B.S. Abdur Rahman Crescent Institute of Science & Technology

Deemed to be University u/s 3 of the UGC Act, 1956

Regulations 2021

Curriculum and Syllabi (I – IV Semesters)

(Amendments updated upto February 2022)

B.Sc. (Computer Science)

REGULATIONS 2021

CURRICULUM AND SYLLABI (I - IV Semesters)

(Amendments updated upto February 2022)

B.Sc. COMPUTER SCIENCE

VISION AND MISSION OF THE INSTITUTION

VISION

B.S.Abdur Rahman Crescent Institute of Science and Technology aspires to be a leader in Education, Training and Research in multidisciplinary areas of importance and to play a vital role in the Socio-Economic progress of the Country in a sustainable manner.

MISSION

- To blossom into an internationally renowned Institute.
- To empower the youth through Quality and Value-Based Education.
- To promote Professional Leadership and Entrepreneurship.
- To achieve excellence in all its endeavors to face global challenges.
- To provide excellent teaching and research ambience.
- To network with global Institutions of Excellence, Business, Industry and Research Organizations.
- To contribute to the knowledge base through Scientific Enquiry, Applied Research and Innovation.

DEPARTMENT OF COMPUTER APPLICATIONS

VISION AND MISSION

VISION

Aspires to provide quality education in the field of computer applications with state-of-the-art computational facilities and undertake quality research in collaboration with industries and universities to produce committed professionals and academicians to meet the needs of the industries and society.

MISSION

The Department of Computer Applications, endeavours

- To disseminate knowledge through education and training of graduates in the field of computer applications.
- To focus on teaching - learning, research and consultancy to promote excellence in computer applications.
- To foster graduates with opportunities required to explore, create and face challenges of IT related industries.
- To equip the graduates with the necessary skills in communication, team work and leadership qualities to meet the needs of the IT related sector globally.
- To disseminate the outcome of projects and research work undertaken by the department through appropriate measures for the benefit of society and industry.

PROGRAMME EDUCATIONAL OBJECTIVES AND OUTCOMES

B.Sc. (COMPUTER SCIENCE)

PROGRAMME EDUCATIONAL OBJECTIVES

The Programme Educational Objectives of B.Sc. (Bachelor of Science in Computer Science) are listed below:

PEO-1: To give good foundation in mathematics and computing sciences for acquiring computational knowledge level understanding of systems modeling and algorithm development.

PEO-2: To give technical knowledge in various high-level and systems level programming languages to comprehend, analyze, design and create innovative computing solutions for information technology projects.

PEO-3: To empower the students for self learning by providing quality environment to upgrade their skill in creating and maintaining data centers, system resources and infrastructure for the organizations in their information technology projects.

PEO-4: To create awareness in the young minds of the students and motivate them to qualify academically with further studies with research acumen and serve the society with creative ideas and inventions.

PROGRAMME OUTCOMES

PO1: Computational knowledge for mathematical and systems modeling through effective teaching and learningprocesses.

PO2: Prepare requirement engineering metrics with scientific diagrams for system software/application software product development.

PO3: Design and development of solution methodologies and implementation of simple computationalalgorithms.

PO4: Conduct literature survey and summarize the inferences from the authentice-resources.

PO5: Ability to select appropriate software tools for development as well as testing for successful implementation.

PO6: Become a software professional with social responsibilities and ethical values.

PO7: Provide the necessary skill set to solve societal and environmentally sensitive problems in professional manner.

PO8: Manage technology and configuration change management in the working places.

PO9: Function as individual member or leader of team and able to manage projects in the software development and project automation processes.

PO10: Comprehend and write effective projectreports.

PO11: Improve professional affiliation with national and international societies and additional certifications through self learningmode.

PO12: Become an entrepreneur with enterprising attitude and serve the society.

PROGRAMME SPECIFIC OUTCOMES

PSO1: To enrich the graduates with necessary design and development skills for exclusive systems oriented or application software products.

PSO2: To enhance the productivity level in providing software automation skills with computer and mobile network specialization

REGULATIONS - 2021
B.A. / BBA/ B.Com. / BCA / B.Sc. DEGREE PROGRAMMES
(Under Choice Based Credit System)

1.0 PRELIMINARY DEFINITIONS & NOMENCLATURE

In these Regulations, unless the context otherwise requires:

i) **"Programme"** means B.A. / BBA / BCA / B.Com. / B.Sc. Degree Programmes.

ii) **"Course"** means theory / practical / laboratory integrated theory / seminar / internship / project and any other subject that is normally studied in a semester like English, Mathematics, Environmental Science, etc.,

iii) **"Institution"** means B.S. Abdur Rahman Crescent Institute of Science and Technology.

iv) **"Academic Council"** means the Academic Council, which is the apex body on all academic matters of this Institute.

v) **"Dean (Academic Affairs)"** means the Dean (Academic Affairs) of the Institution who is responsible for the implementation of relevant rules and regulations for all the academic activities.

vi) **"Dean (Student Affairs**)" means the Dean (Students Affairs) of the Institution who is responsible for activities related to student welfare and discipline in the campus.

vii) **"Controller of Examinations"** means the Controller of Examination of the Institution who is responsible for the conduct of examinations and declaration of results.

viii) **"Dean of the School"** means the Dean of the School of the deparment concerned.

ix) **"Head of the Department"** means the Head of the Department concerned.

2.0 PROGRAMMES OFFERED AND ELIGIBILITY CRITERIA FOR ADMISSION

2.1 UG Programmes Offered

Degree	Mode of Study
B.A.	FullTime
BBA	
B.Com.	
BCA	
B.Sc.	

2.2 Eligibility Criteria

Students for admission to the first semester of the undergraduate degree programme must have passed the Higher Secondary Examination of the 10 +2 curriculum (Academic stream) or any other examination of any authority accepted by this Institution as equivalent thereto.

S.No.	Programme	Eligibility Criteria
1	BCA	10+2 (Higher Secondary) with Mathematics or equivalent subject
2	B.Sc. Computer Science	10+2 (Higher Secondary) with Mathematics or equivalent subject
3	B.Sc. Biotechnology	10+2 (Higher Secondary) with Chemistry and Biology as subjects
4	BBA (Financial Services)	10+2 (Higher Secondary)
5	BBA (General)	
6	B.Com. (General)	10+2 (Higher Secondary) with Mathematics, Physics and Chemistry / Physics, Chemistry, Botany and Zoology / Commerce / Statistics as subjects.
7	B.Com (Accounts and Finance)	
8	B.Com. (Hons.)	
9	B.A. English (Hons.)	10 +2 (Higher Secondary)
10	B.A. Islamic Studies	
11	B.A. Public Policy	

2.4 The eligibility criteria such as marks, number of attempts and physical fitness shall be as prescribed by the Institution in adherence to the guidelines of regulatory / statuatory authorities

from time to time.

3.0 STREAMS / SPECIALISATION OF STUDY

The following are the details of specialization / streams offered in various programmes:

S.No.	Program	Streams / Specialisation of Study
1.	BCA	i. Cloud Technology and Information Security ii. Mobile Applications and Information Security iii. Data Science iv. Multimedia and Web Application Development
2.	B.Sc.	i. Computer Science ii. Biotechnology
3.	BBA	i. General ii. Financial Services
4.	B.Com	i. General ii. Honours iii. Accounts and Finance
5.	B.A.	i. English (Honours) ii. Islamic Studies iii. Public Policy

4.0 STRUCTURE OF THE PROGRAMME

4.1 The curriculum of the UG programmes consists of the following components:

- Core Courses (CC)
- Allied Courses (AC)
- Ability Enhancement Courses (AEC)
- Skill Enhancement Courses (SEC)
- Elective Courses (EC)
- Laboratory Courses (LC)
- Laboratory Integrated Theory Courses (LITC)
- Value added courses
- Mandatory courses (MC)
- Project - PROJ (Project work, seminar, and internship in

industry or at appropriate workplace)

4.1.1 Personality and Character Development

All students shall enroll, on admission, in any of the following personality and character development programmes:

- National Cadet Corps (NCC)
- National Service Scheme (NSS)
- National Sports Organization (NSO)
- Youth Red Cross (YRC)
- Rotaract
- Crescent Indian Society Training Development (ISTD – C)
- Crescent Creative Strokes
- Crescent Technocrats Club

The training activities / events / camp shall normally be organized during the weekends / vacation period.

4.1.2 Online Courses for Credit Transfer

Students are permitted to undergo department approved online courses under SWAYAM up to 10% of credits of courses in a semester excluding project semester (if any) with the recommendation of the Head of the Department / Dean of School and with the prior approval of Dean Academic Affairs during his/ her period of study. The credits earned through online courses ratified by the respective Board of Studies shall be transferred following the due approval procedures. The online courses can be considered in lieu of core courses and elective courses.

4.1.3 Value Added Courses

The students are permitted to pursue department approved online courses (excluding courses registered for credit transfer) or courses offered / approved by the department as value added courses.

The details of the value added course viz., syllabus, schedule of classes and the course faculty shall be sent to Dean, Academic Affairs for approval. The students may also undergo the valued added course offered by other departments with the consent of the Head of the Department offering the course.

These value added courses shall be specified in the consolidated mark sheet as additional courses pursued by the student over and above the curriculum during the period of study.

4.1.4 Industry Internship

The students shall undergo training for a period as specified in the curriculum during the summer vacation in any industry relevant to the field study.

The students are also permitted to undergo internship at a research organization / eminent academic institution for the period prescribed in the curriculum during the summer vacation, in lieu of Industrial training.

In any case, the student shall obtain necessary approval from the Head of the Department / Dean of School and the training has to be taken up at a stretch.

4.1.5 Industrial Visit

The student shall undergo at least one industrial visit every year. The Heads of Departments / Deans of Schools shall ensure the same.

4.2 Each course is normally assigned certain number of credits:

- One credit per lecture period per week
- One credit per tutorial period per week
- One credit for two to three periods and two credits for four periods of laboratory or practical sessions per week
- One credit for two periods of seminar / project work per week
- One credit for two weeks of industrial training or 80 hours per semester.

4.3 Each semester curriculum shall normally have a blend of lecture courses, laboratory courses, laboratory integrated theory courses, etc.

4.4 For successful completion of the programme, a student must earn a minimum total credit specified in the curriculum of the respective programme of study.

4.5 The medium of instruction, examinations and project report shall be English, except B.A. Islamic Studies (Arabic medium) and for

courses in languages other than English.

5.0 DURATION OF THE PROGRAMME

5.1 A student is expected to complete the programme in 6 semesters but in any case not more than 10 continuous semesters reckoned from the date of first admission.

5.2 Each semester shall consist of a minimum of 90 working days including the days of examinations.

5.3 The maximum duration for completion of the programme as mentioned in clause 5.1 shall also include period of break of study vide clause 7.1 so that the student may be eligible for the award of the degree.

6.0 REGISTRATION AND ENROLLMENT

6.1 The students of first semester shall register and enroll for courses at the time of admission by paying the prescribed fees. For the subsequent semesters registration for the courses shall be done by the student one week before the last working day of the previous semester.

6.2 A student can enroll for a maximum of 32 credits during a semester including Redo / Predo Courses.

6.3 Change of Course

A student can change an enrolled course within 10 working days from the commencement of the course, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department / Dean of School of the student.

6.4 Withdrawal from a Course

A student can withdraw from an enrolled course at any time before the first continuous assessment test for genuine reasons, with the approval of the Dean (Academic Affairs), on the recommendation of the Head of the Department / Dean of School of the student.

7.0 BREAK OF STUDY FROM PROGRAMME

7.1 A student may be allowed / enforced to take a break of study for two semesters from the programme with the approval of Dean (Academic Affairs) for the following reasons:

7.1.1 Medical or other valid grounds

7.1.2 Award of 'I' grade in all the courses in a semester due to lack of attendance

7.1.3 Debarred due to any act of indiscipline.

7.2 The total duration for completion of the programme shall not exceed the prescribed maximum number of semesters (vide clause 5.1).

7.3 A student who has availed break of study in the current semester (odd/even) can rejoin only in the subsequent corresponding (odd/even) semester in the next academic year on approval from Dean, Academic affairs.

7.4 During the break of study, the student shall not be allowed to attend any regular classes or participate in any activities of the institution. However he / she shall be permitted to enroll for the 'I' grade courses and appear for the arrear examinations.

8.0 CLASS ADVISOR AND FACULTY ADVISOR

8.1 Class Advisor

A faculty member will be nominated by the Head of the Department / Dean of School as class advisor for the class throughout the period of study.

The class advisor shall be responsible for maintaining the academic, curricular and co-curricular records of students of the class.

8.2 Faculty Advisor

To help the students in planning their courses of study and for general counseling, the Head of the Department / Dean of School of the students will attach a maximum of 20 students to a faculty member of the department who shall function as faculty advisor for the students throughout their period of study. Such faculty advisors shall guide the students in taking up the elective courses for registration and enrolment in every semester and also offer advice to the students on academic and related personal matters.

9.0 COURSE COMMITTEE

9.1 Each common theory course offered to more than one group of

students shall have a “Course Committee” comprising all the course faculty teaching the common course with one of them nominated as course coordinator. The nomination of the course coordinator shall be made by the Head of the Department / Dean (Academic Affairs) depending on whether all the course faculty teaching the common course belong to a single department or from several departments. The course committee shall ensure preparation of a common question paper and scheme of evaluation for the tests and semester end examination.

10.0 CLASS COMMITTEE

A class committee comprising faculty members handling the courses, student representatives and a senior faculty member not handling the courses as chairman will be constituted semester-wise by the Head of the Department.

10.1 The composition of the class committee will be as follows:

- One senior faculty member preferably not handling courses for the concerned semester, appointed as chairman by the Head of the Department.
- All the faculty members handling courses of the semester.
- Six student representatives (male and female) of each class nominated by the Head of the Department in consultation with the relevant faculty advisors.
- All faculty advisors and the class advisors
- Head of the Department - Ex-Officio Member

10.2 The class committee shall meet at least three times during the semester. The first meeting shall be held within two weeks from the date of commencement of classes, in which the components of continuous assessment for various courses and the weightages for each component of assessment shall be decided for the first and second assessment. The second meeting shall be held within a week after the date of first assessment report, to review the students' performance and for follow up action.

