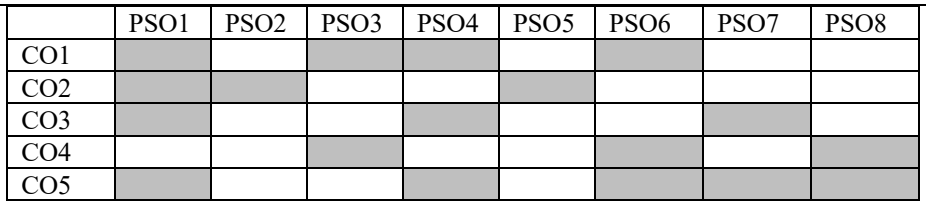
	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

	1.5 Arrays and Lists: 1.5.1 create, modify, and access arrays 1.5.2 creating, modifying, and accessing lists 1.6 Loops (Iterative statements) 1.6.1 for and while loop. 1.6.2 break, continue and return **Unit-2: OOPS Concepts with Kotlin** 2.1 Object oriented concepts: 2.1.1 Properties, methods and basics of objects and classes in Kotlin 2.1.2 Named parameters, constructors. 2.2 Open classes and inheritance. 2.2.1 Named parameters and Default values 2.2.2 Open and Abstract 2.2.3 Interface 2.2.4 Getters and Setters 2.2.5 Visibility of properties, methods and class **Unit-3:JSON, Intent and Storing Android Application data using Database** [Any open-source database can be used. MySQL or SQLite is preferable] 3.1 Concept and Features of JSON 3.1.1 Similarities and difference among JSON and XML 3.1.2 JSON objects (with string and Numbers)) 3.1.3 JSON Arrays and their examples: 3.1.4 Array of string, Array of Numbers, Array of Booleans, Array of objects, Multi-Dimensional Arrays 3.1.5 JSON comments 3.2 Building multi-screen apps: 3.2.1 Intents and their applications, types of intents, 3.2.2 Data exchange from one activity to another using intent 3.3 Working with implicit intents: 3.3.1 Opening web URLs through app 3.3.2 Sharing media from our app to other apps 3.4 Storing Android application data using Database 3.4.1 Connecting Android based App with Database 3.4.2 CRUD operations (Create, Read, Update, Delete) using APP: 3.4.3 Create and insert data to the database 3.4.4 Read, Update and Delete data from database. 3.5 Accessing user's current location 3.6 Capturing image using device camera (ACTION_IMAGE_CAPTURE Intent of MediaStore class.) **Unit-4 : Indian knowledge system of Mathematics :** 4.3 Ancient Indian Arithmetic from Lilavati Samhita by Bhaskarachary-I: 4.3.1 Arithmetic rule : Sutra (Verse 1) 4.3.2 Multiplication of Large Numbers: Sutra (Verse 5) 4.3.3 Division: Sutra (Verse 8): 4.4 Ancient Algebra and Geometry operations from Lilavati Samhita: 4.4.1 Algebra : Sutra (Verse 13) 4.4.2 Geometric Relationships: Sutra (Verse 17) 4.4.3 Understanding Lilavati Samhita theorem later taught as Pythagorean theorem (Geometry): Sutra (Verse 23) [Implementation of all sutras in computer Lab. Using C / Python / Any other Prog. Language.] [Project development will be based on Unit-1 to Unit-3]
Reference Books	1. Android Studio 4.0 Development Essentials – Kotlin Edition, Author – Neil Smyth, Publisher: Payload Media, ISBN – 13: 978 – 1 – 951442 – 19 – 4 2. Android Programming with Kotlin for Beginners, Author – John Horton, Publisher: Packt Publication, ISBN – 13: 978 – 1789615401 3. Mastering Kotlin - Learn advanced Kotlin programming techniques to build apps for Android, iOS, and the web, Author – Nate Ebel, Publisher: Packt Publication, ISBN – 13: 978 – 1838555726 4. Kotlin in Action 1st Edition, Author – Dmitry Jemerov & Sevtlana Isakova, Publisher: Manning Publications Co., ISBN – 13: 978 – 1617293290 5. Android Studio 3.0 Development Essentials: Android 8 Edition Author – Neil Smyth, Publisher: Payload Media, ISBN – 13: 978 – 1977540096

	6. Learn Android Studio 3 with Kotlin – Efficient android App Development, Author – Ted Hagos, Publisher: Apress, ISBN - 978-1-4842-3906-3 7. Kotlin In-Depth: A Guide to a Multipurpose Programming Language for Server-Side, Front-End, Android, and Multiplatform Mobile Author – Aleksei Sedunov, Publisher : BPB, ISBN – 13 - 978-9391030636 8. Android App Development with Kotlin Author – Hardik Trivedi, Publisher BPB, ISBN – 13 - 9789389423501 9. JSON Quick Syntax Reference, Author – Wallace Jackson, Publisher: Apress, ISBN: 9781484218631 10. Beginning Json, Author – Ben Smith, Publisher – Apress, ISBN: 9781484240427
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments, Practical implementation, Application development, Project development. Students will develop a project based on the course content during the semester. The project exam will be conducted at the end of the semester.
Evaluation Method	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-2511000905022001]
[Subject code for Practical-2511000905022002]

Course Code: 504
Course Title: Web Framework and Services

Course Code	504
Course Title	Web Framework and Services (Major-12)
Credits	4
Course Category	Major Course
Level of Course	400-499 (Advance Level)
Teaching per Week	2 Hours Theory + 4 Hours of Applied Project work
Minimum Hours per Semester	90 Hrs. (30 Hours Theory + 60 Hours Project work/Applied work)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	The purpose of this course is to equip students with practical skills in developing dynamic, data-driven web applications using PHP and modern web frameworks like CodeIgniter and Laravel. It aims to build a strong foundation in server-side scripting, MVC architecture, database integration, and RESTful services to prepare students for real-world web development.
Course Objective	1. To impart foundational knowledge of PHP scripting language and its role in developing server-side components for web applications. 2. To enable students to apply MVC architecture using frameworks like CodeIgniter and Laravel for structured web application development. 3. To train students in database connectivity and operations, including creating, reading, updating, and deleting records using PHP and MySQL. 4. To develop proficiency in handling user input, sessions, forms, cookies, and file uploads securely in web applications. 5. To introduce RESTful API development and modern integration techniques for building interactive and scalable web solutions.
Pre-requisite	Basic knowledge of HTML, CSS, JavaScript, programming fundamentals, databases, HTTP concepts, and file management using a code editor.
Course Outcome:	**CO1:** Remembering: *Describe* the syntax, features, and core concepts of PHP including data types, control structures, and functions. **CO2:** Applying: *Demonstrate* the ability to manage form data, sessions, cookies, and file handling using PHP for interactive web applications. **CO3:** Creating: *Develop* database-driven web applications by integrating PHP with MySQL using CRUD operations and AJAX. **CO4:** Applying: *Implement* MVC-based web development using CodeIgniter and Laravel frameworks with appropriate routing, controllers, and views. **CO5:** Creating: *Construct* RESTful APIs and secure, scalable web services using Laravel's built-in tools and features.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	
Course Content	**Unit 1: Core PHP Programming** [Php ver.8.x is recommended] 1.1 Introduction to PHP 1.1.1 Understanding the role of PHP in server-side web development 1.1.2 History and evolution of PHP 1.1.3 Installation and configuration using XAMPP/WAMP 1.1.4 Setting up the development environment using Visual Studio Code 1.2 Basic PHP Syntax and Variables 1.2.1 PHP script structure and tags 1.2.2 Declaring and using variables and constants 1.2.3 Using echo and print statements 1.2.4 Comments and formatting conventions

	1.3 Data Types and Operators 1.3.1 Primitive types: string, int, float, boolean 1.3.2 Arrays and objects 1.3.3 Type casting and type juggling 1.3.4 Operators: arithmetic, logical, comparison, assignment 1.4 Control Structures and Arrays 1.4.1 Conditional statements: if, else, elseif, switch 1.4.2 Looping constructs: for, while, do-while, foreach 1.4.3 Arrays: indexed, associative, multidimensional 1.4.4 Array operations: sort(), asort(), ksort(), array_merge() 1.5 Functions and Form Handling 1.5.1 Creating and invoking user-defined functions 1.5.2 Function parameters and return values 1.5.3 Variable scope: global vs. local 1.5.4 Handling forms with $_GET and $_POST 1.5.5 Basic input validation and sanitization **Unit 2: Advanced PHP and File Management** 2.1 File Handling and Directories 2.1.1 Including files using include and require 2.1.2 File operations: fopen(), fread(), fwrite(), fclose() 2.1.3 File upload using $_FILES and move_uploaded_file() 2.1.4 File download using PHP headers 2.1.5 Directory operations: opendir(), readdir(), mkdir(), rmdir() 2.2 Forms, Filters, and JSON 2.2.1 Designing and handling HTML forms 2.2.2 Server-side validation techniques 2.2.3 PHP filters: filter_var() and constants 2.2.4 Parsing and generating JSON with json_encode() and json_decode() 2.3 Cookies, Sessions, and Emails 2.3.1 Creating and accessing cookies using setcookie() and $_COOKIE 2.3.2 Session management with session_start() and $_SESSION 2.3.3 Sending emails using the mail() function 2.3.4 Email formatting: headers, subject, attachments 2.4 OOP and Exception Handling in PHP 2.4.1 Creating classes and objects 2.4.2 Using constructors and property visibility 2.4.3 Inheritance and method overriding 2.4.4 Exception handling: try, catch, finally, throw 2.4.5 Input validation using regular expressions **Unit 3: Database Interaction and CodeIgniter Framework** [Codeigniter ver.4.4 or higher is recommended] 3.1 PHP with MySQL/MongoDB 3.1.1 Connecting to databases using mysqli or PDO 3.1.2 Creating databases and tables 3.1.3 Executing CRUD operations: INSERT, SELECT, UPDATE, DELETE 3.1.4 Using clauses: WHERE, ORDER BY, LIMIT 3.2 AJAX for Backend Integration 3.2.1 Introduction to AJAX and asynchronous requests 3.2.2 Sending AJAX requests to PHP 3.2.3 Real-time search functionality 3.2.4 JSON data exchange with JavaScript and PHP 3.3 CodeIgniter Introduction 3.3.1 Installing and configuring CodeIgniter (CI4) 3.3.2 Understanding MVC architecture in CodeIgniter 3.3.3 Creating models, views, and controllers 3.3.4 URL routing and default controller setup 3.4 Core Features in CodeIgniter 3.4.1 Form validation using CI validation library 3.4.2 Session management and flashdata 3.4.3 Handling file uploads 3.4.4 Loading helpers and libraries **Unit-4 : Indian knowledge system on Astronomy :** 4.1 Ancient Indian Astronomy from Suryasidhdhanta by Aryabhatt:

