SCHEME & SYLLABUS

B.Sc.(IT) Course - 04 Years

(3/4 years Honours or Honours with Research)
Four Year Under-Graduate (FYUG) Programme as per NEP Choice Based

Credit System Semester Scheme with Multiple Entry and Exit Options

Programme Code: UG003 (Academic Session 2025-26 onwards)
National Higher Education Qualifications Framework (NHEQF)
Level (3 Years- 5.5, 4 Years- 6)

Department of Computer Science and Applications
UICAIS
Sant Baba Bhag Singh University
Batch: 2025-2029 onwards (As Per NEP 2020)

SCHEME & SYLLABUS

(04 YEARS B.Sc. (IT) PROGRAMME)

Session: 2025-29

ABOUT THE B.Sc. (IT)

B.Sc. (IT) (Information Technology) is a 3-year undergraduate degree that imparts learners with intricate knowledge of storing, securing, processing and managing data and information. Pursuing B.Sc. (IT), students get to know about databases, software and networking. Further, you will be exploring the intricacies of software testing, software development, software engineering, web design, programming databases, computer networking and computer systems. Some of the major B.Sc. (IT) subjects are Foundation of Information Technology, Advanced-Data Structure, and DBMS using FoxPro, Foundation of Mathematics and Statistics, amongst others.

SALIENT FEATURES OF THE DEPARTMENT

- Research oriented curriculum designed to enable students to acquire all the skills needed to collect and analyze the data.
- The Institute draws upon its strength of highly qualified well-trained faculty, state of art infrastructure and innovative teaching methodology.
- Elective courses that bridge the gap between industry requirements and academia.
- Hands-on experience in most of the courses of information technology/computer applications so as to impart practical knowledge in the relevant field.
- To keep the students at par with the emerging technologies prevailing in the market, the institute is furnished with various specialized research labs and software labs.

B.Sc. (IT) (BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY)

- The Program outcomes in B.Sc.(IT) are aimed at allowing flexibility and innovation in design and development of course content, in method of imparting training, in teaching learning process and in assessment procedures of the learning outcomes. The emphasis in B.Sc.(IT) courses, in outcome-based curriculum framework, help students learn solving problems, accomplishing IT tasks, and expressing creativity, both individually and collaboratively. The proposed framework will help Students learn programming techniques and the syntax of one or more programming languages. **After graduating with a 4 year degree, the students are eligible for 1 year MCA (Master in Computer**

Application) and M.Sc. (IT) (Master in Science in Information Technology) Programme.

VISION

- To prepare technically proficient and skillful computer professionals thereby contributing towards building a strong and developed nation.

MISSION

- To provide innovative and quality knowledge to students for global competence and excellence. Also, to prepare high quality Professionals for catering the needs of industry.

ELIGIBILITY CRITERIA

- 10+2 or its equivalent examination in any stream conducted by a recognized Board/ University/Council

DURATION

- 4 Years

The present Curriculum Framework for B.Sc. (IT) degrees is intended to facilitate the students to achieve the following:

Some of the subjects taught in the B.Sc.IT course include computer architecture and organization, database system, operating system, electronics, computer networking, foundations of a computer system, java programming, website design, etc. B.Sc.IT course has excellent job scope and career prospects. Aspirants looking for a professional career, then there are various job openings available for them. Some important career profiles are IT Support Analyst, Network Engineer, IT Consultant and Technical Sales.

PROGRAMME EDUCATIONAL OBJECTIVE (PEO)

PEO1: To provide opportunity for the study of modern methods of information processing and its applications.

PEO2: By using technical methods, students are able to solve the real time computerized problems by analyzing, designing, implementing and evaluating the problems.

PEO3: To develop among students the programming techniques and the problem solving skills through programming.

PEO4: To prepare students who wish to go on to further studies in computer science and related subjects.

PROGRAMME OUTCOMES (PO)

PO1: Research and development: Developing with the idea of new research and technology.

PO2: Designing Product: Information Technology design products based on AI motion, and it includes the act of development in the range of Software development, Information technology, Computer Forensic Analyst, Information Technology Business Analyst, and Computer Network Architect.

PO3: Systems Management: Involves basic skills for analyzing and solving problems related to the technical system.

PO4: Marketing: The market of Information Technology is growing day by day and can grow during the working time and date. The work has been easy and dependable upon the Information Technology that doing without is unthinkable.

PROGRAMME SPECIFIC OUTCOMES (PSO)

PSO1. **Apply** standard Software Engineering practices and strategies in real -time software project development

PSO2. Design and develop computer programs/computer -based systems in the areas related to AI, algorithms, networking, web design, cloud computing, IoT and data analytics

PSO3. Acquaint with the contemporary trends in industrial/research settings and thereby innovate novel solutions to existing problems

PSO4. The ability to apply the knowledge and understanding noted above to the analysis of a given information handling problem.

PSO5. The ability to work independently on a substantial software project and as an effective team member.

CHOICE BASED CREDIT SYSTEM (CBCS)

The choice based credit system provides flexibility in designing curriculum and assigning credits based on the course content and hour of teaching. The choice based credit system provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective and open elective courses. The CBCS provides a cafeteria type approach in which the students can take courses of their choice, learn at their own pace, undergo additional courses and acquire more than the required credits, and adopt an interdisciplinary approach to learning. The

courses shall be evaluated on the grading system, which is considered to be better than the conventional marks system. It is necessary to introduce the grading system to make uniformity among all technical institutions of India. This will benefit the students to move across institutions within India to begin with and across countries. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in the evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on student's performance in examinations, the AICTE has formulated the guidelines to be followed.

Curriculum Structure: IT graduates assume the responsibility of the development and selection of the appropriate computer hardware and software products and systems for an organization; and the installation, customization, implementation, management, and maintenance of such products and systems for the organization's computer users. IT will have a curriculum with Syllabi consisting of following type of courses:-

A. **Core Courses**: A course, which should be studied compulsorily by a candidate as a necessary requirement is termed as a core course.

- **Major: Compulsory Course**
- **Minor: Use their minor course to focus or specialized certain area**
- **Skill/ Vocational: Skill Enhancement**
- **Interdisciplinary Course : Introduce for other course**

B. **Elective Course:** Generally a course which can be chosen from a pool of courses and which may be very specific or specialized or advanced or supportive to the discipline/ subject of study or which provides an extended scope or which enables an exposure to some other discipline/subject/domain or nurtures the candidate's proficiency/skill is called an Elective Course.