10.3 During these two meetings the student members shall meaningfully interact and express opinions and suggestions to

improve the effectiveness of the teaching-learning process, curriculum, and syllabi, etc.

10.4 The third meeting of the class committee, excluding the student members, shall meet after the semester end examinations to analyse the performance of the students in all the components of assessments and decide their grades in each course. The grades for a common course shall be decided by the concerned course committee and shall be presented to the class committee(s) by the course faculty concerned.

11.0 ASSESSMENT PROCEDURE AND PERCENTAGE WEIGHTAGE OF MARKS

11.1 Every theory course shall normally have a total of three assessments during a semester as given below:

Assessments	Course Coverage in Weeks	Duration	Weightage of Marks
Assessment 1	1 to 6	1.5 hours	25%
Assessment 2	7 to 12	1.5 hours	25%
Semester End Examination	Full course	3 hours	50%

11.2 Theory Course

Appearing for semester end theory examination for each course is mandatory and a student shall secure a minimum of 40% marks in each course in semester end examination for the successful completion of the course.

11.3 Laboratory Course

Every practical course shall have 60% weightage for continuous assessments and 40% for semester end examination. However, a student shall have secured a minimum of 50% marks in the semester end practical examination for the award of pass grade.

11.4 Laboratory integrated theory courses

For laboratory integrated theory courses, the theory and practical components shall be assessed separately for 100 marks each and consolidated by assigning a weightage of 75%

for theory component and 25% for practical components. Grading shall be done for this consolidated mark. Assessment of theory components shall have a total of three assessments with two continuous assessments carrying 25% weightage each and semester end examination carrying 50% weightage. The student shall secure a separate minimum of 40% in the semester end theory examination.The evaluation of practical components shall be through continuous assessment.

11.5 The components of continuous assessment for theory / practical / laboratory integrated theory courses shall be finalized in the first class committee meeting.

11.6 Industry Internship

In the case of industry internship, the student shall submit a report, which shall be evaluated along with an oral examination by a committee of faculty members constituted by the Head of the Department. The student shall also submit an internship completion certificate issued by the industry / research / academic organisation. The weightage of marks for industry internship report and viva voce examination shall be 60% and 40% respectively.

11.7 Project Work

In the case of project work, a committee of faculty members constituted by the Head of the Department / Dean of the School shall carry out three periodic reviews. Based on the project report submitted by the students, an oral examination (viva voce) shall be conducted as semester end examination by an external examiner approved by the Controller of Examinations. The weightage for periodic reviews shall be 50%. Of the remaining 50%, 20% shall be for the project report and 30% for the viva voce examination.

11.8 Assessment of seminars and comprehension shall be carried out by a committee of faculty members constituted by the Head of the Department.

11.9 For the first attempt of the arrear theory examination, the internal assessment marks scored for a course during first appearance shall be used for grading along with the marks scored in the arrear examination. From the subsequent

appearance onwards, full weightage shall be assigned to the marks scored in the semester end examination and the internal assessment marks secured during course of study shall become invalid.

In case of laboratory integrated theory courses, after one regular and one arrear appearance, the internal mark of theory component is invalid and full weightage shall be assigned to the marks scored in the semester end examination for theory component. There shall be no arrear or improvement examination for lab components.

12.0 SUBSTITUTE EXAMINATIONS

12.1 A student who is absent, for genuine reasons, may be permitted to write a substitute examination for any one of the two continuous assessment tests of a course by paying the prescribed substitute examination fee. However, permission to take up a substitute examination will be given under exceptional circumstances, such as accidents, admission to a hospital due to illness, etc. by a committee constituted by the Head of the Department / Dean of the School for that purpose. There is no substitute examination for semester end examination.

12.2 A student shall apply for a substitute exam in the prescribed form to the Head of the Department / Dean of the School within a week from the date of assessment test. However, the substitute examination will be conducted only after the last instructional day of the semester.

13.0 ATTENDANCE REQUIREMENT AND SEMESTER / COURSE REPETITION

13.1 A student shall earn 100% attendance in the contact periods of every course, subject to a maximum relaxation of 25% to become eligible to appear for the semester end examination in that course, failing which the student shall be awarded “I” grade in that course.

13.2 The faculty member of each course shall cumulate the attendance details for the semester and furnish the names of the students who have not earned the required attendance in the

concerned course to the class advisor. The class advisor shall consolidate and furnish the list of students who have earned less than 75% attendance, in various courses, to the Dean (Academic Affairs) through the Head of the Department/ Dean of the School. Thereupon, the Dean (Academic Affairs) shall officially notify the names of such students prevented from writing the semester end examination in each course.

13.3 If a student secures attendance between 65% and less than 75% in any course in a semester, due to medical reasons (hospitalization / accident / specific illness) or due to participation in the institution approved events, the student shall be given exemption from the prescribed attendance requirement and the student shall be permitted to appear for the semester end examination of that course. In all such cases, the students shall submit the required documents immediately after joining the classes to the class advisor, which shall be approved by the Head of the Department / Dean of the School. The Vice Chancellor, based on the recommendation of the Dean (Academic Affairs) may approve the condonation of attendance.

13.4 A student who has obtained an "I" grade in all the courses in a semester is not permitted to move to the next higher semester. Such students shall repeat all the courses of the semester in the subsequent academic year.

13.5 The student awarded "I" grade, shall enroll and repeat the course when it is offered next. In case of "I" grade in an elective course either the same elective course may be repeated, or a new elective course may be taken with the approval of Head of the Department / Dean of the School.

13.6 A student who is awarded "U" grade in a course shall have the option to either write the semester end arrear examination at the end of the subsequent semesters, or to redo the course in the evening when the course is offered by the department. Marks scored in the continuous assessment in the redo course shall be considered for grading along with the marks scored in the semester end (redo) examination. If any student obtains "U" grade in the redo course, the marks scored in the continuous assessment test (redo) for that course shall be considered as

internal mark for further appearance of arrear examination.

13.7 If a student with “U” grade, who prefers to redo any particular course, fails to earn the minimum 75% attendance while doing that course, then he / she is not permitted to write the semester end examination and his / her earlier “U” grade and continuous assessment marks shall continue.

14.0 REDO COURSES

14.1 A student can register for a maximum of three redo courses per semester without affecting the regular semester classes, whenever such courses are offered by the concerned department, based on the availability of faculty members and subject to a specified minimum number of students registering for each of such courses.

14.2 The number of contact hours and the assessment procedure for any redo course shall be the same as regular courses, except there is no provision for any substitute examination and withdrawal from a redo course.

15.0 PASSING AND DECLARATION OF RESULTS AND GRADE SHEET

15.1 All assessments of a course shall be made on absolute marks basis. The class committee without the student members shall meet to analyse the performance of students in all assessments of a course and award letter grades following the relative grading system. The letter grades and the corresponding grade points are as follows:

Letter Grade	Grade Points
S	10
A	9
B	8
C	7
D	6
E	5
U	0
W	-

I	-

"W" - denotes withdrawal from the course.

"I" - denotes inadequate attendance in the course and prevention from appearance of semester end examination

"U" - denotes unsuccessful performance in the course.

15.2 A student who earns a minimum of five grade points ('E' grade) in a course is declared to have successfully completed the course. Such a course cannot be repeated by the student for improvement of grade.

15.3 Upon awarding grades, the results shall be endorsed by the chairman of the class committee and Head of the Department / Dean of the School. The Controller of Examination shall further approve and declaretheresults.

15.4 Within one week from the date of declaration of result, a student can apply for revaluation of his / her semester end theory examination answer scripts of one or more courses, on payment of prescribed fee, through proper application to the Controller of Examinations. Subsequently the Head of the Department/ Dean of the School offered the course shall constitute a revaluation committee consisting of chairman of the class committee as convener, the faculty member of the course and a senior faculty member having expertise in that course as members. The committee shall meet within a week to revalue the answer scripts and submit its report to the Controller of Examinations for consideration and decision.

15.5 After results are declared, grade sheets shall be issued to each student, which contains the following details: a) list of courses enrolled during the semester including redo courses / arrear courses, if any; b) grades scored; c) Grade Point Average (GPA) for the semester and d) Cumulative Grade Point Average (CGPA) of all courses enrolled from first semester onwards.

GPA is the ratio of the sum of the products of the number of credits of courses registered and the grade points corresponding to the grades scored in those courses, taken for all the courses, to the sum of the number of credits of all the courses in the semester.

If C_i, is the number of credits assigned for the i^{th} course and GP_i is the Grade Point in the i^{th} course,

$$GPA = \frac{\sum_{i=1}^{n}(C_i)(GPi)}{\sum_{i=1}^{n} C_i}$$

Where n = number of courses

The Cumulative Grade Point Average (CGPA) is calculated in a similar manner, considering all the courses enrolled from the first semester.

“I” and "W" grades are excluded for calculating GPA.

"U", “I”and **"W"** grades are excluded for calculating CGPA.

The formula for the conversion of CGPA to equivalent percentage of marks shall be as follows:

Percentage equivalent of marks = CGPA X 10

15.6 After successful completion of the programme, the degree shall be awarded to the students with the following classifications based on CGPA.

Classification	CGPA
First Class with Distinction	8.50 and above and passing all the courses in first appearance and completing the programme within the prescribed period of six semesters.
First Class	6.50 and above, having completed within a period of eight semesters.
Second Class	Others

15.6.1 Eligiblity for First Class with Distinction

- A student should not have obtained “U” or “I” grade in any course during his/her study.
- A student should have completed the UG programme within the minimum prescribed period of study (except clause 7.1.1)

15.6.2 Eligibility for First Class

- A student should have passed the examination in all the courses not more than two semesters beyond the minimum prescribed period of study (except clause clause 7.1.1)

15.6.3 The students who do not satisfy clause 16.6.1 and clause 16.6.2 shall be classified as second class.

15.6.4 The CGPA shall be rounded to two decimal places for the purpose of classification. The CGPA shall be considered up to three decimal places for the purpose of comparison of performance of students and ranking.

16.0 SUPPLEMENTARY EXAMINATION

Final year students and passed out students can apply for supplementary examination for a maximum of three courses thus providing an opportunity to complete their degree programme. The students can apply for supplementary examination within three weeks of the declaration of results in the even semester.

17.0 DISCIPLINE

17.1 Every student is expected to observe discipline and decorum both inside and outside the campus and not to indulge in any activity which tends to affect the reputation of the Institution.

17.2 Any act of indiscipline of a student, reported to the Dean (Student Affairs), through the Head of the Department / Dean of the School concerned shall be referred to a Discipline and Welfare Committee constituted by the Registrar for taking appropriate action. This committee shall also address the grievances related to the conduct of online classes.

18.0 ELIGIBILITY FOR THE AWARD OF DEGREE

18.1 A student shall be declared to be eligible for the award of B.A. / BBA / BCA / B.Com. / B.Sc. degree provided the student has:

i) Successfully earned the required number of total credits as specified in the curriculum of the programme of study within a maximum period of 10 semesters from the date of admission, including break of study.

ii) Successfully completed the requirements of the enrolled professional development activity.

iii) No dues to the Institution, Library, Hostel, etc.

iv) No disciplinary action pending against him/her.

18.2 The award of the degree must have been approved by the Institution.

19.0 POWER TO MODIFY

Notwithstanding all that has been stated above, the Academic Council has the right to modify the above regulations from time to time.

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B.S. ABDUR RAHMAN CRESCENT INSTITUTE OF SCIENCE AND TECHNOLOGY

CURRICULUM FRAMEWORK, REGULATIONS 2021

B.Sc. COMPUTER SCIENCE

(SIX SEMESTERS / FULL TIME)

SEMESTER I

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	AEC	END 1183	General English – I	3	0	0	3
2.	AEC	LND 1181	General Tamil – I	2	1	0	3
		LND 1182	German – I	2	1	0	3
		LND 1183	Arabic Language	3	0	0	3
3.	AC	MAD 1187	Algebra and Numerical Methods	3	1	0	4
4.	CC	CAD 1101	Computer Fundamentals and Organization	3	0	0	3
5.	CC	CAD 1102	Programming in C	3	0	0	3
6.	CC	CAD 1103	Data Structures	3	0	0	3
7.	LC	CAD 1104	Programming in C Laboratory	0	0	4	2
8.	LC	CAD 1105	Data Structures Laboratory	0	0	4	2
			Credits				**23**

SEMESTER II

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	AEC	END 1283	General English – II	3	0	0	3
2.	AEC	LND 1281	General Tamil - II	2	1	0	3
		LND 1282	German - II	3	0	0	3
		LND 1283	Modern Communicative Arabic	3	0	0	3
3.	AC	MAD 1288	Probability and Statistics	3	1	0	4
4.	CC	CAD 1201	OOPS with C++	3	0	0	3
5.	CC	CAD 1202	Operating Systems	3	0	0	3
6.	MC	GED 1207	Environmental Studies	2	0	0	2
7.	LC	CAD 1203	OOPS with C++ Laboratory	0	0	4	2
8.	LC	CAD 1204	Linux Laboratory	0	0	4	2
			Credits				**22**

SEMESTER III

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	CC	CAD 2101	Design and Analysis of Algorithms	3	0	0	3
2.	CC	CAD 2102	Software Engineering	3	0	0	3
3.	CC	CAD 2103	Relational Database Manangement Systems	3	0	0	3
4.	CC	CAD 2104	Computer Networks	3	0	0	3
5.	CC	CAD 2105	Programming in Java	3	0	0	3
6.	CC	CAD 2108	Digital Marketing	3	0	0	3
7.	LC	CAD 2106	Relational Database Manangement Systems Laboratory	0	0	4	2
8.	LC	CAD 2107	Programming in Java Laboratory	0	0	4	2
9.	SEC	GED 2102	Aptitude and Interpersonal Skills	0	0	2	1
			Credits				**23**

SEMESTER IV

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	SEC	CAD 2201	Python Programming	3	0	0	3
2.	CC	CAD 2204	Web Design and Development	3	0	0	3
3.	CC	CAD 2205	Data Mining and Data Warehousing	3	0	0	3
4.	CC	CAD 2206	Object Oriented Analysis and Design	3	0	0	3
5.	EC		Programme Elective – I	3	0	0	3
6.	OEC		General / Open Elective	3	0	0	3
7.	LC	CAD 2203	Python Programming Laboratory	0	0	4	2
8.	LC	CAD 2207	Web Design Laboratory	0	0	4	2
9.	SEC	GED 2204	Aptitude and Workplace Skills	0	0	2	1
			Credits				**23**

