M. G. Science Institute, Ahmedabad

Autonomous | Affiliated to Gujarat University, Ahmedabad

(Managed by The Ahmedabad Education Society)

Department of Computer and Data Science

Bachelor of Science (Hons.) in Computer Science

B.S. (Hons.) CS

(Effective from Academic Year 2024-25)

Contents

1.0   Preamble

In the age of digital transformation and technological evolution, the Bachelor of Science in Computer Science (B.S. (Hons.) CS) program at M.G. Science Institute stands as a beacon of intellectual principles of intellectual exploration, technical mastery, and holistic development. Rooted in the principles of innovation, collaboration, and ethical responsibilities, our B.S. (Hons.) CS program is designed to prepare students for dynamic careers in the ever-evolving field of computer applications.

2.0   Definitions

Bachelor Degree

Bachelor Degree is designed to offer the undergoing students a broad foundation necessary for a science-based career with a special focus on multidisciplinary learning.

Bachelor Degree (Hons.)

Bachelor Degree (Hons.) aims at providing advanced and specialized theoretical and research skills in the chosen science subject, along with the overall knowledge in the sciences, to provide the students a strong platform for an advanced academic or professional career.

Choice Based Credit System

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising Core, minor, multi-disciplinary, or skill-based courses.

Credit

Credits means the value assigned to a course which indicates the level of instruction:

   1 hour lecture per week equals 1 credit
   2 hours practical per week equals 1 credit

Credit for a practical could be proposed as part of a course or as a separate practical course.

SGPA

SGPA means Semester Grade Point Average calculated for individual semesters.

CGPA

CGPA means Cumulative Grade Point Average calculated for all courses completed by the students at any point of time. CGPA is calculated for each year for both semesters clubbed together.

Course

A course is a specific subject in the academic programme taught in a particular semester for the specifically assigned number of credits.

Course Announcement

The college shall announce the elective courses it proposes to offer to the students out of the wider course basket. It is not mandatory to offer all the electives. The decision of the principal shall be final in this case. However, in the spirit of Choice Based Credit System, the college should offer choices to the students for the elective courses and not offer only the minimum number of electives.

Course Registration

It is mandatory for every student, to register every semester, for the elective courses opted for that semester. Each student, on admission shall be assigned to a Faculty Advisor who shall

advise him/her about the academic programs and counsel on the choice of courses considering the student's profile, career goals and courses taken in the earlier semesters. With the advice and consent of the Faculty Advisor, the student shall register for a set of courses he/she plans to take up for the Semester. Students shall have to register for the courses for the semester within first week of Semester I and immediately after conclusion of the preceding term for subsequent Semesters II, III, IV, V, VI, VII and VIII.

Course Outcomes

Course outcomes are the specific and measurable attributes defining the knowledge, skill and attitude of the learners are expected to demonstrate by the completion of the course.

Grading System

The Grading System is the 10-point standard scale system defined by the UGC comprising of the Semester Grade Point Average (SGPA) and Cumulative Grade Point Average (CGPA).

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

Graduate Attributes

The Graduate Attributes are the generic abilities, attitudes and approaches expected to be demonstrated by the learner in the world around him/her in a longer period of the life time.

Learning Outcomes

Learning outcomes describe the measurable skills, abilities, knowledge, or values that students should be able to demonstrate as a result of completing a course.

Outcome Based Education (OBE) Approach

OBE is the approach focusing on the performance outcome comprising of the following:
 a. The performer – the student (learner), not only the teacher.
 b. The performable (thus demonstrable or assessable) to perform
 c. The performance outcome, not the activity or task to be performed.

Outcome-Based Assessment

An assessment system that asks course teachers to first identify what it is that we expect students to be able to do once they have completed a course or program. It then asks course teachers to provide evidence that they are able to do so. In other words, how will each learning outcome be assessed? What **evidence of student learning** is most **relevant for each learning outcome** and **what standard or criteria** will be used to evaluate that evidence? Assessment is therefore a key part of outcome-based education and used to determine whether or not a qualification has been achieved.

Programme Educational Objectives

Programme Educational Objectives are a set of **broad future-focused student performance outcomes** that explicitly identify what students will be **able to do with what they have**

learned, and what **they will be like** after they leave school and are **living full and productive lives**. Thus, PEOs are what the programme is preparing graduates for in their **career and professional life** (to attain within a **few years** after graduation).

Programme Outcomes

Programme Outcomes are a set of **narrow statements** that describe what learners of the programme are expected to know and be able to perform or attain by the time of graduation.

Programme Specific Outcomes

The PSOs are a set of narrow statements that describe what the learners of a particular specialization of the programme are expected to know and be able to perform or attain by the time of graduation. PSOs are also a function of the various course combinations offered by the college.

Semester

The Semester means the one half of the academic year comprising of the teaching days and examination & evaluation days as per the UGC/ University norms.

Teaching and Learning Activities

The set of **pedagogical tools and techniques** or the teaching and learning activities that aim to **help students to attain** the intended learning outcomes and engage them in these learning activities through the teaching process.

3.0   B.S. Programme Focus

Programme Educational Objectives (PEOs)

a) To impart advance knowledge about various sub-domains related to the field of computer applications.
b) The program will focus on the improving students learning ability to identify, formulate and analyse complex problems.
c) The program will help students to develop professional skills that prepare them for immediate employment or for learning in advanced areas of computer science and related fields.
d) Understanding the front end and back end of the software applications.
e) Be effective and inspiring leader for fellow professionals and face the challenges of the rapidly changing multi-dimensional, contemporary world.

Programme Specific outcomes (PSOs)

Expected outcomes that a student should be able to demonstrate are the following:

a) To provide students with required knowledge and necessary skills to get rewarding careers into the changing world of information technology.
b) Provide foundation of computing principles and business practices for effectively using/managing information systems and enterprise software.
c) To specialize in legacy applications, system software and mobile applications.
d) Think of new approaches for solving real-world problems across different domains.
e) To caters the need of managing the business applications.
f) Be in a position to develop industrial applications.

Graduate Attributes (GAs)

These attributes reflect the core competencies necessary for graduates to succeed in the field.
The common graduate attributes for B.S. courses are:

a) Graduates will be capable of demonstrating comprehensive and considered knowledge of a discipline. Student enables to evaluate and utilize information and apply their knowledge and professional skills in the field of IT.

b) Graduates will be trained to develop skills needed for creativity to design and implement computer application software. Also, able to think and imagine IT solution for real life problems / applications.

c) The graduates are expected to have clarity in thinking. Graduates will be involved to develop constructively and methodically, exploring ideas, theories and philosophies. It also relates to the ability to analyse and construct knowledge with depth, insight and intellectual maturity.

d) Graduate have the ability to communicate clearly and to work well in a team setting is critical to sustained and successful employment. Good communication and social skills involve the ability to listen to, as well as clearly express information back to others in a variety of ways - oral, written, and visual - using a range of technologies.

e) Proficiency in programming languages, software development, and database management. Understanding of algorithms, data structures, and computer architecture.

f) Basic project management skills to plan, organize, and execute software development projects within time and budget constraints.

g) Capable of working effectively in diverse teams in both classroom, laboratory, in industry and project-based situations.

h) Skills in conducting research, gathering information, and investigating issues to support decision-making and problem-solving.

4.0 B.S. Programme Course Types and Evaluation Pattern

Sr. No.	Course Type	Credits	Nature	CCE Marks	ECE Marks	Total Marks
1	Major Course	4	Compulsory	50	50	100
2	Minor Course	4	Compulsory	50	50	100
3	Multidisciplinary Course	4	Elective	50	50	100
4	Skill Enhancement Course	2	Elective	25	25	50
5	Ability Enhancement Course	2	Elective	25	25	50
6	Indian Knowledge System/ Value Added Courses	2	Elective	25	25	50

Courses Types Definitions:

1. **Major Course (DSC-C)**
   Discipline-specific course core is a course that a student admitted to a particular programme must successfully complete receiving the degree and which cannot be substituted by any other course.

2. **Minor Course (DSC-M)**

A discipline Specific Minor Course refers to a set of academic courses that form a focused and specialized area of study within a particular discipline. Students have the option to pursue a minor alongside their major allowing them to gain additional expertise in a specific subject.

3. **Multidisciplinary Course (IDC)**

   A multidisciplinary course is a course chosen generally from a related discipline/subject, intending to seek exposure in the discipline relating to the core domain of the student.

4. **Skill Enhancement Course**

   Skill Enhancement Course is designed to provide students with specific skills or knowledge in addition to their primary academic pursuits. The main purpose of the SEC is to provide students with practical skills, life skills, soft skills, hands-on training, etc. to increase their employability.

5. **Ability Enhancement Course**

   The ability enhancement course is designed to improve students' communication, language, and personality development skills. The main purpose of the AEC is to introduce students to the theory, fundamentals, and tools of communication and to develop in them vital communication skills that should be integral to personal, social, and professional interactions.

6. **Indian Knowledge System**

   Indian Knowledge System refers to the rich and diverse heritage of knowledge, wisdom, and traditions that have evolved over millennia within the Indian subcontinent.

5.0   B.S. Programme Structure

B.S. (Hons.) is a four-year programme divided into eight semesters. A student is required to complete 176 credits for the completion of the programme and the award of B.S. (Hons.) degree.

The B.S. (Hons.) programme is aligned with the NEP-2020 structure as given in below Table.