	4.1.1 Motion of the Earth: Sutra (Verse 3.9) 4.1.2 Length of the Year : Sutra (Verse 3.10) 4.1.3 Lunar and Solar Eclipses: Sutra (Verse 4.5) 4.1.4 The Motion of Planets : Sutra (Verse 1.13) 4.1.5 The Influence of the Sun on Planetary Motion: Sutra (Verse 2.12) 4.1.6 Zodiac and Signs: Sutra (Verse 1.5) 4.1.7 Solar System: Sutra (Verse 1.15) 4.1.8 Speed of Planets: Sutra (Verse 6.5) 4.1.9 Planetary Distances from earth to moon: Sutra (Verse 7.8) 4.1.10 Latitude and Longitude of Planets : Sutra (Verse 8.12) 4.2 Ancient Indian Astronomy by Varahmihir : 4.2.1 On Lunar Phases : Sutra (Verse 2.10) 4.2.2 On the Movements of the Stars : Sutra (Verse 2.18) 4.2.3 Ecliptic Latitude and Longitude 4.2.4 Sidereal and Tropical Years 4.2.5 Planetary Conjunctions and Aspects [Unit-4: Students will prepare a presentation on assigned topics and prepare a detailed report on given topic. Students will present the topic and submit the report as part of their final evaluation.] [Project development will be based on Unit-1 to Unit-3]
Reference Books	
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. : - Attendance, Class and home Assignment, Unit tests. - Practical work, Application development, viva-voce 50% External assessment : - Theory/Written examination - Project examination, Presentation/viva-voce

1	PHP and MySQL Web Development, Fifth Edition	Luke Welling, Laura Thomson	Pearson Education	ISBN: 9789332582736
2	PHP and MySQL Web Development: A Beginner's Guide	Marty Matthews	McGraw-Hill Education	ISBN: 9780071837316
3	Professional CodeIgniter®	Thomas Myer	Wrox	ISBN: 9780470282458
4	PHP and MySQL® Web Development, Fourth Edition	Luke Welling, Laura Thomson	Addison-Wesley Professional	ISBN: 9780672329166
5	PHP Master - Write Cutting Edge Code	Davey Shafik, Lorna Mitchell, Matthew Turland	SitePoint	ISBN: 9780987090870
6	Laravel: Up & Running: A Framework for Building Modern PHP Apps	Matt Stauffer	O'Reilly Media	ISBN: 9781492041212
7	Ultimate Laravel for Modern Web Development	Drishti Jain	Orange Education Pvt Ltd	ISBN: Not Available
8	Building Real-Time Marvels with Laravel	Sivaraj Selvaraj	Apress	ISBN: 9781484290196
9	PHP and MySQL Web Development, Third Edition	Luke Welling, Laura Thomson	Sams Publishing	ISBN: 9780672326721
10	Web Application Development with PHP 4.0	Tobias Ratschiller, Till Gerken	Sams Publishing	ISBN: 9780735709973

[Subject code for Theory-2511000905033001]
[Subject code for Practical-2511000905033002]

Course Code: 505

Course Title: .Net Technology

Course Code	505
Course Title	.Net Technology (Major-13)
Credits	4
Course Category	Major Course
Level of Course	400-499 (Advance Level)
Teaching Hours	90 Hrs. (30 Hours Theory + 60 Hours Applied/Practical work)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	The purpose of this course is to introduce students to ASP.NET, a robust server-side web development framework by Microsoft, enabling them to build dynamic, interactive, and data-driven web applications. It aims to provide foundational knowledge of web forms, server controls, state management, database access using ADO.NET, and basic web services, preparing students for real-world enterprise-level web development.
Course Objective	1. To introduce the fundamentals of ASP.NET and the .NET framework for building dynamic web applications. 2. To develop skills in using web controls, event-driven programming, and server-side scripting to design interactive web pages. 3. To provide knowledge of ADO.NET for database connectivity and operations such as data retrieval, insertion, and updates. 4. To enable students to manage user sessions, cookies, query strings, and application states effectively. 5. To familiarize students with configuration files and basic web service development for client-server communication.
Pre-requisite	Basic understanding of HTML, CSS, and programming fundamentals using C# or a similar language, along with familiarity with web concepts like HTTP and client-server architecture.
Course Outcomes	**CO1:** Remembering**:** *Describe* the architecture of ASP.NET and its role within the .NET framework. **CO2:** Understanding: Explain the use of server controls, event handling, and page life cycle in creating interactive web forms. **CO3:** Applying: Apply ADO.NET components to establish database connectivity and perform CRUD operations. **CO4:** Creating**:** Develop web applications using state management techniques like sessions, cookies, and query strings. **CO5:** Build simple web services and configure ASP.NET applications using Web.config and navigation controls.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	
Course Content	**Unit-1. Introduction to ASP.NET** 1.1 Concepts of ASP.NET 1.2 .Net framework 1.3 Compile Code 1.3.1 Code Behind and Inline Coding 1.4 The Common Language Runtime 1.5 Event Driven Programming 1.6 Server Controls (TextBox, Button, CheckBox, Image Map, Label, LinkButton, RadioButton) 1.7 Post Back 1.8 Data Binding 1.8.1 Grid View 1.8.2 List Box

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

	1.8.3 Data binding Events 1.8.4 Repeater 1.8.5 Form View 1.9 Validation Controls , Login Control 1.10 Master Pages, CSS & Themes. **Unit 2: Database Access And Client-Server Communications** 2.1 Introduction about ADO.NET 2.2 Introduction about Provider, Adapter, Reader, Command Builder 2.3 Database Access using ADO.NET 2.4 Communications with Web Browser 2.5 Response Object 2.6 Cookies 2.7 Query String 2.8 Session and State Management **Unit 3: Advance ASP.NET** 3.1 Web.config 3.2 Sitemappath Server Control 3.3 Web Services 3.3.1 Basics of Web Services 3.3.2 Interacting with web services **Unit-4: Principles of Mathematics, Geometry and Triangles in Ancient Indian Knowledge*:*** 4.1 Principles of Mathematics by Aryabhatt. 4.1.1 Principles of Mathematics: Sutra (Verse 1.1) 4.1.2 Value of Pi: Sutra (Verse 3.1) 4.1.3 Sine Function: Sutra (Verse 3.2) 4.1.4 Trigonometric Functions: Sutra (Verse 3.11) 4.2 Ancient knowledge From the Shulba Sutras (a part of Vedic texts): 4.2.1 Construction of a square 4.2.2 The original version of current Pythagorean theorem (Sulbha Sutra 1.2) 4.2.3 Area of Circle 4.2.4 Area of Triangle 4.3 Ancient knowledge by Brahmgupta : 4.3.1 Area of Cyclic Quadrilateral. (Sutra(vere-10)) [Implementation of all sutras of Unit-4 in computer Lab. Using C / Python / Any Prog. Language] [Practical exam will be based on Unit-1 to Unit-3]
Reference Books	1. ASP.NET – A Beginner's Guide by Dave Mercer – TMH 2. ASP.NET Bible – Mridula Parihar et. Al. – Wiley India 3. Programming ASP.NET 4 – Dino Esposito 4. Professional ADO.NET – Bipin Joshi, Donny Mack, Doug Seven, Fabio Claudio Ferracchiati, Jan D Narkiewiez - Wrox 5. ASP.NET for Developers – Amundsen 6. The Complete Reference ASP.NET -Matthew MacDonald –TMH 7. ASP.NET – Black Book – dreamTech 8. Beginning ASP.NET 3.5 in C# and VB –Wrox-Imar Spaanjaars 9. The Essential of Vedic Mathematics, Rajesh Kumar Thakur, Rupa Publications, New Delhi 2019. 10. Vedic Mathematics: Sixteen Simple Mathematical formulae from the Vedas, Jagadguru Swami Sri Bharati Krishna Trithaji, Motilal Banarasidas, New Delhi 2015.
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments, Project development, Application Development
Evaluation Method	50% Internal assessment. : - Attendance, Class and home Assignment, - Practical/Applied work, Practical journal, Unit test and viva-voce 50% External assessment : - Theory/Written examination - Practical examination, viva-voce

Course code: 506
Course Title: Skill Enhancement Course (SEC-05)