    - **Discipline Specific Elective (DSE) Course:** Elective courses may be offered by the main discipline/subject of study referred to as Discipline Specific Elective. The University/Institute may also offer discipline related Elective courses of interdisciplinary nature (to be offered by main discipline/subject of study).
    - **Dissertation/Project:** An elective course designed to acquire special/advanced knowledge, such as supplement study/support study to a project work, and a candidate studies such a course on his own with an advisory support by a teacher/ faculty member is called dissertation/project.

- **Generic Elective (GE) Course**: An elective course chosen generally from an unrelated discipline/subject, with an intention to seek exposure is called a Generic Elective. P.S. A core course offered in a discipline/subject may be treated as an elective by another discipline/subject and vice versa and such electives may also be referred to as Generic Elective.

C. **Major Specific Elective courses (MSE)**: Elective courses offered under the major: Management/ Economics/History/Sociology/Political science/Philosophy/Public administration shall be referred to as major specific electives.

D. **Open Elective Courses (OE)**: Open electives courses offered under the related stream/disciplines (Languages/Performing and visual arts) and those under the unrelated streams/disciplines (Physical and chemical sciences/Mathematical, Management and computational sciences) to seek exposure beyond main discipline of choice shall be referred to as open elective courses.

Points to be considered

- The NEP 2020 offers the students the option of choosing a 01 year Diploma, a 03 years bachelor degree or a 04 years bachelor degree with research across disciplines.

GENERAL COURSE STRUCTURE & THEME

A. **Definition of Credit**:

1 Hr. Lecture (L) per week	1 Credit
1 Hr. Tutorial (T) per week	1 Credit
1 Hr. Practical (P) per week	0.5 Credit
2 Hours Practical (P) per week	1 Credit

B. **Course code and definition:**

Course code	Definitions
L	Lecture
T	Tutorial
P	Practical

CC	Core Courses
AEC	Ability Enhancement Courses
MDE	Multi-Disciplinary Elective course
VAC	Value added Courses
SEC	Skill Enhancement courses
DSE	Discipline Specific Elective
OE	Open Elective

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Course Name: Bachelor of Science in Information Technology, Bachelor of Science in Information Technology (Honours) and Bachelor of Science in Information Technology (Honours with Research).

Course Level/Duration/System:

Undergraduate / Three or Four years/6 or 8 Semesters with multiple entry and exit. The following option will be made available to the students joining B.Sc.(IT) Research Program:

a. **One year:** Under Graduate Certificate in Information Technology (**Total Credits:50**)
b. **Two years**: Under Graduate Diploma in Information Technology (**Total Credits:97**)
c. **Three years**: Bachelor of Science in Information Technology [B.Sc.(IT)] (**Total Credits:147**)
d. **Four years**: Bachelor of Science in Information Technology with Honours: B.Sc.(IT) (Honours) or Bachelor of Science in Information Technology with Research: B.Sc.(IT) (Honours with Research) (**Total Credits:195**)

Minimum Eligibility Criteria:

Minimum eligibility criteria for opting the course in the fourth year will be as follows:

1. **B.Sc.(IT) (Honours with Research):** B.Sc.(IT) Degree
2. **For B.Sc.(IT) (Honours)**: B.Sc.(IT) Degree

Note : The students who are eligible for B.Sc.(IT) (Honours with Research) shall have choice to pursue either B.Sc.(IT) (Honours) or B.Sc.(IT) (Honours with Research)

SEMESTER WISE CREDIT DISTRIBUTION:

SEMESTER WISE CREDIT DISTRIBUTION OF PROPOSED B.Sc.(IT)
[B.Sc.(IT) (HONOURS) AND B.Sc.(IT) (HONOURS WITH RESEARCH)]
PROGRAM:

Semester	Core Courses	Ability Enhancement Courses	Multi-Disciplinary Elective Courses	Value Added Courses	Skill Enhancement Courses	Discipline Specific Elective	Practical Subjects	Total
I	20	2	-	-	-	-	6	28
II	17	-	-	5	3	-	4	29
III	11	-	1	6	3	-	5	26
IV	15	3	-	2	-	-	4	24
V	17	-	-	2	-	-	4	23
VI	-	-	-	-	-	-	-	20
B.Sc.(IT) (Research)								
VII	19	-	-	2	-	-	6	27
B.Sc.(IT) (Research With Honours)								
VII	19	-	-	-	2	-	6	27

Category-wise distribution*

Description	Core Courses	Ability Enhancement Courses	Multi-Disciplinary Elective Courses	Value Added Courses	Skill Enhancement Courses	Discipline Specific Elective	Practical Subjects	Total
B.Sc.(IT)	118	05	01	17	08	-	35	
B.Sc.(IT) (Research)	21	00	00	02	00	-	6	47
B.Sc.(IT) (Research With Honours)	21	00	00	00	02	-	6	47

3 Years B.Sc.(IT) Program	**Total Credits = 146**
4 Years B.Sc.(IT) (Research) and B.Sc.(IT) (Research With Honours)	**Total Credits = 193**

Note: Students can take extra credit courses from their own department or from other departments as per the Admitting Body / University norms.

Course Scheme (B.Sc. (IT) Program
Semester 1

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA175	Fundamentals of IT Tools	4:1:0	4:1:0	5	5
2	Major Course	CSA177	Data Communication and Networks	4:1:0	4:1:0	5	5
3	Minor Course	CSA179	Programming with C	4:1:0	4:1:0	5	5
4	Major Course	CSA187	Indian Knowledge System (Ancient Indian Innovations in Computer Technology)	4:1:0	4:1:0	5	5
5	AEC	AEC/JK (LS)-I	Jeevan Kaushal Life Skills 2.0 (Communication Skills in English-I)	2:0:0	2:0:0	2	2
6	PT	PT102/ PT104/ PT106	Physical Training (NSO/NCC/NSS)	0:0:2	NC	2	NC

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA181	Fundamentals of IT Tools (P)	0:0:4	0:0:2	4	2
2	Major Course	CSA183	Programming with C (P)	0:0:4	0:0:2	4	2
3	Major Course	CSA185	Data Communication and Networks (P)	0:0:4	0:0:2	4	2

Total Credits: 28
Total Contact Hours: 36

Semester 2

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA176	Programming in C++	4:1:0	4:1:0	5	5
2	Major Course	CSA178	Operating System	4:1:0	4:1:0	5	5
3	Minor Course	CSA180	Software Engineering	3:0:0	3:0:0	3	3
4	Major Course	MAT174	Fundamentals of Elementary Mathematics	4:0:0	4:0:0	4	4
5	VAC	AEC-II	Jeevan Kaushal 2.0 (Communication Skills in English -II)	2:0:0	2:0:0	2	2
6	VAC	VAC016	Value Added Course(Fitness & Wellness)	3:0:0	3:0:0	3	3
7	SEC	SEC008	Skill Enhancement Course (E-Filling of Tax Returns - Theory)	3:0:0	3:0:0	3	3
8	PT	PT201/PT203/PT205	Physical Training (NSO/NCC/NSS)	0:0:2	NC	2	NC

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA182	Programming in C++ (P)	0:0:4	0:0:2	4	2
2	Major Course	CSA184	Operating System (P)	0:0:4	0:0:2	4	2

Total Credits: 29

Total Contact Hours: 36

***Students exiting after one year have to do Vocational Course**

After Year 1, Students are advised to take Social Responsibility & Community Engagement - encompassing Community Engagement with an NGO in the vacation time.