	Courses	No. of Papers	Credits Each	Total Credits
1.	DSC-Major	23	4	92
2.	DSC-Minor	7	4	28
3.	IDC-Multi	3	4	12
4.	AEC	5	2	10
5.	SEC	5	2	10
	Internship	1	4	4
6.	IKS	4	2	8
	OJT/RP	2	6	12
			Total	**176**

Details of Programme

Year	Semester	Course Type (Credits)						
1st Year	Sem-I	Major-1 (4)	Major-2 (4)	Minor-1 (4)	MDC-1 (4)	AEC-1 (2)	SEC-1 (2)	IKS-1 (2)
	Sem-II	Major-3 (4)	Major-4 (4)	Minor-2 (4)	MDC-2 (4)	AEC-2 (2)	SEC-2 (2)	VAC-1 (2)
2nd Year	Sem-III	Major-5 (4)	Major-6 (4)	Major-7 (4)	MDC-3 (4)	AEC-3 (2)	SEC-3 (2)	IKS-2 (2)
	Sem-IV	Major-8 (4)	Major-9 (4)	Major-10 (4)	Minor-3 (4)	AEC-4 (2)	SEC-4 (2)	VAC-2 (2)
3rd Year	Sem-V	Major-11 (4)	Major-12 (4)	Major-13 (4)	Minor-4 (4)	Minor-5 (4)	SEC-5 (2)	-
	Sem-VI	Major-14 (4)	Major-15 (4)	Major-16 (4)	Minor-6 (4)	AEC-5 (2)	Internship (4)	-
4th Year	Sem-VII	Major-17 (4)	Major-18 (4)	Major-19 (4)	Minor-7 (4)	-	OJT/RP-1 (6)	-
	Sem-VIII	Major-20 (4)	Major-21 (4)	Major-22 (4)	Minor-8 (4)	-	OJT/RP-2 (6)	-

6.0   Multiple Entry-Exit Option

The B.S. programme is fully compliant with the Curriculum and Credit Framework for Undergraduate Programmes issued by the UGC. Accordingly, the programme provides the exit option to the learners at the end of the first year with UG Certificate awarded, at the end of the second year with UG Diploma awarded, at the end of the third year with UG Degree awarded and at the end of the fourth year with UG Honors Degree awarded. The learners choosing to exit the programme at the end of the first year or at the end of the second year will be allowed to, subject to successful completion of the relevant portion of the curriculum, shall be allowed to re-enter within a period of three years and complete the degree programme within a period of maximum seven years from the year of the first admission. All the other details are as provided in Sec.3.2.3 of the Curriculum and Credit Framework for Undergraduate Programmes issued by the UGC in December 2022.

7.0   Internship Project

Every learner must undergo and complete the internships/apprenticeships in a firm/ industry/organization or training in labs with faculty or researchers in their own or other college/institute/research institution during the summer term. Completion of the Summer Internship shall be mandatory for every learner choosing to exit at the end of the first year with a UG Certificate or at the end of the second year with a UG Diploma. The Internship Project shall carry the weightage of 4 credits. Since the internship is categorized as Practice, every learner will have to actually produce the work for 120 hours during the internship.

Evaluation of the Internship Project:

It is mandatory for the student to seek advance written approval from the faculty guide and the HOD for the internship and organization before commencing the internship.

   a.   It is mandatory for the student to seek advance written approval from the faculty guide and the Director of the Institute about the topic and organization before commencing the SIP.
   b.   Students shall also seek a formal evaluation of their Internship Project from the external guide. The formal evaluation by the external guide shall be done for 50 marks and comment on the nature and quantum of work undertaken by the student, the effectiveness and overall professionalism. The learning outcomes of the Internship Project and utility of the project to the host organization must be specifically

highlighted in the formal evaluation by the external guide. The Internship Project evaluation sheet duly signed and stamped by the external guide shall be included in the final Internship report.

c. The completion of the SIP shall be certified by the respective Faculty Guide & approved by the Director of the Institute.

d. The college level evaluation shall be for 50 marks through the Viva-Voce conducted by the faculty guide and HOD of the respective department.

e. Copies of SIP report and records of evaluation shall be maintained by the college for a period of 5 academic years.

8.0 Comprehensive Internal Evaluation (CIE)/Comprehensive Concurrent Evaluation (CCE)

1. The course teacher shall prepare the scheme of Comprehensive Concurrent Evaluation (Formative Assessment) before commencement of the term. The scheme of Comprehensive Concurrent Evaluation shall explicitly state the linkages of each CCE with the Course Outcomes and define the targeted attainment levels for each CO.

2. The Head of the Department shall approve the scheme of Comprehensive Concurrent Evaluation with or without modifications.

3. The course teacher shall display, on the notice board/ ERP, the approved CCE scheme of the course and the same shall also be hosted on the website, not later than the first week of the term.

4. Each CCE item shall be of minimum 25 marks.

5. For a 4 Credit Course there shall be a MINIMUM of three CCE items. The final scores shall be converted to 50, using an average or best two out of three formulae.

6. For 2 Credit Course there shall be a MINIMUM of two CCE items. The final scores shall be converted to 50.

7. CCE shall be spread through the duration of course and shall be conceptualized, executed, assessed and documented by the course teacher along with student-wise and class-wise attainment levels of the COs and the attainment levels of the course.

8. The assessment outcome of each CCE shall be duly signed by the course teacher & the programme coordinator / HOD of the college.

9. A copy of the duly signed CCE outcome shall be displayed on the notice boards/ ERP, within a week of the assessment and course teachers shall guide the students on a need basis.

10. The college may conduct additional make up / remedial CCE items at its discretion.

11. At the end of the term aggregate CCE scores/grades shall be calculated and the CO attainment levels shall be calculated by the course teacher. The same shall be displayed on the notice board/ ERP.

12. Records of CCE shall be retained for 5 years from the completion of the Academic Year. i.e. Current Academic Year (CAY) + 4 years.

The comprehensive internal evaluation shall be conducted by the college once a semester. The maximum marks for 4 credit courses shall be 50 and for 2 credit courses shall be 25 marks.

9.0 End-Semester Evaluation

1. The End Semester Evaluation (Summative Evaluation) for all the courses shall be conducted by the Examination Department/Committee of the college headed by a full-

time regular faculty member nominated by the Principal as Controller of the Examination.

2. The ESE for each course shall have the weightage as follows:
   - For a 4 Credit Course: 50 marks
   - For a 2 Credit Course: 25 marks
3. The ESE for each course shall have 5 questions each of 10 marks. In case of 2 Credit courses the aggregate marks out of 50 shall be converted to the level proportionate to 25 marks.
4. All questions shall be compulsory with internal choice within the questions.
5. The broad structure of the ESE question paper shall be as follows:

Question Number	COGNITIVE ABILITIES EVALUATED	Nature
Q.1	REMEMBERING	Answer any 5 out of 8 (2 marks each)
Q.2	UNDERSTANDING	Answer any 2 out of 3 (5 marks each)
Q.3	APPLYING	Answer 3 (a) or 3 (b) (10 marks)
Q.4	ANALYSING	Answer 4 (a) or 4 (b) (10 marks)
Q.5	EVALUATING	Answer 5 (a) or 5 (b) (10 marks)
	CREATING	

10.0 Passing Standard

A learner shall be said to have earned the credits for a course if he/she earns minimum 36% marks.

Formative Evaluation and Summative Evaluation shall be separate head of passing.

Grading System

The Indirect and Absolute Grading System shall be used, i.e. the assessment of individual Courses in the concerned examinations will be on the basis of marks. However, the marks shall later be converted into Grades by a defined mechanism wherein the overall performance of the learners can be reflected after considering the Credit Points for any given course. The overall evaluation shall be designated in terms of Grade. The 10-point standard scale mandated by UGC shall be used.

The performance of a student will be evaluated in terms of two indices, viz.

(a) Semester Grade Point Average (SGPA) which is the Grade Point Average for a semester

(b) Cumulative Grade Point Average (CGPA) which is the Grade Point Average for all the completed semesters at any point in time

Letter Grade	Grade Point
O (Outstanding)	10
A+ (Excellent)	9
A (Very Good)	8
B+ (Good)	7
B (Above Average)	6
C (Average)	5
P (Pass)	4
F (Fail)	0
Ab (Absent)	0

Grade Point (Gi) (10 points scale) = Marks of each paper out of 100 / 10

Marks out of 100	Grade Point Range (Gi)	Letter Grade	Classification
96.0-100	10	O	Outstanding
86.0-95.9	9	A+	Excellent
76.0-85.9	8	A	Very Good
66.0-75.9	7	B+	Good
56.0-65.9	6	B	Above Average
46.0-55.9	5	C	Average
36.0-45.9	4	P	Pass
Below 36.0	0	F	Fail
Absent	0	Ab	Absent

The Semester Grade Point Average (SGPA) is the ratio of the sum of the product of the number of credits with the grade point scored by a student in all the courses taken by a student and the sum of the number of credits of all the courses undergone by a student, i.e.,

$$\text{SGPA } (S_i) = \Sigma \, (C_i \times G_i) \, / \, \Sigma \, C_i$$

where C_i is the number of credits of the ith course and G_i is the grade point scored by the student in the ith course.

The cumulative grade point average (CGPA) is also calculated in the same manner taking into account all the courses undergone by a student over all the semesters of a programme, i.e.,

$$\text{CGPA} = \Sigma \, (C_i \times S_i) \, / \, \Sigma \, C_i$$

where S_i is the SGPA of the ith semester and C_i is the total number of credits in that i^{th} semester.