Course Code	506
Course Title	Skill Enhancement Course - V (SEC – 05)
Credit	2
Category of Course	Skill Enhancement Course
Level of Course	200-299 (Intermediate)
Teaching per Week	2 Hrs (Any or Combination of Theory/Practical/Fieldwork/Internship/Project)
Minimum weeks per Semester	15 (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	- As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Skill Enhancement Course out of the choices given by the college/institute. - It will be mandatory for the student to opt minimum one 2-credit Skill Enhancement Course from the course baskets of Skill Enhancement courses approved by the university or from any recognized MOOC or from recognised university through online mode subject to transfer of credit through ABC during semester-1 to semester-5. - The student can start an alternative career in the field by obtaining higher degree of knowledge in the area. - It's aimed at imparting practical skills, embedded internship, hands-on training, soft skills, life skills, such approved online courses etc. to enhance the employability of students. This may also include courses as per the need of new evolving technology.
Course Objective	Obtaining skill in particular field along with the regular curriculum of the selected program is essential. It not only enhance the skill but also provide an opportunity to develop skill in particular area where one can pursue career in future. Skill enhancement provides the opportunity and knowledge for an individual to develop and strengthen the necessary skills to gain, maintain, and advance in a chosen area. Skill enhancement programs are focused around training that combines the best practices from varieties of areas as described in NEP-2020 SOP by Gujarat State Higher education Department's SOP. Skill enhancement or training typically uses a combination of cognitive and behaviour problem solving approaches, both of which are used to strengthen a person's positive skill develop.
Pre-requisite	-
Course Content and Implementation road-map.	(i) University has categorised and prepared the basket of the courses including approved online courses that can be offered as Skill Enhancement Course. (ii) The institute/college/department can design and implement skill enhancement course by getting approval from the relevant apex body of the university considering the SOP of the certificate course policies of the University. (iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students. (iv) The students can select any of the courses offered by the institute/college/department from the given choices and enrol for the course. (v) The institute/college/department will arrange appropriate resource person(s) for the course. (vi) The course evaluation will be taken place at the college/institute/department level based on the nature of the course. (vii) The institute/college/department will assess the student based on the nature of the course. The student will be granted the credits on successful completion of the course.
Reference Books	- The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses. - Minimum five copies of relevant topics are recommended to keep in the library.
Teaching Methodology	Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.

Evaluation Method	50% Internal assessment. 50% External assessment. (Evaluation and Assessment will be carried out based on the nature of the course. On successful completion of the course, the student will be granted 2 credits.)

University Examinations

Course Code	Course	Exam Component	Max. Marks	Duration
501 (Minor-4)	Linux Operating System (LOS)	**Theory**	**25**	**1 Hours**
		Practical	**25**	**2 Hours**
502 (Minor-5)	Network Technology	**Theory**	**50**	**2 Hours**
503-01 (Major-11-01) **OR** 503-02 (Major-11-02)	Advance Web Designing **OR** Advanced Mobile Technology	**Theory**	**25**	**1 Hours**
		Project Presentation	**25**	**-**
504 (Major-12)	Web Framework and Services	**Theory**	**25**	**1 Hours**
		Project Presentation	**25**	**-**
505 (Major-13)	.NET Technology	**Theory**	**25**	**1 Hours**
		Practical	**25**	**2 Hours**
506 (SEC-05)	Skill Enhancement Course	**Theory/Practical**	**25**	Evaluation and Assessment will be carried out based on the nature of the course opted by Student.

Internship: Student willing to exit the program at the end of the two semesters and to avail the Certificate in Computer Application or exit the program at the end of the first four semesters and to avail the Diploma in Computer Application, it is essential to acquire four credits from internship. A key aspect of the internship is induction into actual work situations. Internships involve working with local industry, government or private organizations, business organizations, artists, crafts persons, and similar entities to provide opportunities for students to actively engage in on-site experiential learning. In option to these internships, the student can avail such four credits by availing two 2-credit university approved courses during any of these semesters. The student is required to enroll and avail these 4-credits and produce the evidence in process to opt the multi-level exit option after successfully completion of first year (two semester) or second year(four semesters).

SEMESTER – 6

Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching per week	
					Theory	**Practical/ Fieldwork/Project/ Internship**
601-01 (Minor-6-01) OR 601-02 (Minor-6-02) OR 601-03 (Minor-6-02)	E-Commerce & Cyber Security OR Concepts of A.I. and IoT Devices OR Computer Graphics (Student will opt any one minor course from the courses listed here)	Minor Course	200-299 Intermediate level	4	4	0
602 (Major-14)	Data Analytics using Python	Major Course	400-499 Advanced Courses	4	2	4
603-01 (Major-15-01)	Fundamentals of Full stack Web Development	Major Course	400-499 Advanced Courses	4	2	4
OR						
603-02 (Major-15-02)	Advance Mobile Application Development-II	Major Course	400-499 Advanced Courses	4	2	4
604 (Major-16)	Project	Major Course	400-499 Advanced Courses	4	0	8
605	Project and Interview Presentation Soft Skills [Ability Enhancement Course] (AEC)	AEC	100-199 Foundation Course	2	0	2
606	INTERNSHIP	Internship	400-499 Advanced Course	4	-	120 hours of Supervised Applied work
Other Activities	The student is expected to participate in activities related to National Service Scheme (NCC), National Cadet Corps (NCC), adult education/literacy initiatives, mentoring school students, Elderly literacy program / Environment preservation activities and other similar activities.			-	-	-
Total				22	08	18

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
601-01 (Minor-6-01) OR 601-02 (Minor-6-02) OR 601-03 (Minor-6-02)	E-Commerce & Cyber Security OR Concepts of A.I. and IoT Devices OR Computer Graphics (Student will opt any one minor course from the courses listed here)	4	Theory/ Written :	2 Hours	50	50	100
602 (Major-14)	Data Analytics using Python**	4	Theory/Written: Practical/Project:	1 Hours 2 Hours	25 25	25 25	100
603-01 (Major-15-01) OR	Fundamentals of Full stack Web Development (Major-15-01)**	4	Theory/ Written : Practical/Project :	1 Hours 2 Hours	25 25	25 25	100
603-02 (Major-15-02)	Advance Mobile Application Development-II (Major-15-02)**						
604 (Major-16)	Project (Major-16) **	4	Project	4 Hours (In-house) + 4 Hours (External Project work)	50	50	100
605	Project and Interview Presentation Soft Skills [Ability Enhancement Course] (AEC)	2	Presentation / Seminar:	-	25	25	50
606	Internship	4	Internship Report presentation	-	50	50	100
Total		22			275	275	550

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 exceed 45 numbers.
- Practical includes Practical sessions for course-602 and course-603-01/603-02. **Minimum** 60 hours of Practical/Project hours each for course-602 and course-603-01/603-02 should be allocated per batch. Out of which 30 hours will be in supervised mode and balance hours in un-supervised mode.
- Students will create an application (in-house project) for course 602 and course-603-01/603-02 as project. Their practical/project assessment will be based on the mini-project(application) developed for the concerned courses 602 and course-603-01/603-02 in terms of demonstration, presentation and viva-voce. E-project report should be prepared by the students which must 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/project Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

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. Students can choose the courses from the pool of courses. 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.

Internship: A student who wish to exit after successfully completion of first year (Semester-1 and Semester-2) without any backlog is required to obtain Four credits at the end of the year either through the summer internship or university approved skill based certificate courses(two courses of 2-credits each or one 4-credit course). Student is required to enrol for the certificate courses separately by paying the course fees as decided by the college/institute. For summer training, the Institute/college will grant the permission and evaluate the training outcomes. Based on satisfactory completion of the summer training, the Institute head will recommend to the university to grant four credits for summer training. The Internship/summer training/skill based certificate courses will be an audit course.[The internship cost/fees will be bear by the student.]

Ability Enhancement Course (AEC): To be offered to students to achieve competency in a Modern Indian Language and English Language focused on language and communication skills. It may be a major specific course. The Credit allocated

for these courses is 10 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree programme. The courses can be selected by the college/institute from available basket of approved 2-credit certificate courses provided by the university.

Skill Enhancement Course : As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit skill enhancement course out of the choices given by the college/institute (From available basket of courses as per University norms). It will be mandatory for the student to opt minimum one 2-credit Skill enhancement course out of offered courses recognised by University during semester-1 to semester-5.

(The student need to enrol separately and pay the fees as decided by the respective institute/department)

 # Marks: : The students will enrol for the course from the given university approved list of certificate courses offered by the respective college/department. The student will select and enrol separately for any of the offered list of courses at college/department/institute and obtain respective credits. The institute will evaluate the performance (preferably continuous evolution) as per the SOP of certificate courses and on successfully completion of the course, the student will be eligible to obtain respective credits for the course. These credits will be considered and reflect in student's mark-sheet as well as in ABC(Academic Bank of Credit). These courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

[The student is required to pay separately for these courses as prescribed by the college. The college will decide the fees for these courses based on the University norms/SOP for certificate course/credit fees.]

** Major Applied Subjects: Course 602 and 603-01/603-02 are major courses consists of two components: Theory and Practical/Project. These courses are carrying 4 credits.

For Course-602 : 30 hours of Theory and 60 hours of practical work per semester are allocated.

For Course 603-01 / 603-02: 30 hours of Theory and 60 hours of practical work per semester are allocated.

Major courses carry 100 marks of exam weightage (50 theory and 50 project/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 viva-voce for course-602, course-603-01 / course-603-02 will be conducted.

External Theory and Practical/Project exam marks (25 marks each for course-602, course-603-01/603-02)

Division of marks for External Project course-602, course-603-01 / course-603-02:

Project Demonstration and presentation evaluation: 20 marks + Viva-voce: 5 Marks.

Internal and External Major-Project Presentation (Course-604) : 50 Marks (Presentation/Code explanation/project Demonstration)

Project Demonstration and presentation evaluation: 35 marks + Viva-voce: 10 Marks + Project E-Documentation : 5 Marks

Students are required to pass in both components (Theory and Practical/Project) collectively for course 602,603-01/603-02 as combined head (Theory + Practical) for each major course. It is mandatory for Students to appear for internal and external theory and practical exams for all courses. Similarly, In case, a student remain absent in any of the component of Theory or Practical of particular major subject, the student will be considered fail for that particular major subject.

[It is recommended to complete the theory exams of 601 to 603 between 10th and 15th of February. (between 10th and 15th August for Winter session].

Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2025-26)	Semester Tuition Fees : As per the norms of University Semester Laboratory Utilization fees : As per norms of University [Other one time /affiliation /exam fees, will be as per the norms of the University] [For all certificate course fees, Skill Enhancement Courses and Value Addition Courses fees will be as per the prescribed limit for per credit as per the SOP of certificate courses decided by the university.]

[Subject code-2611000906044001]

Course Code: 601-01
Course Title: E-commerce and Cyber Security

Course Code	601-01
Course Title	**E-Commerece and Cyber Security (Minor-6-01)**
Credits	4
Course Category	Minor Course
Level of Course	200-299 (Intermediate Level)
Teaching Hours	60 Hours
Minimum Hours/ Semester	60 hours of Theory (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	This course aims to introduce students to the fundamental principles of electronic commerce and essential concepts of cyber security. It prepares learners to understand online transaction models, digital payment systems, and safeguards against cyber threats.
Course Objective	1. To understand the concepts, structure, and applications of e-Commerce and m-Commerce. 2. To study the infrastructure and network components that support online commerce. 3. To learn about various electronic payment systems and associated security mechanisms. 4. To identify and analyze different types of cybercrimes and their technical aspects. 5. To comprehend basic cyber security concepts and terminologies related to internet protocols. 6. To explore common cyberattacks, vulnerabilities, and the roles of different types of hackers.
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:** Understand the fundamental concepts and framework of e-Commerce and m-Commerce. **CO2:** Explain the network infrastructure, payment methods, and associated security issues in e-Commerce. **CO3:** Identify various types of cybercrimes and their technical aspects. **CO4:** Describe key concepts, terminologies, and threats related to cyber security. **CO5:** Differentiate between types of hackers and understand common system vulnerabilities.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

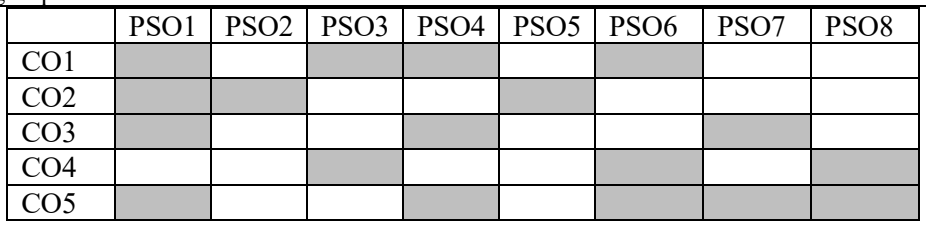
Course Content	**Unit 1: Introduction to Electronic Commerce** 1.1 Concepts of e-Commerce 1.2 Aims of e-Commerce 1.3 e-Commerce Framework 1.4 e-Commerce Consumer Applications 1.5 e-Commerce Organizational Applications 1.6 Introduction to m-Commerce

	Unit 2: Network Infrastructure of e-Com , Payment and Security: 2.1. Concepts of Information Way 2.2. Components of I-Way 2.2.1. Network Access Equipment 2.2.2. Local on-ramps 2.2.3. Global Information Distribution Network 2.3. Transaction Models 2.4 e-Commerce Payments and Security Issues 2.4.1. e-Commerce Payment Systems 2.4.2. Debit Card Based, Credit Card Based ,. Risks & EPS 2.4.3. e-Cash, e-Cheque, e-wallet 2.5. Security on Web, SSL **Unit-3: Introduction to Cyber Crimes:** 3.1 Category of Cyber Crimes 3.2 Technical Aspects of Cyber Crimes 3.2.1 Unauthorized access & Hacking 3.2.2 Trojan, Virus and Worm Attacks 3.2.3 E-Mail related Crimes: Spoofing, Spamming, Bombing 3.2.4 Denial of Service Attacks 3.2.5 Distributed Denial of Service Attack 3.3 Various crimes : 3.3.1 IPR Violations (Software piracy, Copyright Infringement, Trademarks Violations, Theft of Computer source code, Patent Violations) 3.3.2 Cyber Squatting, Cyber Smearing, Cyber Stacking 3.3.3 Financial Crimes: (Banking, credit card, Debit card related) **Unit-4: Cyber Security Fundamentals:** 4.1 Concepts of Cyber Security: 4.1.1 Types of Threats 4.1.2 Advantages of Cyber Security 4.2 Basic Terminologies: 4.2.1 IP Address, MAC Address 4.2.2 Domain name Server(DNS) 4.2.3 DHCP, Router, Bots 4.3 Common Types of Attacks: 4.3.1 Distributed Denial of Service 4.3.2 Man in the Middle, Email Attack 4.3.3 Password Attack, Malware 4.4 Hackers: 4.4.1 Various Vulnerabilities: 4.4.1.1 Injection attacks, Changes in security settings 4.4.1.2 Expouser of Sensitive Data 4.4.1.3 Breach in authentication protocol 4.4.2 Types of Hackers: White hat and Black hat [All Units carry Equal Weightage]
Reference Books	1. Frontiers of Electronic Commerce, Ravi Kalakota and Andrew Whinston, Addition Wesley 2. Electronic Commerce: A Managerial Perspective, Efraim turban, Jae Lee, David King, H. Michel Chung, Addition Wesley 3. E-Commerce: An Indian Perspective, Joseph, PHI 4. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd. 5. e-Commerce Concept, Models Strategies, G.V.S. Murthy, Himalaya Publisher 6. Cyber Crime in India, Dr M Dasgupta, Centax Publications Pvt Ltd 7. Cyber Laws and Crimes, Barkha U, Rama Mohan, Universal Law Publishing Co. Pvt Ltd. 8. Cyber Crime, Bansal S.K., A.P.H. Publishing Corporation 9. Cyber Security Understanding Cyber Crime, Computer Forensic and Legal Perspectives, Nina Godbole, Sunit Belapur, Willey India Publication

Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment. - Unit Tests 50% External assessment. - Written Theory exam

[Subject code-2611000906044002]

Course Code: 601-02
Course Title: Concepts of A.I. and IoT Devices

Course Code	601-02
Course Title	**Concepts of A.I. and IoT Devices (Minor-6-02)**
Credits	4
Course Category	Minor Course
Level of Course	200-299 (Intermediate Level)
Teaching Hours	60 Hours
Minimum Hours/ Semester	60 hours of Theory (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	The purpose of this course is to provide students with a foundational understanding of Artificial Intelligence (AI) and the role of Internet of Things (IoT) devices in enabling AI applications. It aims to introduce key concepts, tools, and real-life integrations of AI and IoT, preparing students for further learning or project-based exploration in this emerging interdisciplinary field.
Course Objective	1) To introduce the basic concepts and history of Artificial Intelligence (AI). 2) To explain key AI techniques such as search algorithms, machine learning, and expert systems. 3) To familiarize students with IoT devices and their architecture. 4) To explore how IoT devices collect and transmit data for AI applications. 5) To discuss real-world use cases integrating AI with IoT in domains like healthcare, agriculture, and smart cities. 6) To encourage understanding of the challenges and future scope of AI-enabled IoT systems.
Pre-requisite	Basic knowledge of computer fundamentals and an introductory understanding of programming or logic-building concepts is recommended. No prior experience with AI or IoT is required.
Course Outcomes	**CO-1 Remembering:** Recall and define key concepts, history, and types of Artificial Intelligence and IoT technologies. **CO-2 Understanding:** Explain the architecture, components, and connectivity methods of IoT systems used in AI applications. **CO-3 Applying:** Apply AI algorithms to process real-time data collected from IoT devices for smart decision-making. **CO-4 Analyzing:** Analyze challenges related to data quality, latency, power consumption, and security in AIoT systems. **CO-5 Creating:** Design and present innovative AIoT solutions based on case studies and group collaboration.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	
Course Content	**Unit 1: Basics of Artificial Intelligence (AI)** 1.1 Introduction to Artificial Intelligence 1.2 History and Evolution of AI 1.3 Types of AI – Narrow, General, Super AI 1.4 Key Concepts: Machine Learning, Deep Learning, Natural Language Processing 1.5 Real-life Applications of AI in Various Sectors (Healthcare, Education, Agriculture, Manufacturing) **Unit 2: IoT Devices that Can Be Used in AI Applications – Basics**

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

	2.1 Introduction to Internet of Things (IoT) 2.2 Architecture of IoT Systems – Sensors, Actuators, Gateways, Cloud 2.3 Types of IoT Devices Useful in AI Projects 2.3.1 Environmental Sensors (Temperature, Humidity, Air Quality) 2.3.2 Motion and Position Sensors (Accelerometers, Gyroscopes, PIR) 2.3.3 Wearables and Smart Health Devices 2.3.4 Cameras and Microphones for Image and Voice Input 2.4 Basics of Connectivity: Wi-Fi, Bluetooth, Zigbee, LoRaWAN 2.5 Data Flow: From Sensors to AI Processing **Unit 3: Advanced Integration of AI with IoT** 3.1 Introduction to AIoT (Artificial Intelligence of Things) 3.2 Real-Time Data Processing Using AI Algorithms 3.3 Edge Computing vs Cloud AI in IoT 3.4 AI-Based Decision Making from IoT Inputs (examples: Smart Home, Smart Agriculture) 3.5 Challenges in AIoT: Data Quality, Latency, Power Consumption 3.6 Privacy, Security, and Ethical Considerations in AIoT **Unit 4: Summary and Case Study Discussion** 4.1 Summary of Key Concepts from AI and IoT 4.2 Case Study 1: Smart Farming using IoT and AI 4.3 Case Study 2: AI-Powered Smart Home Automation 4.4 Open Discussion on AIoT Trends and Future Scope 4.5 Group Activity: Analyze and Present an AIoT Use Case [All Units carry Equal Weightage]
Reference Books	1. Frontiers of Electronic Commerce, Ravi Kalakota and Andrew Whinston, Addition Wesley 2. Electronic Commerce: A Managerial Perspective, Efraim turban, Jae Lee, David King, H. Michel Chung, Addition Wesley 3. E-Commerce: An Indian Perspective, Joseph, PHI 4. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd. 5. e-Commerce Concept, Models Strategies, G.V.S. Murthy, Himalaya Publisher 6. Cyber Crime in India, Dr M Dasgupta, Centax Publications Pvt Ltd 7. Cyber Laws and Crimes, Barkha U, Rama Mohan, Universal Law Publishing Co. Pvt Ltd. 8. Cyber Crime, Bansal S.K., A.P.H. Publishing Corporation 9. Cyber Security Understanding Cyber Crime, Computer Forensic and Legal Perspectives, Nina Godbole, Sunit Belapur, Willey India Publication
Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment - Unit Tests 50% External assessment. - Written Theory exam

