



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, ઉદ્ધના-મગદલા રોડ, સુરત - ૩૯૫ ૦૦૭, ગુજરાત, ભારત.

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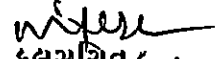
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## **-:પરિપત્ર:-**

કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા હેઠળની B.Voc.(IT) કોર્સ ચલાવતી તમામ કોલેજોનાં આચાર્યશ્રીઓને જણાવવાનું કે, શૈક્ષણિક વર્ષ ૨૦૨૫-૨૬ થી અમલમાં આવનાર B.Voc.(IT)Sem.-5 & 6 નો પેટાસમિતિ દ્વારા તૈયાર કરવામાં આવેલ અભ્યાસક્રમ કોમ્પ્યુટર સાયન્સ વિષયની અભ્યાસ સમિતિના ચેરમેનશ્રીએ અભ્યાસ સમિતિ વતી અને કોમ્પ્યુટર સાયન્સ વિદ્યાશાખાના અધ્યક્ષશ્રીએ વિદ્યાશાખાની મંજૂરીની અપેક્ષાએ વિદ્યાશાખાવતી મંજૂર કરી એકેડેમિક કાઉન્સિલને કરેલ ભલામણ એકેડેમિક કાઉન્સિલની તા.૨૪/૧૨/૨૦૨૪ ની સભાના ઠરાવ ક્રમાંક:૩૫૩ અન્વયે માન.કુલપતિશ્રીને આપેલ સત્તા અંતર્ગત માનનીય કુલપતિશ્રી દ્વારા મંજૂર કરેલ છે. જેનો અમલ કરવા આથી જાણ કરવામાં આવે છે.

બિડાણ: ઉપર મુજબ

ક્રમાંક:ઓથોરીટીઝ/પરિપત્ર/સિલેબસ/૧૮૬૫૪/૨૦૨૫  
તા.૧૮/૦૭/૨૦૨૫

  
કુલસચિવ

પ્રતિ,

(૧) B.Voc.(IT) કોર્સ ચલાવતી તમામ કોલેજોના આચાર્યશ્રીઓ.

.....આપશ્રીની કોલેજના સંબંધિત શિક્ષકો તથા વિદ્યાર્થીઓને જણ કરી અમલ કરવા સારું.

૨) ડીનશ્રી, કોમ્પ્યુટર સાયન્સ વિદ્યાશાખા.

૩) પરીક્ષા નિયામકશ્રી, પરીક્ષા વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

૪) એકેડેમિક વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

૫) જોડાણ વિભાગ, વીર નર્મદ દ. ગુ. યુનિવર્સિટી, સુરત.

.....તરફ જાણ તેમજ અમલ સારું.

# Veer Narmad South Gujarat University, Surat



**Computer Science and Information Technology Faculty**

**Syllabus for (Semester-V and Semester-VI) of**

**B.Voc. (Information Technology)(Honours)**

**As per NEP-2020**

**To be implemented from**

**Academic Year: June, 2025-2026**

**Veer Narmad South Gujarat University, Surat**  
**Bachelor of Vocational (Information Technology) (Honours))**  
**Under the Faculty of**  
**Computer Science and Information Technology**

<b>Name of Program:</b>	<b>Bachelor of Vocational (Information Technology) (Honours)</b>
<b>Abbreviation:</b>	B.Voc. (Information Technology) (Honours): Four-year Integrated Program. With Multi-Level Entry and Exit option
<b>Multi-level Exit Criteria:</b>	<p>i) Under Graduate Certificate in Informational Technology: 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.</p> <p>ii) Diploma in Vocational Informational Technology : 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.</p> <p>iii)B.Voc. (Informational Technlogy) : 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.</p>
<b>Multi-Level Entry Criteria:</b>	As per the norms of the Veer Narmad South Gujarat University.
<b>Duration:</b>	4 year of B.Voc. (Information Technology) (Honors) degree program with multi level exit options at 1 <sup>st</sup> , 2 <sup>nd</sup> and 3 <sup>rd</sup> Year to obtain Certificate, Diploma, Degree and Honours Degree in Vocational Information and Technology respectively.
<b>Eligibility:</b>	As per the norms of University
<b>Medium of Instruction:</b>	English
<b>Program Structure:</b>	Semester-wise Breakup of the course is given as follows :



**Veer Narmad South Gujarat University, Surat**

**Program Structure : T.Y.B.Voc.(Information Technology) (SEM – 5 & SEM – 6)**

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

**B.Voc.(Information Technology) – Three Year Program**

**B.VOC.(Information Technology)(Honours) – Four Year Integrated Program**

**SEMESTER – 5**

Course Code	Course Title	Course Category	Level of Course	Course Credits	Teaching Hours/week	
					Th.+Pra.	Theory Practical/ Fieldwork /Project/ Internship
VOC-501	Fundamentals of Cloud Technology	Minor Course	200-299 Intermediate Level Course	4	4	0
VOC-502	Computer Network	Minor Course	200-299 Intermediate	4	4	0
VOC-503	Concepts of Machine Learning	Major Course	400-499 Intermediate Level Course	4	2	4
VOC-504	Web Development Framework	Major Course	400-499 Intermediate Level Course	4	2	4
VOC-505	Project	Major Course	300-399 Intermediate Level Course	4	-	8
	Practical (Based on Course Code:CS-503 , CS-504 & CS- 505	No separate credits allocated for practical. The Practical exam/viva-voce will based on Course CS-503, CS-504 and CS-505.				
CS-506	<b>Skill Enhancement Course-5(SEC-05)</b>  The student will undergo field training/internship training <u>OR</u> Select minimum one University approved and recognized 2 credit Certificate course from the skill based courses list offered by the respective Institute/department.  (The student need to enroll separately and pay the fees as decided by the respective institute/department)	Skill Enhance ment Course	100-199 Foundation / Introductory	2	-	
Total				22	14	12

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
VOC-501	Fundamentals of Cloud Technology	4	Theory/Written	2 Hours	50	50	100
VOC-502	Computer Network	4	Theory/Written	2 Hours	50	50	100
VOC-503**	Concepts of Machine Learning	4	Theory/ Written Practical :	1 Hours 2 Hours	25 25	25 25	100
VOC-504**	Web Development Framework	4	Theory/Written: Practical :	1 Hours 2 Hours	25 25	25 25	100
VOC-505**	Project	4	Theory/Written Practical/Project :	- 2 Hours	- 50	- 50	100
CS-506	Skill Enhancement Course-5 (SEC-05)	2	er Nature ofCourse	2 Hours	25	25	50 <sup>#</sup>
<b>Total</b>							
		22			275	275	550

#### For Practical and Project:

- Batch Size – 30 Maximum (Desirable). Maximum 40 students can be accommodated in a batch. Separate batch should be considered if the student strength exceed 25 numbers.
- Practical includes Practical/Project sessions for course- CS-503 CS-504 and course-CS-505. Minimum Twelve Practical hours(4 hours each for course-503 4 hours for course-504 and 8 hours for course-505) per week should be allocated per batch. Out of which 8 hours will be in supervisedmode and balance hours in un-supervised mode.
- The journal must be certified by the concerned faculty and by the Head of the Department, failing which the student will not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

#### Internal/External Evaluation :

CCE ( Continuous and Comprehensive Evaluation) : To be conducted by college.

SEE (Semester End Evaluation) : To be conducted by University.

**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 enroll 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.]

**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.

**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.

**Interdisciplinary/Multidisciplinary/Allied Courses:** This is constituent discipline of the major courses and it helps learners to acquire core competence in relevant or any other independent courses of their choices. This course may be major specific or other discipline specific. Learner shall have option to choose the course from available basket of approved courses provided by the university or from any other institutions as the learner's choice. The Credit allocated for these courses is 12 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree programme.

**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 recognized by University during semester-1 to semester-5..

**Value Addition Course:** As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition 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 Value Addition Course out of offered courses recognised by the University during semester-1 to semester-4..

**# Marks:** The scale on which the students will be evaluated. The evaluation methodology will be continuous evaluation and the score obtained will reflect in mark-sheet but not considered for SGPA or CGPA. These courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.

[The college/Institute will decide the fees for SEC and VAC courses based on the University norms for certificate course per credit fees.]

% : Institute/College will offer any one course from given list of Ability Enhancement Courses approved by the University.

\*\* Major Practical based Subjects: Course 503 504 and 505 are major courses. These courses are carrying 4 credits (2 Hours of theory and 4 hours of practical per week).These subjects carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively. Practical exams for course-503 (2hours duration) , Practical exams for course-504 (2hours duration) and Project exam for course-505(2 hours duration) will be conducted on same day.

**Division of Theory internal marks (CCE) :**

For courses having 50 marks as Internals :

Class Assignment/Active Learning: 07 marks+Home Assignment/Field Assignment: 08 marks + Attendance: 10 + Class Test\*: 25

For courses having 25 marks as Internals :

Class Assignment/Active Learning: 03 marks+Home Assignment/Field Assignment: 03 marks + Attendance: 04 + Class Test\*: 15

**For Practical internal marks (CCE) :**

For courses having 50 marks Internals :

Attendance: 10 marks + Viva-voce/Quiz: 20 marks + Lab-work Assessment/Practical: 20 marks.

For courses having 25 marks Internals :

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

**Division of Practical External exam marks (SEE) :**

**For 25 marks Externals :**

Division of marks are: Exam evaluation: 20 marks + Viva-voce: 5 Marks.

Practical examination will be conducted for course code-503,504 and course-505 separately on same day.

**Practical examination will be conducted for course code-503 504 and course-505 separately on same day.**Students are required to pass in combined head (Theory + Practical) for each course.

Students are required to remain present in internal and external theory and practical exams for course code – 503 504 and505 mandatorily.