The SGPA and CGPA shall be rounded off to 2 decimal points.

Scaling Down of the CIE Score

The marks obtained by the student for the CCE shall be scaled down, to the required extent, if percentage of the marks of CCE exceeds the percentage of marks scored in the ESE (End Semester University Examination) by 25% for the respective course.

Degree Requirements

The degree requirements for the B.S. programmes are completion of minimum 136 credits and 180 credits in case of Honours degree.

Maximum Duration for Completion of the Programme

The program of the study is four years of eight semesters. A candidate shall complete his/her degree within **seven (7)** academic years from the date of his/her admission to the first semester.

Grade Improvement

There shall be a provision for candidates to reappear for the examination for the concerned course of theory papers only (subject) in which the candidate wishes for improvement of his/her grade point of SGPA in general and CGPA in a total of the program subject to the condition that:

a) The candidate shall be eligible to reappear for improvement of grade points only after successfully passing the program.

b) The candidate may opt for the examination for any number of courses (subject/paper) of the programme for improvement of grade points but not more than three times for each course (subject/paper) as per the prevailing syllabus of the examination conducted in the regular schedule of University examinations.

c) All such provisions are there within 04 years from successful completion of the programme, but not exceeding the period of 08 years of the duration of completion of the programme.

d) In all such cases grade points are considered if there is a progress in such improvements, otherwise, original grade points shall be retained.

e) No such candidates shall be eligible for the award of Rank, Gold Medal, Cash Prize, etc.

f) The validity of credits earned will be for a maximum period of seven years or as specified by the Academic Bank of Credits (ABC).

11.0 Attendance

The student must meet the requirement of 75% attendance per semester per course for grant of the term. The college may condone the shortage in attendance in exceptional circumstances, up to a maximum of 10%. The college shall have the right to withhold the student from appearing for examination of a specific course if the above requirement is not fulfilled.

12.0 Medium of Instruction

The medium of instruction and evaluation shall be English.

13.0 Detailed Course List (Annexure-1)

Detailed course list is available in Annexure-1

14.0 Detailed Syllabus for Each Course (Annexure-2)

Detailed syllabus for each course is available in Annexure-2

Annexure 1 Detailed Course List for B.S.(Hons.) CS

Detailed Course List for B.S. (Hons.) Computer Science

Year	Sem	Course Type	Course Code	Course Title	Credits T	P	Total
1	Sem-I	DSC-Core	CSM111	Fundamentals of Computers	3	1	4
		DSC-Core	CSM112	Programming in C	3	1	4
		DSC-M	CSE113	Web Designing-I	3	1	4
		IDC/Multi	CSMDC114	Mathematics-I	4	0	4
		AEC	AEC115	Language Through Literature-I	2	-	2
		SEC	CSSEC116	Essential Excel Skills for Data Science	1	1	2
		VAC/IKS	IKS117	Indian Knowledge System	2	-	2
	Sem-II	DSC-Core	CSM121	Data Structure Using C	3	1	4
		DSC-Core	CSM122	Object Oriented Programming using JAVA	3	1	4
		DSC-M	CSE123	Digital Logic Fundamentals	3	1	4
		IDC/Multi	CSMDC124	Statistics-I	3	1	4
		AEC	AEC125	Language Through Literature-II	2	-	2
		SEC	CSSEC126	Advance Excel Skills for Data Science	1	1	2
		VAC/IKS	VAC127	Interpersonal Skills	2	-	2

Exit Option: Students exiting the programme after securing **44** credits will be awarded an **Advanced UG Certificate in B.S. (CS)** provided they secure **4** credits in work-based vocational courses offered by the institute during the summer term.

Year	Sem	Course Type	Course Code	Course Title	Credits T	P	Total
2	Sem-III	DSC-Core	CSM231	Database Management System-I	3	1	4
		DSC-Core	CSM232	C# and DOT NET Framework	3	1	4
		DSC-Core	CSM233	Computer Communication and Network	3	1	4
		IDC/Multi	CSMDC234	Mathematics-II	4	0	4
		AEC	AEC235	Communicative English-III	2	-	2
		SEC	CSSEC236	*SEC-3 Choose any one from Table 1*	1	1	2
		VAC/IKS	IKS237	Environmental Studies	2	-	2
	Sem-IV	DSC-Core	CSM241	Database Management System-II	3	1	4
		DSC-Core	CSM242	Operating System Concepts	3	1	4
		DSC-Core	CSM243	Web Designing-II	3	1	4
		DSC-M	CSE244	Statistics-II	3	1	4
		AEC	AEC245	Communicative English-IV	2	-	2
		SEC	CSSEC246	*SEC-4 Choose any one from Table 1*	1	1	2
		VAC/IKS	IKS247	Understanding India	2	-	2

Exit Option: Students exiting the programme after securing **88** credits will be awarded a **UG Diploma in B.S. (CS)** provided they secure **4** credits in skill-based courses offered by the institute during 1st year or 2nd-year summer term.

Year	Sem	Course Type	Course Code	Course Title	Credits T	P	Total
3	Sem-V	DSC-Core	CSM351	Software Engineering	3	1	4
		DSC-Core	CSM352	Internet Technologies	3	1	4
		DSC-Core	CSM353	Introduction to Microprocessor and System Software	3	1	4
		DSC-M	CSE354	Data Warehouse and Data Minning	3	1	4
		DSC-M	CSE355	Data Communication and Network	3	1	4
		SEC	CSSEC356	*Choose any one from Table 1*	1	1	2
		IKS	-	-	-	-	-
	Sem-VI	DSC-Core	CSM361	Introduction to AI and ML	3	1	4
		DSC-Core	CSM362	AI and Expert Systems	3	1	4
		DSC-Core	CSM363	Software Verification and Validation	3	1	4
		DSC-M	CSE364	Principles of Accounting	3	1	4
		AEC	AEC365	Business Communication	2	-	2
		SEC	SEC-	Internship	4	-	4
		IKS	-	-	-	-	-

Exit Option: Students exiting the programme after securing **132** credits will be awarded **UG Degree B.S. in Computer Science.** provided they have satisfied the credit requirements.

Year	Sem	Course Type	Course Code	Course Title	Credits T P		Total
4	Sem-VII	DSC-Core	CSM471	Analysis and Design Algorithm	3	1	4
		DSC-Core	CSM472	Data Minning and Knowledge Management	3	1	4
		DSC-Core	CSM473	Mobile Application Development	3	1	4
		DSC-M	CSE474	*Choose any one from Table 1*	3	1	4
		AEC	-	-	-	-	-
		SEC	-	-	-	-	-
		OJT/RP	OJT/RP-1	On-Job Training/Research Project	6	-	6
	Sem-VIII	DSC-Core	CSM481	Automata Theory and Compiler Design	3	1	4
		DSC-Core	CSM482	Research Methodology	3	1	4
		DSC-Core	CSM483	Internet of Things	3	1	4
		DSC-M	CSM484	*Choose any one from Table 1*	3	1	4
		AEC	-	-	-	-	-
		SEC	-	-	-	-	-
		OJT/RP	OJT/RP-2	On-Job Training/Research Project	6	-	6

Students after securing **176** credits will be awarded a **UG in B.S. (Hons.) Computer Science** provided they have satisfied the credit requirements.

Table 1: List of Elective Courses

Year	Sem	Course Type	Course Code	Course Title	Credits T	P	Total
2	Sem-III	SEC-3	CSSEC236	Android Programming	1	1	2
			CSSEC236	PHP Programming	1	1	2
			CSSEC236	Digital Image Processing	1	1	2
	Sem-IV	SEC-4	CSSEC246	Python Programming	1	1	2
			CSSEC246	Wireless Mobile Communication	1	1	2
			CSSEC246	Database Programming with SQL	1	1	2
3	Sem-V	SEC-5	CSSEC356	R Programming	1	1	2
			CSSEC356	E-commerce	1	1	2
			CSSEC356	Computer Graphics	1	1	2
4	Sem-VII	DSC-M	CSE474	Digital Marketing	3	1	4
			CSE474	Management Information System	3	1	4
			CSE474	Introduction to NoSQL Database	3	1	4
	Sem-VIII	DSC-M	CSE484	Introduction to Machine Learning	3	1	4
			CSE484	Image Processing	3	1	4
			CSE484	Introduction to NLP	3	1	4

Annexure 2 Detailed Syllabus for Each Course
Detailed Syllabus for B.S. (Hons.) CS Sem-I and Sem-II

CSM111 Fundamentals of Computers

Semester: I	Course Title: Fundamentals of Computers	Credit: 4
Course No.: CSM111		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Introduction to computers, classification of computers, anatomy of computer, constituents and architecture, microcontrollers.
CO 2	UNDERSTANDING	Understand operating systems, functions of operating systems, classification of operating systems, kernel, shell, basics of Unix, shell programming, booting
CO 3	APPLYING	Learn the functional units and classify types of computers, how they process information.
CO 4	ANALYSING	Learn how individual computers interact with other computing systems and devices.
CO 5	EVALUATING	Familiarity of various components of data communication. Learns concepts of Data security, Physical structure, type of connections, topology and Network.
CO 6	CREATING	Use and customize a web browser, use e-mail to send and receive messages, create a website and publish a simple web page.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	2	1	-	2
CO 2	2	3	2	1	1
CO 3	2	2	2	2	1
CO 4	1	2	2	1	2
CO 5	2	2	1	1	-
CO 6	1	1	2	-	-