[Subject code-2611000906044003]

Course Code: 601-03
Course Title: Computer Graphics

Course Code	601-03
Course Title	**Computer Graphics (Minor-6-03)**
Credits	4
Course Category	Minor Course
Level of Course	200-299 (Intermediate Level)
Teaching Hours	60 Hours
Minimum Hours/ Semester	60 hours of Theory (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	The purpose of the Computer Graphics course is to introduce students to the fundamentals of graphical systems, display technologies, and graphic standards. It enables students to apply algorithms and geometric transformations to create and manipulate basic graphical objects.
Course Objective	1) Define the key concepts, application areas, and file formats used in computer graphics. 2) Explain the working principles of various video display devices and scanning techniques. 3) Apply line drawing algorithms to generate basic graphic primitives like lines and circles. 4) Analyze the effects of geometric transformations such as scaling, rotation, translation, reflection, and shearing. 5) Create simple graphic designs by integrating graphical objects and transformation techniques.
Pre-requisite	The prerequisite for the Computer Graphics course is a basic understanding of programming concepts and mathematical foundations such as coordinate geometry and matrix operations.
Course Outcomes	**CO-1:**Remembering**:** Recall the application areas, file formats, and graphic standards used in computer graphics systems. **CO-2:**Understanding**:** Describe the architecture and functioning of various display devices, scan methods, and graphic object types. **CO-3:Applying:** Implement standard line drawing algorithms such as DDA and Bresenham for rendering basic graphic primitives. **CO-4:Analyzing:** Analyze the behavior and effects of geometric transformations like scaling, rotation, translation, reflection, and shearing on 2D objects. **CO-5:Creating:**Construct and manipulate graphical objects by integrating transformations and rendering techniques for simple graphic applications.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

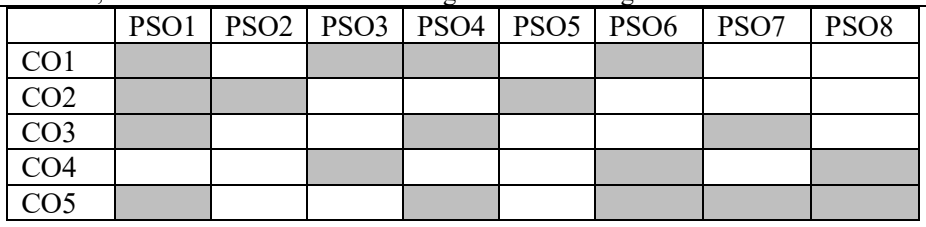
Course Content	**Unit 1. Introduction** 1.1 Application areas of Graphics Systems 1.1.1. Presentation Graphics 1.1.2. Entertainment 1.1.3. Education and Training 1.1.4. Image Processing 1.2 Computer Graphics Files 1.3 Introduction to graphic standards **Unit 2. Graphics Systems** 2.1. Video Display Devices

	2.1.1. Refresh CRT 2.1.2. Color CRT 2.1.3. LCD 2.1.4. Direct View Storage Tube 2.2. Raster scan and Random Scan Display 2.3. Raster Graphics and Vector Graphics 2.4. Concepts of various objects: Point, Line, Circle, Ellipse and Polygons **Unit 3. Line generation** 3.1. Geometry of line 3.2. Frame Buffer 3.3. Line Drawing Algorithms 3.3.1. DDA Algorithm 3.3.2. VECGEN 3.3.3. Bresnahan 3.4. Line Styles 3.4.1. Thick line 3.4.2. Line caps and joint **Unit 4. Geometric Transformations** 4.1 Basic Transformations 4.1.1 Scaling 4.1.2 Translation 4.1.3 Rotation 4.1.3.1 Rotation about origin 4.1.3.2 Rotation about Homogeneous Coordinates 4.2 Other transformations 4.2.1 Reflection 4.2.2 Shearing [All Units carry Equal Weightage]
Reference Books	1. Computer Graphics - second edition, Donald Hearn & M. Pauline Baker – Tata McGraw Hill Pub. 2. Computer Graphics, Harrington S. -Tata McGraw Hill. 3. Computer Graphics, Desai A. A. –PHI. 4. Computer Graphics: Algorithms & Implementations, Mukherjee & Jana – PHI. 5. Interactive Computer Graphics, Giloi W. K. –Prentice Hall India. 6. Principles of Interactive Computer Graphics, New Man W. & Sproul P. F. –McGraw Hill 7. Procedural Elements for Computer Graphics, Rogers D. F. – McGraw Hill.
Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment - Unit Tests 50% External assessment. - Written Theory exam

[Subject code for Theory-2611000906011001]

[Subject code for Practical-2611000906011002]

Course Code: 602
Course Title: Data Analytics using Python

Course Code	602
Course Title	**Data Analytics using Python**
Credits	4
Course Category	Major Course
Level of Course	400-499 (Advance Level)
Teaching Hours	30 Hours of class-room teaching + 60 Hours of Applied work(Project)
Minimum Hours/ Semester	30 hours of Theory + 60 Hours of Applied work (Project) (Including class work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	Only during A.Y. 2025-2026
Purpose of Course	This course aims to introduce students to data analytics techniques using Python, with a focus on Exploratory Data Analysis (EDA), regression, and supervised learning. It equips learners with practical skills in handling data, automating EDA, and applying machine learning concepts in real-world scenarios.
Course Objective	**1)**Explain the concepts and techniques of exploratory data analysis including handling missing data, outliers, and distribution types. **2)** Apply Python libraries like Pandas and NumPy to automate and perform efficient data analysis tasks. **3)** Describe the basics of regression and correlation, and understand their role in data analysis and machine learning. **4)** Understand key concepts of machine learning including types, benefits, and real-world applications. **5)** Evaluate supervised learning models using loss functions such as MSE and MAE, and explain concepts like overfitting and underfitting.
Pre-requisite	Students should have a basic understanding of Python programming and core concepts of statistics and probability. Familiarity with libraries like Pandas and NumPy will be helpful but not mandatory.
Course Outcomes	**CO1:**Understanding: Explain key concepts of exploratory data analysis, including univariate, bivariate, and multivariate techniques, and describe data distributions. **CO2:**Applying: Use Python libraries like Pandas and NumPy to perform and automate exploratory data analysis on various datasets. **CO3:**Analyzing: Analyze relationships between variables using regression techniques, and interpret covariance and correlation in datasets. **CO4:**Understanding & Applying: Describe the types and benefits of machine learning, and apply basic ML lifecycle steps to real-world problems. **CO5:**Evaluating: Evaluate supervised learning models using loss functions such as MSE and MAE, and assess issues like overfitting and underfitting.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	
Course Content	**Unit-1 : Fundamentals of Data Analytics :** 1.1 Exploratory Data Analysis (EDA) 1.1.1 Types of Exploratory Data Analysis: 1.1.2 Univariate Analysis 1.1.3 Bivariate Analysis 1.1.4 Multivariate Analysis 1.1.5 Handling Missing Data and Outliers 1.2 Understanding the Data: 1.2.1 Quantitative Data : Discrete and Continuous