SEMESTER V

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	CC	CAD 3101	Reasoning and Thinking	3	0	0	3
2.	CC	CAD 3102	Artificial Intelligence	3	0	0	3
3.	CC	CAD 3103	C# and .NET Programming	3	0	0	3
4.	CC	CAD 3104	R Programming	3	0	0	3
5.	CC	CAD 3105	Software Testing	3	0	0	3
6.	EC		Programme Elective –II	3	0	0	3
7.	LC	CAD 3106	C# and .NET Programming Laboratory	0	0	4	2
8.	LC	CAD 3107	R Programming – Laboratory	0	0	4	2
9.	SEC	CAD 3108	Personality Development Skills	1	0	0	1
			Credits				**23**

SEMESTER VI

Sl. No.	Course Group	Course Code	Course Title	L	T	P	C
1.	CC	CAD 3201	Enterprise Application Development	3	0	0	3
2.	CC	CAD 3202	Software Project Management	3	0	0	3
3.	PROJ	CAD 3203	Project	0	0	0	12
			Credits				**18**

Overall Total Credits – 132

PROGRAMME ELECTIVE COURSES FOR

B.Sc. COMPUTER SCIENCE - R 2021

Sl. No.	Course Code	Course Title	L	T	P	C
		PROGRAMME ELECTIVE – I				
1	CADX 250	E-Commerce	3	0	0	3
2	CADX 251	Information Retrieval	3	0	0	3
3	CADX 252	Social Media Analysis	3	0	0	3
4	CADX 253	Online Advertisement	3	0	0	3
5	CADX 254	PHP Programming	3	0	0	3
		PROGRAMME ELECTIVE – II				
1	CADX 150	Healthcare Analytics	3	0	0	3
2	CADX 151	Agile Methodology	3	0	0	3
3	CADX 152	Human Resource Analytics	3	0	0	3
4	CADX 153	Web Mining	3	0	0	3
5	CADX 154	Human Computer Interaction	3	0	0	3

OPEN / GENERAL ELECTIVE COURSES FOR BA/ BBA / B.Com. / BCA / B.Sc PROGRAMMES R 2021

Sl. No.	Course Code	Course Title	L	T	P	C	Offering Department
1.	GEDX 301	Accounting and Financial Management	3	0	0	3	Commerce
2.	GEDX 302	AI for e-Commerce	3	0	0	3	ECE
3.	GEDX 303	Basics of Management and Organizational Behaviour	3	0	0	3	CSB
4.	GEDX 304	Behavioural Psychology	3	0	0	3	SSSH
5.	GEDX 305	Big Data Analytics	3	0	0	3	CA
6.	GEDX 306	Building Repair Solutions	3	0	0	3	Civil
7.	GEDX 307	Cloud Services and Management	3	0	0	3	CA
8.	GEDX 308	Computer Fundamentals and Office Automation	2	0	2	3	CA
9.	GEDX 309	Consumer Electronics	3	0	0	3	ECE
10.	GEDX 310	Creative Writing	2	1	0	3	English
11.	GEDX 311	Customer Relationship Management Analytics	3	0	0	3	CA
12.	GEDX 312	Cyber Law and Ethics	3	0	0	3	CSL
13.	GEDX 313	Disaster Management	3	0	0	3	Civil
14.	GEDX 314	Drone Technologies	2	0	2	3	Aero
15.	GEDX 315	English for Competitive Examination	2	1	0	3	English
16.	GEDX 316	Enterprise Risk Management	3	0	0	3	CSB
17.	GEDX 317	Fundamentals of Project Management	3	0	0	3	CSB
18.	GEDX 318	Genetic Engineering	3	0	0	3	SLS
19.	GEDX 319	Green Design and Sustainability	3	0	0	3	Civil
20.	GEDX 320	Industrial Safety	3	0	0	3	Mech.
21.	GEDX 321	Internet of Things and Its Applications	3	0	0	3	ECE
22.	GEDX 322	Introduction to Health Care Analytics	3	0	0	3	CA
23.	GEDX 323	IPR and Patent Laws	3	0	0	3	CSB
24.	GEDX 324	Logistics and Supply Chain Management	3	0	0	3	CSB
25.	GEDX 325	Motor Vehicle Act and Loss Assessment	3	0	0	3	Automobile
26.	GEDX 326	National Service Scheme	3	0	0	3	SSSH
27.	GEDX 327	National Cadet Corps	3	0	0	3	SSSH
28.	GEDX 328	Numerical Computational Tools for Engineers	2	0	2	3	EIE

29.	GEDX 329	Organizational Behaviour	3	0	0	3	CA
30.	GEDX 330	Personal Finance and Investment	3	0	0	3	Commerce
31.	GEDX 331	Polymers for Emerging Technologies	3	0	0	3	Polymer
32.	GEDX 332	Professional Ethics and Values	3	0	0	3	SSSH
33.	GEDX 333	Programming Principles	3	0	0	3	CSE
34.	GEDX 334	Public Speaking and Rhetoric	2	1	0	3	English
35.	GEDX 335	R Programming	2	0	2	3	CA
36.	GEDX 336	Smart Sensors for Healthcare applications	3	0	0	3	EIE
37.	GEDX 337	Total Quality Management	3	0	0	3	Mech.
38.	GEDX 338	Vehicle Maintenance	3	0	0	3	Automobile
39.	GEDX 339	Waste Water Management	3	0	0	3	Civil
40.	GEDX 340	Web Application Development	3	0	0	3	CA

SEMESTER I

END 1183	GENERAL ENGLISH I	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

COB1: To enable students to read, comprehend and appreciate the value of literature to life

COB2: To help them acquire language skills through Literature

COB3: To develop LSRW skills through practice in variety of contexts

COB4: To improve their vocabulary and correct English usage.

MODULE I **9**

Poetry: No Man is an Island – John Donne;
O Captain! My Captain! –Walt Whitman

Speaking: Introducing oneself and Introducing each other

Writing: Hints Development

Language: Articles, Adjectives & Adverbs (comparisons), Punctuation

Vocabulary: Homophones and homographs

MODULE II **9**

Prose: "Spoken English and Broken English" – G.B.Shaw

Listening: Listening for gist (general meaning)
The Speech that made Obama President. (6.12 minutes)

Speaking: Conversations - formal and semi formal contexts

Writing: Jumbled sentences

Language: Pronouns and Linking words, Conjunctions

Vocabulary: Register – Formal, semi-formal and Informal

MODULE III **9**

Short story: "The Cherry Tree" - Ruskin Bond

Speaking: Asking questions (about companies. Products, Jobs)

Creative Writing: Open ended stories

Language: Question Forms – 'Wh' & Yes/No

Vocabulary: Prefixes and Suffixes, negative prefixes

MODULE IV **9**

Short story: "The Last Leaf" - O. Henry

Speaking: Role play (Telephone call to a supplier, enquiry about products)

Writing: Letter of Enquiry, Replies to Enquiry
Language: Tenses
Vocabulary: Synonyms and Antonyms

MODULE V **9**

Prose: "Voluntary Poverty" – Mahatma Gandhi
Listening: Listening for specific information - You must follow if you want success by Sundar Pichai. (8.42 minutes)
Speaking: Giving the summary of an article (from newspapers)
Writing: Order Letter, Complaint Letter
Language: Subject -Verb Agreement
Vocabulary: Business Vocabulary (marketing, air travel)

L – 45; Total Hours- 45

REFERENCES:

1. Guy Brook-Hart, Business Benchmark Upper- Intermediate Student's Book, CUP, 2006
2. Sriraman.T, Macmillan College Prose, Laksmi Publications, 2015
3. Whitby, Norman, Business Benchmark: Pre-intermediate to Intermediate, 2nd Edition, CUP, 2014.
4. Swan.M, Practical English Usage, OUP, 2005.
5. https://www.thehindu.com/opinion/open-page/it-has-done-more-harm-than-good/article5129459.ece
6. https://www.youtube.com/watch?v=OFPwDe22CoY
7. https://www.youtube.com/watch?v=iAlsg_orac8

COURSE OUTCOMES:

CO1: Respond to literary texts efficiently
CO2: Appreciate and critically analyze literary texts
CO3: Display effective LSRW skills in academic and professional contexts
CO4: Demonstrate a range of appropriate vocabulary in a variety of situations
CO5: Communicate effectively using grammatically correct language

Board of Studies (BoS) :
13th BoS of the Department of English held on 17.6.2021

Academic Council:
17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
CO1	H	H	H	H	M	H	H	L	L	M
CO2	H	H	H	H	H	M	H		L	M
CO3	M	H	H	L	M	H	H	M		L
CO4	H	H	H	H	H	H	H	H	L	
CO5	L	H	L	H	H	M	H			

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement: The acquisition of LSRW skills of English language could help students in promoting lifelong learning opportunities.

LND 1181	பொதுத் தமிழ் - I	L	T	P	C
SDG 16	GENERAL TAMIL -I	2	1	0	3

நோக்கங்கள்

- சமூக மாற்றச்சிந்தனைகளை உள்ளடக்கிய தற்காலஇலக்கியங்களை அறிமுகம் செய்தல்
- இருபதாம்நூற்றாண்டு மரபுக்கவிதைகளை அறிமுகம் செய்தல்
- புதுக்கவிதை, சிறுகதை, உரைநடை ஆகிய இலக்கியங்களை நயம் பாராட்டுதல்
- புதுக்கவிதை மற்றும் சிறுகதையின் தோற்றம் வளர்ச்சி குறித்து எடுத்துரைத்தல்
- சந்திப் பிழையின்றி எழுத மாணவர்களைப் பயிற்றுவித்தல்
- கவிதை மற்றும் சிறுகதை எழுதமாணவர்களை ஊக்கப்படுத்துதல்

அலகு I	இருபதாம் நூற்றாண்டு மரபுக்கவிதைகள்	8

கவிமணி தேசிய விநாயகம் பிள்ளை - உடல் நலம் பேணல், பாரதியார்– செந்தமிழ் நாடு, பாரதிதாசன்– நீங்களே சொல்லுங்கள், கண்ணதாசன்– குடும்பம் ஒரு கதம்பம்.

அலகு II	புதுக்கவிதைகள்	8

இன்குலாப்– போராட்டம், அப்துல்ரகுமான்– மண், வைரமுத்து–விதைச் சோளம், நா.காமராசன்–அலிகள், ஆண்டாள் பிரியதர்சினி– தொலைந்து போனது, மு.மேத்தா–தேசப்பிதாவுக்கு ஒரு தெருப்பாடகனின் அஞ்சலி, ஹைக்கூ கவிதைகள்.

அலகு III	சிறுகதைகள்	8

ஜெயகாந்தன்–நந்தவனத்தில் ஓர் ஆண்டி, கி.இராஜநாராயணன்– கதவு, சு.சமுத்திரம்- ஏழை-ஆப்பிள்-நட்சத்திரம், மாதவிக்குட்டி–நெய்ப்பாயாசம், தி.ஜானகிராமன்–முள்முடி.

அலகுIV	மொழிப்பயிற்சி	7

கலைச்சொல்லாக்கம், பிழைத்திருத்தம் (ஒருமை, ல-ள-ழகர, ர-ற-கர, ண-ந-னகரவேறுபாடுகள்), அயற்சொற்களைதல்.

அலகு V	இலக்கிய வரலாறு	7

பாடந்தழுவியது (இருபதாம் நூற்றாண்டு மரபுக் கவிதைகள், புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும், சிறுகதையின் தோற்றமும் வளர்ச்சியும்)

அலகு VI	படைப்பிலக்கியம்	7

கவிதை எழுதுதல், சிறுகதை வரைதல்

L – 30 ; T – 15 ; TOTAL HOURS – 45

குறிப்புகள்

1. பொதுத் தமிழ்– செய்யுள் திரட்டு– தமிழ்த் துறை வெளியீடு
2. தமிழ் இலக்கிய வரலாறு–சோம. இளவரசு
3. சிறுகதைத் தொகுப்பு (கட்டுரைக் களஞ்சியம்)

வெளிப்பாடு

- மாணவர்கள் சமூக மாற்றச்சிந்தனைகளை அறிந்து கொள்வர்
- இருபதாம்நூற்றாண்டு மரபுக்கவிதைகள் குறித்த அறிவினைப்பெறுவர்.
- சந்திப்பிழைகளைநீக்கி எழுதும் திறன் பெறுவர்
- இருபதாம் நூற்றாண்டு தமிழ் இலக்கியத்தின் வரலாறு, வளர்ச்சி, பாடுபொருள் ஆகியவற்றை உணர்ந்து கொள்வர்.
- இருபதாம்நூற்றாண்டு தமிழ் இலக்கியப் படைப்பாளர்களைப் பற்றி அறிந்து கொள்வர்.
- புத்திலக்கியங்களைப் படைக்கும் திறனையும் திறனாய்வு செய்யும் திறனையும்பெறுவர்

Board of Studies (BoS):
15th BoS of the Department of Commerce held on 24.6.2021

Academic Council:
17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12
CO1							M	M	M	M		M
CO2							L	L	L	M		M
CO3							L	M	L	L		L
CO4							L	L	M	L		L
CO5							L	L	L	L		L
CO6							M	M	M	M		L

Note: L- Low Correlation M - Medium Correlation H - High Correlation

SDG 16: Peace, Justice and Strong Institutions

Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime through the Quranic, Vedic and Biblical literature.

LND 1182	GERMAN – I	L	T	P	C
SDG: 4		2	1	0	3

COURSE OBJECTIVES:

The objectives of this course are:

COB1: To improve the proficiency of students in German language.

COB2: To create awareness of using vocabulary among students.

COB3: To expose them to correct grammatical forms of the language.

COB4: To empower them for successful communication in the society.

COB5: To understand matters which are of daily usage

COB6: To understand them for describe the people need and their requirements.

MODULE I GUTEN TAG! 7

Learn alphabet, introduction to German -greetings, identifying countries and their capital cities and languages, introducing oneself, read and write Cardinal numbers till 100, Read and write telephone numbers and e-mail addresses. Grammar - question words, sentence structure and formation, Regular verbs - Conjugation and personal pronouns.