<b>Program Passing Rules:</b>	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 : 2025-2026)	Semester Tuition Fees : As per University norms. Semester Laboratory Utilization fees : As per University norms. (For Govt. and GIA colleges) : As per University norms. (For Self Finance Institutes ) : As per University Norms [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, 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.] [Tuition and other fees for Govt. colleges and Grant-in-aid colleges will be as per the norms of University.]

**SEMESTER – 6**

CourseCode	Course Title	Course Category	Level of Course	Course Credits	Teaching per week	
					Theory	Practical/ Fieldwork/ Project/ Internship
VOC-601	Fundamentals of AI and IoT	Minor Course	200-299 Intermediate Level Course	4	4	0
VOC-602	Data Analysis using Python	Major Course	400-499 Advance Level Course	4	2	4
VOC-603	Full-stack Development Fundamentals	Major Course	400-499 Advance Level Course	4	2	4
VOC-604	Project	Major Course	400-499 Advance Level Course	4	0	8
VOC-605	Project and Interview Presentation Soft Skills (AEC)	AEC [Ability Enhancement Course]	100-199 Foundation Course	2	2	0
VOC-606	INTERNSHIP	Internship	400-499 Advance Level 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 others similar activities.			-	-	-
<b>Total</b>				22	14	10

Course Code	Course Title	Course Credit	University Exam Type	Exam Duration	External Marks	Internal Marks	Total Marks
VOC-601	Fundamentals of AI and IoT Devices	4	Theory/Written	2 Hours	50	50	100
VOC-602	Data Analysis using Python	4	Theory/Written Practical	2 Hours 1 Hours	25 25	25 25	100
VOC-603	Full-stack Development Fundamentals	4	Theory/Written Practical	1 Hours 2 Hours	25 25	25 25	100
VOC-604	Project	4	Theory/Written: Practical :	- 2 Hours	50	50	100
VOC-605	Project and Interview Presentation Soft Skills (AEC)	2	Presentation / Seminar	-	25	25	50
VOC-606	INTERNSHIP	4		-	50	50	100
Total		22			275	275	550

#### For Practical and Project:

- Batch Size – 20 Maximum (Desirable). Maximum 25 students can be accommodated in a batch. Separate batch should be considered if the student strength exceeds 25 numbers.
- Practical includes Practical sessions for course-602 and course-603. **Minimum** 8 Practical hours per week should be allocated per batch. Out of which 4 hours will be in supervised mode and balance hours in un-supervised mode.
- The journal should be certified by the concerned faculty and by the Head of the Department, failing which the student should not be allowed to appear for External Practical Examination. Student will submit softcopy of Minor Project duly certified by the internal guide.

#### Internal/External Evaluation :

CCE ( Continuous and Comprehensive Evaluation) : To be conducted by college.

SEE ( Semester End Evaluation) : To be conducted by University.

**Major Course :** Major discipline is the main focus (Core) dominant subject and the degree will be awarded in that discipline. Students must secure a prescribed number of credits (50% of total credits) through core courses in the major discipline. 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. The Credit of Minor subject is 24 credits of total credits for 3 years' bachelor's degree and 32 credits of total credits for four years' bachelor's degree program.

**Interdisciplinary/Multidisciplinary/Allied Courses:** This is constituent discipline of the major courses and it helps learners to acquire core competence in relevant or any other independent courses of their choices. This course may be major specific or other discipline specific. Learner shall have option to choose the course from available basket of approved 2-credit certificate courses provided by the university or from any other institutions as the learner's choice. The Credit allocated for these courses is 12 credits of total credits for 3 years' bachelor's degree and four years' bachelor's degree program.

**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 which must be applied/field training/skill based). Student is required to enroll 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 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 program. 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 recognized by University during semester-1 to semester-5.  
(The student need to enroll separately and pay the fees as decided by the respective institute/department.)

**Value Addition Course:** As per NEP(National Education Policy-2020), it is mandatory for students to select a 2 credit Value Addition 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 Value Addition Course out of offered courses recognized by the University during semester-1 to semester-4.  
(The student need to enroll separately and pay the fees as decided by the respective institute/department.)

**# Marks:** The scale on which the students will be evaluated. The evaluation methodology will be continuous evaluation and the score obtained will reflect in mark-sheet but not considered for SGPA or CGPA. These courses are mandatory and student is required to obtain the specified credits in process to acquire the certificate/diploma/degree.  
[The college/Institute will decide the fees for SEC and VAC courses based on the University norms for certificate course per creditfees.]

% : Institute/College will offer any one course from given list of Ability Enhancement Courses approved by the University.

\*\* Major and Minor Practical based Subjects: 603 course. These courses are carrying 4 credits ( 2 Hours of theory and 4 hours of practical per week). These subjects carry 100 marks of exam weightage (50 theory and 50 practical). External and Internal distribution of marks are in ratio of 50:50 respectively. Students are required to acquire minimum passing marks from theory and practical collectively.

Practical exams for course-603, (2 hours duration).

Project Presentation Exam : Course-604 ( Duration – 2 Hours )

Seminar/Presentation Examination for course-605.

**Division of Theory internal marks (CCE) :**

For courses having 50 marks as Internals :

Class Assignment/Active Learning: 07 Marks + Home Assignment/Field Assignment: 08 marks + Attendance: 10 +

Class Test\*: 25For courses having 25 marks as Internals :

Class Assignment/Active Learning: 03 Marks + Home Assignment/Field Assignment: 03 marks + Attendance: 04 +

Class Test\*: 15

**For Practical internal marks (CCE) :**

For courses having 50 marks Internals :

Attendance: 10 marks + Viva-voce/Quiz: 20 marks + Lab-work Assessment/Practical: 20

marks.For courses having 25 marks Internals :

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

**Division of Practical External exam marks (SEE) :**

For 25 marks Externals :

Division of marks are: Exam evaluation: 20 marks + Viva-voce: 5 Marks.

Students are required to pass in combined head (Theory + Practical) for each course.

Students are required to remain present in internal and external theory and practical exams for course code – 603 mandatorily.

Program Passing Rules:	As per University rules.
Program Fees : (Per Semester) (One time fees and exam fees are additional as prescribed by the university) (w.e.f. Academic Year : 2025-2026)	Semester Tuition Fees : As per University norms. Semester Laboratory Utilization fees : (For Govt. and GIA colleges) : As per University norms. (For Self Finance Institutes ) : As per University norms. [Other one time /affiliation /exam fees, will be as per the norms of the University] [The fees for all certificate courses, 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.]

## Course : VOC-501

### Fundamentals of Cloud Technology

[Subject code-2511001205040001]

<b>Course code</b>	VOC-501																																													
<b>Course Title</b>	Fundamentals of Cloud Technology																																													
<b>Credit</b>	4 Credits ( Minor )																																													
<b>Teaching per week</b>	4 hours																																													
<b>Minimum week per semester</b>	15 (Including Class work, examination, preparation, holidays etc.)																																													
<b>Last Review / Revision</b>	-																																													
<b>Implementation year</b>	2025-2026																																													
<b>Purpose of the course</b>	This course imparts the knowledge of Fundamentals of cloud Computing and its services.																																													
<b>Course Objective</b>	<p><b>Objective-1:</b> <i>Understand</i> the foundational concepts, key characteristics, and evolution of cloud computing technologies.</p> <p><b>Objective-2:</b> <i>Explain</i> different cloud service and deployment models along with real-world cloud applications.</p> <p><b>Objective-3:</b> <i>Analyze</i> the architecture of cloud platforms, virtualization technologies, and resource management strategies.</p> <p><b>Objective-4:</b> <i>Evaluate</i> leading cloud platforms (AWS, Azure) in terms of services, security, and compliance features.</p> <p><b>Objective-5:</b> <i>Apply</i> emerging cloud trends such as big data, edge computing, and AI/ML integration in practical scenarios.</p>																																													
<b>Pre-requisite</b>	Basic understanding of operating system and computer network																																													
<b>Course Out come</b>	<p>CO1: Students will understand History and Evolution of cloud computing along with that they will come to know merits and demerits of cloud computing</p> <p>CO2: Students will understand core concepts of the cloud computing paradigm: how and why this paradigm shift came about, the characteristics, advantages and challenges brought about by the various models and services in cloud computing.</p> <p>CO3: Students will get idea of use of commonly used services providers like Amazon Web services and Microsoft Azure</p> <p>CO4: Students will get idea of advanced Cloud Concepts &amp; Future Trends</p>																																													
<b>Mapping between COs with PSOs</b>	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4								
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CO4																																														
<b>Course Content</b>	<p><b>Unit-1: Basics of Cloud Computing</b></p> <p>1.1 Introduction to Cloud Computing</p> <p>    1.1.1 Definition and Key Characteristics</p> <p>    1.1.2 Evolution and History of Cloud Computing</p> <p>    1.1.3 Benefits: Cost-efficiency, Scalability, Flexibility, Reliability</p> <p>    1.1.4 Challenges: Security, Compliance, Vendor Lock-in</p> <p><b>UNIT-2 : Cloud Models :</b></p> <p>2.1 Cloud Models</p> <p>    2.1.1 Deployment Models: Public, Private, Hybrid, Multi-Cloud</p> <p>    2.1.2 Service Models:</p> <p>        2.1.2.1 IaaS, PaaS, SaaS</p> <p>        2.1.2.2 Additional Models: Network as a Service (NaaS), Database as a Service (DBaaS)</p>																																													