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

	1.2.2 Qualitative Data : Non-numerical (Normal and Ordinal) 1.3 Spread of Data 1.3.1 Normal Distribution 1.3.2 Skewed Distribution 1.3.3 Skewness and Kurtiosis **Unit-2 Automate EDA (Exploratory Data Analysis)** 2.1 Python Libraries to Automate Exploratory Data Analysis 2.1.1 Pandas and Numpy 2.2 Regression 2.2.1 Characteristics of Regression 2.2.2 Dependent and Independent variables 2.2.3 Covariance and Correlation 2.3 Machine Learning Basics: 2.3.1 Concepts of Machine learning 2.3.1.1 Understanding machine learning 2.3.1.2 Benefit of machine learning 2.3.1.2 Machine learning life cycle 2.4 Types of Machine Learning: 2.4.1 Supervised and Unsupervised Learning 2.4.2 Applications of ML in real-world scenarios **Unit-3: Understanding Supervised Learning** 3.1 Overview of Supervised Learning 3.1.1 Concepts of Supervised Learning 3.1.2 Difference between Classification and Regression 3.2 Basic Terminologies 3.2.1 Dataset, Features, Labels 3.2.2 Training Data, Test Data, validation Data 3.3.3 Overfitting, Underfitting 3.3 Loss functions : 3.3.1 Mean Squared Error (MSE) 3.3.2 Definition of MSE 3.3.2.1 Computing MSE and its properties 3.3.3 Mean Absolute Error (MAE) 3.3.3.1 Definition of MAE 3.3.3.2 Computing MAE and its properties 3.3.3.3 Understanding Regression and R^2. **Unit-4 : Vedic Mathematics Sutras :** 4.1 Nikhilam Navatashcaramam Dashatah : "All from 9 and the last from 10." 4.2 Ekadhikena Purvena : "By one more than the previous one." 4.3 Udharan : "The extraction." 4.4 Paraavartya : "Transposition and cancellation." 4.5 Shunyam Saamyasamuccaye : "When the sum is the same that sum is zero." 4.6 Anurupyena : "Proportionately." 4.7 Sankalana-Vyavakalanabhyam : "By addition and by subtraction." 4.8 Puranapuranabhyam : "By the completion or non-completion." 4.9 Chalana-Kalana : "By motion or by applying a shift." 4.10 Yavadunam : "Whatever is the deficiency." 4.11 Vyastisamanstih : "The parts and the whole." 4.12 Sesanyan : "The remainder." 4.13 Gunitasamuchyah : "The product of the sum." 4.14 Vistaran : "Expansion." 4.15 Rupan : "Form." 4.16 Chidana : "By splitting." [Implementation of all sutras of Unit-4 in computer Lab. Using C / Python / Any Prog. Language] [Students will submit E-Document 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.] [Students need to complete their project by 10th of February/15th of August(Winter session)] [All Units carry Equal Weightage]
Reference Books	1) Data Analytics Using Python, Bharti Motwani, Wiley India Pvt. Ltd., ISBN: 978-93-87034-42-0 2) Data Science and Analytics, V.K. Jain, Khanna Publishing House, ISBN: 978-93-86173-66-3 3) Data Analytics with Python, R. N. Prasad, Seema Acharya, Wiley India Pvt. Ltd., ISBN: 978-81-265-9337-4 4) Foundations of Data Science, Avrim Blum, John Hopcroft, Ravindran Kannan, Universities Press (India) Pvt. Ltd., ISBN: 978-93-86279-47-1 5) Python for Data Analysis, Reema Thareja, Oxford University Press India, ISBN: 978-0-19-948017-1 6) Python for Data Analysis, Wes McKinney, O'Reilly Media, ISBN: 978-1-491-95766-0 7) Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurélien Géron, O'Reilly Media, ISBN: 978-1-492-03264-1 8) Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly Media, ISBN: 978-1-491-91205-8 9) An Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, ISBN: 978-1-4614-7138-7 10) Think Stats: Exploratory Data Analysis in Python, Allen B. Downey, O'Reilly Media, ISBN: 978-1-449-39416-6
Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment, Unit tests. - Internal project presentation and demonstration, project documentation. 50% External assessment. - Theory / written examination - project presentation and demonstration, viva-voce and e-project report.

[Subject code for Theory-2611000906022001]

[Subject code for Practical-2611000906022002]

Course Code: 603-01
Course Title: Fundamentals of Full Stack Web Development

Course Code	603-01
Course Title	Fundamentals of Full Stack Web Development
Credits	4
Course Category	Major Course
Level of Course	Advance level
Teaching per Week	2 Hours Theory + 4 Hours of Project work
Minimum Teaching Hours per Semester	90 Hours (Theory + Project work) (Including class work, Project work, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Cognitive Skills of the Course	The course enhances analytical thinking by guiding students through the structure and logic of web application development. Learners develop problem-solving skills as they design, debug, and improve client-server interactions. It fosters the ability to break down complex tasks into manageable components, encouraging modular and structured thinking. Students also gain the ability to evaluate and choose appropriate tools and approaches for frontend, backend, and database integration.
Course Objective	This course introduces students to the fundamentals of full stack web development using Angular, Express.js, and Firebase. Learners will gain hands-on experience building single-page applications (SPAs) using Angular, setting up backend servers with Express.js, and integrating cloud-based databases using Firebase Firestore. The course emphasizes core concepts such as routing, forms, data binding, and basic CRUD operations. Students will understand how frontend and backend components interact in a modern web application. By the end of the course, learners will be able to build simple yet functional web apps and connect them to a real-time database. The focus remains on conceptual clarity, practical application, and foundational skills development.
Pre-requisite	305-01: Web Designing -1 course of Semester-3. 405-01: Web Designing -2 course of Semester-4. 503-01: Advanced Web Designing – I
Course Outcomes	**CO1:** The skills acquired in this course are highly transferable and applicable in a wide range of professional settings. **CO2:** Whether students aim to become web developers, designers, or entrepreneurs, proficiency in web development technologies is invaluable. **CO3:** Through hands-on projects and exercises, they will gain practical experience in building real-world solutions. **CO4:** Students will be able to develop modern, complex, responsive and scalable websites. **CO5:** Understand necessary functionalities and elements of cleint and server-side development of website.

Unit	Remember	Understand	Apply	Analyze	Evaluate	Create
Unit 1	✓	✓	✓			✓
Unit 2	✓	✓	✓	✓		
Unit 3		✓	✓	✓		✓
Unit 4	✓	✓	✓			✓

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course Content

Unit 1: Fundamentals of Angular (v17) for Single Page Applications

1.1 Angular Recap & Project Setup
- 1.1.1 Brief Recap of Angular 17 core concepts: Components, Services, Routing
- 1.1.2 Setting up a scalable Angular project using Angular CLI with Standalone Components
- 1.1.3 Folder structure and module organization for large projects

1.2 Advanced Routing & State Handling
- 1.2.1 Implementing Lazy Loading with Feature Modules
- 1.2.2 Route Guards: CanActivate, CanDeactivate for securing routes
- 1.2.3 Route Resolvers for preloading data
- 1.2.4 Introduction to advanced state handling using RxJS Subjects and Behavior Subjects

1.3 Reactive Forms in Real Applications
- 1.3.1 Dynamic form generation using FormArray
- 1.3.2 Custom Validators and Asynchronous Validation
- 1.3.3 Centralized error handling and displaying validation messages
- 1.3.4 Submitting forms to APIs and form state management

1.4 Building Reusable UI Components & Design Patterns
- 1.4.1 Creating reusable card, modal, and alert components
- 1.4.2 Component interaction with RxJS and Shared Services
- 1.4.3 Use of ng-template, ng-container, ng-content for structural flexibility
- 1.4.4 Smart vs Dumb Components: Best practices

1.5 Application Deployment & Performance Optimization
- 1.5.1 Angular build process, environments, and optimization flags
- 1.5.2 Deploying Angular applications using Firebase Hosting
- 1.5.3 Performance tuning: trackBy, OnPush change detection, lazy loading routes/components

Unit 2: Introduction to Express.js and Server-Side Basics with Node.js

2.1 Introduction to Node.js and Express.js
- 2.1.1 Installing Node.js (v20+) and setting up Express server
- 2.1.2 Creating a RESTful backend using Express.js
- 2.1.3 Introduction to nodemon and project structuring

2.2 Handling Routes and HTTP Methods
- 2.2.1 Defining routes using GET, POST, PUT, DELETE
- 2.2.2 Sending responses and working with route/query parameters
- 2.2.3 Connecting routes to controller logic

2.3 Middleware and API Basics
- 2.3.1 Understanding middleware in Express
- 2.3.2 Using built-in and custom middleware (e.g., body-parser, static files)
- 2.3.3 Introduction to CORS and environment variables

Unit 3: Building Web App Components and Backend Integration

3.1 Working with Forms and APIs
- 3.1.1 Handling form submissions in Express
- 3.1.2 Sending JSON responses and extracting request data
- 3.1.3 Connecting Angular forms to Express APIs

3.2 Organizing Code with Models and Controllers
- 3.2.1 Structuring backend with models, services, and controllers
- 3.2.2 Creating data models for users/products using MongoDB (Mongoose)
- 3.2.3 Basic CRUD operations using Express and MongoDB

	3.3 Authentication and Security Basics 3.3.1 Introduction to Firebase Authentication (Email & Password) 3.3.2 Adding user registration and login to Angular frontend 3.3.3 Securing backend routes with Firebase Admin SDK and JWT **Unit 4: Firebase and React Integration** 4.1 Firebase Firestore and Realtime Database 4.1.1 Setting up Firebase project and Firestore database 4.1.2 Performing basic CRUD operations on Firestore (add, read, update, delete) 4.1.3 Structuring collections and subcollections 4.2 Connecting Firebase with Angular and Express 4.2.1 Integrating Firebase SDK in Angular to fetch/store data 4.2.2 Connecting Firebase Admin SDK in Express for backend access 4.2.3 Basic deployment using Firebase Hosting (for frontend) 4.3 Overview of React Frontend for Full Stack Developers 4.3.1 Setting up a basic React app using Vite or Create React App 4.3.2 Understanding JSX, functional components, and hooks (useState, useEffect) 4.3.3 Integrating Firebase in a React app for data access and authentication [Versions recommended: Node.js: v20 LTS or higher, Angular: v17+, Express: v4.x, Firebase: v10 SDK or latest (modular SDK)] [Students will submit E-Document 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.][Students are required to complete this project by 10th of February/15th of August(for winter sessions) and submit].
Reference Books	1. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, O'Reilly Media, Inc. 2. Mastering Web Application Development with AngularJS, Pawel Kozlowski Peter and Bacon Darwin, Packt Publishing 3. Beginning Node.js, Express & MongoDB Development, by Greg Lim, ISBN-13 : 978-9811480287 4. Building Scalable Web Apps with Node.js and Express: Design and Develop a Robust, Scalable, High-Performance Web Application Using Node.js, Express.js, TypeScript, and Redis, Yamini Panchal, Ravi Kumar Gupta, Orange Education Pvt. Ltd, ISBN-13 : 978-8197223815 5. MongoDB, Express, Angular, and Node.js Fundamentals, Paul Oluyege, Packt Publishing, ISBN-13 : 978-1789808735 6. Pro Express.js: Master Express.js: The Node.js Framework For Your Web Development, by Azat Mardan, APress; 1st ed. Edition, ISBN-13 : 978-1484200384 7. Mastering Express.js: A Comprehensive Guide to Node.js Web Development, Rupesh Kumar Tipu, Vandna B, Suman Punia, LAP Lambert Academic Publishing, ISBN-13 : 978-6207808090 8. Express.js: Node.js Framework for Web Application Development, Daniel Green, ASIN: B014FVDVUA, 9. Mastering Firebase: The Complete Guide to Building and Scaling Apps, by Kameron Hussain, Frahaan Hussain, Sonar Publishing, ISBN – 13 979-8223728290 10. The Road to Firebase: Your journey to master Firebase in JavaScript, Robin Wieruch, 2018 edition 11. Firebase Cookbook, Houssem Yahiaoui, Packt Publishing, ISBN-13 : 978-1788296335
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. : - Attendance, Class and home Assignment, Unit test. - Project Assessment, Presentation and viva-voce 50% External assessment. : - Theory written examination