MODULE II FREUNDE, KOLLEGEN UND ICH 7

Introducing Others and Family Members, To speak about hobbies, jobs, learn Cardinal numbers from 101, Days, Months, Seasons, Colours, Day Timings, directions; Vocabulary: related to the topic; Grammar: Definite Articles, Irregular Verbs & Conjugations, Auxiliary verbs, ja/nein Fragen undAntworten, Nouns singular/plural.

MODULE III IN DER STADT 8

To know places, buildings, know transport systems, understand international words, Shopping, talk to sales person while purchasing goods, return faulty goods at a shop, asking someone to repeat something , read and write Ordinal numbers till 100,; Vocabulary: related to the topic; Grammar: Indefinite articles, Negotiation, Imperative - Sie form.

MODULE IV GUTEN APPETIT! 8

To speak about food, Daily routine ,Going to the market – asking prices, filling up simple forms; Vocabulary: related to the topic; Grammar: Verb position, Simple Present Tense with regular and irregular verbs.

MODULE V TAG FÜR TAG 7

To learn time related expressions and asking Time , speak about family, ask excuse; Vocabulary: related to the topic; Simple Conversation skills (pertaining chiefly to simple dialogues in everyday situations), Grammar: Preposition – am, im, um, von bis, Modal verbs, Present perfect Tense with regular and irregular verbs

MODULE VI ZEIT MIT FREUNDEN 8

To speak about birthdays, understand and write an invitation, converse in the restaurant and Pay; Vocabulary: related to the topic; Simple Text -Translation and Reading Comprehension Practice German Into English Vice versa: Grammar: Accusative personal pronouns, Possessive Pronomen, Verbs and prepositions, Gern - word Usage in Sentence formation.

L – 30; T – 15; Total Hours – 45

TEXT BOOKS:

1. Stefanie Dengler, “Netzwerk A1.1”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2015.

PRACTICE BOOK:

1. Johannes Gerbes, “Fit fürs Goethe-Zertifikat A1”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2010.

REFERENCES:

1. Paul Rusch, “Einfach Grammatik”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2012.
2. Hermann Funk, “studio d A1”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2009. 15OH78 German Language.

COURSE OUTCOMES:

On successful completion of this course learners will be able to

CO1: Show their proficiency in German Language.

CO2: Use appropriate vocabulary in real life contexts.

CO3: Use appropriate grammatical forms while communicating with people.

CO4: Effectively use the language in social and academic contexts.

CO5: Comprehend matters which are of daily usage

CO6: Communicate as per people’s need and requirement.

Board of Studies (BoS): 14th BoS of the Department of Commerce held on 22.04.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	M	H		H	H	H	M	H	M	H				
CO2				H		H	H	H	H	H		H				
CO3				H		H	H	H	H	H		H				
CO4				H		H	H	H		H		H				
CO5				H		H	H	H		H		H				
CO6				H		H	H	H		H		H				

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4 : Quality Education

The substantially improve the relevant skills which develop the confidence in young people, including technical and vocational skills, help for employment, decent work and entrepreneurship.

LND 1183	ARABIC LANGUAGE	L	T	P	C
SDG 4		3	0	0	3

COURSE OBJECTIVES:

The course aims to teach

COB1: Arabic alphabets, reading and writing and pronunciation.

COB2: Listening and writing of words related to market, doctor, parts of body, dining.

COB3: Arabic simple sentences using names of animals, birds, singular and plural.

COB4: Listening and writing of Countries' names, singular, dual and plural.

COB5: Arabic sentences using verbs, tenses and numbers.

MODULE I **INTRODUCTION TO ARABIC READING AND WRITING** **9**

Introduction to Arabic alphabets - reading from right to left - Listening to audio & video – practice correct pronunciation – Writing join letters from right to left - (lessons: 1 and 2): (حجرة الدراسة ، حجرة الدراسة 2، المرور) - introduction to Arabic words in and around the classroom – Transport - Vocabulary related to market - introduction of verbs (lessons: 4 – 6).

MODULE II **LISTENING ARABIC COMMUNICATION** **9**

Reading skill: Lessons 4 – 6. Words related to doctor, parts of body, dining, fruits, food items, family members, house and air travel (أسماء أعضاء الجسم والمطعم والفواكه وغيرها) Vocabulary related to names of animals, birds (lessons: 7 – 12).

MODULE III **SIMPLE SENTENCES** **9**

Home – singular and plural - introduction to gender: irst person, second person and third person – inerrogatory sentences - arabic simple sentences – nominal sentence and verbal sentence (الجملة الاسمية والفعلية) (lessons: 13 & 14) Words related to kitchen utensils – cooking (أسماء أواني المطبخ والطبخ)– introduction to gender: firt person, second person and third person (التذكير والتأنيث) – singular and plural – vocabulary related to office – possession (الإضافة) -
(lessons: 15 – 17)

MODULE IV **COMMUNICATION PRACTICE** **9**

Countries names – world map - performing ablution – vocabulary related to prayer - singular, dual and plural - situational communication - emphasis on interrogation (المحادثة العربية) (lessons: 18 – 20)

MODULE V TENS, SINGULAR & PLURAL 9

Sentence making – words related to prayer – verbs and tenses – communication on dining – gender - singular and dual – numbers – discussion of evening – dining manners (المفرد والتثنية والجمع والعدد) (lessons: 21 – 25)

L – 45; Total Hours – 45

TEXT BOOKS:

1. Al QirathulArabiyya Lil Mubtadiyeenالقراءة العربية للمبتدئين (UmmulQura University, Makkah), Bukhari Aalim Arabic College, 2005.

REFERENCES:

1. Al Arabiya Lin Nashiyeen (Education Ministry, K.S.A.), Bukhari Aalim Arabic College, 2005.
2. Dr. V. Abdur Raheem, Durus Al LugathilArabiyya Li Ghairin Natiqeen Biha, Islamic Foundation Trust, Chennai, 2002.

COURSE OUTCOMES:

At the end of the course, the student is expected to:

CO1: Vocabulary related to the market, doctor, parts of body, dining.

CO2: Identify Arabic names of animals, birds, singular and plural, interrogatory sentences.

CO3: Recognize Arabic alphabets, reading and writing and pronunciation.

CO4: Use countries names, singular, dual and plural.

CO5: Form Arabic sentences using verbs, tenses and numbers.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO 3	PSO 4	PSO 5
CO1						L									
CO2							M								
CO3							M								
CO4						L									
CO5							M								

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Developing Language skill

Statement: Arabic language enhances effective communication in the workplace.

MAD 1187	**ALGEBRA AND NUMERICAL METHODS**	**L**	**T**	**P**	**C**
SDG: 4		**3**	**1**	**0**	**4**

COURSE OBJECTIVES:

COB1: To develop the basic concepts of Numerical methods that are useful for application oriented topics

COB2: To introduce the concept of Eigen values and eigenvectors of matrix algebra

COB3: To lay the foundation for finding the roots of equations

COB4: To familiarize the students with the functions of several variables

COB5: To evaluate various types of integrals

MODULE I **NUMERICAL SOLUTION OF EQUATIONS AND INTERPOLATION** **9+3**

Newton Raphson method – Operators E, Δ , ∇ and their relations – Difference Tables –Newton's forward and backward interpolation formula for equal intervals- Lagrange's interpolation formula.

MODULE II **MATRICES** **9+3**

Symmetric – Skew-Symmetric - Orthogonal and Unitary matrices - Rank of a Matrix - Consistency - Characteristic equation - Eigenvalues and Eigenvectors - properties - Cayley Hamilton's Theorem (proof not needed) - Simple applications.

MODULE III **THEORY OF EQUATIONS** **9+3**

Polynomial Equations with real Coefficients - Irrational roots - Complex roots - Symmetric functions of roots - Transformation of equation by increasing or decreasing roots by a constant – Reciprocal equations.

MODULE IV **DIFFERENTIAL CALCULUS** **9+3**

Rules of differentiation - Derivative of implicit function - Successive differentiation nth derivatives - Leibnitz theorem (without proof) and applications - maxima and minima of functions of two variables - Partial differentiation - Euler's Theorem.

MODULE V **INTEGRAL CALCULUS** **9+3**

Integration of rational functions - algebraic expressions involving only one irrational quantity- rational functions of sinx and cosx - Trigonometric substitutions - Bernoulli's formula for integration by parts - reduction formulae

- properties of definite integral - Evaluation of double and triple integrals.

L –45 ; T-15; Total Hours – 60

TEXT BOOKS:

1. Grewal B.S., “Higher Engineering Mathematics” (43rd edition), Khanna Publishers, New Delhi, 2012
2. Grewal, B.S., “Numerical methods in Engineering and Science”, 7th edition, Khanna Publishers, New Delhi 2007

REFERENCES:

1. Stewart J, “Single Variable Calculus”, (4th edition) Brooks / Cole, Cengage Learning 2010.
2. Tom M. Apostol - Calculus, Vol. I (second edition) John Wiley and Sons, New Jersey 2007.
3. MacDuffee, C.C. - Theory of Equations, John Wiley &Sons., New Jersey 1954.

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Find the roots of the equation numerically

CO2: Solve Eigen value and Eigen vector problems

CO3: Classify and solve polynomial equations of different types

CO4: Evaluate the maxima and minima of functions of two variables

CO5: Integrate different types of double, triple and definite integrals

Board of Studies (BoS) : 12th BOS of Mathematics and AS held on 23.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M														
CO2	M														
CO3	H														
CO4	M														
CO5	M														

SDG 4: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.

Learning of various mathematical tools will lead to knowledge of applications in Computer Science

CAD 1101	**COMPUTER FUNDAMENTALS AND ORGANIZATION**	**L**	**T**	**P**	**C**
SDG: 9		**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

COB1: Impart the knowledge on historical development of Computers, different number systems and logic gates.

COB2: Learn the basic structure of CPU, computer memory and Input - Output units.

COB3: Understand the concepts of Boolean algebra and Circuit reduction methods.

COB4: Describe the components of Sequential logic circuits.

COB5: Explain the working principles of Arithmetic and logic unit ALU.

MODULE I INTRODUCTION **9**

General features of a computer, Generation of computers, Personal computer, workstation, mainframe computer and super computers. Computer applications - Number systems - Conversion from one number system to another - compliments - Binary codes - Binary logic - Logic gates - Truth tables.

MODULE II COMPUTER ORGANIZATION **9**

Computer organization, Block Diagram of Computer- Central processing unit, computer memory – primary memory and secondary memory, Secondary storage devices – Magnetic and optical media, Associative memory; Cache memory organization and Virtual memory organization Input and output units, OMR, OCR, MICR, scanner, mouse, modem.

MODULE III BOOLEAN ALGEBRA AND CIRCUIT REDUCTION METHODS **9**

Boolean Algebra, Axioms - Truth table simplification of Boolean function- logic diagrams - Dem organs theorems, duality theorem - K-map method – Mc- Clausky tabulation method - Universal Logic gates.

MODULE IV SEQUENTIAL LOGIC CIRCUITS **9**

Sequential logic – RS, JK, D and T Flip flops - Registers –Shift Registers - Counters – Ripple Counters – Synchronous Counter – Design of Counters.

MODULE V COMBINATIONAL LOGIC CIRCUITS **9**

Adders – Subtractors – Decoders – Encoders – Multiplexer- Demultiplexer – Design of

Circuits using decoders/Multiplexers – ALU.

L – 45; Total Hours – 45

TEXT BOOKS:

1. Rajaraman V. And NeeharikaAdabala “Fundamentals of Computers” 6th Edition, PHI New Delhi 2017.
2. M.M. Mano, Digital Logic and Computer Design, Pearson Education, 2016.

REFERENCES:

1. Charles H.Roth, Jr., Kinney,” Fundamentals of Logic Design”, Brooks Publications, Seventh Edition,2013
2. E Balagurusamy“ Fundamental of Computing and programming” 2nd edition ,Tata McGraw-Hill, 2012
3. P.K. Sinha “ Computer Fundamentals” BPB Publications; Reprint Edition 2018
4. Hamacher “Computer Organization” McGraw Hill Education, 2011.

COURSE OUTCOMES:

CO1: Identify different types of computers with hardware configuration for different utility purposes.

CO2: Distinguish between primary memory and secondary storage devices and their properties.

CO3: Apply the principles of logic circuits and Boolean algebra which forms the basis of digital computer design.

CO4: Design knowledge of components with Sequential logic circuits with counter.

CO5: Design knowledge of Arithmetic Knowledge Unit - ALU in a computer system.

Board of Studies (BoS) : 15th BoS of CA held on 22.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	H		H											H
CO2					M			M	M					H
CO3	H		M										H	M
CO4			H	M	M									H
CO5			H	M	M									H

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainableindustrialization and foster innovation

The course outcomes are measurable and enable the learner to apply concepts of theoretical principles of computer organization learned in the course to design a customized computer system. The learner would be able to design an advanced computer laboratory with innovative capacity to solve all kinds of hardware infrastructure and installation related issues and provide hardware infrastructure support services.

CAD 1102	PROGRAMMING IN C	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Learn the fundamental concepts of Programming

COB2: Understand the basics of C language

COB3: Learn about advanced concepts of C language

COB4: Understand how pointer works in C language

COB5: Gain knowledge about File handling in C

MODULE I OVERVIEW OF PROGRAMMING 9

Introduction to computer based problem solving, Program design and implementation issues- Flowcharts & Algorithms, Top down design & stepwise refinement, Programming environment – Machine language, assembly language, high level languages, Assemblers, Compilers, Interpreters.

MODULE II FUNDAMENTALS OF C PROGRAMMING 9

Overview of C, Identifier and Keywords,Data Types, Constants & Variables, Expressions, Statements, Operators, Decision Making Statements, Switch, Break and Continue, Go to Statement, Looping Statements, Introduction to Arrays: Declaration, Initialization, One dimensional array, Two dimensional arrays.

MODULE III ADVANCED PROGRAMMING TECHNIQUES 9

Introduction to functions: Function prototype, Function definition, Function call,Recursions, Scope rules- Local & global variables, Storage Classes - Automatic, External, Static, Register Variables, Type modifiers and storage class specifiers for data types, Type casting, Type conversion.