An UNDERGRADUATE CERTIFICATE IN INFORMATION TECHNOLOGY will be awarded, if a student wishes to exit at the end of First year.

Exit Criteria after First Year of B.Sc. (IT)

Programme

Students will have the option to exit the Bachelor of Science in Information Technology [B.Sc.(IT)] program after successfully completing the first year. Upon exit, they will be awarded a **UG Certificate in Information Technology**. To be eligible for this certificate, students must complete an additional 04 credits in one of the following areas:

1. **Skill-Based Subject**: A course designed to enhance practical and technical skills in the field of information technology.
2. **Work-Based Vocational Course**: A vocational course offered during the summer term that emphasizes hands-on training and workplace readiness.
3. **Internship/Apprenticeship**: A professional internship or apprenticeship program in a relevant field, with a minimum duration of 08 weeks, which will take place after the second semester.
4. **Social Responsibility & Community Engagement**: Active engagement with an NGO or community organization for a minimum duration of 08 weeks, focusing on real-world problem-solving, social responsibility, and community service.

The mode and specifics of these additional credits will be determined by the respective **University/Admitting Body**, and students will be required to complete the 08-week program during the summer term following their second semester. The exiting students will clear the subject / submit the Internship Report as per the University schedule.

Re-entry Criteria in to Second Year (Third Semester)

The student who takes an exit after one year with an award of certificate may be allowed to re-enter into Third Semester for completion of the B.Sc.(IT) Program as per the respective University /Admitting Body schedule after earning requisite credits in the First year.

Semester 3

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA275	Data Structure and Algorithms	3:1:0	3:1:0	4	4
2	Major Course	CSA277	Web System and Technologies	4:0:0	4:0:0	4	4
3	Minor Course	CSA279	Cyber Security	3:0:0	3:0:0	3	3
4	VAC	VAC022/ EVS200	Value Added Course (Environmental Education)	4:0:0	4:0:0	4	4
5	SEC	SEC006	Skill Enhancement Course (Tally Computer Based Accounting Practical)	3:0:0	3:0:0	3	3
6	VAC	VAC-II (JKM001)	Mulya Pravah 2.0 (Human Values and Professional Ethics)	2:0:0	2:0:0	2	2
7	MDC	CSR001	Community Engagement and Social Responsibilities	1:0:0	1:0:0	1	1

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA281	Data Structure and Algorithms (P)	0:0:4	0:0:2	4	2
2	Major Course	CSA283	Web System and Technologies (P)	0:0:4	0:0:2	4	2
3	MDC	CSR002	Community Engagement and Social Responsibilities (P)	0:0:1	0:0:1	1	1

Total Credits: 26
Total Contact Hours: 30

Semester 4

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA276	Database Management System	4:0:0	4:0:0	4	4
2	Major Course	CSA278	Java Programming	4:0:0	4:0:0	4	4
3	Major Course	MAT274	Title Computer Oriented Statistical Methods	4:0:0	4:0:0	4	4
4	Major Course	CSA284	Indian Knowledge System (Artificial Intelligence)	3:0:0	3:0:0	3	3
5	VAC	VAC	Jeevan Kaushal Life Skills 2.0 (Universal Human Values)	2:0:0	2:0:0	2	2
6	AEC	AEC001	Ability Enhancement Course(Functional English-I)	3:0:0	3:0:0	3	3

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA280	Database Management System (P)	0:0:4	0:0:2	4	2
2	Major Course	CSA282	Java Programming (P)	0:0:4	0:0:2	4	2

Total Credits: 24
Total Contact Hours: 28

Exit Criteria after Second Year of B.Sc.(IT) Programme

Students will have the option to exit the Bachelor of Science in Information Technology (B.Sc.(IT)] program after successfully completing the second year. Upon exit, they will be awarded a **UG Diploma in Information Technology**. To be eligible for this diploma, students must complete an additional 04 credits in one of the following areas:

1. **Skill-Based Subject**: A specialized course aimed at enhancing technical and practical expertise in information technology.
2. **Work-Based Vocational Course**: A vocational course offered during the summer term, focused on building practical, industry-relevant skills.
3. **Internship/Apprenticeship**: A professional internship or apprenticeship with a minimum duration of 08 weeks, conducted after the fourth semester, offering hands- on experience in a relevant field.
4. **Social Responsibility & Community Engagement**: Involvement with an NGO or community-based organization for a minimum of 08 weeks, contributing to social initiatives and applying information technology knowledge to solve real-world challenges.
5. **Capstone Project**: Completion of a capstone project integrating the skills and knowledge gained during the first two years of the program, which can be an independent or group project.

The specific mode of completing the additional credits will be decided by the respective **University/Admitting Body**, and students will be required to complete the 08-week program or project during the summer term following their fourth semester. Students opting for this exit will also be required to **submit an Internship/Apprenticeship Report** or complete the Capstone Project as per the schedule outlined by the University/Admitting Body before they are awarded the UG Diploma.

Re-entry Criteria in to Third Year (Fifth Semester)

The student who takes an exit after second year with an award of Diploma may be allowed to re-enter into fifth Semester for completion of the B.Sc.(IT) Program as per the respective University / Admitting Body schedule after earning requisite credits in the Second year.

Semester 5

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA375	Computer System Architecture	4:0:0	4:0:0	4	4
2	Major Course	CSA377	Computer Graphics	4:0:0	4:0:0	4	4
3	Minor Course	CSA379	Systems and Network Administration	3:0:0	3:0:0	3	3
4	Minor Course	CSA381	Fundamentals of Digital Electronics	3:0:0	3:0:0	3	3
5	Minor Course	CSA383	Basics of Information Technology Management	3:0:0	3:0:0	3	3
6	VAC	VAC	Jeevan Kaushal Life Skills 2.0 (Leadership and Management Skills)	2:0:0	2:0:0	2	2

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA385	Computer Graphics (P)	0:0:4	0:0:2	4	2
2	Major	CSA387	Fundamentals of Digital Electronics (P)	0:0:4	0:0:2	4	2

Total Credits: 23
Total Contact Hours: 27

Semester 6
Apprenticeship/Internship Training (ATS001)

Guidelines for the Apprenticeship in the Sixth Semester of the B.Sc.(IT) Programme can vary slightly depending on the university or institution, but here's a general structure that many B.Sc.(IT) programmes follow:

1. Objective: To provide students with hands-on experience in a real work environment and apply the theoretical knowledge gained in the previous semesters.