	- Project Assessment, Presentation and viva-voce

[Subject code for Theory-2611000906022003]

[Subject code for Practical-2611000906022004]

Course Code: 603-02

Course Title: Advance Mobile Application Development - II

Course Code	603-02 (Major-15-02)
Course Title	Advance Mobile Application Development – II
Credits	4
Course Category	Major Course
Level of Course	Advance Level
Teaching Hours	30 Hours of class-room teaching + 60 Hours of applied/project work.
Minimum Hours per semester	90 Hours (Including class-room teaching, Applied work and project development work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Cognitive Skills of the Course	The course is aim to give knowledge about Firebase. This course enhances knowledge of Firebase Authentication and datastorage storing data into database. It also aims to understand concepts API and Web Services.
Course Objective	1) To introduce students to Firebase and its integration with Android Studio for developing secure mobile applications. 2) To enable learners to implement various Firebase Authentication methods including email/password, Google, and Facebook logins. 3) To equip students with the ability to perform real-time data storage, retrieval, and CRUD operations using Firebase Realtime Database and Firestore. 4) To familiarize students with web services and RESTful APIs for building connected Android applications. 5) To provide hands-on experience in handling API requests and responses using Volley and JSON parsing in Android.
Pre-requisite	Paper-305-02 (Mobile Application Development -1) in Semester-3. Paper-405-02 (Mobile Application Development -2) in Semester-4. Paper-501-02 (Advanced Mobile Computing – I) in Semester-5.
Course Outcomes	**CO1:** Understand: Understand and explain the functionalities and services provided by Firebase in the context of mobile application development. **CO2:** Apply: Apply Firebase Authentication mechanisms to build secure and user-friendly Android apps with email/password and social logins. **CO3:** Apply: Demonstrate the ability to store, read, and update data in Firebase Realtime Database using Android apps. **CO4:** Analyze: Analyze and handle API responses using RESTful architecture, JSON parsing, and Volley libraries in Android. **CO5:** Create: Develop a fully functional Android application integrating Firebase services and REST APIs to perform real-world tasks like user login, data sync, and backend interaction.

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

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1								
CO2								
CO3								
CO4								
CO5								

Course Content

Unit-1: Introduction to Firebase
1.1 Introduction to Firebase and its services
1.2 Setting up firebase project
1.3 Signing into firebase consol
1.4 Integrating firebase with android studio
1.5 Overview of firebase authentication
1.5.1 FirebaseAuth Instance
1.5.2 AuthUI instance
1.5.3. FirebaseUser Class
1.5.4 Authentication Provider Class
1.6 Introduction to FirebaseUI Auth authentication
1.7 Firebase SDK Authentication

Unit-2: FirebaseUI Auth authentication
2.1 E-Mail and Password authentication
2.1.1 User Registration
2.1.2 Manage Login/ Logout
2.2.3 Password Reset and E-Mail verification
2.2 Google Sign-In authentication
2.3 Facebook Sign-In authentication
2.4 Handling Firebase Authentication Error
2.5 Firebase real time database Vs. Firestore

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 Reding 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
[Recommended versions: - Firebase BoM: 32.8.1, Android Studio: Hedgehog / Iguana (2024–2025), Firebase UI Auth: 8.0.2, Volley Library: 1.2.1, Gradle Plugin: 8.2 or later]
[All Units carry Equal Weightage]
[Students will submit E-Document 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.]

Reference Books

1) Android Programming: The Big Nerd Ranch Guide, Bill Phillips, Chris Stewart, and Kristin Marsicano, Big Nerd Ranch, ISBN: 9780134706054
2) Firebase Essentials - Android Edition, Neil Smyth, Payload Media, ISBN: 9781946844342
3) Android Application Development Black Book, Pradeep Kothari, Dreamtech Press, ISBN: 9789351194091
4) Learning Firebase, Kato Richardson, Packt Publishing, ISBN: 9781786463567
5) Mobile Computing, Raj Kamal, Oxford University Press India, ISBN: 9780198068915

	6) Mastering Android Development with Kotlin, Miloš Vasić, Packt Publishing, ISBN: 9781788473694 7) Android App Development for Dummies, Michael Burton, Wiley India Pvt. Ltd., ISBN: 9788126559172 8) Programming Android, Zigurd Mednieks, Laird Dornin, O'Reilly Media, ISBN: 9781491911058 9) Mobile Application Development (According to NEP 2020), Reeta Sahoo & Gagan Sahoo, VK Global Publications Pvt. Ltd., ISBN: 9789356121177 10) Beginning Android Programming with Android Studio, Jerome DiMarzio, Wiley, ISBN: 9781119017927 11) Android Application Development Black Book, Pradeep Kothari, Dreamtech Press, ISBN: 9789351194091 12) Mobile Computing, Raj Kamal, Oxford University Press India, ISBN: 9780198068915 13) Mobile Application Development (According to NEP 2020), Reeta Sahoo & Gagan Sahoo, VK Global Publications Pvt. Ltd., ISBN: 9789356121177 14) Mobile Computing and Application Development, R.K. Gaur, Khanna Publishing House, ISBN: 9789388005155 15) Android Programming, Kogent Learning Solutions Inc., Wiley India Pvt. Ltd., ISBN: 9788126536234
Teaching Methodology	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. : - Attendance, Class and home Assignment, Unit Test. - Project work and application work - Project Report writing, report presentation. 50% External assessment. : - Theory/Written Examination. - Project presentation, viva-voce and demonstration.

[Subject Code-2611000906033001]

Course Code: 604
Course Title: Project

Course Code	604 (Major-16)
Course Title	PROJECT
Credits	4
Course Category	Major Course
Level of Course	400-499 (Advance Level)
Teaching Hours	120 Hours of Applied work(Project)
Minimum Hours/ Semester	120 Hours of Applied work (Project) (Including applied work, E-documentation, viva-voce examination, Project preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	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 web technologies. It encourages hands-on learning by developing a real-world, full-scale project through self-exploration of technologies, structured documentation, and effective presentation.
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, mobile application development, and web technologies. They should be familiar with programming languages (such as HTML, CSS, JavaScript, Web-technologies/Mobile Technologies, Python, or Java), 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.

<table>
<tr><td></td><td>CO5:Evaluate: Students will present their project solutions confidently and clearly to technical and non-technical audiences.</td></tr>
<tr><td>Project Development</td><td>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 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.]</td></tr>
<tr><td>Project Evaluation Scheme</td><td><table>
<tr><th>Component</th><th>Marks</th></tr>
<tr><td>Problem Definition and Planning</td><td>10%</td></tr>
<tr><td>Design and Architecture</td><td>15%</td></tr>
<tr><td>Implementation and Functionality</td><td>30%</td></tr>
<tr><td>Testing and Deployment</td><td>15%</td></tr>
<tr><td>Documentation</td><td>10%</td></tr>
<tr><td>Final Presentation & Viva</td><td>20%</td></tr>
<tr><td>Total</td><td>100%</td></tr>
</table></td></tr>
<tr><td>Evaluation Method</td><td>50% Internal assessment.
- Attendance and reporting to internal guides
- Internal project presentation and demonstration, project documentation.
50% External assessment.
- project presentation and demonstration, viva-voce and e-project report.</td></tr>
</table>

[Subject Code-2611000906055001]

Course Code: 605

Course Title: Project and Interview Presentation Soft Skills (AEC-06)

Course Code	605 (Ability Enhancement Course (AEC))
Course Title	Project and Interview Presentation Soft Skills
Credits	2
Course Category	AEC Course
Level of Course	100-199 (Fundamental Level)
Teaching Hours per semester	30 Hours of class-room work
Minimum Hours/ Semester	30 hours of Class-room work (Including class work, interactive sessions, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	The purpose of this course is to equip students from the software, computer, and IT industry with essential project execution, documentation, and presentation skills. It aims to enhance their technical communication, soft skills, and interview preparedness through hands-on project work, seminars, and structured evaluations.
Course Objective	1) To develop students' ability to plan, execute, and manage software/IT projects using industry-standard practices. 2) To enhance technical documentation skills through structured project reports and software documentation. 3) To build confidence in delivering effective oral presentations and technical demonstrations relevant to software and IT domains. 4) To improve soft skills such as teamwork, time management, and problem-solving in a professional IT project environment. 5) To prepare students for technical and HR interviews by practicing mock interviews and resume-building activities.
Pre-requisite	Learners should have a fundamental understanding of programming languages, web or mobile application development, database management, and software development life cycle. Prior exposure to mini-projects or hands-on experience with development tools and technologies used in the IT/software industry will be beneficial.
Course Outcomes	**1)CO1:**(Understand)**:** Explain the essential components of professional project documentation and communication in the software and IT industry. **2)CO2:**(Apply)**:** Demonstrate the ability to present project concepts clearly using structured presentation techniques and visual aids relevant to IT solutions. **3)CO3:**(Analyze)**:** Evaluate the technical and soft skill requirements of various IT job roles and align personal project work and presentation accordingly.