	<p>2.2 Cloud Applications and Use Cases</p> <p>2.2.1 Business Applications</p> <p>2.2.2 Data Backup and Recovery</p> <p>2.2.3 Media Streaming, File Sharing</p> <p><b>Unit-3: Cloud Architecture and Virtualization</b></p> <p>3.1 Cloud Computing Architecture</p> <p>3.1.1 Components of Cloud Infrastructure</p> <p>3.1.2 Front-end and Back-end Architecture</p> <p>3.1.3 Resource Pooling and Multi-tenancy</p> <p>3.2 Virtualization Technologies</p> <p>3.2.1 Concept of Virtualization</p> <p>3.2.2 Types of Virtualization: Hardware (Full, Para, Emulation)</p> <p>3.2.3 Hypervisors: Type 1 and Type 2</p> <p>3.2.4 Role of Virtual Machines in Cloud</p> <p><b>Unit-4: Cloud Platforms Fundamentals:</b></p> <p>4.1 Cloud Planning and Design</p> <p>4.1.1 Business and IT Architecture</p> <p>4.1.2 Cloud Transformation Planning</p> <p>4.1.3 Introduction to Service-Oriented Architecture (SOA)</p> <p>4.1.4 Utility Computing Concepts</p> <p>4.2 Overview of Leading Cloud Platforms</p> <p>4.2.1 Basic Concepts of AWS, Azure</p> <p>4.2.2 Global Infrastructure: Regions and Availability Zones</p> <p>4.3 Compute and Storage Services</p> <p>4.3.1 AWS EC2 and Azure Virtual Machines</p> <p>4.3.2 AWS Lambda and Azure Functions (Serverless Computing)</p>
<p><b>Reference Books:</b></p>	<ol style="list-style-type: none"> <li>1. <b>Cloud Computing: Principles and Paradigms</b> – Rajkumar Buyya, James Broberg, Andrzej Goscinski , <b>Publisher: Wiley</b></li> <li>2. <b>Cloud Computing: A Hands-on Approach</b> – Arshdeep Bahga, Vijay Madisetti , <b>Publisher: Universities Press / CreateSpace Independent Publishing</b></li> <li>3. Cloud Computing for Dummies – Judith Hurwitz</li> <li>4. <b>Microsoft Azure Fundamentals Certification and Beyond</b> – Steve Miles ,<b>Publisher: Packt Publishing</b></li> <li>5. AWS Certified Solutions Architect Official Study Guide – Ben Piper</li> <li>6. Amazon Web Services in Action – Michael Wittig</li> <li>5. Exam Ref AZ-900 Microsoft Azure Fundamentals – Jim Cheshire</li> <li>6. Mastering Microsoft Azure Infrastructure Services – John Savill</li> <li>7. Cloud Computing Bible - Sosinsky - Wiley - India, 2011</li> <li>8. <b>Cloud Computing for Science and Engineering</b> – Ian Foster, Dennis B. Gannon, <b>Publisher: MIT Press</b></li> </ol>
<p><b>Teaching Methodology</b></p>	<p>Class Work, Discussion, Self-Study, Seminars and/or Assignment</p>
<p><b>Evaluation Method</b></p>	<p>50% Internal assessment. 50% External assessment</p>

**Course code: VOC-502**  
**Course Title: Computer Networking**

[Subject code-2511001205050001]

<b>Course code</b>	VOC-502								
<b>Course Title</b>	Computer Networking								
<b>Credit</b>	4 Credits ( Minor )								
<b>Teaching per week</b>	4 hours								
<b>Minimum week per semester</b>	15 (Including Class work, examination, preparation, holidays etc.)								
<b>Last Review / Revision</b>	-								
<b>Implementation Year</b>	2025-2026								
<b>Purpose of the course</b>	This course imparts the knowledge of Fundamentals of Computer Networks.								
<b>Course Objective</b>	<p><b>Objective-1:</b> <i>Understand</i> the fundamental concepts, architectures, and topologies of computer networks.</p> <p><b>Objective-2:</b> <i>Describe</i> the functions and protocols of the OSI and TCP/IP models across all network layers.</p> <p><b>Objective-3:</b> <i>Apply</i> basic networking and diagnostic commands to configure and troubleshoot network connectivity.</p> <p><b>Objective-4:</b> <i>Analyze</i> IP addressing schemes, routing methods, and network security mechanisms.</p> <p><b>Objective-5:</b> <i>Evaluate</i> emerging internet technologies and modern networking paradigms like SDN, IoT, and cloud networking.</p>								
<b>Pre-requisite</b>	Basic Knowledge of Computer Organization								
<b>Course Out come</b>	<p>CO1: Explain students about fundamentals of network, types of networks, topologies, Data Communication Fundamentals.</p> <p>CO2: Explain about the OSI models and services of each layer, to make students able to understand working of data transmission from device to device.</p> <p>CO3: Explain TCP/IP protocol suite, class addressing</p> <p>CO4: Explain about method of delivery, ICMP, ARP, Port and Sockets.</p> <p>CO5: Explain in detail about UDP and TCP Protocol.</p> <p>CO6: Explain and train student about DNS, Name Servers, HTTP</p> <p>CO7: Understanding about Email architecture, Services and Email Protocols (SMTP, POP3, IMAP).</p>								
<b>Mapping between COs with PSOs</b>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
	CO1								
	CO2								
	CO3								
	CO4								
	CO5								
	CO6								
	CO7								
<b>Course Content</b>	<p><b>Unit 1: Network Fundamentals &amp; Architecture</b></p> <p>1.1 Introduction to Networks</p> <p>    1.1.1 Types of networks (LAN, WAN, MAN, PAN)</p> <p>    1.1.2 Need, uses, and advantages of networking</p> <p>1.2 Networking Topologies</p> <p>    1.2.1 Bus, Star, Ring, Mesh, Hybrid</p> <p>    1.2.2 Advantages and disadvantages of each</p> <p>1.3 Network Models</p> <p>    1.3.1 Client-Server, Peer-to-Peer, Hybrid networks</p> <p>1.4 Data Communication Basics</p> <p>    1.4.1 Signals, Bandwidth, Frequency</p>								

	<p>1.4.2 Transmission modes: Simplex, Half-duplex, Full-duplex 1.4.3 Multiplexing techniques (FDM, TDM, WDM)</p> <p><b>Unit 2: OSI Model &amp; Network Infrastructure</b> 2.1 OSI Model &amp; Functions of Each Layer 2.2 Physical and Data Link Layer 2.2.1 MAC &amp; LLC sublayers 2.2.2 CSMA/CD, CSMA/CA 2.2.3 IEEE 802 Standards 2.2.4 Transmission media (wired &amp; wireless) 2.2.5 Devices: NIC, Repeaters, Hubs, Bridges</p> <p><b>UNIT 3 : Network and Transport Layer</b> 3.1 Network Layer 3.1.1 Logical addressing, IPv4 vs IPv6 3.1.2 Switching techniques (Circuit, Packet, Message switching) 3.1.2 Routing Basics (Static vs Dynamic) 3.1.3 Layer 2 &amp; Layer 3 switches, Routers 3.2 Application &amp; Upper Layers 3.2.1 Session Layer: Session management, Remote procedure calls 3.2.2 Presentation Layer: Encryption &amp; Compression techniques 3.2.3 Application Layer: FTP, NFS, Proxy, Gateway</p> <p><b>Unit 4: TCP/IP &amp; Network Security</b> 4.1 TCP/IP Protocol Suite 4.1.1 Comparison of OSI and TCP/IP models 4.2 IP Addressing &amp; Routing 4.2.1 IPv4/IPv6, Subnetting, Supernetting 4.2.2 CIDR &amp; VLSM 4.2.3 Routing types (Static, Dynamic – RIP, OSPF, BGP) 4.3 Data Transmission Methods 4.3.1 Unicast, Broadcast, Multicast, Anycast</p>
<b>Reference Books:</b>	<ol style="list-style-type: none"> <li>1. Networking Complete Third edition, BPB Publication</li> <li>2. Computer Networks- Andrew S. Tanenbaum &amp; David Wetherall – Edition: 5th Edition</li> <li>3. Data Communications and Networking - Behrouz A. Forouzan – Publisher: McGraw Hill Education Edition: 5th Edition</li> <li>4. Computer Networking with Internet Protocols - William Stallings – Publisher: Pearson Education</li> <li>5. Internetworking with TCP/IP- Douglas E. Comer – Publisher: Pearson Education Edition: 6th Edition</li> <li>6. The Practice of Network Security Monitoring- Richard Bejtlich – Publisher: No Starch Press</li> <li>7. Data Communication &amp; Networking- Rajiv Bahadur – Publisher: Laxmi Publications</li> <li>8. Data Communications and Computer Networks- Prakash C. Gupta – Publisher: PHI Learning</li> <li>9. Data Communication and Networking- T. L. Singal – Publisher: Cambridge University Press</li> <li>10. Computer Networks and Communications- S. K. Bhattacharya – Publisher: New Age International</li> </ol>
<b>Teaching Methodology</b>	Class Work, Discussion, Self-Study, Seminars and/or Assignment
<b>Evaluation Method</b>	50% Internal assessment. 50% External assessment

[Subject code for Theory-2511001205010001]

[Subject code for practical-2511001205010002]