Unit	Detailed Syllabus	Teaching Hours
I	**Introduction to Computers** - Computer Definition, Characteristics of Computers, Evolution and History of Computers, Types of Computers, Basic Organization of a Digital Computer; Number Systems – different types, conversion from one number system to another; Computer Codes – BCD, Gray Code, ASCII and Unicode; Types of Software – System Software and Utility Software; Computer Languages - Machine Level, Assembly Level & High-Level Languages, Translator Programs – Assembler, Interpreter and Compiler; Planning a Computer Program **Data Representation:** Bit, Byte, Binary, Decimal, Hexadecimal, and Octal Systems, Conversions and Binary Arithmetic (Addition/ Subtraction/ Multiplication) Applications of IT	12
II	**Introduction and Major Components of a Computer:** Characteristics of computers, Classification of Digital Computer Systems: Block diagram, a brief introduction of CPU, Main Memory, I/O units, RAM, ROM, Keyboard,	10

	display, mouse, printers, etc. Hardware, Software, Secondary storage devices (hard disks, optical disks, and flash memory), backup devices, How CPU and memory work. Program execution with illustrative examples. Introduction to Algorithm, Flowchart, and Pseudo code with Examples.	
III	**Operating Computer using GUI-Based Operating System:** Basics of Popular Operating Systems; The User Interface, Using Mouse; Using the right Button of the Mouse and Moving Icons on the screen, Use of Common Icons, Status Bar, Using Menu and Menu-selection, Running an Application, Viewing of File, Folders, and Directories, Creating and Renaming of files and folders, Opening and closing of different Windows; Using help; Creating Short cuts, Basics of O.S Setup; Common utilities. **Operating Systems:** Introduction, Functions of an Operating System, Classification of Operating Systems, System programs, Application programs, Utilities, The Unix Operating System, Basic Unix commands, and Booting.	12
IV	**Data communication:** components of communication - representation- text, numbers, images, audio, video – Data security – Physical structure – type of connections, topology – Categories – LAN, WAN, MAN – Inter connection - circuit, packet – protocols – standards – layered approach – ISO OSI model - functions of layers. Types of wireless communication (mobile, WiFi, WiMAX, Bluetooth, Infrared – concept and definition only) Internet Basics, Applications (E-mail, Search engines, FTP, VOIP, Video Conferencing, Audio-Video streaming, Chatting).	11

Practical Component		
Sr. No.	Title of the Practical	Teaching Hours
1	Identification of the peripherals of a computer, components in a CPU and their functions	2
2	Assembling and disassembling the system hardware components of personal computer.	2
3	Basic Computer Hardware Trouble shooting.	2
4	LAN and WiFi Basics.	2
5	Operating System Installation – Windows OS, UNIX/LINUX, Dual Booting.	2
6	Installation and Uninstallation of Software – Office Tools, Utility Software (like Anti-Virus, System Maintenance tools).	2
7	Application Software - Like Photo/Image Editors, Audio Recorders/ Editors, Video Editors …); Freeware, Shareware, Payware and Trialware	2
8	Internet Browsers, Programming IDEs, System Configuration – BIOS Settings, Registry Editor, MS Config, Task Manager, System Maintenance, Third-party System Maintenance Tools	2

Suggested Reference Books:
1. Pradeep K. Sinha and Priti Sinha: Computer Fundamentals (Sixth Edition), BPB Publication.
2. David Riley and Kenny Hunt: Computational thinking for modern solver, Chapman & Hall/CRC.

3. R.G. Dromey: "How to solve it by Computer", PHI.
4. J. Glenn Brook Shear: "Computer Science: An Overview", Addision-Wesley, Twelfth Edition.
5. Anita Goel: Computer Fundamentals, Pearson, 2010.
6. Riley DD, Hunt K.A: Computational Thinking for the Modern Problem Solver, By CRC press, 2014.
7. Ferragina P, Luccio F.: Computational Thinking: First Algorithms, Then Code. Springer.

CSM112 Programming in C

Semester: I	Course Title: Programming in C	Credits: 4
Course No.: CSM112		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Remember the syntax of C programming.
CO 2	UNDERSTANDING	Associate the programs in 'C' language for real world situations.
CO 3	APPLYING	Apply the concepts of Arrays, Strings in 'C' language for user defined problems.
CO 4	ANALYSING	Apply the concepts of functions and pointers.
CO 5	EVALUATING	Associate the programs with structures using 'C' language.
CO 6	CREATING	Discuss to read and write data from /to files in 'C' programs.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	1	1	1	-
CO 2	2	1	1	1	2
CO 3	3	2	2	1	3
CO 4	3	2	2	1	3
CO 5	2	1	1	1	2
CO 6	2	1	1	1	2

Unit	Detailed Syllabus	Teaching Hours
I	Basics of Programming and Ubuntu OS • Basics of Linux Operating System (Ubuntu) and 'C' programming language • Problem definition, problem analysis, Algorithms, flow chart, Debugging, Types of errors in programming, Documentation. • Introduction to GCC Compiler, • Data Types, Variable Declaration, Input/output Statement, Built- In Standard Library, C Program Structure, Vim Editor, writing the First 'c' Program, Compilation and Execution of C Program, Format Specifies and Escape Sequences.	9
II	Control Statements • Branching Statements -Introduction, if statement, ifelse statement, Nested If-else, Switch case statement. • Definition of Loop.	9

	• Types of looping statements. • Difference between while loop and do—while Loop, • Loop control Statement (break, continue). • Infinite Loop.	
III	Arrays • Definition and declaration of the array. • features of Array • Types of Arrays • Initialization of array • Memory representation of the array. • Single Dimensional Array, • Two-Dimensional Array, • Predefined String functions.	9
IV	Functions and Pointers • Definition, declaration, prototype of function • Local and global variable, • User defined functions • Recursion, Storage classes. • Pointer Definition and Declaration, • Pointer Initialization, • Pointer arithmetic. • Arrays of Pointers, • Pointers and one- and two-dimensional Arrays, • Call by value and call by reference • Dynamic Memory Allocation	9
V	Structures and File Handling • Definition and declaration of structure, • Nested Structure, Array of structures, structure pointer, • passing structure to function, self- referential structure, • Definition and declaration, of union • Difference between Structure and Union • Concept of File, Text and binary mode files, Opening and closing files-fopen() and fclose(), • File opening mode- read, write, append, reading and writing string function gets(), puts(), getw(), putw(). Formatted input, output-fscanf(), fprintf(), fseek(), rewind(), ftell().	9

Practical Component		
Sr. No.	Title of the Practical	Teaching Hours
1	(a) Write a program to accept 5 subject marks and calculate the total marks, percentage, and grades of students. (b) Write a program to input a number and find whether the given number is odd or even.	15
2	(a) Write a program to input the day number and display the day of the week. (b) Write a program to find the sum of first n natural numbers.	
3	(a) Write a program that displays a triangle pattern of the alphabets.	

	(b) Write a program to accept the range and generate the Fibonacci Series.
4	(a) Write a program to find given number is Armstrong or not. (a) Write a program to find prime numbers between a given range.
5	Write a program to sort the numbers in ascending and descending order using an array.
6	(a) Write a program to add two Matrices; Use two Dimensional arrays. (b) Write a program to find the product of the given two matrices.
7	(a) Write a function that adds three numbers and displays output on the screen. (b) Write a function that calculates the cube of a given number.
8	(a) Write a program that swaps two numbers using a) call by value and b) call by reference.
9	(a) Write a program that creates a student structure that accepts- stud rollno, student name, address, subject marks, and percentage and displays the same on screen. (b) Write a program to separate even and odd numbers available in file.
10	(a) Write a program to count the no. of words in a given text file. (b) Write a program to remove blank lines from a file. (c) Write a program to copy the content of one file into another file.
11	Write a file handling program that accepts student information and store it into a disk file using binary mode

Suggested Reference Books:
1. The C Programming Language- By Brian W Kernighan and Dennis Ritchie
2. C Programming by E. Balgurusamy.
3. The GNU C Programming Tutorial -By Mark Burgess
4. Let us C- By Yashwant Kanetkar

CSE113 Web Designing-I

Semester: I	Course Title: Web Designing-I	Credits: 4
Course No.: CSE113		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO1	REMEMBERING	Understand key concepts and basic terminology of Web Technology.
CO 2	UNDERSTANDING	Use HTML core tag, link, table, form and design a static web page.
CO 3	APPLYING	Implement HTML 5 graphics, multimedia, geolocation, web storage api in a web page.
CO 4	ANALYSING	Applying cascading style sheet to style a web page.
CO 5	EVALUATING	Use Java script to add dynamic behaviour in a web page.
CO 6	CREATING	Creating simple web pages.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	3	-	-	2
CO 2	-	3	1	-	2
CO 3	-	2	-	1	2
CO 4	-	2	-	1	2