MODULE IV DYNAMIC DATA STRUCTURES IN C 9

Pointers, Pointer operators, Pointer Arithmetic, Arrays and pointers, Pointers to pointers, pointers to functions, Structures- Basics, referencing structure elements, array of structures, passing structures to functions, structure pointers, arrays and structures within structures, Unions –Declaration, uses, Enumerated data-types, typedef

MODULE V ADDITIONAL FEATURES 9

File Handling –The file pointer, file accessing functions, C Preprocessor- #define, #include, #undef, Conditional compilation, directives, C standard library and header files: Header files, string functions, mathematical functions, Date and Time functions.

L – 45; Total Hours – 45

TEXT BOOKS:

1. Let Us C By Yashwant Kanetkar,15th Edition,PBP Publications, 2010.

REFERENCES:

1. Programming in ANSI C by Balaguruswamy, 8th Edition, Tata McGraw Hill, 2019.
2. C: The Complete Reference By HerbetSchildt, 4th Edition, 2017.

COURSE OUTCOMES:

CO1: Identify the characteristics of programming

CO2: Describe the fundamentals of C programming

CO3: Apply the advance concepts of C programming

CO4: Identify the role of Pointers in C language

CO5 : Explain the importance of file handling

Board of Studies (BoS) : 15th BoS of CA held on 22.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO11	PO 12	PSO 1	PSO2
CO1			H										M	
CO2	M													L
CO3			M					L	M					M
CO4			M					L	M					M
CO5			M						M					M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9: Industry, Innovation and Infrastructure – Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: The skills taught in this course for the learners with respect to the course outcomes are measurable and useful in improving the programming skill of the learner. As the future software engineer, the learner of this subject will get a strong foundation and it will help him in building quality software.

CAD 1103	DATA STRUCTURES	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Impart the fundamental concept of Data Structures and algorithms

COB2: Implement and apply the concepts of stacks and Queues.

COB3: Understand the operations and types of the Linked list.

COB4: Get familiarized with searching and sorting algorithms.

COB5: Implement the traversal operations of tree and graph.

MODULE I INTRODUCTION TO DATA STRUCTURES 9

Definition - Classification of data structures - primitive and non-primitive - Elementary data organization – Arrays - Pointers - Accessing the address of a variable - Declaring and initializing pointers - Accessing a variable through its pointer. Memory allocations - static and dynamic memory allocation - Memory allocation functions - Recursion–Definition - Advantages, Implementation - Binomial coefficient, Fibonacci, GCD.

MODULE II STACK AND QUEUE 9

Stack – Operations - Evaluating arithmetic expressions - Conversion of Infix to postfix expression, Infix to prefix expression – Applications of Stack - Queue – Operations - Circular Queue - Priority Queue - deque - Applications of queues.

MODULE III LINKED LIST 9

Abstract Data Types (ADTs) - List ADT – Array-based implementation - linked list implementation – singly-linked lists- circularly linked lists- doubly-linked lists - Insertion, Deletion, search and display operations.

MODULE IV SEARCHING AND SORTING TECHNIQUES 9

Searching Techniques: Linear Search - Binary Search - Sorting Techniques: Bubble Sort - Insertion Sort - Selection Sort - Quick Sort - Radix Sort - Heap Sort- Merge Sort.

MODULE V TREES AND GRAPHS 9

Trees: Basic terminologies - Binary tree – Representations - Binary tree traversal – Inorder, Preorder and Postorder traversals - Graphs: Terminologies - Graph traversal - Depth First Search, Breadth-First Search

- Minimum Spanning trees – Prim's and Kruskal's Algorithm - Shortest path algorithm – Dijkstra's algorithm.

L – 45; Total Hours – 45

TEXT BOOKS:

1. Lipschutz: Schaum's outline, "Data structures with C"Tata McGraw-Hill, 2017.
2. Reema Thareja, "Data Structures using C", Second Edition, Oxford University Press, 2011.
3. Mark Allen Weiss, "Data Structures and Algorithm Analysis in C", 2nd Edition,
   Pearson Education, 2014.

REFERENCES:

1. A.S. Tanenbaum, Y. Langsam, and M.J. Augenstein, "Data Structures Using C" Pearson Education India, 2nd Edition, 2015.
2. Ellis Horowitz, Sartaj Sahni, "Fundamentals of Data Structures in C", University Press, 2020.
3. Robert Kruse, C.L. Tondo, Bruce Leung, Shashi Mogalla, "Data Structures and Program Design in C", 2nd Edition, Pearson Education, 2007.
4. Jean-Paul Tremblay, Paul G. Sorenson, "An Introduction to Data Structures with Application", Tata McGraw-Hill, 2017.

COURSE OUTCOMES:

CO1: Demonstrate the importance of Data Structures in implementing algorithms

CO2: Understand and implement the applications of linear data structures

CO3: Suggest appropriate linear data structures to the real-time problems

CO4: Apply the sorting and searching technique for any application.

CO5: Understand and implement the applications of trees and graphs

Board of Studies (BoS) : 15th BoS of CA held on 22.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H												M	
CO2	H			H					L		M		H	
CO3		H			M								H	M
CO4	H	H											H	
CO5		H		H	M				L		M		H	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: Learners able to create, design, develop, upgrades and continuously improves their innovation in Data structure algorithms. Learners have capacity – building to invest in innovation and in the development of clean and sound technologies in support of the sustainable development goals.

CAD 1104	PROGRAMMING IN C LABORATORY	L	T	P	C
SDG: 9		0	0	4	2

COURSE OBJECTIVES:

COB1: Provide programming skill in C language.

COB2: Prepare the learners with appropriate software to understand the control structures and functions.

COB3: Train the learners to understand the basic algorithms and techniques in C environment.

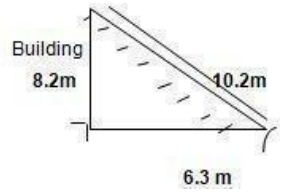
COB4: Disseminate the techniques and methods to handle the dynamics memory using pointers.

COB5: Understand the concept to implement applications developed using C language.

PRACTICALS

List of Experiments:

1. Write a C program to generate all prime numbers up to n^{th} number.
2. Write a C program to find Odd & Even numbers in n series.
3. Write a C program to calculate simple and compound interest.
4. Write a C program to perform the arithmetic expression using switch statement.
5. Write a C program to concatenate two strings without using library functions.
6. A cow is tied to a pole centered in field using 45 m rope. Write a C program to compute the total area that the cow is capable of grazing.
7. A ladder is laid onto a building such that the distance between the ladder and building is 6.3 m. The length of ladder is 10.2 m as shown below. Write a C program to calculate the area of triangle so formed.



8. Rahul's birthday falls on 28thFebruary 1994. Write a C program to check if given year is a leap year or not.
9. A patient is suffering from high fever with 104.2 F. Write a C program to find his body temperature in Celsius.
10. Write a C program using string function to display the newly changed password based on the following constraints. A user has password 4221899 as his login credential for a banking website. His password is

about to expire. He has to change his password and has decided that the new password would be the reverse of the existing one.

11. Write a C program to print Fibonacci series of numbers.
12. Rainfall received in few areas in Chennai were recorded as 31cm,11.64cm, 16.87cm, 28 cm and 23.5 cm. Write a C program to calculate total amount of rainfall and average rainfall received that day.
13. Consider an array in following order: 58, 51, 35, 78, 15, 22 and 85. Write a C program to search the value of a given number using linear search.
14. The heights of ten students were marked as 163cm, 171 cm, 158 cm, 167cm, 175cm, 160cm, 173 cm, 149 cm, 180cm and 154cm.Write a C program to sort the given heights in ascending or descending order.
15. Write a C program to find the CGPA of the student according to following constraints.

MARKS	GRADE
90-100	S
80-89	A
70-79	B
60-69	C
50-59	D
40-49	E
0-39	U

16. The quantity of stationary sold for three days are shown. Write a C program to find the product of the quantity of items mentioned below in the form of matrix.

Day/Item	Pen	Pencil	Eraser
Day1	10	5	5
Day 2	8	4	2
Day3	5	10	10
Day/Item	**Notebook**	**Whitener**	**Marker**
Day1	3	6	5
Day 2	2	1	3
Day3	5	4	15

17. Write a C program to calculate factorial of a number using recursion.
18. Write a C program to store and display the student mark details for 3 students including name, department, subjects and respective marks using Structure.
19. Write a C program to print the elements of array using pointers.
20. Write a C program to input details (name, department and salary) for 3 employees into a file created and read the contents from the file to display all the details along with average salary of those employees on output terminal using suitable file handling functions. Create a scenario based on real time domain.

P – 60; Total Hours – 60

TEXT BOOKS:

1. Reema Thareja, Computer Fundamentals and Programming in C, Oxford Press, 2012.

REFERENCES:

1. Programming in C, Pradip Dey, Manas Ghosh, 2nd edition Oxford University Press, 2013.
2. Programming in ANSIC, E.Balaguruswamy, 5th Edition, McGraw- Hill, 2010.

COURSE OUTCOMES:

CO1: Apply the basic logics and mathematical concepts behind programming language.

CO2: Apply and use various computing logics to solve a problem using C programming**.**

CO3: Enhance their programming skills in C environment.

CO4: Apply structure, array, and pointer concepts in C platform to provide a solution for real time scenario.

CO5: Develop and implement C programming application to solve the real time problem.

Board of Studies (BoS) : 15th BoS of CA held on 22.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M								H				H	
CO2			H				H							H
CO3								M	H	M				H
CO4			H	M					H				H	
CO5							H	L	H	M		H		H

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement: Programming logics, design and developments taught in this course for the learners with respect to the course outcomes are measurable and useful in improving the programming skill of the learner. As the future of the software industry enhances rapidly, the learners will be able to understand and implement any technologies by having a strong foundation in C programming language.

CAD 1105	DATA STRUCTURES LABORATORY	L	T	P	C
SDG: 9		0	0	4	2

COURSE OBJECTIVES:

COB1: Understand the implementation of recursive function.

COB2: Implement stack and queue using arrays and dynamic memory allocation.

COB3: Introduce the implementation of a linked list and the various operations.

COB4: Learn to implement various searching and sorting algorithms.

COB5: Introduce the Tree and Graph implementation using C.

PRACTICALS

List of Experiments:

1. Write a C program to find the GCD of two numbers using recursive function.
2. Write a C Program to read the list of elements and print the array elements using pointers.
3. Implementation of the following operations in stack using arrays.
   a. Push
   b. Pop
   c. Display
4. Implementation of stack using linked list.
5. Implementation of queue using arrays.
6. Implementation of queue using linked list.
7. Implementation of Singly Linked List. The operations to be supported are:
   a. Insertion operation
   i. At the front of the list
   ii. At the back of the list
   iii. At any position in the list
   b. Deletion of the first and last node
   c. Searching a node. If the specified node is not present in the list then 'the node is not present in the list' should be displayed.
   d. Display all the nodes in the list.
8. Implementation of Doubly Linked List. The operations to be supported are:
   a. Insertion operation
   (i) At the front of the list
   (ii) At the back of the list
   (iii) At any position in the list
   b. Deletion of the first and last node

c. Displaying all the nodes in the list.

9. Write a C program to implement the linear search and binary search. Find an element that is present or not in a given list of numbers. If the number is present then display the position of the number in a list of values.
10. Write a program to implement the Insertion Sort.
11. Write a program to implement the Selection Sort.
12. Create a binary search tree and traversing it using Inorder, Preorder and Postorder.
13. Write a C program to implement Dijkstra's algorithm to find the shortest path between two nodes in a graph.

P – 60; Total Hours - 60

TEXT BOOKS:

1. Magnifying Data Structures, Aprita Gopal, First Edition, Prentice Hall India Learning Private Limited (2010).
2. Data Structures in C, Horowitz, Sahni, Anderson-Freed, Universities Press, Second edition (2008).
3. Narasimha Karumanchi, "Data Structures and Algorithms Made Easy: Career Monk Publications; Fifth edition, 2016.
4. Structure and Algorithmic Puzzles", 2nd Edition, Create Space Independent Publishing Platform, 2011.

REFERENCES:

1. Ashok N. Kamthane, "Introduction to Data Structures in C", 2nd Edition, WileyPublications, 2008.
2. Data Structures Using C - A.S.Tanenbaum, Y. Langsam, and M.J.Augenstein, Pearson Education India; 2nd edition, 2015.

COURSE OUTCOMES:

CO1: Write and demonstrate recursive methods

CO2: Implement stack and queue and evaluate various operations involved in it

CO3: Develop an application using singly linked list and doubly linkedList

CO4: Implement and analyze various searching techniques and sortingTechniques

CO5: Implement the various operations in the Tree and Graph

Board of Studies (BoS) :
15th BoS of CA held on 22.06.2021

Academic Council:
17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO1	PSO2	PSO3
CO1	H	L	H										H		
CO2		M	H												
CO3			M		M		M								
CO4								M							
CO5		H	H												

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG No. 9

Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement :

Learners able to create, design, develop, upgrades and continuously improves their innovation in Data structure and algorithms. Learners have capacity of design and development of solution methodologies and computational algorithms for practical implementation in support of the sustainable development goals.