**Course Code: Major CS-503**

**Course Title: Concepts of Machine Learning**

<b>Course Code</b>	VOC-503																																										
<b>Course Title</b>	Concepts of Machine Learning																																										
<b>Course Credit</b>	4																																										
<b>Teaching Per Week</b>	2 Hours (Theory) + 4 Hours (Practical)																																										
<b>Minimum Weeks per Semester</b>	15 (Including Class work, examination, preparation, holidays etc.)																																										
<b>Purpose of Course</b>	To equip students with practical and theoretical knowledge of machine learning techniques using Python for real-world data analysis and predictive modelling.																																										
<b>Review/Revision</b>	-																																										
<b>Implementation Year</b>	2025-2026 A.Y. 2026-2027 onwards [Only from Unit-1 to Unit-4 will be applicable.]																																										
<b>Course Objective</b>	<p><b>Objective-1:</b> <i>Understand</i> core concepts, types, and real-world applications of machine learning.</p> <p><b>Objective-2:</b> <i>Identify</i> appropriate machine learning models and Python libraries for solving data-driven problems.</p> <p><b>Objective-3:</b> <i>Apply</i> regression and classification techniques using scikit-learn to build predictive models.</p> <p><b>Objective-4:</b> <i>Analyze</i> the performance of supervised and unsupervised learning algorithms using evaluation metrics.</p> <p><b>Objective-5:</b> <i>Evaluate</i> and improve machine learning workflows by addressing challenges like data leakage and model validation.</p>																																										
<b>Course Outcome</b>	<p><b>CO1.</b> Understand and explain the fundamental concepts and types of machine learning along with real-world applications and tools like Python, Numpy, Pandas, and Matplotlib.</p> <p><b>CO2.</b> Apply linear, multiple, polynomial, and logistic regression techniques for data analysis and prediction.</p> <p><b>CO3.</b> Implement and analyze various supervised learning models including decision trees, support vector machines (SVM), and k-nearest neighbors (KNN).</p> <p><b>CO4.</b> Explore and apply unsupervised learning models such as K-Means, DBSCAN, HDBSCAN, and hierarchical clustering for pattern discovery.</p> <p><b>CO5.</b> Evaluate and validate machine-learning models using appropriate classification and regression metrics and understand common pitfalls such as data leakage.</p>																																										
	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> </tr> </thead> <tbody> <tr> <th>CO1</th> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO2</th> <td></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO3</th> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> <tr> <th>CO4</th> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td></td> <td style="background-color: #cccccc;"></td> </tr> <tr> <th>CO5</th> <td></td> <td style="background-color: #cccccc;"></td> <td></td> <td style="background-color: #cccccc;"></td> <td style="background-color: #cccccc;"></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	CO1							CO2							CO3							CO4							CO5						
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<b>Pre-requisite</b>	Knowledge of Python programming																																										
<b>Course Content :</b>	<p><b>Unit – 1 Introduction to Machine Learning</b></p> <p>1.1 What is a Machine Learning</p> <p>1.1.1 Need for Machine Learning.</p> <p>1.1.2 Why &amp; When to Make Machines Learn?</p>																																										

	<p>1.1.3 Challenges in Machines Learning 1.1.4 Real-world Applications of Machine Learning</p> <p><b>Unit-2 Types of Machine Learning</b> 2.1 Types of Machine Learning     2.2.1 Supervised     2.2.2 Unsupervised and Semi-supervised     2.2.3 Reinforcement Learning     2.2.4 Difference between Supervised and Unsupervised learning</p> <p>2.2 Machine Learning Workflow 2.3 Basics libraries of Python for Machine Learning (Numpy, Pandas, scikit-learn)</p> <p><b>Unit -3 Regression Analysis</b> 3.1 Introduction to Regression 3.2 Introduction to simple linear regression, Examples on Linear Regression 3.3 scikit-learn library to implement simple linear regression</p> <p><b>Unit – 4 Supervised Learning Model</b> 4.1 Introduction to classification, Classification Terminologies in Machine Learning 4.2 Decision trees: Concepts of Decision Tree 4.3 Implementation of Decision Tree 4.4 Regression trees</p> <p><b>Unit-5 : Indian knowledge system of Mathematics :</b> 5.1 Ancient Indian Arithmetic from Lilavati Samhita by Bhaskarachary-I:     5.1.1 Arithmetic rule : Sutra (Verse 1)     5.1.2 Multiplication of Large Numbers: Sutra (Verse 5)     5.1.3 Division: Sutra (Verse 8): 5.2 Ancient Algebra and Geometry operations from Lilavati Samhita:     5.2.1 Algebra : Sutra (Verse 13)     5.2.2 Geometric Relationships: Sutra (Verse 17)     5.2.3 Understanding Lilavati Samhita theorem later taught as Pythagorean theorem (Geometry): Sutra (Verse 23)</p>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. "Introduction to Machine Learning with Python" by Andreas C. Müller &amp; Sarah Guido (Beginner-friendly, code-focused)</li> <li>2. "Hands-On Machine Learning with Scikit-Learn, Keras&amp;TensorFlow" by Aurélien Géron (Excellent for practical implementation)</li> <li>3. "Pattern Recognition and Machine Learning" by Christopher M. Bishop (Theoretical foundations – advanced)</li> <li>4. "Python Machine Learning" by Sebastian Raschka (Good blend of theory and practice)</li> <li>5. "Data Science from Scratch" by Joel Grus (Great for fundamentals)</li> <li>6. “ Python machine learning : machine learning and deep learning with python, Scikit-learn and tensor flow ” by Sebastian Raschka and Vahid Mirjalili</li> </ol>
<b>Teaching Methodology</b>	Class Work, Discussion, Self-Study, Seminars and/or Assignment
<b>Evaluation Method</b>	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> <li>- Attendance, Class and home Assignment, Unit tests.</li> <li>- Practical exam, viva-voce, E-Journal</li> </ul> <p>50% External assessment.</p> <ul style="list-style-type: none"> <li>- Written Theory exam</li> </ul> <p>Practical Exam, viva-voce</p>

[Subject code for Theory-2511001205020001]

[Subject code for practical-2511001205020002]

**Course Code: VOC-504**

**Course Title: Web Development Framework**

<b>Course Code</b>	VOC-504																																																						
<b>Course Title</b>	Web Framework and Services (Major-12)																																																						
<b>Credits</b>	4																																																						
<b>Course Category</b>	Major Course																																																						
<b>Level of Course</b>	400-499 ( Advance Level )																																																						
<b>Teaching per Week</b>	2 Hours Theory + 4 Hours of Applied Project work																																																						
<b>Minimum Hours per Semester</b>	90 Hrs. ( 30 Hours Theory + 60 Hours Project work/Applied work )																																																						
<b>Review / Revision</b>	-																																																						
<b>Implementation Year:</b>	A.Y. 2025-2026 A.Y. 2026-2027 onwards [Only from Unit-1 to Unit-4 will be applicable.]																																																						
<b>Purpose of Course</b>	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.																																																						
<b>Course Objective</b>	<ol style="list-style-type: none"> <li><b>To impart foundational knowledge of PHP scripting language</b> and its role in developing server-side components for web applications.</li> <li><b>To enable students to apply MVC architecture</b> using frameworks like <b>CodeIgniter and Laravel</b> for structured web application development.</li> <li><b>To train students in database connectivity and operations</b>, including creating, reading, updating, and deleting records using PHP and MySQL.</li> <li><b>To develop proficiency in handling user input, sessions, forms, cookies, and file uploads</b> securely in web applications.</li> <li><b>To introduce RESTful API development and modern integration techniques</b> for building interactive and scalable web solutions.</li> </ol>																																																						
<b>Pre-requisite</b>	<b>Basic knowledge of HTML, CSS, JavaScript, programming fundamentals, databases, HTTP concepts, and file management using a code editor.</b>																																																						
<b>Course Outcome:</b>	<p><b>CO1:</b> Remembering: <i>Describe</i> the syntax, features, and core concepts of PHP including data types, control structures, and functions.</p> <p><b>CO2:</b> Applying: <i>Demonstrate</i> the ability to manage form data, sessions, cookies, and file handling using PHP for interactive web applications.</p> <p><b>CO3:</b> Creating: <i>Develop</i> database-driven web applications by integrating PHP with MySQL using CRUD operations and AJAX.</p> <p><b>CO4:</b> Applying: <i>Implement</i> MVC-based web development using CodeIgniter and Laravel frameworks with appropriate routing, controllers, and views.</p> <p><b>CO5:</b> Creating: <i>Construct</i> RESTful APIs and secure, scalable web services using Laravel's built-in tools and features.</p>																																																						
<b>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</b>	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4									CO5								
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<b>Course Content</b>	<p><b>Unit 1: Core PHP Programming</b></p> <p>[Php ver.8.x is recommended]</p> <p>1.1 Introduction to PHP</p> <p>1.1.1 Understanding the role of PHP in server-side web development</p> <p>1.1.2 History and evolution of PHP</p> <p>1.1.3 Installation and configuration using XAMPP/WAMP</p> <p>1.1.4 Setting up the development environment using Visual Studio Code</p>																																																						

## 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

## **UNIT-2 : PHP Control structures :**

### 2.1 Control Structures and Arrays

- 2.1.1 Conditional statements: `if`, `else`, `elseif`, `switch`
- 2.1.2 Looping constructs: `for`, `while`, `do-while`, `foreach`
- 2.2.3 Arrays: indexed, associative, multidimensional
- 2.2.4 Array operations: `sort()`, `asort()`, `ksort()`, `array_merge()`

### 2.2 Functions and Form Handling

- 2.2.1 Creating and invoking user-defined functions
- 2.2.2 Function parameters and return values
- 2.2.3 Variable scope: global vs. local
- 2.2.4 Handling forms with `$_GET` and `$_POST`
- 2.2.5 Basic input validation and sanitization

## **Unit 3: Advanced PHP and File Management**

### 3.1 File Handling and Directories

- 3.1.1 Including files using `include` and `require`
- 3.1.2 File operations: `fopen()`, `fread()`, `fwrite()`, `fclose()`
- 3.1.3 File upload using `$_FILES` and `move_uploaded_file()`
- 3.1.4 File download using PHP headers
- 3.1.5 Directory operations: `opendir()`, `readdir()`, `mkdir()`, `rmdir()`

### 3.2 Forms, Filters, and JSON

- 3.2.1 Designing and handling HTML forms
- 3.2.2 Server-side validation techniques
- 3.2.3 PHP filters: `filter_var()` and constants
- 3.2.4 Parsing and generating JSON with `json_encode()` and `json_decode()`

## **Unit 4: Database Interaction and CodeIgniter Framework**

[Codeigniter ver.4.4 or higher is recommended]