2. Duration: Typically 4 to 6 months. Covers the entire 6th semester of the B.Sc.(IT) programme.

3. Eligibility: Students must have successfully completed the first five semesters of B.Sc.(IT).

4. Work Scope: Students may work on:

- Software/application development
- Web development
- Database management
- Networking
- IT support and services
- Testing and QA
- Cyber Security
- Data analytics

5. Documentation and Reporting: Daily/Weekly Log Book: Students must maintain records of their daily tasks. Mid-Term Review: Some colleges may conduct an internal review midway. Final Report: A detailed project/apprenticeship report must be submitted at the end of the term.

6. Evaluation:

Generally includes:

- Supervisor's evaluation from the organization
- Internal faculty evaluation (viva + report)
- Weightage in final semester results (often 100-200 marks)

7. Code of Conduct: Students must follow the organization's rules and professional ethics. Regular attendance and performance are mandatory.

8. Certification: A certificate of completion must be obtained from the organization, detailing the nature of work and duration.

Total Credits: 20

BACHELOR OF SCIENCE IN INFORMATION TECHNOLOGY Degree will be awarded, if a student wishes to exit at the end of Third year.

National Higher Education Qualifications Framework (NHEQF 5.5)

Exit Criteria after Third Year of B.Sc.(IT) Programme

The students shall have an option to exit after the 3rd year of the Information Technology Program and will be awarded with a Bachelor of Science in Information Technology.

Re-entry Criteria in to Fourth Year (Seventh Semester)

The student who takes an exit after third year with an award of B.Sc.(IT) may be allowed to re-enter in to Seventh Semester for completion of the B.Sc.(IT) (Honours) or B.Sc.(IT) (Honours with Research) Program as per the respective University / Admitting Body schedule after earning requisite credits in the Third year.

Semester 7 (For Research Opting Student)

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA451	Advanced Data Structures	4:0:0	4:0:0	4	4
2	Major Course	CSA453	Database Administration	4:0:0	4:0:0	4	4
3	Major	CSA455	Recent Trends in the field of IT	3:0:0	3:0:0	3	3
4	Major Course	CSA457	Linux Administration	3:1:0	3:1:0	4	4
5	Minor Course	CSA459	Introduction to Research Methodology	3:1:0	3:1:0	4	4
6	VAC	VAC	Jeevan Kaushal Life Skills 2.0 (Professional Skills)	2:0:0	2:0:0	2	2

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA461	Research Synopsis	0:0:8	0:0:4	8	4
2	Major Course	CSA463	Advanced Data Structures (P)	0:0:4	0:0:2	4	2

Total Credits: 27
Total Contact Hours: 33

Semester 7 (For Honours Students)

I. Theory Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA451	Advanced Data Structures	4:0:0	4:0:0	4	4
2	Major Course	CSA453	Database Administration	4:0:0	4:0:0	4	4
3	Major	CSA455	Recent Trends in the field of IT	3:0:0	3:0:0	3	3
4	Major Course	CSA457	Linux Administration	3:1:0	3:1:0	4	4
5	Minor Course	CSA459	Introduction to Research Methodology	3:1:0	3:1:0	4	4
6	SEC	SEC039	Professional Skills	2:0:0	2:0:0	2	2

II. Practical Subjects

Sr. No.	Course Type	Course Code	Course Name	Contact Hours (L:T:P)	Credits (L:T:P)	Total Contact Hours	Total Credit Hours
1	Major Course	CSA461	Project	0:0:4	0:0:2	4	2
2	Major Course	CSA463	Advanced Data Structures (P)	0:0:4	0:0:2	4	2
3	Major Course	CSA465	Database Administration (P)	0:0:4	0:0:2	4	2

Total Credits: 27
Total Contact Hours: 33

Semester 8 (For Honours/Research Opting Students)

Apprenticeship/Internship Training (ATS002)

Guidelines for the Apprenticeship in the Sixth Semester of the B.Sc.(IT) Programme can vary slightly depending on the university or institution, but here's a general structure that many B.Sc.(IT) programmes follow:

1. Objective: To provide students with hands-on experience in a real work environment and apply the theoretical knowledge gained in the previous semesters.

2. Duration: Typically 4 to 6 months. Covers the entire 6th semester of the B.Sc.(IT) programme.

3. Eligibility: Students must have successfully completed the first five semesters of B.Sc.(IT).

4. Work Scope: Students may work on:

- Software/application development
- Web development
- Database management
- Networking
- IT support and services
- Testing and QA
- Cyber Security
- Data analytics

5. Documentation and Reporting: Daily/Weekly Log Book: Students must maintain records of their daily tasks. Mid-Term Review: Some colleges may conduct an internal review midway. Final Report: A detailed project/apprenticeship report must be submitted at the end of the term.

6. Evaluation:

Generally includes:

- Supervisor's evaluation from the organization
- Internal faculty evaluation (viva + report)
- Weightage in final semester results (often 100-200 marks)

7. Code of Conduct: Students must follow the organization's rules and professional ethics. Regular attendance and performance are mandatory.

8. Certification: A certificate of completion must be obtained from the organization, detailing the nature of work and duration.
A Bachelor's degree 'Honours with research' after a 4-year (eight semesters) programme of study if the student completes a rigorous research project in her/his major area(s) of study as specified by the HEI.

Total Credits: 20

National Higher Education Qualifications Framework (NHEQF 6)

Summary of Scheme

Semester	L	T	P	Contact Hours Per Week	Credits
1	20	0	4	30	24
2	20	0	4	33	27
3	20	1	5	30	26
4	20	0	4	28	24
5	19	0	4	27	23
6	--	--	--	--	20
7 (RS)	19	2	6	33	27
7 (HS)	19	2	6	33	27
8	--	--	--	--	20
Total (RS)	**118**	**3**	**27**	**181**	**191**
Total (HS)	**118**	**5**	**27**	**181**	**191**

First Semester

Course Code	**CSA175**
Course Title	**Fundamentals of IT Tools**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	Basic Knowledge About Computers
Course Objective(s)	To gain experience about MS-Office. To help students to understand the basic concepts of computer.
Course Outcome (CO)	The students will be able to: **1.** Understand the basic concepts of computer **2.** Understand the various storage devices **3.** Learn basics of Word Processing, Spread Sheets and Presentation. **4.** Learn new concepts used in IT world.