SEMESTER II

END 1283	GENERAL ENGLISH - II	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

COB1: To enable students to read, comprehend and appreciate the value of literature to life

COB2: To help them acquire language skills through Literature

COB3: To develop LSRW skills through practice in variety of contexts

COB4: To improve their vocabulary and correct English usage

MODULE I **9**

Poetry: The Second Coming – W. B. Yeats

Speaking: Expressing one's opinion /Asking for others' opinion, agree, disagree

Writing: Movie / Book Review, Slogan Writing

Language: Modals, Prepositions

Vocabulary: Business Vocabulary (advertisements, sales)

MODULE II **9**

Poetry: "Where the Mind is Without Fear" (Gitanjali 35) - Rabindranath Tagore

Listening: For understanding speaker's opinion

How books can open your mind by Lisa Bu. (6.16 minutes)

Reading: To understand the meaning and purpose of short texts (mails, memos)

Writing: Email Writing, Memo writing

Language: If Clause

Vocabulary: Finance vocabulary

MODULE III **9**

Prose: "The Civilization of To-day" – C.E.M.Joad

Reading Comprehension: Digital habits across generations (learn English)**Speaking:** Discussions

Writing: Fax

Language: Relative Clause

Vocabulary: Collocations – verb-noun collocations

MODULE IV **9**

Short story: "The Sparrows" - K. A. Abbas

Speaking: Making small talk

Writing: Job Application Letter

Language: Voice

Vocabulary: Employment vocabulary

MODULE V **9**

Short story: "First Confession"– Frank O' Connor

Listening: Listening and taking short notes - Inspirational lesson for lifetime- How to manage failure and success by Dr. APJ (8.21 minutes)

Writing: Report Writing – Survey Reports

Language: Reported Speech

Vocabulary: Collocation sets about time and money

L – 45; Total Hours - 45

REFERENCES:

1. Guy Brook-Hart, Business Benchmark Upper- Intermediate Student's Book, CUP, 2006.
2. S.Mythili, V.Kadambari. Ed. Plumes of Many Colours: A Collection of Short stories, Blackie Books, 1994.
3. Sriraman.T. Macmillan College Prose, Laksmi Publications, 2015.
4. Swan.M. Practical English Usage, OUP, 2005.
5. Whitby, Norman. Business Benchmark: Pre-intermediate to Intermediate, 2nd Edition, CUP, 2014.
6. https://learnenglish.britishcouncil.org/skills/reading/intermediate-b1/the-martian-a-book-review
7. https://learnenglish.britishcouncil.org/skills/reading/intermediate-b1/digital-habits-across-generations
8. https://www.youtube.com/watch?v=6ibCtsHgz3Y
9. https://www.youtube.com/watch?v=7E-cwdnsiow

COURSE OUTCOMES:

CO1: Respond to literary texts efficiently

CO2: Appreciate and critically analyse literary texts

CO3: Display effective LSRW skills in academic and professional contexts

CO4: Demonstrate a range of appropriate vocabulary in a variety of situations

CO5: Communicate effectively using grammatically correct language

Board of Studies (BoS):
13th BoS held in the Department of English 0n 17.6.2021

Academic Council:
17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13
CO1													M
CO2													M
CO3						M	H						
CO4						L	M						
CO5						M	H						

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement: This course helps the students to read, comprehend and appreciate the value of literature to life. It also helps them to enrich LSRW skills in academic and professional contexts.

LND 1281	பொதுத் தமிழ் - II	L	T	P	C
SDG 16	GENERAL TAMIL - II	2	1	0	3

நோக்கங்கள்

- சங்க இலக்கியங்களையும் சங்கப் புலவர்களையும் அறிமுகம் செய்தல்.
- பழந்தமிழர்களின் அகப் புற வாழ்வினையும் பண்பாட்டினையும் எடுத்துரைத்தல்.
- அற இலக்கியங்கள், பக்தி இலக்கியங்கள், காப்பியங்களை அறிமுகம் செய்தல்
- பல்வேறு சமயக் கோட்பாடுகளையும் உண்மைகளையும் உணர்த்துதல்
- கட்டுரைகளை எழுத மாணவர்களைப் பயிற்றுவித்தல்
- சந்திப் பிழையின்றி எழுத மாணவர்களைப் பயிற்றுவித்தல்

அலகு I	சங்க / அற இலக்கியங்கள்	8

புறநானூறு - 143 - ஆவது பாடல், நற்றிணை - 19 - ஆவது பாடல், திருக்குறள் - நட்பு, காலமறிதல், நாலடியார் - அவையறிதல், பழமொழி நானூறு - இன்னா செய்யாமை (5 பாடல்கள்), இனியவை நாற்பது - முதலைந்து பாடல்கள்

அலகு II	பக்தி இலக்கியங்கள்	8

திருவாசகம் - எட்டாம் திருமுறை (5 பாடல்கள்), நம்மாழ்வார் - (5 பாடல்கள்,) திருமந்திரம் (தேர்ந்தெடுக்கப் பெற்ற 5 பாடல்கள்).

அலகு III	காப்பியங்கள்	8

சிலப்பதிகாரம் - வழக்குரை காதை 50-73 (23 அடிகள் மட்டும்), கம்பராமாயணம் - பாலகாண்டம்-நாட்டுப்படலம் (10 பாடல்கள்), இரட்சண்ய யாத்ரிகம் - சிலுவைப்பாடு (10 பாடல்கள்), சீறாப்புராணம் - மானுக்குப் பிணை நின்ற படலம் (தேர்ந்தெடுக்கப் பெற்ற 5 பாடல்கள்

அலகு IV	கட்டுரைகள்	7

உ.வே.சாமிநாதையர் - தமிழ்நாட்டு வணிகம், மா.இராசமாணிக்கனார் -சித்தன்னவாசல், ம.லெ.தங்கப்பா - எது வாழ்க்கை, பி.எஸ்.அப்துர் ரஹ்மானின் வாழ்க்கை வரலாறு..

அலகு V	இலக்கிய வரலாறு	7

எட்டுத் தொகை, பத்துப்பாட்டு

அலகு VI	மொழிப்பயிற்சி	7

இலக்கணக் குறிப்புத் தருதல், வல்லினம் மிகுவிடங்களும் மிகாவிடங்களும், மொழிபெயர்ப்பு (ஆங்கிலத்திலிருந்து தமிழில் பெயர்த்தல்)கடிதங்களும் வகைகளும்

L – 30; T – 15; TOTAL HOURS – 45

குறிப்புகள்

1. பொதுத்தமிழ் - செய்யுள்திரட்டு - தமிழ்த்துறை வெளியீடு
2. தமிழ் இலக்கிய வரலாறு - சோம.இளவரசு
3. சிறுகதைத் தொகுப்பு (கட்டுரைக் களஞ்சியம்)

வெளிப்பாடு

- சங்க இலக்கியங்கள் குறித்தும் சங்ககால மக்களின் வாழ்வு குறித்தும் உணர்ந்து கொள்வர்.
- சங்கப் புலவர்கள் பற்றிய தகவல்களையும் அவர்தம் படைப்பாளுமை பற்றியும் அறிந்து கொள்வர்.
- தமிழர்களின் ஆன்மீகச் சிந்தனைகளைப் பற்றியும் அறச்சிந்தனைகள் பற்றியும் அறிந்து கொள்வர்,
- மாணவர்கள் பல்வேறு சமயச் சிந்தனைகள் குறித்து தெரிந்து கொள்வர்.
- தமிழ் இலக்கணங்கள் பற்றி அறிந்து கொள்ளவும் மொழிபெயர்ப்பு செய்யும் திறனும் பெறுவர்.
- புத்திலக்கியங்களைப் படைக்கும் திறனையும் திறனாய்வு செய்யும் திறனையும் பெறுவர்

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO 11	PO12
CO1							M	M	M	M		M
CO2							L	L	L	M		M
CO3							L	M	L	L		L
CO4							L	L	M	L		L
CO5							L	L	L	L		L
CO6							M	M	M	M		L

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 16: Peace, Justice and Strong Institutions

Strengthen relevant national institutions, including through international cooperation, for building capacity at all levels, in particular in developing countries, to prevent violence and combat terrorism and crime through the Quranic, Vedic and Biblical literature.

LND 1282	GERMAN – II	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

The objectives of this course are :

COB1: To enable the learners to listen and understand the spoken German language which uses the elementary spoken structures.

COB2: To enable the learners to speak and engage in simple dialogues in German.

COB3: To enable the learners to read and understand the elementary texts in German.

COB4: To enable the learners to write simple sentences and short paragraphs in German.

COB5: To demonstrate Proficiency in reading, writing, and speaking in basic German. Learning vocabulary related to profession, education, day-to-day activities, food, culture, sports and hobby, family set up, workplace, market and classroom activities are essential.

COB6: To make the students industry oriented and make them adapt in the German culture.

MODULE I KONTAKTE 7

To arrange appointments, understand and give instructions, understand and reply letters, find information in the text, identify the situations and understand the conversation; Vocabulary: related to the topic; Grammar: Dative personal pronomen, Possessive Pronomen, verbs and Preposition.

MODULE II MEINE WOHNUNG 7

To understand the advertisements related to flats/houses, describe a flat, write a text about a flat; Vocabulary: related to the topic; Grammar: Adjective with sein (sehr/zu), wechselpreposition with Dative.

MODULE III ALLES ARBEIT? 7

To describe daily routine, talk about the past, speak about jobs, position, advertisements, prepare telephone conversation; Vocabulary: related to the topic; Grammar: Imperativ -Du form, Simple Past tense (regular & irregular verbs).

MODULE IV KLEIDUNG UND MODE 8

KLEIDUNG UND MODE – LEARNING: To speak about clothes, understand

the conversation at shopping centers, shopping for dresses, lead a discussion on purchasing dresses and orient oneself about a shopping complex. Vocabulary: related to the topic; Grammar: Trennbare & Untrenn bareverben, Introduction to reflexive pronoun und Reflexive verbs.

MODULE V GESUND UND MUNTER 8

To make personal statements, name body parts, understand sport activities, conversation with the doctor, get & give tips to healthy life, The prefix Lieblings -Sentence formation; Advanced Conversation skills (pertaining chiefly to simple dialogues in everyday situations), Vocabulary: related to the topic; Grammar: Simple Future Tense, Esgibt, Gibtes? -sentence formation.

MODULE VI AB IN DEN URLAUB! 8

To suggest a city tour, describe the directions, write a Simple Email and reply, describe the weather, make a complaint in the hotel, speak about the trips; Advanced Text - Reading Comprehension And Translation Practice from German Into English Vice versa; Vocabulary: related to the topic and related to School, University, Professions; Grammar: Adverbs (time), Join sentences with “und”, “oder”, and “aber”.

L -45; Total Hours – 45

TEXT BOOKS:

1. Stefanie Dengler, “Netzwerk A1.2”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2015.

PRACTICE BOOK:

1. Johannes Gerbes, “Fit fürs Goethe-Zertifikat A1”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2010.

REFERENCES:

1. Paul Rusch, “Einfach Grammatik”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2012.
2. Hermann Funk, “studio d A1”, Goyal Publishers & Distributors Pvt. Ltd., Delhi, 2009. 15OH78 German Language.

COURSE OUTCOMES:

On successful completion of this course learners will be able to

CO1: remember greeting people, introducing oneself and understanding basic expressions in German

CO2: read and describe basic German sentences relating to routine

situations.

CO3: introduce him / her and others as well as ask others about themselves and communicate using simple sentences.

CO4: write simple sentences and short paragraphs in German.

CO5: identify and deal with social and cultural aspects of Germany and other German speaking countries.

CO6: listen and identify individual sounds of German and simple day-to-day conversations

CO7: speak simple sentences using basic sounds and words

CO8: read and understand short passages on familiar topics

CO9: apply basic sentence structures while writing

Board of Studies (BoS):
14th BoS of the Department of Commerce held on 22.04.2021

Academic Council:
17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3	PSO 4
CO1	H	H	M	H		H	H	H	M	H	M	H				
CO2				H		H	H	H	H	H		H				
CO3				H		H	H	H	H	H		H				
CO4				H		H	H	H		H		H				
CO5				H		H	H	H		H		H				
CO6				H		H	H	H		H		H				

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4 : Quality Education

The substantially improve the relevant skills which develop the confidence in young people, including technical and vocational skills, help for employment, decent work and entrepreneurship.

LND 1283 SDG 4	MODERN COMMUNICATIVE ARABIC	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

The course aims to teach:

COB1: communication in the situations of marketing clothes, food, etc.

COB2: vocabulary about the climates, seasons and hold telephonic conversations

COB3: vocabulary related to various games, students' associations.

COB4: communication in Work place like ticketing, booking, confirmation & passport procedures

COB5: vocabulary related to illness, numbers and communication with doctors.

MODULE I BUSINESS PLACE COMMUNICATION 9

Reading and listening Lesson 9: marketing (التسويق) –vocabulary related to marketing clothes, food, different types of contracts- conversation in business place - price, marketing, subject and predicate (المبتدأ والخبر), using interrogating form of (أي - بكم)

MODULE II USAGE OF TENSES 9

Situational conversation - Lesson 10: climate (الجوّ) – vocabulary related to climate, places& seasons, discussion question and answers – telephonic conversations – order (فعل الأمر) – interrogative form (كيف) - negative form of المضارع

Lesson 11: people and places (الناس والأماكن) – vocabulary related to people and places, colours, feminine gender – place of work – transportation – question and answer – past tense – usage of articles (استخدام الحروف: في – إلى – من - مع)

MODULE III SENTENCES IN COMMUNICATION 9

Lesson12 : hobby (الهوايات) - vocabulary related to various games, students' associations – adjectives and synonyms – (الفعل المضارع المسند إلى ياء المخاطبة – الإشارة)

MODULE IV CONVERSATION OF BUSINESS CONVERSATION 9

Lesson:13 travel (السفر) - vocabulary related to ticket booking – confirmation – passport procedures – resident permits (الحجز والتأكيد والجوازات والإقامة)– lost luggages – four directions – conversation about services – seeking information of luggage lost.

Lesson:14 haj and umrah (الحج والعمرة) - vocabulary related to haj and umrah –

expression of arabic numbers – procedures of umrah and haj – (– الاستفهام: متى كيف – بم - أين)

MODULE V SITUATIONAL CONVERSATION 9

Lesson 15: health (الصحة) - vocabulary related to illness – numbers 100 and 1000 – doctor's visit – communication with doctor – (الاستفهام : لماذا)

Lesson 16: vacation (العطلة) - vocabulary related to holidays – festivals – travel – spending holidays – Arabic months – interrogative form (الاستفهام: كم – أين، المضارع مع واو الجماعة: ستقضون)

L – 45 ; Total Hours – 45

TEXT BOOKS:

1. Al Lughathul Arabiya (اللغة العربية ، الصف الأول ، الجزء الأول), Part I, Bukhari Aalim Arabic College, 2004.

REFERENCES:

1. Dr. F. Abdur Raheem, Durus Al LugathilArabiyya, Islamic Foundation Trust, Chennai, 2002.
2. Al QirathulArabiyya Lil Mubtadiyeen (UmmulQura University, Makkah), Bukhari Aalim Arabic College, 2005.

COURSE OUTCOMES:

At the end of the course, the student is expected to:

CO1: communicate in the situation of marketing clothes, food, etc.

CO2: discuss about the climates, seasons and hold telephonic conversations

CO3: discuss in the playground, students' gatherings

CO4: communicate in certain work places

CO5: recognize proper usage of sentences in communication.

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5
CO1						L									
CO2							M								
CO3							M								
CO4						L									
CO5							H								

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Developing Language skill

Statement: Arabic language enhances effective communication in the workplace.