### 4.1 PHP with MySQL/MongoDB

- 4.1.1 Connecting to databases using `mysqli` or `PDO`
- 4.1.2 Creating databases and tables
- 4.1.3 Executing CRUD operations: `INSERT`, `SELECT`, `UPDATE`, `DELETE`
- 4.1.4 Using clauses: `WHERE`, `ORDER BY`, `LIMIT`

### 4.2 AJAX for Backend Integration

- 4.2.1 Introduction to AJAX and asynchronous requests
- 4.2.2 Sending AJAX requests to PHP
- 4.2.3 Real-time search functionality
- 4.2.4 JSON data exchange with JavaScript and PHP

### 4.3 CodeIgniter Introduction

- 4.3.1 Installing and configuring CodeIgniter (CI4)
- 4.3.2 Understanding MVC architecture in CodeIgniter
- 4.3.3 Creating models, views, and controllers
- 4.3.4 URL routing and default controller setup

## **Unit-5 : Indian knowledge system on Astronomy :**

### 5.1 Ancient Indian Astronomy from Suryasidhdhanta by Aryabhata:

- 5.1.1 Motion of the Earth: Sutra (Verse 3.9)
- 5.1.2 Length of the Year : Sutra (Verse 3.10)

	5.1.3 Lunar and Solar Eclipses: Sutra (Verse 4.5) 5.1.4 The Motion of Planets : Sutra (Verse 1.13) 5.1.5 The Influence of the Sun on Planetary Motion: Sutra (Verse 2.12) 5.1.6 Zodiac and Signs: Sutra (Verse 1.5) 5.1.7 Solar System: Sutra (Verse 1.15) 5.1.8 Speed of Planets: Sutra (Verse 6.5) 5.1.9 Planetary Distances from earth to moon: Sutra (Verse 7.8) 5.1.10 Latitude and Longitude of Planets : Sutra (Verse 8.12) 5.2 Ancient Indian Astronomy by Varahmihir : 5.2.1 On Lunar Phases : Sutra (Verse 2.10) 5.2.2 On the Movements of the Stars : Sutra (Verse 2.18) 5.2.3 Ecliptic Latitude and Longitude 5.2.4 Sidereal and Tropical Years 5.2.5 Planetary Conjunctions and Aspects [Unit-5: 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]				
<b>Reference Books</b>	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
<b>Teaching Methodology</b>	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments				
<b>Evaluation Method</b>	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				

[Subject code-2511001205030001]

**Course Code: VOC-505**

**Course Title: Project**

<b>Course Code</b>	VOC-505
<b>Course Title</b>	PROJECT
<b>Credits</b>	4
<b>Course Category</b>	Major Course
<b>Level of Course</b>	400-499 ( Advance Level )
<b>Teaching Hours</b>	120 Hours of Applied work(Project)
<b>Minimum Hours/ Semester</b>	120 Hours of Applied work (Project) (Including applied work, E-documentation, viva-voce examination, Project preparation etc.)
<b>Review / Revision</b>	-
<b>Implementation Year:</b>	A.Y. 2025-2026
<b>Purpose of Course</b>	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.
<b>Course Objective</b>	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.
<b>Pre-requisite</b>	Students must have completed foundational and intermediate courses in web design, 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.
<b>Course Outcomes</b>	<b>CO1:</b> Analyze: Students will be able to analyze project requirements, identify suitable tools, and prepare an implementation strategy. <b>CO2:</b> Create: Students will develop full-fledged applications using relevant web, mobile, or hybrid technologies. <b>CO3:</b> Apply: Students will gain experience in applying the Software Development Life Cycle (SDLC) to real-world problems. <b>CO4:</b> Create: Students will prepare and submit a comprehensive project report that meets academic and professional standards. <b>CO5:</b> Evaluate: Students will present their project solutions confidently and clearly to technical and non-technical audiences.
<b>Project Development</b>	<b>STEP-1: Project Planning and Definition</b> 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  <b>STEP-2: Project Design and Architecture</b> 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  <b>STEP-3: Project Development</b> 3.1 Frontend Development 3.2 Backend Development

	<p>3.3 Integration with Database and External APIs  3.4 Testing: Unit Testing, Integration Testing, User Acceptance Testing</p> <p><b>STEP-4: Documentation and Deployment</b>  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</p> <p>[ 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.]</p>	
<p><b>Project Evaluation Scheme</b></p>	<p>Component</p>	<p>Marks</p>
	<p>Problem Definition and Planning</p>	<p>10%</p>
	<p>Design and Architecture</p>	<p>15%</p>
	<p>Implementation and Functionality</p>	<p>30%</p>
	<p>Testing and Deployment</p>	<p>15%</p>
	<p>Documentation</p>	<p>10%</p>
	<p>Final Presentation &amp; Viva</p>	<p>20%</p>
<p><b>Evaluation Method</b></p>	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> <li>- Attendance and reporting to internal guides</li> <li>- Internal project presentation and demonstration, project documentation.</li> </ul> <p>50% External assessment.</p> <ul style="list-style-type: none"> <li>- project presentation and demonstration, viva-voce and e-project report.</li> </ul>	

**Course code: VOC-506**  
**Course Title: Skill Enhancement Course (SEC-06)**

<b>Course Code</b>	VOC-506
<b>Course Title</b>	Skill Enhancement Course (SEC-06)
<b>Credits</b>	2
<b>Course Category</b>	Skill Enhancement Course
<b>Level of Course</b>	100-199 ( Foundation / Introductory )
<b>Teaching per Week</b>	2 Hrs. ( 2 Hours Theory + Practical work as per requirement)
<b>Minimum weeks per Semester</b>	15 (Including class work, examination, preparation etc.)
<b>Review / Revision</b>	-
<b>Implementation Year</b>	A.Y. 2025-2026
<b>Purpose of Course</b>	<p>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.</p> <ul style="list-style-type: none"> <li>- It will be mandatory for the student to opt minimum one 2-credit Skill Enhancement Course out of the list of offered courses recognised by the University during semester-1 to semester-5.</li> <li>- The student can start an alternative career in the field by obtaining higher degree of knowledge in the area.</li> <li>- 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.</li> </ul>
<b>Course Objective</b>	<p>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. 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.</p>
<b>Pre-requisite</b>	- As per the nature of course.
<b>Course Outcomes</b>	<p>CO1: Student select the area of skill as per his/her interest. The choices will be given by the institute/department.</p> <p>CO2: The student acquire basic and fundamental level of knowledge in the field that the student opted.</p> <p>CO3: Understand the insight of the area and possibility of to explore more in the field.</p> <p>CO4: Understand effective representation of problems in terms addressing the Problems.</p> <p>CO5: Learn to upskill and upgrade the knowledge in the area of selected subject</p>

<p><b>Course Content and Implementation roadmap.</b></p>	<p>(i) University has categorized and prepared the basket of the courses including approved online courses that can be offered as Skill Enhancement Course.</p> <p>(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.</p> <p>(iii) The institutes/college/departments can select more than one course out of the given sets of courses and offer them to their students.</p> <p>(iv) The students can select any of the courses offered by the institute/college/department from the given choices and enroll for the course.</p> <p>(v) The institute/college/department will arrange appropriate resource person(s) for the course.</p> <p>(vi) The course evaluation will be taken place at the College/institute/department level based on the nature of the course.</p> <p>(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</p>
<p><b>Reference Books</b></p>	<p>- The reference materials and books will be decided by the Institutes/Colleges/Departments based on the selected Courses.</p> <p>- Minimum five copies of relevant topics are recommended to keep in the library.</p>
<p><b>Teaching Methodology</b></p>	<p>Class Work/ Discussion/ Self-Study/ Seminars/ field works/ practical training/ field work and/or Assignments.</p>
<p><b>Evaluation Method</b></p>	<p>50% Internal assessment. 50% External assessment. Maximum Marks: 50 (20 Internal +30 External )</p> <p>(Evaluation and Assessment will be carried out at institute level. On successful completion of the course, the student will be granted 2 credits</p>

[Subject code-2511001206040001]

**VEER NARMAD SOUTH GUJARAT UNIVERSITY – SURAT**

**Syllabus for T. Y. B. Voc. (I.T.) Semester-6**

**Effective From: June-2025**

**Course Code: VOC-601**

**Course Title: Fundamentals of A.I. and IoT Devices**

<b>Course Code</b>	VOC-601																																																						
<b>Course Title</b>	<b>Fundamentals of A.I. and IoT Devices (Minor-6-02)</b>																																																						
<b>Credits</b>	4																																																						
<b>Course Category</b>	Minor Course																																																						
<b>Level of Course</b>	200-299 ( Intermediate Level )																																																						
<b>Teaching Hours</b>	60 Hours																																																						
<b>Minimum Hours/ Semester</b>	60 hours of Theory (Including class work, examination, preparation etc.)																																																						
<b>Review / Revision</b>	-																																																						
<b>Implementation Year:</b>	A.Y. 2025-2026																																																						
<b>Purpose of Course</b>	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.																																																						
<b>Course Objective</b>	<ol style="list-style-type: none"> <li>1) To introduce the basic concepts and history of Artificial Intelligence (AI).</li> <li>2) To explain key AI techniques such as search algorithms, machine learning, and expert systems.</li> <li>3) To familiarize students with IoT devices and their architecture.</li> <li>4) To explore how IoT devices collect and transmit data for AI applications.</li> <li>5) To discuss real-world use cases integrating AI with IoT in domains like healthcare, agriculture, and smart cities.</li> <li>6) To encourage understanding of the challenges and future scope of AI-enabled IoT systems.</li> </ol>																																																						
<b>Pre-requisite</b>	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.																																																						
<b>Course Outcomes</b>	<p><b>CO-1 Remembering:</b> Recall and define key concepts, history, and types of Artificial Intelligence and IoT technologies.</p> <p><b>CO-2 Understanding:</b> Explain the architecture, components, and connectivity methods of IoT systems used in AI applications.</p> <p><b>CO-3 Applying:</b> Apply AI algorithms to process real-time data collected from IoT devices for smart decision-making.</p> <p><b>CO-4 Analyzing:</b> Analyze challenges related to data quality, latency, power consumption, and security in AIoT systems.</p> <p><b>CO-5 Creating:</b> Design and present innovative AIoT solutions based on case studies and group collaboration.</p>																																																						
<b>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</b>	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4									CO5								
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<b>Course Content</b>	<p><b>Unit 1: Basics of Artificial Intelligence (AI)</b></p> <p>1.1 Introduction to Artificial Intelligence</p>																																																						