SYLLABUS

UNIT-I:

Fundamentals of computer: Introduction to Computers, Generation of Computers, classification of Computer, block diagram of Computer and applications of computer.

Introduction to peripheral devices: Introduction to various Input and Output devices with its types.

Operating system and its functions: types of operating system (Single user, multi-user, multitasking, time sharing, distributed). Fundamentals of DOS, internal and external commands.

UNIT-II:

Storage Devices: Introduction to storage devices, types of storage devices: primary memory with its types, secondary memory with its types, cache memory. Primary storage devices (RAM, ROM, PROM, EPROM, EEPROM), secondary storage devices (Floppy disk, Hard disk, optical disk, magnetic tapes). Input and output devices (keyboard, mouse, light pen, joystick, scanner, monitor, printers.)

Introduction to Internet: WWW, Internet, how to compose Email, Email components.

UNIT-III:

Software: Introduction to Software and its needs, Types of S/W. System Software: Operating System, Utility Programs Programming Language: Machine Language, Assembly Language, High Level Language their advantages & disadvantages. Application S/W and its types: Introduction and working with Word Processing, Spread Sheets and Presentation.

UNIT-IV:

Recent Trends in IT: Introduction to Data Science, Basic concepts of IoT, Introduction to AI, use of AI in IT world, introduction to Robotics. **Emerging Technologies**: Bluetooth, cloud computing, big data, data mining, mobile computing and embedded systems.

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Fundamentals of Information Technology	Alexis Leon and Mathews Leon	Vikas Publishing House
2.	Computer Fundamentals	P.K. Sinha	BPB Publications
3.	Fundamentals of Computer	E. Balagurusamy	TATA McGraw Hill

Course Code	**CSA177**
Course Title	**Data Communication and Networks**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	+2 in any stream
Course Objective(s)	The objective of this course includes learning about computer network organization and implementation, obtaining a theoretical understanding of data communication and computer networks, and gaining practical experience in installation, monitoring, and troubleshooting of current LAN systems.
Course Outcome (CO)	The students will be able to: **1.** Familiar with the different Network Models. **2.** Understand different protocols working at Medium Access Sub layer. **3.** Learn the concept of network routing through algorithms. **4.** Learn and understand Internet protocols and network security.

SYLLABUS

UNIT-I: Computer Networks: Uses of computer Networks, Goals and applications of networks, Computer Network Structure and Architecture, Reference models: OSI model, TCP/IP model, and Comparison of TCP/IP and OSI models. **Medium Access Sub layer**: Static and dynamic channel allocation for LAN and MAN, ALOHA Protocols, LAN Protocols: CSMA, CSMA/CD, Collision Free protocol.

UNIT-II: Networking and Internetworking devices: Repeater, bridges, routers, gateways, switches. **High speed LAN:** FDDI, Fast Ethernet, HIPPI, Fiber channel. LAN IEEE 802.x standards.

UNIT-III: Data Link Layer: Links, Access Networks, and LANs- Introduction to the Link Layer, The Services Provided by the Link Layer, Types of errors, Redundancy, Detection vs. Correction, Forward error correction Versus Retransmission Error-Detection and Correction Techniques, Parity Checks, Check summing Methods, Cyclic Redundancy Check (CRC), Framing, Flow Control

UNIT-IV: Internet Protocols: Principles of Internetworking, connectionless internetworking, Internet protocols, IPv6. **Network Security:** Security requirements and attacks, Encryption: Public key encryption and digital Signatures. **Distributed Applications:** SNMP, SMTP, HTTP.

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Computer Networks, 3rd Edition	Andrew S. Tanenbaum	Prentice Hall
2.	Data Communication & Networking	Behrouz A. Forouzan	Tata McGraw Hill
3.	Computer Networks and Internet	D.E. Cormer	Addison Wesley

Course Code	**CSA179**
Course Title	**Programming With C**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	+2 in any stream
Course Objective(s)	The objective of this course is to provide the students an overview of computer programming.
Course Outcome (CO)	The students will be able to: **1.** Understand how to create flowcharts. **2.** Perform logical proofs. **3.** Apply recursive functions. **4.** Determine equivalent logic expressions

SYLLABUS

UNIT-I: Introduction: History of languages, high- level, Low level, Assembly languages, Introduction to Algorithm, how to write algorithm, flowchart, symbols used in flowcharts, flowcharts examples to solve complex problems. **Introduction to Programming Language:** character Set, Constants, Types of constants, Variables and Keywords, data types. Instructions: Type Declaration Instruction, Arithmetic Instructions.

UNIT-II: Control structures: Decision making structures: If, If-else, Nested If –else, Switch. Loop Control structures: While, Do-while, for, Nested for loop. Other statements: Break, Continue, goto, Exit. **Arrays and Pointers:** Arrays Initialization, Types of Array. Initializing Two Dimensional & Multidimensional Arrays, Introduction to Pointers. Pointers and Functions.

UNIT-III: Storage Classes and Character Strings: Automatic, Register, Static, External (Local and Global), Strings, Standard library String Functions: strlen (), strcpy (), strcat(),strcmp(). **Functions:** Definition, Passing values between functions, call by value, call by reference, Recursion

UNIT-IV: Structures And Unions: Declaring structure and its variables, Arrays of structures. Introduction to Unions. **Input/Output:** Getchar (), putchar (), printf (), scanf (), puts (), gets () Introduction to files and its operations.

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Programming in C	Byron Gottfried, Jitender Chhabra	Schuam out line series
2.	Let us C	Yaswant Kanetkar	BPB Publication
3.	A structured Programming approach using C	Behrouz Forouzan	Thomas learning

Course Code	**CSA187**
Course Title	**Indian Knowledge System (Ancient Indian Innovations in Computer Technology)**
Type of Course	Major
L T P	3:0:0
Credits	3
Course Prerequisites	Basic historical, mathematical and computational concepts.
Course Objective(s)	To explore ancient Indian contributions to mathematics, logic, and computational concepts that influenced the development of modern computer technology, fostering an appreciation of India's intellectual heritage and its relevance to contemporary innovation.
Course Outcome (CO)	The students will be able to: **1.** Understand the historical evolution of computational concepts in ancient India. **2.** Analyze the contributions of Indian mathematicians and scholars to algorithms, number systems, and logic. **3.** Relate ancient Indian knowledge to modern computer science principles. **4.** Apply interdisciplinary approaches to connect IKS with contemporary technological challenges.