MAD 1288	PROBABILITY AND STATISTICS	L	T	P	C
SDG: 4		3	1	0	4

COURSE OBJECTIVES:

COB1: To impart knowledge on the basic concepts of probability

COB2: To understand random variables and distributions

COB3: To provide an understanding of moment generating functions

COB4: To learn joint density function and use of generating functions

COB5: To understand correlation and the regression lines

MODULE I BASIC PROBABILITY CONCEPTS 9+3

Sample space - events - algebraic operations on events - definition of probability - Conditional probability - addition and multiplication theorems of probability – Baye's theorem-Applications.

MODULE II RANDOM VARIABLES AND DISTRIBUTIONS 9+3

Discrete and continuous random variables - distribution function and its properties - probability mass function and probability density function - discrete and continuous probability distributions - Binomial, Geometric, Poisson, Uniform, Exponential and Normal distributions.

MODULE III MOMENT GENERATING FUNCTIONS 9+3

Expectation of a random variable – probability generating function – properties – moment generating function-moments.

MODULE IV TWO DIMENSIONAL RANDOM VARIABLES 9+3

Joint, marginal and conditional distribution functions - independence of random variables-convolution- Generating functions.

MODULE V CORRELATION AND REGRESSION 9+3

Correlation coefficient and regression - rank correlation - curve fitting by least square methods - fitting a straight line, parabola, power curve and exponential curves.

L – 45 ; T-15; Total Hours – 60

TEXT BOOKS:

1. Miller, I.; Miller, M.; "Mathematical statistics", 7th Edition. Prentice Hall International, New Jersey 1999
2. Dr. P. Kandaswamy, Dr. K. Thilagavathy and Dr. K. Gunavathy, Probability and Queuing Theory, 3rd Edition, S. Chand

Publishing, New Delhi 2013.

3. T. Veerarajan, “Probability, Statistics and Random Processes”, Tata McGraw Hill, New Delhi 2014.

REFERENCES:

1. Ross, S.M.,”Probabilty and Statistics for Engineers and Scientists” John Wiley & Sons, New Jersey 2007.
2. S.C Gupta, V.K Kapoor, “Fundamentals of mathematical statistics”, Sultan chand and sons, New Delhi, 2019.
3. S.C Gupta, V.K Kapoor,”Fundamentals of Applied statistics“, Sultan chand and sons, New Delhi, 2017.
4. Lopuhaä C.**,** Dekking**,** F.M., Kraaikamp**,** H.P., Meester, L.E. “A Modern Introduction to Probability and Statistics”, 2nd Edition, Springer text series, 2005.
5. Chin Long chiang, “Statistical Methods of Analysis“, World Scientific Books, 2003**.**

COURSE OUTCOMES:

At the end of the course students will be able to

CO1: Solve basic problems in probability and apply Baye’s theorem

CO2: Solve problems using standard probability distributions

CO3: Derive moment generating functions and use them to evaluate moments.

CO4: Find the marginal and conditional distributions of two dimensional random variables

CO5: Calculate correlation and regression lines for the given data

Board of Studies (BoS) :
12th BOS of Mathematics & AS held on 23.06.2021

Academic Council:
17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M														
CO2	M														
CO3	M														
CO4	M														
CO5	H														

SDG 4: Ensure inclusive and equitable quality education and promote lifelong opportunities for all.

Learning of various statistical methods will lead to knowledge of applications in Data Science and Computing

CAD 1201	OOPS WITH C++	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Understand Object Oriented Programming concepts and basic characteristics of C++.

COB2: Relate the concepts of objects and classes with real world concepts and models.

COB3: Understand the concepts of operator overloading.

COB4: Become skilled at utilizing the principles of inheritance and interfaces.

COB5: Define data members and member functions in a class.

MODULE I INTRODUCTION TO OBJECT ORIENTED PROGRAMMING 9

Concept of Object orientation – comparison with procedural and structured programming – Classes and objects – Data Abstraction, Encapsulation, Dynamic binding, Message passing. Advantages of object orientation -Basic data types and declarations.

MODULE II CLASSES AND OBJECTS 9

Classes and objects in C++, access modifiers, static members, friend functions, Constructors and Destructors, polymorphism, Operator Overloading and type conversion.

MODULE III INHERITANCE 9

Inheritance - parent and child classes, private, public and protected inheritance, multiple inheritances and multi-level inheritance, Virtual base classes. new and delete operators, objects.

MODULE IV POLYMORPHISM AND EXCEPTION HANDLING 9

Binding & Polymorphism: Early binding, Late Binding, Pointers to derived class objects, virtual functions, Pure virtual functions, exception handling in C++: try, throw and catch.

MODULE V FILE STREAM CLASSES AND TEMPLATES 9

Study of File stream classes in C++-Templates–class and function templates, Templates versus macros, String objects in C++, Standard

Template Library in C++.

L – 45; Total Hours – 45

TEXT BOOKS:

1. E.Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill. Publications ,6th edition2013

REFERENCES:

1. BjarneStroustrup," The C++ Programming Language", Addison Wesley, 4th edition, ISBN-13: 978-0321563842, 2013.
2. Herbert Schildt, "C++ the Complete Reference", Tata McGraw Hill fourth Edition, 2003.

COURSE OUTCOMES:

CO1: Comprehend the concepts of object Oriented Programming Concepts and their significance in real world.

CO2: Learn to co-relate relationship among different entities involved in a system

CO3: Design classes using the inheritances concepts.

CO4: Develop programs using the concepts of Polymorphism and utilize the techniques of Exception Handling.

CO5: Handle data through files systems.

Board of Studies (BoS) :
15th BoS of CA held on 22.06.2021

Academic Council:
17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1		H											H	
CO2							H						H	
CO3			H				H						H	
CO4			H											H
CO5					M			M						H

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainableindustrialization and foster innovation

Statement: Object Oriented Programming concepts taught in this course for the learners with respect to the course outcomes are measurable and useful in applying one's disciplinary knowledge and transferable skills to new/unfamiliar contexts. As the future industrial personnel, the learner would be able to demonstrate competence in the practical art of computing by identifying, analyzing problems and seek solutions to real-life problems.

CAD 1202	OPERATING SYSTEMS	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Introduce the fundamental concepts of Operating Systems.

COB2: Learn the concept of CPU Scheduling and Deadlocks.

COB3: Explore the Memory Management concepts.

COB4: Understand directory structure, file allocation methods and disc scheduling concepts

COB5: Train on LINUX commands and basic file management operations.

MODULE I INTRODUCTION TO OPERATING SYSTEMS AND THREADS 9

Objectives and Functions of OS - Operating System Components and Services, Types of Operating systems - System calls, Process Concepts -Process Scheduling – Co-operating process-Introduction to Threads.

MODULE II PROCESS MANAGEMENT AND DEADLOCK 9

CPU Scheduling : Scheduling criteria and Introduction to scheduling algorithms — First Come First Serve (FCFS) - Shortest Job First(SJF) –Round Robin Scheduling - Process Synchronization: Mutual Exclusion, Critical – section problem, Semaphores, Critical Regions- Deadlock : Deadlock prevention, Deadlock Avoidance, Deadlock Detection and Recovery from Deadlock .

MODULE III MEMORY MANAGEMENT 9

Basics concepts of swapping, Contiguous Memory Allocation, Paging: Segmentation with paging-Virtual Memory Management : Demand paging-Process, Creation-Introduction to Page Replacement Algorithm – First In First Out(FIFO) – Optimal Page Replacement(ORP) - Least Recently Used(LRU) - Thrashing.

MODULE IV FILE SYSTEM AND DISK SCHEDULING 9

File concepts and Access Methods - File Structure and Allocation Method - Disk Management and Disk Structure-Introduction to Disk Scheduling – First Come First Served (FCF) – Shortest Seek Time First (SSTF) – SCAN – CSCAN – LOOK-CLOOK –Introduction to Security and Threats.

MODULE V LINUX – OPEN SOURCE OPERATING SYSTEM 9

What Is Linux? -The Problems with Windows -The Benefits of Linux - Proprietary Software and the GPL- GNU and Linux Together- Different Flavors of Linux- Who Uses Linux?- Understanding How Linux Differs from Windows- Using Ubuntu -

Working with Files-Listing Files-Copying Files and Directories -Moving Files and Directories - Deleting Files and Directories - Changing and Creating Directories-Users and File Permissions.

L – 45 ; Total Hours – 45

TEXT BOOKS:

1. Silberschatz , Galvin & Gagne, 8thEdition, “Operating Systems”, Wiley publications,2012

REFERENCES:

1. Operating System by William Stallings, 4th edition,Pearson Education,2012
2. Operating System by H.M. Deitel, 2nd Edition, Pearson Education, 2002.
3. Operating Systems by Nutt, 3/e Pearson Education 2004.
4. Beginning Ubuntu Linux, Keir Thomas , Andy Channelle and Jaime Sicam,4thedition, 2009

COURSE OUTCOMES:

CO1: Provide conceptual process management solution and solve problems using CPU Scheduling algorithms.

CO2: Solve problems related to page replacement algorithms.

CO3: Schedule Input and output requests (I/O requests) with conceptual clarity and solve problems using disk scheduling algorithms.

CO4: Create directories and files in Linux.

CO5: Store data, information efficiently and retrieve them effectively by applying Linux file management operations.

Board of Studies (BoS) :
15th BoS of CA Meeting held on 22.06.2021

Academic Council:
17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	P O4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1	M	L	H										H	
CO2			H										H	
CO3			H										H	
CO4					M									L
CO5								H	M		M		H	L

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainableindustrialization and foster innovation

Statement: The learner would be able to introduce the open source operating systems and build the computerized ecosystem for the enterprise in a cost effective manner. The outcomes of the course are measurable and would enable the learner to be productive in industrialization process with innovative computerization ideas.

GED 1207	ENVIRONMENTAL STUDIES	L	T	P	C
SDG: All		2	0	0	2

COURSE OBJECTIVES:

To make the student conversant with the

COB1: Various natural resources, availability, utilisation and its current scenario.

COB2: Diverse ecosystems and its function, importance of biodiversity, its values, threats and conservation.

COB3: Types of pollutants and its impacts on the environment and the effects of natural disasters.

COB4: Impacts of human population, human health, diseases and immunisation for a sustainable lifestyle.

MODULE I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES AND NATURAL RESOURCES **8**

Definition, scope and importance, Need for public awareness.

Natural resources and associated problems(a) Land resources: Land as a resource, land degradation, soil erosion and desertification -(b) Forest resources: Use and over-exploitation, deforestation, dams and their effects on forest and tribal people -(c) Water resources: Use and over-utilization of surface and ground water,conflicts over water, dams-benefits and problems,Water conservation: rain water harvesting, watershed management -(d) Mineral resources: Use and exploitation, environmental effects of extractingand using mineral resources,mining -(e) Food resources: World food problems, changes caused by agriculture andovergrazing, effects of modern agriculture - (f) Energy resources: Growing energy needs, renewable and non-renewableenergy sources, use of alternate energy sources.

MODULE II ECOSYSTEMS AND BIODIVERSITY **8**

Ecosystems: Concept of an ecosystem; Structure and function of an ecosystem; Producers, consumers and decomposers; Energy flow in the ecosystem; Ecological succession; Food chains, food webs and ecological pyramids; Introduction, types, characteristic features, structure and function of thefollowing ecosystem(a)Terrestrial Ecosystems: Forest ecosystem, Grassland ecosystem, Desert ecosystem (b) Aquatic fresh water ecosystems: Ponds and lakes, rivers and streams (c) Aquatic salt water ecosystems: oceans and estuaries.

Biodiversity:Classification: genetic, species and ecosystem diversity; Bio-geographical classification of India and India as a mega-diversity nation;Invasive, endangered, endemic and extinct species;Hot sports of biodiversity and Red Data book;Values of biodiversity, Threats to biodiversity; Conservation of biodiversity.

MODULE III ENVIRONMENTAL POLLUTION AND ITS CONTROL 8

Definition, Cause, effects and control measures of (a) Air pollution, (b) Water pollution, (c) Soil pollution, (d) Marine pollution, (e) Noise pollution, (f) Thermal pollution, (g) Nuclear hazards, (h) ill-effects of fireworks and upkeep of clean environment - El Nino and La Nina.

Solid waste Management - Causes, effects and control measures of urban, industrial wastes and e-waste -Disaster management: flood, drought, cyclone, landslide, avalanche, volcanic eruptions, earthquake and tsunami.

MODULE IV HUMAN POPULATION, SOCIAL ISSUES AND HEALTH 6

Population, population growth, variation among nations; population explosion; Family Welfare Programme - Unsustainable to sustainable development - Resettlement and rehabilitation of people - Environment Protection Act - Public awareness -Human Rights - Value Education - Women and Child Welfare - HIV/AIDS - Environment and human health: air-borne, water borne, infectious diseases, contagious diseases and immunization (all types of vaccines from birth), risks due to chemicals in food and water, endocrine disrupting chemicals, cancer and environment.

Case studies related to current situation.

L – 30; Total Hours – 30

TEXT BOOKS:

1. ErachBharucha, Text Book for Environmental Studies - Environmental Studies for Undergraduate Courses, University Grants Commission, New Delhi and BharatiVidyapeeth Institute of Environmental Education and Research, Pune, 2004.
2. *Ravikrishnan A.,* Environmental Science and Engineering, Sri Krishna Hitech Publishing Company Pvt.Ltd. Chennai, 2017.

REFERENCES:

1. Clair N. Sawyer, Perry L. McCarthy and Gene F. Parkin, Chemistry for Environmental Engineering and Science, 5th Edition, Tata McGraw-Hill Education Pvt. Ltd, India, 2011.

2. J. Glynn Henry and Gary W. Heinke, Environmental Science and Engineering, 2nd Edition, Prentice Hall of India, 2004.
3. J. Jeffrey Peirce, P. AarneVesilind, Ruth F. Weiner, Environmental Pollution and Control, Butterworth-Heinemann, 1997.
4. Trivedi, R.K., Handbook of Environmental Law's, Rules, Guidelines, Compliances and Standards, Volume 1 and 1, Envio Media.
5. https://www.teriin.org/article/e-waste-management-india-challenges-and-opportunities.
6. https://green.harvard.edu/tools-resources/how/6-ways-minimize-your-e-waste.
7. https://www.aiims.edu/en/departments-and-centers/central-facilities/265-biomedical/7346-bio-medical-waste-management.html.
8. https://tspcb.cgg.gov.in/Shared%20Documents/Guidelines%20for%20Management%20of%20Healthcare%20Waste%20Waste%20Management%20Rules,%202016%20by%20Health%20Care%20Facilities.pdf.