	<p>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)</p> <p><b>Unit 2: IoT Devices that Can Be Used in AI Applications – Basics</b>  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</p> <p><b>Unit 3: Advanced Integration of AI with IoT</b>  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</p> <p><b>Unit 4: Summary and Case Study Discussion</b>  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]</p>
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1. Frontiers of Electronic Commerce, Ravi Kalakota and Andrew Whinston, Addison Wesley</li> <li>2. Electronic Commerce: A Managerial Perspective, Efraim turban, Jae Lee, David King, H. Michel Chung, Addison Wesley</li> <li>3. E-Commerce: An Indian Perspective, Joseph, PHI</li> <li>4. E-Mail Hacking, Ankit Fadia, Vikas Publishing House Pvt. Ltd.</li> <li>5. e-Commerce Concept, Models Strategies, G.V.S. Murthy, Himalaya Publisher</li> <li>6. Cyber Crime in India, Dr M Dasgupta, Centax Publications Pvt Ltd</li> <li>7. Cyber Laws and Crimes, Barkha U, Rama Mohan, Universal Law Publishing Co. Pvt Ltd.</li> <li>8. Cyber Crime, Bansal S.K., A.P.H. Publishing Corporation</li> <li>9. Cyber Security Understanding Cyber Crime, Computer Forensic and Legal Perspectives, Nina Godbole, Sunit Belapur, Willey India Publication</li> </ol>
<b>Teaching Methodology</b>	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
<b>Evaluation Method</b>	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> <li>- Attendance, Class and home Assignment</li> <li>- Unit Tests</li> </ul> <p>50% External assessment.</p> <ul style="list-style-type: none"> <li>- Written Theory exam</li> </ul>

[Subject code for Theory-2511001206010001]

[Subject code for Practical-2511001206010002]

**Course Code: VOC-602**

**Course Title : Data Analysis using Python**

<b>Course Code</b>	VOC-602																																																						
<b>Course Title</b>	<b>Data Analysis using Python</b>																																																						
<b>Credits</b>	4																																																						
<b>Course Category</b>	Major Course																																																						
<b>Level of Course</b>	400-499 ( Advance Level )																																																						
<b>Teaching Hours</b>	30 Hours of class-room teaching + 60 Hours of Applied work(Project)																																																						
<b>Minimum Hours/ Semester</b>	30 hours of Theory + 60 Hours of Applied work (Project) (Including class work, examination, preparation etc.)																																																						
<b>Review / Revision</b>	-																																																						
<b>Implementation Year:</b>	Only during A.Y. 2025-2026 From A.Y.2026-2027 only Unit-1 to Unit-4 will be applicable.																																																						
<b>Purpose of Course</b>	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.																																																						
<b>Course Objective</b>	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.																																																						
<b>Pre-requisite</b>	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.																																																						
<b>Course Outcomes</b>	<b>CO1:Understanding:</b> Explain key concepts of exploratory data analysis, including univariate, bivariate, and multivariate techniques, and describe data distributions. <b>CO2:Applying:</b> Use Python libraries like Pandas and NumPy to perform and automate exploratory data analysis on various datasets. <b>CO3:Analyzing:</b> Analyze relationships between variables using regression techniques, and interpret covariance and correlation in datasets. <b>CO4:Understanding &amp; Applying:</b> Describe the types and benefits of machine learning, and apply basic ML lifecycle steps to real-world problems. <b>CO5:Evaluating:</b> Evaluate supervised learning models using loss functions such as MSE and MAE, and assess issues like overfitting and underfitting.																																																						
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<b>Course Content</b>	<b>Unit-1 : Fundamentals of Data Analytics :</b> 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																																																						

	<p><b>Unit-2: Understanding Data</b></p> <p>2.1 Understanding the Data:</p> <p>2.2.1 Quantitative Data : Discrete and Continuous</p> <p>2.2.2 Qualitative Data : Non-numerical (Normal and Ordinal)</p> <p>2.3 Spread of Data</p> <p>2.3.1 Normal Distribution</p> <p>2.3.2 Skewed Distribution</p> <p>2.3.3 Skewness and Kurtosis</p> <p><b>Unit-3: Automate EDA (Exploratory Data Analysis)</b></p> <p>3.1 Python Libraries to Automate Exploratory Data Analysis</p> <p>3.1.1 Pandas and Numpy</p> <p>3.2 Regression</p> <p>3.2.1 Characteristics of Regression</p> <p>3.2.2 Dependent and Independent variables</p> <p>3.2.3 Covariance and Correlation</p> <p><b>Unit-4: Understanding Machine Learning</b></p> <p>4.1 Machine Learning Basics:</p> <p>4.1.1 Concepts of Machine learning</p> <p>4.1.1.1 Understanding machine learning</p> <p>4.1.1.2 Benefit of machine learning</p> <p>4.1.1.3 Machine learning life cycle</p> <p>4.2 Types of Machine Learning:</p> <p>4.2.1 Supervised and Unsupervised Learning</p> <p>4.2.2 Applications of ML in real-world scenarios</p> <p>4.3 Overview of Supervised Learning</p> <p>4.3.1 Concepts of Supervised Learning</p> <p>4.3.2 Difference between Classification and Regression</p> <p><b>Unit-5 : Vedic Mathematics Sutras :</b></p> <p>5.1 Nikhilam Navatashcaramam Dashatah : "All from 9 and the last from 10."</p> <p>5.2 Ekadhikena Purvena : "By one more than the previous one."</p> <p>5.3 Udharan : "The extraction."</p> <p>5.4 Paraavartya : "Transposition and cancellation."</p> <p>5.5 Shunyam Saamyasamuccaye : "When the sum is the same that sum is zero."</p> <p>5.6 Anurupyena : "Proportionately."</p> <p>5.7 Sankalana-Vyavakalanabhyam : "By addition and by subtraction."</p> <p>5.8 Puranapuranaabhyam : "By the completion or non-completion."</p> <p>5.9 Chalana-Kalana : "By motion or by applying a shift."</p> <p>5.10 Yavadunam : "Whatever is the deficiency."</p> <p>5.11 Vyastisamanstih : "The parts and the whole."</p> <p>5.12 Sesanyan : "The remainder."</p> <p>5.13 Gunitasamuchyah : "The product of the sum."</p> <p>5.14 Vistaran : "Expansion."</p> <p>5.15 Rupan : "Form."</p> <p>5.16 Chidana : "By splitting."</p> <p>[Implementation of all sutras of Unit-5 in computer Lab. Using C / Python / Any Prog. Language]</p> <p>[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/15<sup>th</sup> of August(Winter session)]</p> <p>[All Units carry Equal Weightage]</p>
<p><b>Reference Books</b></p>	<p>1) Data Analytics Using Python, Bharti Motwani, Wiley India Pvt. Ltd., ISBN: 978-93-87034-42-0</p> <p>2) Data Science and Analytics, V.K. Jain, Khanna Publishing House, ISBN: 978-93-86173-66-3</p> <p>3) Data Analytics with Python, R. N. Prasad, Seema Acharya, Wiley India Pvt. Ltd., ISBN: 978-81-265-9337-4</p> <p>4) Foundations of Data Science, Avrim Blum, John Hopcroft, Ravindran Kannan, Universities Press (India) Pvt. Ltd., ISBN: 978-93-86279-47-1</p> <p>5) Python for Data Analysis, Reema Thareja, Oxford University Press India, ISBN: 978-0-19-948017-1</p>

	<p>6) Python for Data Analysis, Wes McKinney, O'Reilly Media, ISBN: 978-1-491-95766-0</p> <p>7) Hands-On Machine Learning with Scikit-Learn, Keras, and TensorFlow, Aurélien Géron, O'Reilly Media, ISBN: 978-1-492-03264-1</p> <p>8) Data Science from Scratch: First Principles with Python, Joel Grus, O'Reilly Media, ISBN: 978-1-491-91205-8</p> <p>9) An Introduction to Statistical Learning, Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, Springer, ISBN: 978-1-4614-7138-7</p> <p>10) Think Stats: Exploratory Data Analysis in Python, Allen B. Downey, O'Reilly Media, ISBN: 978-1-449-39416-6</p>
<b>Teaching Methodology</b>	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
<b>Evaluation Method</b>	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> <li>- Attendance, Class and home Assignment, Unit tests.</li> <li>- Internal project presentation and demonstration, project documentation.</li> </ul> <p>50% External assessment.</p> <ul style="list-style-type: none"> <li>- Theory / written examination</li> <li>- project presentation and demonstration, viva-voce and e-project report.</li> </ul>

[Subject code for Theory-2511001206020001]

[Subject code for Practical-2511001206020002]