SYLLABUS

UNIT I: Introduction to Indian Knowledge System and Computational Thought: Introduction to Indian Knowledge Systems, their interdisciplinary nature and relevance to modern science and technology. Ancient Indian Scientific Traditions: Role of Vedas and Shulba Sutras in fostering systematic thinking. Computational Thinking in Ancient India.

UNIT II: The Concept of Zero and the Decimal System: Origin of Zero (Shunya): Contributions of Indian mathematicians (Brahmagupta, Aryabhata) to the concept of zero as a number and placeholder. Decimal Place-Value System: Development and significance in arithmetic operations, its impact on modern computing algorithms.

UNIT III: Algorithms and Mathematical Innovations: Aryabhata's Algorithmsand their relevance to computational algorithms. Bhaskaracharya's Contributions: Vedic Mathematics.

UNIT IV: Interdisciplinary Applications and Modern Relevance: Ancient Indian Innovations in Technology: Metallurgy, architecture, and water management systems as examples of systematic engineering thought. Relevance to Modern Computer Science: How ancient concepts of zero, algorithms, and logic underpin binary systems, data structures, and AI.

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Introduction to Indian Knowledge System: Concepts and Applications	Mahadevan, B., Bhat, V. R., & Nagendra, P. R. N.	PHI Learning. ISBN: 978-9391818203
2.	History of Technology in India, Vol. I	Bag, A. K.	Indian National Science Academy, New Delhi.
3.	Indian Knowledge Systems Vol. I & II	Kapoor, K., & Singh, A.	Indian Institute of Advanced Study, Shimla.

Course Code	**AEC/JK(LS)-I**
Course Title	**Jeevan Kaushal Life Skills 2.0 (Communication Skills in English-I)**
Type of Course	AEC
L T P	2:0:0
Credits	2
Course Prerequisites	+2 in any stream
Course Objective(s)	The course will introduce learners to the role and importance of effective communication at work. It presents theories and principles of communication responsible for good interpersonal interaction. Students will be prepared to communicate effectively in a variety of contexts and different mediums. The Units are structured around the communication tasks of managers.

SYLLABUS

UNIT-I: Basics of Communication Skills: Communication, Process of Communication, Types of Communication Verbal and Non-verbal communication, Channels of Communication- Upward, Downward, Horizontal, Barriers to Communication, Role of Communication in society.

UNIT-II: Listening Skills: Listening Process, Hearing and Listening, Types of Listening, Effective Listening, Barriers to Effective Listening, Note Taking. **Reading Skills:** Purpose of reading, Process of reading, Reading skills Models and strategies, scanning, skimming, SQ3R, Approaches of Reading, Comprehension passages for practice.

UNIT-III: Purpose of writing, Effective writing, Types of writing, Business Correspondence, Precis writing, Memo writing, Minutes of meeting.

UNIT-IV: Speaking Skills: Speech Mechanism, Sounds System, Articulation, Vowels & Consonants, Skills for effective speaking, Role of audience, Feedback Skill, Oral Presentation.

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Bhupender Kour	Effectual Communication Skills	S.K. Kataria and Sons
2.	Communication Skills	D. Dutta Roy and K.K. Dheer	Vishal Publishing Company

CSA181 Fundamentals of IT Tools (P)

L T P
0 0 4

Objective: The objective of this practical course is to introduce the fundamental concepts of computers, hardware and table to interact with Documentation, PowerPoint and Spreadsheet.

1. Familiar with various components of CPU.
2. Familiar with various Software and Hardware components.
3. Introduction of Office & Internet usage
4. Introduction to MS Word.
5. Prepare time-table in Word.
6. Create a Resume for the Jobs in different styles.
7. Introduction of PowerPoint.
8. Prepare Presentation in PowerPoint by applying Formatting Tools.
9. Introduction of Excel
10. Prepare Mark sheet in Excel.
11. Prepare the record of Employees of an organization.
12. Prepare the graphical representation of Sales of company for at least 5 years.

CSA183 Programming with C (P)

L T P
0 0 4

Objective: The objective of this practical course is to to understand the implementation of language. This Programming language helps in solving a problem.

1. Write and execute program to show the working of input/output statements.
2. Write and execute programs to show the use of different types of operators (arithmetic, relational, logical, and conditional).
3. Write and execute programs based on conditional control statements (if, if-else)
4. Write and execute programs based on switch-case statements.
5. Write and execute programs based on for loops
6. Write and execute programs based on while loop and do while loop.
7. Write and execute programs based on jumping control statements (break, continue).
8. Write and execute programs to implement one dimensional array.
9. Write and execute programs to implement two dimensional arrays.
10. Write and execute programs to show the use of pointers.
11. Write and execute programs to perform various functions on strings.
12. Write and execute programs based on use of functions (call by value)
13. Write and execute programs based on use of functions (call by reference)
14. Write and execute programs using recursive functions.
15. Write and execute programs to illustrate the concept of Structure and Union.

Second Semester

Course Code	**CSA176**
Course Title	**Programming in C++**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	Basic Programming Skills/ Programming in C
Course Objective(s)	The objective of this course is to expose the student to procedural programming using C++ and to increase the depth of students' knowledge about several implementation issues.
Course Outcome (CO)	The students will be able to: **1.** Understand how C++ improves C with object-oriented features. **2.** Learn how to write inline functions for efficiency and performance. **3.** Learn the syntax and semantics of the C++ programming language. **4.** Learn how to design C++ classes for code reuse.

SYLLABUS

UNIT-I Basics: Introduction to C++, Tokens, Identifiers, data types, control statements, functions, array, structure, union, pointers. **Classes and Objects:** Classes, Structures and Classes, Unions and Classes are Related, Friend Functions, Friend Classes, Inline Functions, Constructors and its types, Static Class Members, When Constructors and Destructors are Executed, Scope Resolution Operator, Nested Classes, Local Classes, Passing and Returning Objects, Object Assignment. **Arrays, Pointers, References and the Dynamic Allocation**: Arrays of Objects, Pointers, References, Dynamic Allocation Operators, The Placement Forms of new and delete.

UNIT-II Function Overloading and Default Arguments: Function Overloading, Overloading Constructor Functions, Finding the Address of an Overloaded Function, Overload Anachronism, Default Arguments, Function Overloading and Ambiguity. **Operator Overloading:** Creating Member Operator Function, Overloading Using a Friend Function, Overloading new delete, Overloading Special Operators & Comma Operator.

UNIT-III: Inheritance: Base-Class Access Control, Inheritance and protected members, Inheriting Multiple Base Classes, Constructors, Destructors and Inheritance, Granting Access, Virtual Base Classes. **Virtual Functions & Polymorphism:** Virtual Functions, The Virtual Attribute is inherited, Virtual Functions are Hierarchical, Pure Virtual Functions, Using Virtual Functions, Early Vs Late Binding. **Templates:** Generic Functions, Applying Generic Functions, Generic Classes, Type name and export Keywords, Power of Templates.