CO 5	1	2	1	-	2
CO 6	-	1	-	-	2

Unit	Detailed Syllabus	Teaching Hours
I	**Basics of Web Technology** An Introduction to Internet, Internet Address, Uniform Resource Locator, Internet Service Provider, Intranet, Extranet, Working of Internet ,Hypertext Transfer Protocol , World Wide Web , Search Engines, Introduction to Web Server and Web Browser, Static and Dynamic Web Page, Types of Websites, Web Designing Principles	9
II	**Basic HTML Concepts** What is HTML?, History, HTML Page Structure, HTML Basic Tags – text formatting tags, working with list, image, table ,link, block and inline elements, frame ,HTML form	9
III	**HTML5** The Road for HTML 5,Browser Pitfalls, HTML 5 New Elements, Semantics Elements, New Form/Input Elements ,Multimedia, Canvas - Future of Graphics on Web, Simple Shape, Shape Styles, Text and Shadow, Canvas Pitfalls,SVG –Basic shapes , Animation, Introduction to Geolocation API, Web Storage, Web Workers, HTML Drag and Drop Features	9
IV	**Cascading StyleSheets** What is CSS?, Advantages of CSS, CSS Syntax Selectors; Type Selector, Universal Selectors, Descendent Selectors, Class Selectors, ID Selectors, Child Selectors, Attribute Selectors, Multiple Style Rules, Grouping Selectors Embedded CSS - The <style> Element, Inline CSS - The style Attribute, External CSS - The <link> Element, Imported CSS - @import Rule, Handling old Browsers, Setting Background using CSS, Set Font Family, Manipulating the Text, CSS Images, CSS Tables, CSS Margins, CSS lists, CSS Padding	9
V	**Java Script** Introduction to Java Script, Advantage of Java Script, Java Script Syntax, Comments, Variable, Array, Operators, Looping, Functions, Dialog box, Regular Expression, Objects in JavaScript, Cookies, ActiveX and JavaScript	9

Practical Component		
Sr. No.	Title of the Practical	Teaching Hours
1	List of programs based on above mention topics	15

Suggested Reference Books:
1. Beginning HTML5 and CSS3 By Richard Clark, Oli Studholme, Christopher Murphy and Divya Manian, Published by APress
2. The complete reference Web Design by Thomas A. Powell Published by Mc Graw Hill, fifth edition

3. Learning Web Design (A beginner's guide to HTML, CSS, JavaScript and Web Graphics) by Jeniifer Niederst Robbins, Published by O'reilly, third edition

CSMDC114 Mathematics-I

Semester: I	Course Title: Mathematics-I	Credit: 4
Course Code: CSMDC114		4 T

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Remember the concept of set theory and functional relationships.
CO 2	UNDERSTANDING	Understand the concept of functions and types of functions.
CO 3	APPLYING	Study the computational and mathematical context of Boolean Algebra.
CO 4	ANALYSING	Describe several practical applications of graph theory, matrix algebra,
CO 5	EVALUATING	Evaluate simultaneous equations using matrix algebra.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	1	1	0	1	0
CO 2	1	0	0	1	1
CO 3	1	2	0	1	0
CO 4	1	1	1	1	1
CO 5	1	1	0	1	0

Unit	Detailed Syllabus	Teaching Hours
I	**Set Theory** • Introduction, Representation of sets, Types of sets • Venn Diagram, Operations on sets • Algebra of sets with proof • The cardinality of sets, Addition theorem, and its examples. • Examples on set theory	12
II	**Functions** • Introduction, Definition, Domain, Co-domain and Range of a Function • Types of Function: Into Function, On-To Function, One to One Function, Many to One Function, One to One Correspondence and its examples. • Classification of Function-Algebraic Functions, Composite, Identity and Inverse functions, • Transcendental Functions, exponential functions, and logarithmic functions	12
III	**Co-ordinate geometry** • Introduction to co-ordinates quadrants and lines, distance formula in R^2 (without proof) • Section formula (without proof) • Area of a triangle (without proof) • General equation of a straight line	12

	• Slope and intercepts of a line • Parallel, perpendicular lines and Angle between two lines (without proof) and related examples	
IV	**Limit, Differentiation and Integration** **Limit** • Concept of limit and some standard limits (without proof) • Continuity of a function **Differentiation** • Introduction to derivatives • Working rules for differentiation (without proof), • Chain rule • Seconds order derivatives **Integration** • Introduction to indefinite Integral and some standard formulae (without proof) and example based on the standard forms • Method of substitution • Introduction to definite integration and examples on it	12
V	**Matrix Algebra** • Determinant, Rules of determinant with examples • Meaning and Definition of Matrix, Types of Matrices • Addition and Subtraction of Matrices, Scalar Product of a Matrix with examples • Multiplication of two Matrices with Examples, Transpose of a matrix, Adjoint matrix • Inverse of a matrix, Solution of simultaneous equations using a matrix, Laws of Matrix Algebra, examples.	12

Suggested Reference Books:
1. Schaum's outlines Discrete Mathematics Graph Theory, Narsingh Deo
2. Fundamental Approach to Discrete Mathematics, D.P. Acharya Sreekkumar
3. Advance Mathematics, Prof. H.R. Vyas and Others, B.S. Shah Prakashan
4. Advance Mathematics for F.Y.B.C.A., Dr. K.R. Kachot, Ramesh Kataria, Mahajan Publishing House.

AEC115 Language Through Literature-I

Semester: I	Course Title: Language Through Literature-I	Credit: 2
Course Code: AEC115		Hours: 2/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	
CO 2	UNDERSTANDING	Students will develop an appreciation for diverse literary forms, demonstrating an ability to analyze and interpret stories and poems in English.
CO 3	APPLYING	Students will exhibit improved grammatical competence, applying correct grammar and syntax in written and spoken communication.
CO 4	ANALYSING	Students will acquire the ability to understand and critically

		evaluate scientific articles, research papers, and lab reports, demonstrating improved scientific literacy.
CO 5	EVALUATING	Students will showcase overall language proficiency, enabling effective communication in various contexts.

Unit	Content	Teaching Hours
I	Text: *Sparkles* (Macmillan Publication) Section – I	10
II	Text: *Sparkles* (Macmillan Publication) Section – II	10
III	Grammar **A)** BE, HAVE and DO as Lexical Verbs **B)** Tenses: • Simple Present Tense • Simple Past Tense • Simple Future Tense • Present Continuous Tense • Past Continuous Tense • Present Perfect Tense • Past Perfect Tense • Present Perfect Continuous Tense	5
IV	**A)** Comprehension of Scientific articles, scientific texts • The passage should be of 200-300 words. • The questions should measure the student's ability to comprehend the main ideas, relevant facts and arguments, and the logical relationship between various ideas and facts presented in the passage. • A total of four questions will be asked from the passage. B)Vocabulary(Textual Glossary)	5
V	PRACTICAL Speaking: To enable the students to • Greeting and formulae of everyday conversation • Introduce themselves • Making a request, saying no politely	10

References Books:
• *Oxford Practice Grammar (Advanced)* - George Yule – OUP
• *Advanced Grammar in Use* - Martin Hewings - Cambridge University Press
• *English Grammar for Students* - Anne Seaton and Y H Mew - Learner's Publishing
• *A Practical English Grammar* - A J Thomson and A V Martinet – OUP
• *Better English* - Betty Kirkpatrick - Geddes and Grosset
• *Contemporary English Grammar Structures and Composition* – David Green - Trinity Press

CSSEC116 Essential Excel Skills for Data Science

Semester: I	Course Title: Essential Excel Skills for Data Science	Credit: 2
Course Code: CSSEC116		Hours: 2/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Remember Excel shortcuts
CO 2	UNDERSTANDING	Understand Excel formulas (relative and absolute). Understand the basic functions of Excel.
CO 3	APPLYING	Describe the sample data with suitable Excel functions like sum, average, median, var, stdev, etc.
CO 4	ANALYSING	Analyze the sample data from various domains using Excel.
CO 5	EVALUATING	Summarize the data using suitable charts and graphs. Summarize the data using Excel basic functions.
CO 6	CREATING	Students can visualize the data graphically and summarize the data numerically for real-life data analysis problems.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	1	1	1	-
CO 2	2	1	-	1	-
CO 3	-	2	3	-	-
CO 4	1	1	2	2	1
CO 5	1	1	2	1	-
CO 6	1	1	2	3	1

Unit	Detailed Syllabus	Teaching Hours
I	**Introduction to MS Excel** • Importance of MS Excel. Understand workbooks and worksheets. Entering and editing data. Formatting cells. Creating and managing cell styles. Formatting numbers and labels. • Editing worksheet and cells. Add, edit, and delete comments. Lock and protect cells. • Enter basic formulas. Absolute and relative references. Basic functions. • Working with range names. • Create charts and graphs. Format charts and graphs. • Filtering, sorting, and conditional formatting • Calculations and functions: sum, average, min, max, and, or, not, if.	15
II	**Practical Based on Unit-I** 1. Understanding spreadsheet elements. Data Entering and editing. 2. Basics of formulas in Excel. Relative and Absolute referencing. 3. Basic Functions in Excel. Working with range names. 4. Creating formatting Charts and graphs. 5. Use of various functions like sum, average, min, max, and, or, not, if 6. Filtering, sorting of the data 7. Use of conditional formatting.	30

Suggested Reference Books:
1. Microsoft Excel: Data Analysis and Business Model, PHI, Wayne, WL, 2019.
2. Microsoft Excel Formulas and Functions Dummies, Ken Bluttman, 2020.