**Course Code: VOC-603**

**Course Title: Full Stack Development Fundamentals**

<b>Course Code</b>	VOC-603																																																						
<b>Course Title</b>	Fundamentals Development Fundamentals																																																						
<b>Credits</b>	4																																																						
<b>Course Category</b>	Major Course																																																						
<b>Level of Course</b>	Advance level																																																						
<b>Teaching per Week</b>	2 Hours Theory + 4 Hours of Project work																																																						
<b>Minimum Teaching Hours per Semester</b>	90 Hours (Theory + Project work) (Including class work, Project work, preparation etc.)																																																						
<b>Review / Revision</b>	-																																																						
<b>Implementation Year:</b>	A.Y. 2025-2026																																																						
<b>Cognitive Skills of the Course</b>	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.																																																						
<b>Course Objective</b>	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.																																																						
<b>Pre-requisite</b>	305-01: Web Designing -1 course of Semester-3. 405-01: Web Designing -2 course of Semester-4. 503-01: Advanced Web Designing – I																																																						
<b>Course Outcomes</b>	<p><b>CO1:</b> The skills acquired in this course are highly transferable and applicable in a wide range of professional settings.</p> <p><b>CO2:</b> Whether students aim to become web developers, designers, or entrepreneurs, proficiency in web development technologies is invaluable.</p> <p><b>CO3:</b> Through hands-on projects and exercises, they will gain practical experience in building real-world solutions.</p> <p><b>CO4:</b> Students will be able to develop modern, complex, responsive and scalable websites.</p> <p><b>CO5:</b> Understand necessary functionalities and elements of client and server-side development of website.</p> <table border="1"> <thead> <tr> <th>Unit</th> <th>Remember</th> <th>Understand</th> <th>Apply</th> <th>Analyze</th> <th>Evaluate</th> <th>Create</th> </tr> </thead> <tbody> <tr> <td>Unit 1</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td>✓</td> </tr> <tr> <td>Unit 2</td> <td>✓</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> </tr> <tr> <td>Unit 3</td> <td></td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td>✓</td> </tr> <tr> <td>Unit 4</td> <td>✓</td> <td>✓</td> <td>✓</td> <td></td> <td></td> <td>✓</td> </tr> </tbody> </table>	Unit	Remember	Understand	Apply	Analyze	Evaluate	Create	Unit 1	✓	✓	✓			✓	Unit 2	✓	✓	✓	✓			Unit 3		✓	✓	✓		✓	Unit 4	✓	✓	✓			✓																			
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<b>Mapping between Course Outcomes(CO) with Program Specific Outcomes(PSO)</b>	<table border="1"> <thead> <tr> <th></th> <th>PSO1</th> <th>PSO2</th> <th>PSO3</th> <th>PSO4</th> <th>PSO5</th> <th>PSO6</th> <th>PSO7</th> <th>PSO8</th> </tr> </thead> <tbody> <tr> <td>CO1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO2</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO3</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO4</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>CO5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8	CO1									CO2									CO3									CO4									CO5								
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CO4																																																							
CO5																																																							
<b>Course Content</b>	<b>Unit 1: Fundamentals of Angular (v17) for Single Page Applications</b> 1.1 Angular Recap & Project Setup																																																						

	<p>1.1.1 Brief Recap of Angular 17 core concepts: Components, Services, Routing</p> <p>1.1.2 Setting up a scalable Angular project using Angular CLI with Standalone Components</p> <p>1.1.3 Folder structure and module organization for large projects</p> <p>1.2 Advanced Routing &amp; State Handling</p> <p>1.2.1 Implementing Lazy Loading with Feature Modules</p> <p>1.2.2 Route Guards: CanActivate, CanDeactivate for securing routes</p> <p>1.2.3 Route Resolvers for preloading data</p> <p>1.2.4 Introduction to advanced state handling using RxJS Subjects and Behavior Subjects</p> <p><b>Unit-2: Reactive Forms :</b></p> <p>2.1 Reactive Forms in Real Applications</p> <p>2.1.1 Dynamic form generation using FormArray</p> <p>2.1.2 Custom Validators and Asynchronous Validation</p> <p>2.1.3 Centralized error handling and displaying validation messages</p> <p>2.1.4 Submitting forms to APIs and form state management</p> <p>2.2 Building Reusable UI Components &amp; Design Patterns</p> <p>2.2.1 Creating reusable card, modal, and alert components</p> <p>2.2.2 Component interaction with RxJS and Shared Services</p> <p>2.2.3 Use of ng-template, ng-container, ng-content for structural flexibility</p> <p>2.2.4 Smart vs Dumb Components: Best practices</p> <p><b>Unit-3 : Application Deployment :</b></p> <p>3.1 Application Deployment &amp; Performance Optimization</p> <p>3.1.1 Angular build process, environments, and optimization flags</p> <p>3.1.2 Deploying Angular applications using Firebase Hosting</p> <p>3.1.3 Performance tuning: trackBy, OnPush change detection, lazy loading routes/components</p> <p><b>Unit 4: Introduction to Express.js and Server-Side Basics with Node.js</b></p> <p>4.1 Introduction to Node.js and Express.js</p> <p>4.1.1 Installing Node.js (v20+) and setting up Express server</p> <p>4.1.2 Creating a RESTful backend using Express.js</p> <p>4.1.3 Introduction to nodemon and project structuring</p> <p>4.2 Handling Routes and HTTP Methods</p> <p>4.2.1 Defining routes using GET, POST, PUT, DELETE</p> <p>4.2.2 Sending responses and working with route/query parameters</p> <p>4.2.3 Connecting routes to controller logic</p> <p>4.3 Middleware and API Basics</p> <p>4.3.1 Understanding middleware in Express</p> <p>4.3.2 Using built-in and custom middleware (e.g., body-parser, static files)</p> <p>4.3.3 Introduction to CORS and environment variables</p> <p>[Versions recommended: Node.js: v20 LTS or higher, Angular: v17+, Express: v4.x, Firebase: v10 SDK or latest (modular SDK)]</p> <p>[ 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 10<sup>th</sup> of February/15<sup>th</sup> of August(for winter sessions) and submit].</p>
<p><b>Reference Books</b></p>	<p>1. Angular: Up and Running: Learning Angular, Step by Step, Shyam Seshadri, O’Reilly Media, Inc.</p> <p>2. Mastering Web Application Development with AngularJS, Pawel Kozlowski Peter and Bacon Darwin, Packt Publishing</p> <p>3. Beginning Node.js, Express &amp; MongoDB Development, by Greg Lim, ISBN-13 : 978-9811480287</p> <p>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</p> <p>5. MongoDB, Express, Angular, and Node.js Fundamentals, Paul Oluyeye, Packt Publishing, ISBN-13 : 978-1789808735</p> <p>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</p>

	<p>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</p> <p>8. Express.js: Node.js Framework for Web Application Development, Daniel Green, ASIN: B014FVDVUA,</p> <p>9. Mastering Firebase: The Complete Guide to Building and Scaling Apps, by Kameron Hussain, Frahaan Hussain, Sonar Publishing, ISBN – 13 979-8223728290</p> <p>10. The Road to Firebase: Your journey to master Firebase in JavaScript, Robin Wieruch, 2018 edition</p> <p>11. Firebase Cookbook, Housseem Yahiaoui, Packt Publishing, ISBN-13 : 978-1788296335</p>
<b>Teaching Methodology</b>	Class Work, Discussion, Lab work, Self-Study, Seminars and/or Assignments
<b>Evaluation Method</b>	<p>50% Internal assessment. :</p> <ul style="list-style-type: none"> <li>- Attendance, Class and home Assignment, Unit test.</li> <li>- Project Assessment, Presentation and viva-voce</li> </ul> <p>50% External assessment. :</p> <ul style="list-style-type: none"> <li>- Theory written examination</li> <li>- Project Assessment, Presentation and viva-voce</li> </ul>

**Course Code: VOC-604****Course Title: Project**

<b>Course Code</b>	VOC-604
<b>Course Title</b>	PROJECT
<b>Credits</b>	4
<b>Course Category</b>	Major Course
<b>Level of Course</b>	400-499 ( Advance Level )
<b>Teaching Hours</b>	120 Hours of Applied work(Project)
<b>Minimum Hours/ Semester</b>	120 Hours of Applied work (Project) (Including applied work, E-documentation, viva-voce examination, Project preparation etc.)
<b>Review / Revision</b>	-
<b>Implementation Year:</b>	A.Y. 2025-2026
<b>Purpose of Course</b>	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.
<b>Course Objective</b>	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.
<b>Pre-requisite</b>	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.
<b>Course Outcomes</b>	<b>CO1:</b> Analyze: Students will be able to analyze project requirements, identify suitable tools, and prepare an implementation strategy. <b>CO2:</b> Create: Students will develop full-fledged applications using relevant web, mobile, or hybrid technologies. <b>CO3:</b> Apply: Students will gain experience in applying the Software Development Life Cycle (SDLC) to real-world problems. <b>CO4:</b> Create: Students will prepare and submit a comprehensive project report that meets academic and professional standards. <b>CO5:</b> Evaluate: Students will present their project solutions confidently and clearly to technical and non-technical audiences.
<b>Project Development</b>	<b>STEP-1: Project Planning and Definition</b> 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  <b>STEP-2: Project Design and Architecture</b> 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  <b>STEP-3: Project Development</b> 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

	<p><b>STEP-4: Documentation and Deployment</b>  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.]</p>	
<p><b>Project Evaluation Scheme</b></p>	<p>Component</p>	<p>Marks</p>
	<p>Problem Definition and Planning</p>	<p>10%</p>
	<p>Design and Architecture</p>	<p>15%</p>
	<p>Implementation and Functionality</p>	<p>30%</p>
	<p>Testing and Deployment</p>	<p>15%</p>
	<p>Documentation</p>	<p>10%</p>
	<p>Final Presentation &amp; Viva</p>	<p>20%</p>
<p><b>Evaluation Method</b></p>	<p>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.</p>	

**Course Code: VOC-605****Course Title: Project and Interview Presentation Soft Skills (AEC-06)**

[Subject code-2511001206050001]