UNIT–IV: Exception Handling: Fundamentals, Derived-Class Exceptions, Options, Terminate() and unexpected(), uncaught exception(), exception and bad exception Classes, Applying Exception Handling. **The C++ I/O System Basics:** Old Vs. Modern C++ I/O, Streams, Stream Classes, Formatted I/O, Overloading << and >>, Creating Manipulators.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1.	Object Oriented Programming with C++	E. Balaguruswamy	Tata Mc. Graw Hill
2.	Object Oriented Programming using C++	R. Lafore	Galgotia Publications
3.	Mastering C++	A.R. Venugopal, Rajkumar, T. Ravishanker	TMH

Course Code	**CSA178**
Course Title	**Operating System**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	Basic computer knowledge and OS DOS Windows
Course objective(s)	The objective of this course is to help students become familiar with the fundamental concepts of operating systems and provide students with sufficient understanding of operating system design.
Course Outcome (CO)	The students will be able to: **1.** Describe the importance of computer system resources and the role of operating system in their management policies and algorithms **2.** Understand the process management policies and scheduling of processes by CPU **3.** Evaluate the requirement for process synchronization and coordination handled by operating system **4.** Describe and analyze the memory management and its allocation policies

SYLLABUS

UNIT-I: Introduction: Importance of Operating system. Basic concepts and terminology, An Operating system Resource manager, Operating Systems functions, Services provided by operating system, Types of operating systems, An Operating system- Process and system calls, Operating system architecture, Processor and user modes, Virtual Machine.

UNIT-II: Memory management: Physical and virtual address space, Single Contiguous Allocation, Partitioned Allocation, Fragmentation, Paging, Segmentation, Virtual memory and Demand paging, Page replacement algorithms. **Processor Management**: Process, Process control block, State Model, Non-pre-emptive and pre-emptive scheduling, Process Scheduling Algorithms, Deadlocks- detection and prevention.

UNIT-III: Information Management: Directory structure, File operations, A Simple File System, General Model of a File System, File allocation methods.

UNIT-IV: OS and Security: Security breaches, types of attacks, attack prevention methods, security policy and access control, OS design considerations for security, access, policy and access control, OS design considerations for security, access control lists and OS support, internet and network security, Policy mechanism, Program, network and system threats, Authentication.

RECOMMENDED BOOKS

Sr. No.	**Name**	**Author(s)**	**Publisher**
1.	Operating System	William Stallings	Prentice Hall
2.	Operating System Concepts	A. Silberschatz, P.B. Galvin, G. Gagne	John Wiley Publication

Course Code	**CSA180**
Course Title	**Software Engineering**
Type of Course	Minor
L T P	3:0:0
Credits	3
Course Prerequisites	Basic Knowledge About Computers
Course Objective(s)	This course will provide knowledge about testing and maintenance of software.
Course Outcome (CO)	The students will be able to: **1.** Describe key techniques and standards in software testing. **2.** Explain and evaluate strategies for software testing for both complete program life cycles and individual phases. **3.** Develop correct, stable, maintainable and efficient software. **4.** Specify and design test cases and test, debug and optimize programs and produce appropriate documentation.

SYLLABUS

UNIT-I Software Engineering introduction: software development models. Testing and its concepts: significance and potentials Testability and features of test cases.

UNIT-II Software Testing Techniques: Definition of Software Testing, Need for software Testing, various approaches to Software Testing, defect distribution, Software Testing Fundamentals. General characteristics of testing. Seven principles of testing.

UNIT-III Comparative Evaluation of Techniques: Testing tools, dynamic analysis tools, test data generators, debugger and test drivers. Water fall model, V-model, Spiral model, agile model, Life cycle testing concepts, testing methods, testing levels. Static Testing, static analysis tools, dynamic testing, White box testing, block box testing, Regression testing, dynamic testing tools.

UNIT-IV Technical Metrics for Software: Quality factors, framework, metrics for analysis, design, testing source code, Software maintenance and Reengineering. **Access Project Management** Development Estimate and status, Requirement Phase Testing, Design Phase Testing program Phase Testing, Execute Test and record results, Acceptance Test Report Test results, Testing Software Installation, Test Software Change, Evaluate Test Effectiveness. Testing calculating model (TCM).

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Learning Software Testing with Test Studio	Rawane Madi	Shroff and Pactt
2.	Exploratory Software Testing:	James A. Whittaker	Addison Wesley
3.	Mobile Software Testing	Narayanan Palani	Wiley

Course Code	**MAT174**
Course Title	**Fundamentals of Elementary Mathematics**
Type of Course	Major
L T P	4:0:0
Credits	4
Course Prerequisites	Student must have the knowledge of Basic Mathematics
Course Objective(s)	This course aims to provide foundational knowledge in discrete mathematics including matrix theory, set theory, mathematical logic, graph theory, and number systems to develop analytical and problem-solving skills essential for computer applications.
Course Outcome (CO)	The students will be able to: **1.** Understand and apply the fundamental concepts of matrices and determinants, including matrix operations, eigenvalues, and the Cayley-Hamilton Theorem for solving systems of linear equations. **2.** Demonstrate the ability to use set theory and functions to model and solve real-life problems involving relations, mappings, and operations on sets. **3.** Analyze logical statements using truth tables, logical equivalence, and apply mathematical reasoning in problem-solving, including basic concepts of graph theory and trees. **4.** Apply the principles of number theory such as division algorithm, GCD, LCM and congruence relations to solve problems in discrete mathematics and computer science.

SYLLABUS

UNIT I: (Matrix and Determinants) Matrices: Definition, Types of Matrices, Addition, Subtraction, Scalar Multiplication and Multiplication of Matrices, Adjoint, Inverse, Cramers Rule, Dependence of Vectors, Eigen Values of a Matrix, Cayley-

Hamilton Theorem (without proof). Determinants: Definition, Minors, Cofactors, Properties of Determinants.

UNIT II: (Basic of Set Theory) Sets, Subsets, Equal Sets Universal Sets, Finite and Infinite Sets, Operation on Sets, Union, Intersection and Complements of Sets, Cartesian Product, Cardinality of Set, Simple Applications, Properties of Relations, Equivalence Relation, Domain & Range, Onto, Into and One to One Functions, Composite and Inverse Functions.