	4)CO4:(Create)**:** Develop a mini-project or prototype by integrating appropriate software tools and technologies and document it as per standard industry practices. **5)CO5:**(Evaluate)**:** Justify design choices, tool selection, and development approach during interviews or viva presentations using logical reasoning and industry-specific language.
Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)	

	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	■		■	■		■		
CO2	■	■			■			
CO3	■			■			■	
CO4			■			■		■
CO5	■			■		■	■	■

Course Content

Unit 1: Communication and Presentation Skills in the IT Industry

1.1 Fundamentals of Communication
- 1.1.1 Verbal and Non-verbal Communication
- 1.1.2 Barriers in Communication in Technical Teams
- 1.1.3 Listening and Clarity in Technical Discussions

1.2 Presentation Skills for IT Professionals
- 1.2.1 Creating Technical Presentations
- 1.2.2 Using Tools like PowerPoint, Canva, Prezi
- 1.2.3 Speaking with Confidence in Team and Client Meetings

1.3 Email and Technical Writing Etiquette
- 1.3.1 Writing Clear Technical Emails
- 1.3.2 Preparing Professional Reports and Documentation

Unit 2: Project Documentation and Reporting

2.1 Understanding Software Development Life Cycle (SDLC)
- 2.1.1 Role of Documentation at Each Phase
- 2.1.2 Agile Documentation vs Traditional Models

2.2 Technical Project Documentation
- 2.2.1 Problem Statement and Requirements
- 2.2.2 Design Diagrams: UML, ER Diagrams
- 2.2.3 Testing and Deployment Documentation

2.3 Final Report Writing and Formatting
- 2.3.1 Structuring a Complete Project Report
- 2.3.2 IEEE/ACM Style Guidelines and Referencing
- 2.3.3 Common Errors to Avoid in Technical Reports

Unit 3: Interview Readiness and Soft Skills for Developers

3.1 Resume and LinkedIn Profile Building
- 3.1.2 Components of a Tech Resume
- 3.1.3 Tailoring Resumes for Software Roles

3.2 Interviewing Skills for IT Roles
- 3.2.1 Understanding the Interview Process in Software Companies
- 3.2.2 Technical Round vs HR Round Expectations
- 3.2.3 STAR Method for Behavioral Interview Questions

3.3 Mock Interview Sessions

3.3.1 Self-Introduction Practice

3.3.2 Group Feedback and Interview Etiquette

Unit 4: Final Project Presentation and Seminar

4.1 Project Showcase Guidelines
- 4.1.1 Preparing for Project Presentation
- 4.1.2 Demonstrating Code, UI, and Deployment

4.2 Seminar and Peer Review
- 4.2.1 Presentation to Class and Faculty Panel
- 4.2.2 Peer Evaluation Criteria

4.3 Soft Skill Reflection and Final Assessment

	4.3.1 Student Reflections on Soft Skills Gained 4.3.2 Final Grading and Suggestions for Improvement [One topic will be allocated to every students. The student will prepare a seminar and presentation along with a documentation.]
Reference Books	1) Technical Communication: Principles and Practice, Meenakshi Raman & Sangeeta Sharma, Oxford University Press India, ISBN: 9780195695747 2) Soft Skills: Know Yourself and Know the World, Dr. Alex K., S. Chand Publishing, ISBN: 9789352534357 3) Communication Skills for Engineers, Sunita Mishra & C. Muralikrishna, Pearson Education India, ISBN: 9788131733844 4) Business Communication, P.D. Chaturvedi & Mukesh Chaturvedi, Pearson Education India, ISBN: 9788131733585 5) Developing Soft Skills, Gajendra Singh Chauhan, Wiley India, ISBN: 9788126577500 6) The Quick and Easy Way to Effective Speaking, Dale Carnegie, Simon & Schuster, ISBN: 9780743528322 7) Cracking the Coding Interview, Gayle Laakmann McDowell, CareerCup, ISBN: 9780984782857 8) Presentation Skills for Technical Professionals, Naomi Karten, Dorset House Publishing, ISBN: 9780932633585 9) Interviewing: Principles and Practices, Charles Stewart & William Cash Jr., McGraw-Hill Education, ISBN: 9780078036804 10) The Art of Public Speaking, Stephen E. Lucas, McGraw-Hill Education, ISBN: 9780073523910
Teaching Methodology	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
Evaluation Method	50% Internal assessment. - Attendance, Class and home Assignment, Unit Tests (Seminar). - Internal presentations, documentation, viva-voce and Seminar 50% External assessment. - Presentation, documentation, presentation and Viva-voce.

[Subject code-2611000906066001]

Course Code: 606

Course Title: Internship

Course Code	606
Course Title	Internship
Credits	4
Course Category	Internship
Level of Course	400-499 (Advance Level)
Teaching Hours	120 Hours of internship work
Minimum Hours/ Semester	120 hours of internship work (Including industrial visit, interactive sessions, applied/training work, examination, preparation etc.)
Review / Revision	-
Implementation Year:	A.Y. 2025-2026
Purpose of Course	NEP-2020 emphasizes on Vocationalization of Education. A key aspect of the new UG programme is its utility into a real life situation. All students are expected to do Internships/Apprenticeships/OJT in a firm, industry, or organization. Students will be provided the opportunities for do Internships/Apprenticeships/OJT with local industry, business organizations, health, and allied areas, local governments (such as panchayats, and municipalities), local Police Stations, Parliament or elected representatives, media organizations, artists, crafts persons, and a wide range of organizations so that students may engage with the practical side of their learning, which will improve their employability.
Course Objective	1) To provide students with practical exposure to industry standards and practices. 2) To foster the application of academic knowledge in real-life work scenarios. 3) To enhance students' interpersonal, communication, and problem-solving skills. 4) To help students identify their strengths and areas of interest in professional domains. 5) To inculcate a sense of responsibility, discipline, and work ethics.
Pre-requisite	Students must have completed at least one year of their undergraduate program. They should have basic conceptual knowledge of their core subjects before starting the internship.
Course Outcomes	1) **CO1 (Apply):** Apply programming, development, or analytical skills gained in the classroom to solve real-world computing problems during the internship. 2) **CO2 (Analyze):** Analyze the architecture, workflow, and practices of the host organization to understand the integration of computer systems in business or technical environments. 3) **CO3 (Evaluate):** Evaluate project requirements, software tools, and technologies used during the internship to recommend improvements or alternative approaches. 4) **CO4 (Create):** Create a structured technical report and project documentation summarizing the tasks, challenges, and outcomes of the internship. 5) **CO5 (Present):** Present the project findings and experience effectively using professional communication and presentation skills tailored to the IT/software industry.

Internship Structure and Deliverable by Students:

Duration: 120 Hours
Mode: Offline / Online / Hybrid
Location: Industry, business firms, IT companies, local government offices, health organizations, media, artisans, etc.
Deliverables by Student:

1. Internship Joining Report
2. Weekly Progress Logbook
3. Project or Assignment Work (if applicable)
4. Final Internship Report (with photographs, certificates, etc.)
5. Presentation and Viva Voce

Course Evaluation

Component	Marks/Weightage
Attendance and Participation	20%
Weekly Progress Logbook	20%
Final Internship Report	30%
Presentation & Viva Voce	30%
Total	**100%**

Reference Books

INTERNSHIP REPORT TEMPLATE (to be submitted after internship completion)
Front Page

Title: *Internship Report*
Student Name:
Roll Number:
Program and Semester:
College Name and Department:
Name of Organization/Company:
Internship Duration (From – To):
Internship Guide Name (Industry and Faculty):
Submission Date:

1. Acknowledgment
A short paragraph acknowledging the guidance and support of the organization and faculty mentor.
2. Certificate
Internship Completion Certificate (copy from organization)
3. Declaration
Declaration by the student that the report is original and submitted for academic purposes.
4. Internship Details
Name and Address of Organization
Nature of Business/Services
Department/Team worked in
Name and Designation of Industry Supervisor
5. Objectives of Internship
What you aimed to learn and accomplish.
6. Description of Work Done
Overview of the tasks and responsibilities handled
Description of technologies/tools used
Screenshots, flowcharts, or diagrams (if applicable)
7. Learning Outcomes
Skills developed, software or tools learned, industry exposure gained.
8. Challenges and Solutions
Mention any problems faced and how you solved them.
9. Weekly Summary
Brief of what was done in each week (can be derived from the logbook).
10. Conclusion
Summary of overall experience, learning, and impact on career development.
11. References
Any websites, books, or resources referred to during the internship.

INTERNSHIP LOGBOOK FORMAT (to be maintained weekly)

Week No.	Date (From–To)	Tasks Assigned	Tasks Completed	Tools/Technologies Used

	Week 1	01/06/2025–07/06/2025	Task 1 description	Task 1 completed	e.g., HTML, Python, MySQL		Sig cor
	Week 2						
	...						
	Week N						
	Note: The logbook must be signed weekly by the industry/place of internship allocated supervisor and finally verified by the faculty mentor allocated by the institute.						

University Examinations

Course Code	Course	Exam Component	Max. Marks	Duration
601-01 (Minor-5-01)	E-Commerce and Cyber Security	**Theory**	**50**	**2 Hours**
601-02 (Minor-5-02)	Concepts of A.I. and IoT Devices			
601-03 (Minor-5-03)	Computer Graphics			
602 (Major-14)	Data Analytics using Python	**Theory**	**25**	**1 Hours**
		Project	**25**	**-**
603-01 (Major-15-01) OR 603-02 (Major-15-02)	Fundamentals of Full Stack Web Development **OR** Advanced Mobile Computing-II	**Theory**	**25**	**1 Hours**
		Project	**25**	**-**
604 (Major-16)	PROJECT	**Project**	**50**	**-**
605 (AEC-06)	Project and Interview Presentation Soft Skills	**Seminar/Presentation**	**50**	**-**
606 (Major)	Internship	**Project report/ presentation/ viva-voce**	**100**	**-**

[University theory exams Course code: 601-01/601-02/601-03, 602, 603-01/603-02and 605 will be scheduled between 5th February to 11th February. Following to the theory exams, students will work on full time Projects and Internship. Project exams will be scheduled between 10th April to 20th April.]