<b>Course Code</b>	VOC-605 (Ability Enhancement Course (AEC))
<b>Course Title</b>	Project and Interview Presentation Soft Skills
<b>Credits</b>	2
<b>Course Category</b>	AEC Course
<b>Level of Course</b>	100-199 ( Fundamental Level )
<b>Teaching Hours per semester</b>	30 Hours of class-room work
<b>Minimum Hours/ Semester</b>	30 hours of Class-room work (Including class work, interactive sessions, examination, preparation etc.)
<b>Review / Revision</b>	-
<b>Implementation Year:</b>	A.Y. 2026-2027
<b>Purpose of Course</b>	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.
<b>Course Objective</b>	<ol style="list-style-type: none"><li>1) To develop students' ability to plan, execute, and manage software/IT projects using industry-standard practices.</li><li>2) To enhance technical documentation skills through structured project reports and software documentation.</li><li>3) To build confidence in delivering effective oral presentations and technical demonstrations relevant to software and IT domains.</li><li>4) To improve soft skills such as teamwork, time management, and problem-solving in a professional IT project environment.</li><li>5) To prepare students for technical and HR interviews by practicing mock interviews and resume-building activities.</li></ol>
<b>Pre-requisite</b>	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.
<b>Course Outcomes</b>	<p><b>1)CO1:(Understand):</b> Explain the essential components of professional project documentation and communication in the software and IT industry.</p> <p><b>2)CO2:(Apply):</b> Demonstrate the ability to present project concepts clearly using structured presentation techniques and visual aids relevant to IT solutions.</p> <p><b>3)CO3:(Analyze):</b> Evaluate the technical and soft skill requirements of various IT job roles and align personal project work and presentation accordingly.</p> <p><b>4)CO4:(Create):</b> Develop a mini-project or prototype by integrating appropriate software tools and technologies and document it as per standard industry practices.</p> <p><b>5)CO5:(Evaluate):</b> Justify design choices, tool selection, and development approach during interviews or viva presentations using logical reasoning and industry-specific language.</p>

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	<p><b>Unit 1: Communication and Presentation Skills in the IT Industry</b></p> <p>1.1 Fundamentals of Communication</p> <p>1.1.1 Verbal and Non-verbal Communication</p> <p>1.1.2 Barriers in Communication in Technical Teams</p> <p>1.1.3 Listening and Clarity in Technical Discussions</p> <p>1.2 Presentation Skills for IT Professionals</p> <p>1.2.1 Creating Technical Presentations</p> <p>1.2.2 Using Tools like PowerPoint, Canva, Prezi</p> <p>1.2.3 Speaking with Confidence in Team and Client Meetings</p> <p>1.3 Email and Technical Writing Etiquette</p> <p>1.3.1 Writing Clear Technical Emails</p> <p>1.3.2 Preparing Professional Reports and Documentation</p> <p><b>Unit 2: Project Documentation and Reporting</b></p> <p>2.1 Understanding Software Development Life Cycle (SDLC)</p> <p>2.1.1 Role of Documentation at Each Phase</p> <p>2.1.2 Agile Documentation vs Traditional Models</p> <p>2.2 Technical Project Documentation</p> <p>2.2.1 Problem Statement and Requirements</p> <p>2.2.2 Design Diagrams: UML, ER Diagrams</p> <p>2.2.3 Testing and Deployment Documentation</p> <p>2.3 Final Report Writing and Formatting</p> <p>2.3.1 Structuring a Complete Project Report</p> <p>2.3.2 IEEE/ACM Style Guidelines and Referencing</p> <p>2.3.3 Common Errors to Avoid in Technical Reports</p> <p><b>Unit 3: Interview Readiness and Soft Skills for Developers</b></p> <p>3.1 Resume and LinkedIn Profile Building</p> <p>3.1.1 Components of a Tech Resume</p> <p>3.1.2 Tailoring Resumes for Software Roles</p> <p>3.2 Interviewing Skills for IT Roles</p> <p>3.2.1 Understanding the Interview Process in Software Companies</p> <p>3.2.2 Technical Round vs HR Round Expectations</p> <p>3.2.3 STAR Method for Behavioural Interview Questions</p> <p>3.3 Mock Interview Sessions</p> <p>3.3.1 Self-Introduction Practice</p> <p>3.3.2 Group Feedback and Interview Etiquette</p> <p><b>Unit 4: Final Project Presentation and Seminar</b></p> <p>4.1 Project Showcase Guidelines</p> <p>4.1.1 Preparing for Project Presentation</p> <p>4.1.2 Demonstrating Code, UI, and Deployment</p> <p>4.2 Seminar and Peer Review</p> <p>4.2.1 Presentation to Class and Faculty Panel</p> <p>4.2.2 Peer Evaluation Criteria</p> <p>4.3 Soft Skill Reflection and Final Assessment</p> <p>4.3.1 Student Reflections on Soft Skills Gained</p> <p>4.3.2 Final Grading and Suggestions for Improvement</p>								

	[One topic will be allocated to every students. The student will prepare a seminar and presentation along with a documentation.]
<b>Reference Books</b>	<ol style="list-style-type: none"> <li>1) Technical Communication: Principles and Practice, Meenakshi Raman &amp; Sangeeta Sharma, Oxford University Press India, ISBN: 9780195695747</li> <li>2) Soft Skills: Know Yourself and Know the World, Dr. Alex K., S. Chand Publishing, ISBN: 9789352534357</li> <li>3) Communication Skills for Engineers, Sunita Mishra &amp; C. Muralikrishna, Pearson Education India, ISBN: 9788131733844</li> <li>4) Business Communication, P.D. Chaturvedi &amp; Mukesh Chaturvedi, Pearson Education India, ISBN: 9788131733585</li> <li>5) Developing Soft Skills, Gajendra Singh Chauhan, Wiley India, ISBN: 9788126577500</li> <li>6) The Quick and Easy Way to Effective Speaking, Dale Carnegie, Simon &amp; Schuster, ISBN: 9780743528322</li> <li>7) Cracking the Coding Interview, Gayle Laakmann McDowell, CareerCup, ISBN: 9780984782857</li> <li>8) Presentation Skills for Technical Professionals, Naomi Karten, Dorset House Publishing, ISBN: 9780932633585</li> <li>9) Interviewing: Principles and Practices, Charles Stewart &amp; William Cash Jr., McGraw-Hill Education, ISBN: 9780078036804</li> <li>10) The Art of Public Speaking, Stephen E. Lucas, McGraw-Hill Education, ISBN: 9780073523910</li> </ol>
<b>Teaching Methodology</b>	Class Work, Discussion, Presentation, Self-Study, Seminars and/or Assignments
<b>Evaluation Method</b>	<p>50% Internal assessment.</p> <ul style="list-style-type: none"> <li>- Attendance, Class and home Assignment, Unit Tests (Seminar).</li> <li>- Internal presentations, documentation, viva-voce and Seminar</li> </ul> <p>50% External assessment.</p> <ul style="list-style-type: none"> <li>- Presentation, documentation, presentation and Viva-voce.</li> </ul>

[Subject code-2511001206060001]

**Course Code: CS-606**  
**Course Title: Internship**

<b>Course Code</b>	CS-606		
<b>Course Title</b>	Internship		
<b>Credits</b>	4		
<b>Course Category</b>	Internship		
<b>Level of Course</b>	400-499 ( Advance Level )		
<b>Teaching Hours</b>	120 Hours of internship work		
<b>Minimum Hours/ Semester</b>	120 hours of internship work (Including industrial visit, interactive sessions, applied/training work, examination, preparation, Skill enhancement etc.)		
<b>Review / Revision</b>	-		
<b>Implementation Year:</b>	A.Y. 2025-2026		
<b>Purpose of Course</b>	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.		
<b>Course Objective</b>	<ol style="list-style-type: none"> <li>1) To provide students with practical exposure and skill knowledge to industry standards and practices.</li> <li>2) To foster the application of academic knowledge in real-life work scenarios.</li> <li>3) To enhance students' interpersonal, communication, and problem-solving skills.</li> <li>4) To help students identify their strengths and areas of interest in professional domains.</li> <li>5) To inculcate a sense of responsibility, discipline, and work ethics.</li> </ol>		
<b>Pre-requisite</b>	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.		
<b>Course Outcomes</b>	<ol style="list-style-type: none"> <li>1) <b>CO1 (Apply):</b> Apply programming, development, or analytical skills gained in the classroom to solve real-world computing problems during the internship.</li> <li>2) <b>CO2 (Analyze):</b> Analyze the architecture, workflow, and practices of the host organization to understand the integration of computer systems in business or technical environments.</li> <li>3) <b>CO3 (Evaluate):</b> Evaluate project requirements, software tools, and technologies used during the internship to recommend improvements or alternative approaches.</li> <li>4) <b>CO4 (Create):</b> Create a structured technical report and project documentation summarizing the tasks, challenges, and outcomes of the internship.</li> <li>5) <b>CO5 (Present):</b> Present the project findings and experience effectively using professional communication and presentation skills tailored to the IT/software industry.</li> </ol>		
<b>Internship Structure and Deliverable by Students:</b>	<p><b>Duration:</b> 120 Hours <b>Mode:</b> Offline / Online / Hybrid <b>Location:</b> Industry, business firms, IT companies, local government offices, health organizations, media, artisans, etc.</p> <p><b>Deliverables by Student:</b></p> <ol style="list-style-type: none"> <li>1. Internship Joining Report</li> <li>2. Weekly Progress Logbook</li> <li>3. Project or Assignment Work (if applicable)</li> <li>4. Final Internship Report (with photographs, certificates, etc.)</li> <li>5. Presentation and Viva Voce</li> </ol>		
<b>Course Evaluation</b>	<b>Component</b>	<b>Marks/Weightage</b>	
	Attendance and Participation	20%	
	Weekly Progress Logbook	20%	

	Final Internship Report	30%
	Presentation & Viva Voce	30%
	<b>Total</b>	<b>100%</b>

## 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	Remarks by Industry Guide
Week 1	01/06/2025– 07/06/2025	Task 1 description	Task 1 completed	e.g., HTML, Python, MySQL	Signature & comments
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.