UNIT III: (Mathematical Logics) Statements, logical connectives, truth tables, Tautologies, contradictions, logical equivalence, Applications to everyday reasoning, Graph theory: Introduction to graphs, graph terminology, representing graphs and graph isomorphism, connectivity, Euler and Hamilton paths, planar graphs, graph coloring, introduction to trees, application of trees.

UNIT IV: (Number System) Division algorithm, greatest common divisor, least common multiple, congruence relation.

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1.	Mathematical Statistics	V.K. Kapoor	S. Chand
2.	Text Book of Engineering Mathematics	NP Bali	Laxmi Publication
3.	Introduction to Analytic Number Theory	T. M. Apostol	Springer International Student Edition, Narosa Publishing House
4.	Discrete Mathematics and Its Applications	Kenneth H. Rosen	Mc Graw Hill, 6th Edition

Course Code	**AEC-II**
Course Title	**Jeevan Kaushal Life Skills 2.0 (Communication Skills in English-II)**
Type of Course	AEC
L T P	2:0:0
Credits	2
Course Prerequisites	N.A.
Course Objective(s)	To enhance employability skills of the learners by enabling them to write an effective resume and face the interview with confidence.

SYLLABUS

UNIT I: PUBLIC SPEAKING: Introduction to Public Speaking, Business Conversation, Effective Public Speaking Art of Persuasion

UNIT II: INTERVIEW SKILLS: Types of Interview, Styles of Interview, Facing Interviews- Fundamentals and Practice Session, Conducting Interviews- Fundamentals and Practice Session, Mock interview sessions

UNIT III: Writing Skills: Resume Writing, Covering Letters, Interview Follow Up Letters, Email, Fax, Assessment through employability score card

UNIT IV: ETIQUETTES: Business Etiquette, Dressing up Sense, Exchanging Business card, Shaking hands, Dining etiquette

RECOMMENDED BOOKS			
Sr. No.	**Name**	**Author(s)**	**Publisher**
1.	Jeremy Comfort	Speaking Effectively	CUP
2.	N. Krishnaswamy	Creative English for Communication	Macmillan
3.	Raman Prakash	Business Communication	CUP

Course Code	**SEC008**
Course Title	**Skill Enhancement Course (E-Filling of Tax Returns - Theory)**
Type of Course	SEC
L T P	3:0:0
Credits	3
Course Prerequisites	Basics of marketing information
Course Objective(s)	The course aims at making the students understand concepts, processes and techniques of managing the marketing operations of a firm with a view to better understand the Complexities associated with the marketing function.
Course Outcome (CO)	On successful completion of the course, the students will be able to: **1.** Understand the basic concepts of marketing and asses the marketing environment. **2.** Discover the new product development & identify the factors affecting the price of a Product in the present context. **3.** Judge the impact of promotional techniques on the customers & importance of channels of distribution. **4.** Outline the recent developments in the field of marketing.

SYLLABUS

UNIT I: Introduction of E-Filing: Meaning of e filing, Difference between e filing and manual filing of returns, Benefits and limitations of e filing, Types of e-filing

UNIT II: Introduction to Income Tax: Basic terminology, Types of assesses, income taxable under different heads, Basics of computation of total income and tax liability, Deductions available from gross total income, Application for PAN card, Due date of filing of income tax return

UNIT III: DS and E Filing of TDS Return: Introduction to TDS, Provisions relating to advance payment of tax, schedule for deposit of TDS, schedule for submission of TDS returns prescribed forms for filing TDS return

UNIT IV: Introduction to GST Concepts and returns: Output tax liability of CGST, SGST, UTGST, IGST, compensation cess, GST Network, Input tax credit and its utilization, Composition supplier, Schedule for payment of GST, GSTR 1,2,3 and 3B.

RECOMMENDED BOOKS

Sr. No.	Name	Author(s)	Publisher
1.	Self-Preparation and Filing of Income Tax Returns by Individuals	Kotler, P	PrenticeHall of India, New Delhi
2.	Students' Guide to Income Tax	Dr. Vinod K. Singhania & Dr. Monica Singhania	Taxmann Publications, New Delhi
3.	Income Tax Law and Accounts	Dr. H. C. Mehrotra &Dr. S.P. Goyal	Sahitya Bhawan Publications, Agra

CSA182 Programming in C++ (P)

L T P
0 0 4

Objectives: Acquire knowledge about the basic concept of writing a program. Understanding the practical use of functions, classes, objects, inheritance and polymorphism.

1. Write and execute simple program to show the working of input/output statements.
2. Write and execute programs to show the use of different types of operators.
3. Write and execute programs based on use of functions.
4. Write and execute programs to demonstrate function call by value and call by reference.
5. Write and execute programs to demonstrate inline functions.
6. Write and execute programs to demonstrate function overloading.
7. Write and execute programs to show concept of classes using public, private, protected members.
8. Write and execute programs to demonstrate use of constructor (parameterized and un parameterized constructor, copy constructor, multiple constructors in a class, and constructors with default parameters).
9. Write and execute programs to demonstrate use of destructor.
10. Write and execute programs to demonstrate use of static variables and static functions.
11. Write and execute programs to illustrate different types of inheritance.
12. Write and execute programs to illustrate different access specifiers in inheritance (public, private, protected).
13. Write and execute programs to show the use of pointers to classes.
14. Write and execute programs to show the use of this pointer.
15. Write and execute programs to show the use of friend function.
16. Write and execute programs to show the concept of friend class.
17. Write and execute programs to demonstrate method overloading in classes using different parameters and different return types.
18. Write and execute programs to show the use of virtual function and pure virtual function.
19. Write and execute programs to demonstrate operator overloading in classes with different operators.
20. Write and execute programs using concept of dynamic memory allocation.

CSA184 Operating System (P)

L T P
0 0 4

Objective: The goal of this course is to have students understand and appreciate the principles in the design and implementation of operating systems software.

1. Simulate the following CPU scheduling algorithms.

   a) FCFS b) SJF c) Round Robin d) Priority.

2. Write a C program to simulate producer-consumer problem using Semaphores.

3. Write a C program to simulate the concept of Dining-philosophers problem.

4. Simulate MVT and MFT.

5. Write a C program to simulate the following contiguous memory allocation Techniques

   a) Worst fit b) Best fit c) First fit

6. Simulate all page replacement algorithms

   a) FIFO b) LRU c) OPTIMAL.

7. Simulate all File Organization Techniques

   a) Single level directory b) Two level directory

8. Simulate all file allocation strategies

   a) Sequential b) Indexed c) Linked.

9. Simulate Bankers Algorithm for Dead Lock Avoidance.

10. Simulate Bankers Algorithm for Dead Lock Prevention.

11. Write a C program to simulate disk scheduling algorithms.

    a) FCFS b) SCAN c) C-SCAN