IKS117 Indian Knowledge Systems

Semester: I	Course Title: Indian Knowledge Systems	Credit: 2
Course Code: IKS117		Hours: 2/week

Unit	Topic	Teaching Hours
I	**Introduction to IKS** ○ Introduction to IKS& Its importance ▪ Introduction &importance of IKS ▪ Various IKS Systems ○ Shashtra – Foundational Literature of Bharatvarsha ▪ What is Shashtra? ▪ Importance of Shashtra ▪ Classification of Shashtra – Vaidic & Avaidic (with examples of imp. Literature) ○ Base of IKS proliferation ▪ Bhartiya Education System and its philosophy ▪ History of BES from Ancient to Modern ▪ Domains of Education: Gurukul, Pathshala, Vidyalay, Vishva vidyalay	15
II	**Contribution of IKS to the World** ▪ Mathematics &Astronomy ▪ Planetary System ▪ Number System ▪ Speed of Light ▪ Algebra & Arithmetic ▪ Eclipse ▪ Geometry ▪ Trigonometry ○ Life sciences ○ Metal Technology ▪ Physics ▪ Mining Techniques ▪ Chemistry ▪ Types of Metals ▪ Botany ▪ Tools & Techniques for Metal Smelting with examples ○ Town planning &Temple Architecture ▪ Indigenous tools & technologies for town planning & Temple Architecture ▪ Science of Architecture ▪ Lothal, MohanJoDaro, Dholavira	15

| | o Angkorvat, Lepakshi Temple,J agannath Puri Temple, Thanjavur Temple, Modhera and Konark Sun Temple, Hampi Temple Etc.
o Ayurveda
    ▪ Introduction of Ayurveda- Definition, Branches of Ayurveda, Books and Pioneers
    ▪ Concept of Tri Dosh and the importance of its Balance in the body
    ▪ Indic Medical Science Achievement: Tools & Technology
o Art &Traditions
    ▪ History and Origin
    ▪ SkillEnhancementwith64Kala
    ▪ Science behind our traditions and rituals | |

Reference Books:

- Introduction to Indian Knowledge System-Concept and Application by B. Mahadevan, Vinayak Rajat Bhat, Nagendra Pavan R.N.
- R.M.Pujari, Pradeep Kolhe, N.R. Kumar, 'Pride of India: AGlimpse into India's Scientific Heritage', Samskrita Bharati Publication.
- 'Indian Contribution to Science', compiled by Vijnana Bharati.
- 'Knowledge Traditions and Practices of India', Kapil Kapoor, Michel Danino, CBSE, India.
- Dr. Subhash Kak, Computation in Ancient India, Mount, Meru Publishing (2016)
- Dharampal, Indian Science and Technology in the Eighteenth Century, Academy of Gandhian Studies, Hyderabad, 1971, republ. Other India Bookstore, Goa, 2000
- Robert Kanigel, The Man Who Knew Infinity: A Life of the Genius Ramanujan, Abacus, London, 1999.
- Alok Kumar, Sciences of the Ancient Hindus: Unlocking Nature in the Pursuit of Salvation, CreateSpace Independent Publishing, 2014.
- B.V. Subbarayappa, Science in India: A Historical Perspective, Rupa, New Delhi, 2013.
- S. Balachandra Rao, Indian Mathematics and Astronomy: Some Landmarks, Jnana Deep Publications, Bangalore, 3rd ed., 2004.

CSM121 Data Structure Using C

Semester: II	Course Title: Data Structure Using C	Credit: 4
Course Code: CSM121		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Remember the basic syntax of C.
CO 2	UNDERSTANDING	Explain the basics of data structures and their relevance to real-world applications.
CO 3	APPLYING	Analyze and apply suitable linear data structures according to the scope of the problem.
CO 4	ANALYSING	Analyze and design the solution to real-world problems using appropriate Non-linear data structures
CO 5	EVALUATING	Examine, test, and compare the appropriate sorting and searching techniques on real-time data.
CO 6	CREATING	Create a sorting and searching program.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	2	2	3	1
CO 2	3	2	3	2	3
CO 3	3	3	3	3	2
CO 4	2	3	2	2	2
CO 5	3	2	3	2	2
CO 6	1	1	1	1	1

Unit	Detailed Syllabus	Teaching Hours
I	**Introduction to data structure** Basic concepts C languages: Introduction to Structures and Pointers. Importance and applications of data structures, Types of data structures, Algorithms, and Asymptotic notations. **Stack** Definition & Concepts, Operations on Stacks (Push, Pop, Peep, Change - Algorithm & Implementation), Applications of Stack, Polish expressions, Reverse Polish Expression and conversions, Recursion, Tower of Hanoi problem.	9
II	**Queue** Queue and its sequential representation, Simple Queue, Circular Queue, Double Ended Queue, Priority Queue, Applications of Queue. **Linked List** Sequential Allocation method Vs linked Allocation method, Dynamic Data structure vs. static Data structure, Pointers and Linked Allocation, Singly Linked List Storage Structures & Basic Operations, Circular Linked List & Basic Operations, Doubly Linked List & Basic Operations, Applications of Linked List.	9
III	**Tree** Definitions and concepts, Terminology, Binary trees, Binary Tree Representations, Binary Tree Traversals, Binary Search Tree, Insertion and	9

	Deletion in BST, Threaded binary Trees, AVL Tree, B-Tree, Introduction to B+ Tree, Applications of Tree.	
IV	**Graph** Definition and concepts, Graph Representation, Graph Terminology, Graph Traversals – Depth First Search and Breadth First Search, Shortest Path-Dijkstra's Algorithm.	9
V	**Sorting and Searching** Introduction to Sorting, Types of Sorting (Internal and External, Stable and Un-stable Sorting) Elementary sorts: Bubble sort, Selection sort, Insertion sort, Merge sort, Quick sort, Heap Sort, Radix sort, Sequential Search, Binary search, best case, and worst-case behavior. **Hashing** The symbol table, Hashing Functions, Fundamentals of Collision-Resolution Techniques.	9

Practical Component		
Sr. No.	**Title of the Practical**	**Teaching Hours**
1	Array implementation of stack. Array implementation of queue.	2
2	Array implementation of list.	2
3	Linked list implementation of list [singly linked list]. Linked list implementation of stack. Linked list implementation of queue.	2
4	Applications of list polynomial addition and subtraction. Infix to postfix. Expression evaluation.	2
5	Implementation of binary search trees.	2
6	Implementation of avl trees.	2
7	Implementation of heap using priority queues.	2
8	Representation of graph. Graph traversal-breadth first traversal. Graph traversal-depth first traversal.	2
9	Linear and Binary Search.	2
10	Insertion sort, Bubble sort, Quick sort, Merge sort.	2

Suggested Reference Books:
1. Fundamentals of Computer Algorithms: Horowitz, Sahni, Galgotia.
2. Data Structures using C & C++: Ten Baum Publisher – Prentice-Hall International.
3. Fundamentals of Data Structures in C++: Sartaj Sahani,
4. An Introduction to Data Structures with Application: Jean-Paul Tremblay, Paul G. Sorenson.

CSM122 Object-Oriented Programming Using JAVA

Semester: II	Course Title: Object-Oriented Programming Using JAVA	Credit: 4
Course Code: CSM122		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES

CO 1	REMEMBERING	Able to understand the features of Java Programming Language with Syntax and structure of Java Programs and how to use various operators in Java.
CO 2	UNDERSTANDING	Able to understand that how to implement the Object-oriented features by writing Java programs.
CO 3	APPLYING	Ability to define Arrays, Strings, Vectors, Packages, etc. in Java and implement the Exception handling Mechanism in Java.
CO 4	ANALYSING	Use Java Standard API library to write complex programs.
CO 5	EVALUATING	Examine the key aspects of the Java standard API library.
CO 6	CREATING	Develop an interactive program using applets.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	1	-	1	1
CO 2	2	-	1	-	1
CO 3	2	1	3	1	-
CO 4	1	1	2	1	-
CO 5	1	1	2	1	-
CO 6	-	-	-	1	-

Unit	Detailed Syllabus	Teaching Hours
I	Introduction to Java: Basics of Java programming, Data types, Variables, Operators, Control structures including selection, Looping, Java methods, Overloading, Math class, and Arrays in Java. Objects and Classes: Basics of objects and classes in Java, Constructors, Finalizer, Visibility modifiers, Methods, and objects, Inbuilt classes like String, Character, String Buffer, and File, this reference	12
II	Inheritance and Polymorphism: Inheritance in Java, Super and subclass, Overriding, Object class, Polymorphism, Dynamic binding, Generic programming, Casting objects, Instance of operator, Abstract class, Interface in Java, Package in Java, UTIL package.	11
III	Event and GUI programming: Event handling in Java, Event types, Mouse and key events, GUI Basics, Panels, Frames, Layout Managers: Flow Layout, Border Layout, Grid Layout, GUI components like Buttons, Check Boxes, Radio Buttons, Labels, Text Fields, Text Areas, Combo Boxes, Lists, Scroll Bars, Sliders, Windows, Menus, Dialog Box, Applet and its life cycle, Introduction to swing, Exceptional handling mechanism. I/O programming: Text and Binary I/O, Binary I/O classes, Object I/O, Random Access Files.	11
IV	Multithreading in java: Thread life cycle and methods, Runnable interface, Thread synchronization, Exception handling with try-catch-finally, Collections in java, Introduction to JavaBeans and Network Programming.	11

Practical Component		
Sr. No.	**Title of the Practical**	**Teaching Hours**
1	a) Write a simple Java application, to print the message, "Welcome to Java" b) Write a program to display the month of the year. Months of the year should be held in an array.	2
2	a) Write a program to demonstrate a division by zero exception b) Write a program to create a user-defined exception say Pay Out of Bounds.	2
3	Write a Java program to add two integers and two float numbers. When no arguments are supplied, give a default value to calculate the sum. Use function overloading.	2
4	Write a program to perform mathematical operations. Create a class called AddSub with methods to add and subtract. Create another class called MulDiv that extends from the AddSub class to use the member data of the superclass. MulDiv should have methods to multiply and divide A main function should access the methods and perform the mathematical operations.	2
5	Write a program with a class variable that is available for all instances of a class. Use static variable declaration. Observe the changes that occur in the object's member variable values.	2
6	Write a Java program to create a student class with the following attributes: Enrollment_id: Name, Mark of sub1, Mark of sub2, Mark of sub3, Total Marks. The total of the three marks must be calculated only when the student passes in all three subjects. The pass mark for each subject is 50. If a candidate fails in any one of the subjects his total mark must be declared as zero. Using this condition write a constructor for this class. Write separate functions for accepting and displaying student details. In the main method create an array of three student objects and display the details.	2
7	In a college first-year classes have the following attributes name of the class (BS, BCom, BSc), Name of the staff, No. of students in the class, Array of students in the class. Define a class called the first year with the above attributes and define a suitable constructor. Also, write a method called best Student () which processes a first-year object and returns the student with the highest total mark. In the main method define a first-year object and find the best student in this class.	2
8	Write a Java program to define a class called employee with the name and date of appointment. Create ten employee objects as an array and sort them as per their date of appointment. i.e., print them as per their seniority.	2
9	Create a package 'student.Fulltime.BS' in your current working directory a) Create a default class student in the above package with the following attributes: Name, age, and sex. b) Have methods for storing as well as displaying.	2

Suggested Reference Books:
1. E. Balagurusamy, Programming with JAVA, McGraw Hill, New Delhi, 2007.

2. Raj Kumar Buyya, Object-Oriented Programming with JAVA, McGraw Hill, 2009.
3. Herbert Schildt, Java A Beginner's Guide – Create, Compile, and Run Java Programs Today, Sixth Edition, Oracle Press, 2014.
4. Ken Arnold, James Gosling, "The Java Programming Language, Fourth Edition, Addison Wisely, 2005.
5. Herbert Schildt, 'The Complete Reference Java, 7th Edition, McGraw Hill, 2007.

CSE123 Digital Logic Fundamentals

Semester: II	Course Title: Digital Logic Fundamentals	Credit: 4
Course Code: CSE123		(3 T + 1 P)

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Remembering the digital systems and performing arithmetic operations.
CO 2	UNDERSTANDING	Understanding the postulates of Boolean algebra and minimizing combinational functions.
CO 3	APPLYING	Use Boolean simplification techniques to design a combinational hardware circuit.
CO 4	ANALYSING	Design and analyze combinational and sequential circuits.
CO 5	EVALUATING	Evaluate the techniques for the design of digital circuits.
CO 6	CREATING	Design and analysis of a given digital synchronous hardware circuit.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	2	2	3	1	1
CO 2	2	1	1	2	2
CO 3	1	1	-	2	-
CO 4	2	1	2	1	1
CO 5	3	2	3	-	1
CO 6	1	2	1	3	-

Unit	Detailed Syllabus	Teaching Hours
I	**Introduction:** Binary Systems and Logic Circuits, The Advantage of Binary, Number Systems, The Use of Binary in Digital Systems, Logic Gates, Logic Families: Transistor-Transistor Logic(TTL), Emitter-Coupled Logic(ECL), MOSFET Logic, TTL Gates. **Boolean Algebra and Logic Gates:** Basic Definition, Axiomatic Definition of Boolean Algebra, Basic Theorem and Properties of Boolean Algebra, Minterms And Maxterms, Logic Operations	9
II	**Simplification of Boolean Functions** Different types Map method, Sum of Product and Product of sum Simplification, NAND or NOR implementation, Realizing Logic Function	9

	with Gates, Combinational Design examples, Don't Care condition, Tabulation method	
III	**Logic Function Realization with MSI and LSI** Multiplexer, De-Multiplexer/Decoders, Combinational Logic with Multiplexers and Decoders, Adders, Subtractors, BCD arithmetic, carry look ahead adder, serial adder, Digital comparator, Parity checker/generator, Code converters, Standard, Design Problem Using MSI Circuits, ROM, PLA, PAL	9
IV	**Sequential Logic:** Introduction, Flip-Flops, Triggering of Flip-Flops, Analysis of Clocked Sequential Circuits, Applications of flip-flops, Flip-Flop Excitation Tables, Design Procedure, Design of Counters, Design with State Equations, Shift Register, Applications of Shift Registers	9
V	**Introduction to State Machines** The Need for State Machines, The State Machine, Basic Concepts in State Machine Analysis. **Synchronous State Machine Design** Sequential Counters, State Changes Referenced to Clock, Number of State Flip-Flops, Input Forming Logic, Output Forming Logic, Generation of a State Diagram from a Timing Chart, Redundant States, General State Machine Architecture **Asynchronous State Machines:** The Fundamental-Mode Model, Problems of Asynchronous Circuits Basic Design Principles, An Asynchronous Design Example.	9

Practical Component		
Sr. No.	Title of the Practical	Teaching Hours
1	(a)To study operation of various logic gates AND, OR, NOT, NAND, NOR and EX-OR. (b) To study NAND/NOR as universal gates.	2
2	(a) Reduce Boolean Expressions to its simplest possible form and implement it using NAND gates. (b) Develop a logic circuit depending on the requirement of the given logic problem and implement the circuit using NAND gates into its simplest form.	2
3	(a) Design a combinational logic circuit that gives square of the Two-bit number. (b) Design a combinational logic circuit that determines whether given number is prime or non-prime number.	2
4	(a) Design a BCD to Gray code converter & realize it using various logic gates. (b) Design a BCD to XS – 3 code converter & realize it using various logic gates.	2
5	Construct Half Adder, Full Adder, Half Subtractor & Full Subtractor and verify the truth-table for each.	2
6	(a) Realize 8:1 multiplexer using two 4:1 multiplexer. (b) Realize a given logic function using 4:1 Multiplexer and logic gates.	2
7	(a) Implement a Full Adder circuit using 3:8 Decoder. (b) Compare two four-bit numbers using a 4-bit Magnitude comparator.	2
8	Design 3-bit Ripple up counter using Master-Slave JK Flip-flops.	2

	Design a synchronous counter using any Flip-flops.	
9	Using D-Flip-flops set-up following 4-bit Shift Registers. (i) SISO (ii) PIPO (iii) SIPO (iv) PISO	2

Suggested Reference Books:
1. M. Morris Mano, Michael D. Ciletti, Digital Design With an Introduction to the Verilog HDL, Pearson, Fifth Edition, 2013, ISBN-13: 978-0-13-277420-8, ISBN-10: 0-13-277420-8.
2. A. Kumar, "Fundamentals of Digital Circuits", Prentice Hall India, 2016.
3. Malvino & Leach, "Digital Principles and Applications", McGraw-Hill Education
4. M. Rafiquzzaman, Fundamentals of Digital Logic and Microcomputer Design, John Wiley & Sons, Inc., Fifth Edition, 2005.
5. David J. Comer, "Digital Logic & State Machine Design", Third Indian Edition, Oxford University Press

CSMDC124 Statistics-I

Semester: II	**Course Title: Statistics-I**	**Credit: 4**
Course No.: CSMDC124		**(3 T + 1 P)**

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Recall the types of data and when to use which type of data. Remember when to use which type of charts and graphs.
CO 2	UNDERSTANDING	Understand various measures of central tendency, dispersion, skewness, and kurtosis. Summarize the information in the data using different charts and summary measures. Understand the measures of correlation.
CO 3	APPLYING	Apply the theory of descriptive statistics to various real-life situations.
CO 4	ANALYSING	Analyze bivariate data, find the relationship/association between the variables.
CO 5	EVALUATING	Evaluate the relationship between the variables and apply regression analysis to the real-life data.
CO 6	CREATING	Create descriptive summary for real-life data.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	3	2	2	1
CO 2	2	-	3	2	1
CO 3	2	2	-	3	2
CO 4	2	3	2	2	1
CO 5	3	-	2	2	1
CO 6	3	3	-	-	1

Unit No.	Detailed Syllabus	Teaching Hours
I	**Descriptive Statistics**	9

	Classification of data: Qualitative, Quantitative: Discrete, Continuous; Chronological (Time series) data. Data Types: Nominal, Ordinal, Interval, and Ratio data. Frequency: grouped and ungrouped data; Construction of frequency and cumulative frequency distribution. Presentation of qualitative data: Tabulation (up to four attributes). Graphical representation of grouped data: Histogram, frequency curve, frequency polygon, ogives (cumulative frequency curves), Diagrammatic representation of data: Bar diagrams- simple Bar, multiple bars, sub-divided bar, and percentage bar diagrams. Pie diagrams. Stem - Leaf plot. Bivariate: Frequency distribution, Marginal and Conditional frequency distributions	
II	**Measures of Central Tendency** Concept of central tendency, various measures of central tendency, and their interrelationship. Their merits and demerits. The empirical relation between mean, median, and mode. Properties and applications of measures of central tendency. Partition values (quartiles, deciles and percentiles.) **Measures of Dispersion and Moments** Concept of variation/dispersion, quartile deviation, Absolute and relative measures of dispersion with their merits, demerits, and applications. Moments: raw moments, central moments, factorial moments, and their interrelationship. Skewness, Kurtosis and their measures.	9
III	**Correlation and Regression** Bivariate data, Scatter diagram, and interpretation. Concept of correlation between two variables, positive correlation, negative correlation, no correlation. Covariance between two variables: Definition, computation, effect of change of origin and scale. Karl Pearson's coefficient of correlation and its properties. Computation for ungrouped data and grouped frequency distributed data with interpretation. Correlation Ratio, Spearman's rank correlation coefficient, Kendall's Tau. Meaning of regression, the difference between correlation and regression. Concept of error in regression, error modeled as a continuous random variable. Simple linear regression model. Estimation of unknown constants by the method of least squares. Interpretation of parameters.	9
IV	**Curve fitting:** Fitting of second-degree curve ($Y = a + bX + cX^2$), Fitting of exponential and power curves of the type $Y = ae^{bx}$, $Y = ab^X$ and $Y = aX^b$. In all these curves, parameters are estimated by the method of least squares.	9
V	**Theory of Attributes:** Attributes: Classification, notion of manifold classification, dichotomy, class frequency, order of a class, positive class frequency, negative class frequency, ultimate class frequency, relationship among different class frequencies (up to three attributes), and dot operator to find the relation between frequencies, fundamental set of class frequencies.	9

	Consistency of data upto 3 attributes, Concepts of independence and association of two attributes. Yule's coefficient of association (Q), $-1 \leq Q \leq 1$, Interpretation.	

Practical Component		
Sr. No.	**Title of the practical**	**Teaching Hours**
1	Methods of Classification and Construction of Frequency Distribution. (One-way and Two-Way).	2
2	Present the data using various diagrams and graphs.	2
3	Computation of measures of central tendency, dispersion and partition values.	2
4	Computation of moments, coefficient of skewness and kurtosis.	2
5	Computation of correlation coefficient (Pearson's, Spearman's and Kendall's Tau) and its interpretation.	2
6	Fitting of a simple linear regression model.	2
7	Fitting of exponential and power curves.	2
8	Coefficient of associations and interpretation.	2

Suggested Reference Books:

1. Introduction to the Practice of Statistics, Moore, S. David; McCabe, P. George W. H. Freeman and Company, New York.
2. Basic Statistics, Agarwal, B. L., New Age International (P) Ltd.
3. Introduction to the theory of Statistics, Mood, A. M., Greybill, F.A., Boes, D.C., Mc Graw Hill.
4. Probability and Statistics for Engineers and Scientists. Devore, J.L. Cengage Learning, New Delhi 8th Edition, 2014.
5. Mathematical Statistics, P. Mukhopadhyay, New Central Book Agency (P) Ltd, Calcutta
6. An Introduction to Probability and Statistics, V. K. Rohatgi and A.K.Md. Ehsanes Saleh, Wiley Series.

AEC125 Language Through Literature-II

Semester: II	Course Title: Language Through Literature-II	Credit: 2
Course No.: AEC125		Hours: 2/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	
CO 2	UNDERSTANDING	Students will demonstrate an increased interest in reading stories and poems in English, developing a habit of literary exploration.
CO 3	APPLYING	Students will exhibit proficiency in identifying and using different sentence types, articles, and question tags in written and spoken English
CO 4	ANALYSING	Students will apply learned grammatical concepts effectively in communication, showcasing improved language precision

| CO 5 | EVALUATING | Students will be adept at constructing grammatically correct sentences in English, and understanding and implementing English syntax principles. |
| CO 6 | CREATING | Students will demonstrate the ability to choose and use appropriate words and expressions in various contexts, enhancing their communication skills in English |

Unit	Content	Teaching Hours
I	Text: *Sparkles* (Macmillan Publication) Section – III	10
II	Text: *Sparkles* (Macmillan Publication) Section– IV	10

III	Grammar
	  A) Articles
	  B) Types of Sentences
	  • Question Tags
		10

IV	Practical
	  A) Jumbled Sentences
	  B) Cloze Test
	  • The passage for the Cloze Test will contain a total of four blanks (one mark each) and for each blank three options will be given.
	  Describing scientific processes/ experiments
		10

References Books:

• Oxford Practice Grammar (Advanced) - George Yule – OUP.
• Advanced Grammar in Use - Martin Hewings - Cambridge University Press.
• English Grammar for Students - Anne Seaton and Y H Mew - Learner's Publishing.
• A Practical English Grammar - A J Thomson and A V Martinet – OUP.
• Better English - Betty Kirkpatrick - Geddes and Grosset.
• Contemporary English Grammar Structures and Composition – David Green - Trinity Press.

CSSEC126 Advanced Excel Skills for Data Science

Semester: II	Course Title: Advanced Excel Skills for Data Science	Credit: 2
Course No.: CSSEC126		Hours: 3/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Remember Excel functions and data validation tools.
CO 2	UNDERSTANDING	Understand Advanced Excel formulas and other data validation tools.
CO 3	APPLYING	Apply pivoting techniques to summarize the real-life data. Apply slicers to the data in Excel. Applying page layout to Excel worksheet.
CO 4	ANALYSING	Analyzing data using advanced Excel functions and techniques.
CO 5	EVALUATING	Summarize the data using suitable filtering and pivot table techniques.

CO 6	CREATING	Students can visualize the data using charts and slicers.

	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO 1	3	1	1	1	
CO 2	1	1	1	2	
CO 3	1	1	3	1	
CO 4	2	1	3	1	
CO 5	1	1	2	1	
CO 6	1	1	2	3	1

Unit	Detailed Syllabus	Teaching Hours
I	**Advanced MS Excel** • Advance functions: ifs, sumif, sumifs, averageif, averageifs, lookup, vlookup and hlookup. • Data Validation. • Create and modify pivot tables, value field settings, Sorting and filtering pivot tables. • Charts and Slicers. • Page layouts, and page setup.	15
II	**Practical Based on Unit-I** 1. Use of advanced Excel functions: ifs, sumif, sumifs, averageif, averageifs. 2. Use of lookup, vlookup, hlookup functions 3. Creating and modifying pivot tables. 4. Use of data validations. 5. Charts and slicer.	30

Suggested Reference Books:
1. Microsoft Excel: Data Analysis and Business Model, PHI, Wayne, WL, 2019.
2. Microsoft Excel Formulas and Functions Dummies, Ken Bluttman, 2020.

VAC127 Interpersonal Skills

Semester: II	Course Title: Interpersonal Skills	Credit: 2
Course Code: VAC127		Hours: 2/week

Course Outcomes: On successful completion of the course the learner will be able to

CO	COGNITIVE ABILITIES	COURSE OUTCOMES
CO 1	REMEMBERING	Identify and analyze different communication styles and understand their strengthsand weaknesses
CO 2	UNDERSTANDING	Demonstrate active listening skills and questioning styles to explore issues andenhance understanding
CO 3	APPLYING	Identify conflict response styles; approach and effectively mediate workplaceconflicts.
CO 4	ANALYSING	Determine ways to build and maintain trust and

	increase your influence andeminence in the workplace

Unit	Topics	Teaching Hours
I	➢ Effective Communication **1.** Art Of Listening • Introduction • What is listening? • Benefits of active listening • Factors that hamper listening • Common poor listening habits. **2.** Art Of Speaking • Art of public speaking • Importance of public speaking • Public speaking tips • Overcoming fear of public speaking **3.** Art Of Writing E -mail • Introduction • The mail magic • Use appropriate salutations • Make the subject matter significant • Reread before pressing the "send" button – Be polite,and reciprocate good deeds	15
II	➢ Team Building and Conflict Management **1.** Body Language **2.** Body language in building interpersonal relations – Body language in building industrial relations **3.** Interpreting body language Developing confidence with correct body language. ➢ Skill needed for teamwork	15

Reference

1. Soft Skills Know Yourself and Know The World, Author: Dr. K. ALEX, Publication: S. CHAND, First Edition: 2009, Reprint: 2023
2. Barnlund, Dean C. "A Transactional Model of Communication," in Foundations of Communication Theory, eds. Kenneth K. Sereno and C. David Mortensen (New York, NY: Harper and Row, 1970), 83–92.
3. Burleson, Brant R. Sandra Metts, and Michael W. Kirch, "Communication in Close Relationships," in Close Relationships: A Sourcebook, eds. Clyde Hendrick and Susan S. Hendrick (Thousand Oaks, CA: Sage, 2000).
4. Dance, F. E. X. (1972). Speech Communication; Concepts and Behavior. New York:Holt, Rinehart, and Winston.
5. Frank E. X. Dance and Carl E. Larson, The Functions of Human Communication:A Theoretical Approach (New York, NY: Holt, Reinhart, and Winston, 1976)
6. Ellis, Richard and Ann McClintock, You Take My Meaning: Theory into Practice in Human Communication (London: Edward Arnold, 1990).
7. Robert H. Gass and John S. Seiter, Persuasion, Social Influence and ComplianceGaining (Boston, MA: Allyn and Bacon, 1999)

8. Erving Goffman, The Presentation of Self in Everyday Life (New York, NY: Anchor Books, 1959)

9. Greene, Kathryn, Valerian J. Derlega, and Alicia Mathews, "Self-Disclosure in Personal Relationships," in The Cambridge Handbook of Personal Relationships, eds. Anita L. Vangelisti and Daniel Perlman (Cambridge: Cambridge University Press, 2006).

10. Hargie, Owen. Skilled Interpersonal Interaction: Research, Theory, and Practice (London: Routledge, 2011).

11. National Association of Colleges and Employers, Job Outlook 2011 (2010): 25.