COURSE OUTCOMES:

The student will be able to

CO1: Analyse the current scenario of various natural resources and their depletion and suggest remedies to curb the exploitation.

CO2: Identify food chains and web and its function in the environment, assess the impacts on the biodiversity and propose solutions to conserve it.

CO3: Analyse the types and impacts of pollutants in the environment and propose suitable methods to alleviate the pollutants and the natural disasters.

CO4: Assess on the impact of human population and the health related issues and immunisation practices and sustainable developments for a healthy life

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Board of Studies (BoS) :
11th BoS of Chemistry held on 17.06.2021

Academic Council:
17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	L	M	-	-	L	M	-	-	-	-	-	-	-	-
CO2	-	-	-	M	H	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	-	-	-	M	M	-	-	L	-	M	-	-
CO4	-	-	-	-	-	M	M	M	-	-	-	L	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SDG All: No Poverty, Zero Hunger, Good Health and Well-Being, Quality Education, Gender Equality, Clean Water and Sanitation, Affordable & Clean Energy, Decent Work and Economic Growth, Industry, Innovation & Infrastructure, Reduced Inequalities, Sustainable Cities and Communities, Responsible Consumption and Production, Climate Action, Life Below Water, Life on Land, Peace, Justice and Strong Institutions, Partnerships for the Goals.

Statement: This course discuss about the environment, all the natural resources available, sharing of resources, effective utilization, effects of over utilisation, health and environmental issues pertained to that, global warming and related issues, climates, disasters, impact assessments, population, human rights, societal welfare, laws to conserve the environment and sustainability.

CAD 1203	OOPS WITH C++ LABORATORY	L	T	P	C
SDG: 9		0	0	4	2

COURSE OBJECTIVES:

COB 1: Understand and solve logical & mathematical problems using Object Oriented Programming concepts.

COB 2: Design and develop programs using classes and objects

COB 3: Develop programs using Inheritance and constructors.

COB 4: Design and develop programs using Polymorphism and Exception Handling mechanisms.

COB 5: Develop programs using file stream classes

PRACTICALS

List of Experiments**:**

1. Write a C++ program to generate all the prime numbers between 1 and n using control structures.
2. Write a C++ program to sort a list of numbers in ascending order using Array.
3. Write a program to print the values of the variables using Scope resolution operator.
4. Program using classes, Objects and Data member functions.
5. Write a C++ program to implement array of objects.
6. Write a C++ program to implement friend functions
7. Write a C++ program to count the number of objects created using static data member function.
8. Write a C++ program to implement function overloading and operator overloading.
9. Using operator overloading concept implement arithmetic manipulation on two complexnumbers.
10. write a C++ program to demonstrate the use of constructors and destructors
11. Create a base class for a stack and implement push and pop operation. Include a derived class to check for stack criteria such as
    a) Stack empty b) stack full c) stack overflow
    d) Stack underflow.
12. Create a file called student and include the following fields:
    Student- name, Student's Reg No, Student's Attendance (overall % of attendance); and enter data for 10 students and output the same in proper format.
13. Write a C++ program to implement Virtual Function.
14. Program using Exception Handling Mechanism (Try , Throw and Catch).

15. Write a C++ program to sort the numbers using Function Templates.

P - 60; Total Hours - 60

TEXT BOOK:

1. E.Balaguruswamy: Object Oriented Programming with C++, Tata McGraw Hill Publications, 2015.

REFERENCES:

1. Stroustrup: The C++ Programming Language, Pearson Edition, 3rd Edition 2010.
2. Herbert Schildt, "C++:The Complete Reference", Tata McGraw Hill fourth Edition, 2003.

COURSE OUTCOMES: On completion of this course the students will be able to:

CO 1: Implement Object Oriented programming concepts
CO 2: Create classes & objects and understand their usages
CO 3: Implement inheritances, Constructors and Polymorphism
CO 4: Identify, understand and analyze various development models
CO 5: Manipulate data through File and Templates.

Board of Studies (BoS) : 15th BoS of CA held on 22.06.2021

Academic Council: 17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PS O3
CO1	H											H		H	
CO2						H						L			
CO3		M				H						M			H
CO4		H											H		H
CO5				M			M						H		

Note: L- Low Correlation M - Medium Correlation H - High Correlation

SDG 9 :Industry, Innovation and Infrastructure – Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement: By understanding the object oriented features, the students will be able to apply the knowledge to derive solutions to computing problems. Apply object oriented principles in software design process; the students will be able to analyze complex problems in the domain of software development with better effectiveness.

CAD 1204	LINUX LABORATORY	L	T	P	C
SDG: 9		0	0	4	2

COURSE OBJECTIVES:

COB1: Installation of Linux operating system.

COB2: Execute the basic commands of UNIX.

COB3: Understand the functionality and modes of VI Editor.

COB4: Implement the concepts of UNIX.

COB5: Create shell program in UNIX.

List of Programs:

1. How to install LINUX.

2. Execute 25 basic commands of UNIX.

3. Basics of functionality and modes of VI Editor

4. Create a file called vegetables and add the contents as follows
   - Brinjal
   - Carrot
   - Onion
   - Potato
   - Tomato

   Create one more file called Fruits and add the contents as follows
   - Apple
   - Banana
   - Cherry
   - Kiwi
   - PeacH

   a) Display the contents of the vegetables file on screen.
   b) Concatenate vegetables and fruits file and display the result.
   c) Show the difference between fruits and Vegetables.
   d) Add the content in the Fruits file as Mango, Grape.
5. Create a directory called Foods
   a) Move vegetables and fruits to foods directory.
   b) Remove vegetables files from foods.
   c) Comes out from foods.
   d) List all the files from this directory.
   e) Display all hidden files from the directory.

6. Display the detailed result for the below
    a) Get manual help and display the detailed information about bash
    b) Display the time to be taken for executing a file
    c) Change the mode of a fruits file to Read only to all users
    d) Count the number of words in vegetables file.
    e) Count the Number of Characters in Fruits file.
7. Create a file in vi editor and do the following
    a) Type 1-10 numbers and repeat it for two times using macros.
    b) Find the current working directory inside vi editor
    c) Open two files horizontally
    d) Add line numbers
    e) Split the window
    f) Search all the occurrences of the word TEXT.
8. Create a file in vi editor and do the following
    a) Insert a line in the beginning and end of line.
    b) Yank the last line of the text and paste as first line.
    c) List all the files with detailed information from this directory inside vi editor
    d) Change all the occurrences of the word TEXT to UNIX Swap first and second paragraph.
9. Disk related commands and communication commands in Unix
    a) Find the disk used space in your directory.
    b) Find disk free space in your directory with options.
    c) Send message to all users, “To shut down the System”.
    d) Block other user from writing in your terminal.
    e) Find the disk usage.
10. Write a shell program to print all odd numbers between10-30.

P – 60; Total Hours - 60

TEXT BOOKS AND REFERENCES:

1. The operating system Linux and programming languages An introduction Joachim Puls and Michael Wegner, 2010, 1st edition.
2. Beginning Ubuntu Linux, Keir Thomas, Andy Channelle and Jaime Sicam, 4th edition, 2009.

COURSE OUTCOMES

CO1: Installing Linux Operating System in machine.

CO2: Implement basic commands of UNIX.

CO3: Develop skills on the concepts of UNIX.

CO4: Create shell program in UNIX.

CO5: Implement GNU tool chain with Eclipse IDE

Board of Studies (BoS) :
15th BoS of CA held on 22.06.2021

Academic Council:
17th AC held on 15.07.2021

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO2
CO1	L							L				M		M
CO2		M	H										M	
CO3												M	H	
3CO4				L	M						M		L	M
M		H	H		H				L			H	H	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Statement: To analyze, design and develop Linux skills Practically taught in this course for the learners with respect to the course outcomes are measurable. Learners will pursue research and to become a software Professionals through innovative approach.

SEMESTER III

CAD 2101	DESIGN AND ANALYSIS OF ALGORITHMS	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES :

COB1: Design and develop efficient algorithms with minimum complexity using design techniques.

COB2: Understand the problems and design algorithms.

COB3: Study various algorithmic techniques.

COB4: Develop correct and efficient algorithms for solving a given problem.

COB5: Enables to analyse efficient algorithms for numerous applications.

MODULE I INTRODUCTION 09

Notion of an Algorithm – Fundamentals of Problem Solving – Important Problem Types – Fundamentals of the Analysis of Algorithm Efficiency – Analysis Framework – Asymptotic Notations and its properties – Mathematical analysis for Recursive algorithm and Non-recursive algorithms.

MODULE II DIVIDE AND CONQUER TECHNIQUE 09

Brute Force – Closest-Pair and Convex-Hull Problems-Exhaustive Search – Divide and conquer methodology – Merge sort – Quick sort – Binary search – Multiplication of Large Integers – Strassen's Matrix Multiplication.

MODULE III DYNAMIC PROGRAMMING AND GREEDY TECHNIQUE 09

Computing a Binomial Coefficient – Warshall's and Floyd' algorithm – Optimal Binary Search Trees – Knapsack Problem and Memory functions. Greedy Technique– Prim's algorithm- Kruskal's Algorithm- Dijkstra's Algorithm.

MODULE IV BACKTRACKING AND STRING MATCHING 09

Backtracking – N-Queens problem – Hamiltonian circuit problem – Subset sum problem - The naive string matching algorithm, The Rabin-Karp algorithm, String Matching with finite automata, The Knuth-Morris-Pratt algorithm.

MODULE V NP-COMPLETENESS 09

The class P and NP, Polynomial reduction, NP- Completeness Problem, NP-Hard Problems. Travelling Salesman problem, Hamiltonian problem,

Approximation algorithms.

L – 45; Total Hours- 45

TEXT BOOKS:

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition, Pearson Education, 2017.
2. Thomas H. Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein, Introduction to Algorithms, Third Edition, PHI Learning Private Limited, 2018.

REFERENCES :

1. Donald E. Knuth, The Art of Computer Programming, Pearson Education, 2016.
2. R.C.T. Lee, S.S. Tseng, R.C. Chang &Y.T.Tsai, Introduction to the Design and Analysis of Algorithms A Strategic Approach, TMH, 2012.

COURSE OUTCOMES :

Students who complete this course will be able to

CO1: Gain a clear understanding of the algorithm and basic frame work of algorithm development and learn to implement the algorithm notations.

CO2: Solve the algorithmic problems using different strategies.

CO3: Employ graphs to model engineering problems and provide elucidations.

CO4: Perform efficient back tracking and string matching by applying various algorithms

CO5: Implement and understand NP-Hard and deal with NP-complete problems.

Board of Studies (BoS) :
16thBoS of CA held on 23.12.2021

Academic Council:
18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1			H	M	H		L						H	
CO2			M		L									M
CO3					M						L		H	
CO4		L	M		H								M	
CO5			H		M								H	

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: The learner will be able to analyze and design algorithms with appropriate methods and techniques.

CAD 2102	SOFTWARE ENGINEERING	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Understand the phases in a software project

COB2: Familiarize the learners with fundamental concepts of requirements engineering and Analysis Modelling

COB3: Learn knowledge representation about Design and Development

COB4: Learn various testing and maintenance measures

COB5: Ability to apply software engineering principles and techniques.

MODULE I INTRODUCTION 9

The Evolving role of Software – The changing Nature of Software -Legacy software- A Process Framework – Process Assessment - Personal and Team Process Models – Product and Process – Process Models - The Waterfall Model – Incremental Process Models – Incremental Model – The RAD Model– Evolutionary Process Models - Prototyping – The Spiral Model – The Concurrent Development Model – Specialized Process Models –Unified Process.

MODULE II REQUIREMENTS ANALYSIS AND SPECIFICATION 9

Software Requirements: Functional and Non-Functional, User requirements, System requirements, Software Requirements Document - Requirement Engineering Process: Feasibility Studies, analysis, requirements, validation, requirements management-Classical analysis: Structured system Analysis.

MODULE III SOFTWARE DESIGN AND DEVELOPMENT 9

Design process — Design Concepts-Design Model– Design Heuristic — Architectural Design -Architectural styles, Architectural Design, Architectural Mapping using Data Flow- User Interface Design: Interface analysis, Interface Design.

MODULE IV SOFTWARE TESTING AND IMPLEMENTATION 9

Software testing fundamentals-Internal and external views of Testing-white box testing - Basis path testing-control structure testing-black box testing- Unit Testing - Integration Testing - Validation Testing - System Testing and Debugging - Software Implementation Techniques.

MODULE V SOFTWARE MAINTENANCE AND PROJECT MANAGEMENT **9**

Maintenance and Reengineering-Reengineering process model-Reverse and Forward Engineering. Software Project Management: Estimation - LOC, FP Based Estimation, COCOMO I & II Model - Project Scheduling - Scheduling, Earned Value Analysis Planning - Project Plan, Planning Process, Risk Management - Identification, Projection - Risk Identification-Case Tools.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Ian Sommerville,“ Software Engineering”- 10th Edition, Pearson, 2016.
2. Roger S. Pressman, “Software Engineering – A Practitioner "s Approach”, Seventh Edition, Mc Graw-Hill International Edition, 2010.

REFERENCES:

1. Rajib Mall, “Fundamentals of Software Engineering”, Third Edition, PHI Learning Private Limited ,2009.
2. Pankaj Jalote, “Software Engineering, A Precise Approach”, Wiley India, 2010
3. 1.Karl& Joy Beatty," Software Requirements", 3rd Edition, Microsoft Press, 2012.
4. S.K.Kataria, Rajiv Chopra, "Object Oriented Software Engineering", 3rd Edition, 2013.

COURSE OUTCOMES:

CO1: Identify the key activities in managing a software project.

CO2: Apply the Concepts of requirements engineering and Analysis Modeling.

CO3: Apply systematic procedure for software design and deployment.

CO4: Compare and contrast the various testing methods.

CO5: To gain the knowledge of how Maintenance processes are conducted in a software project.

Board of Studies (BoS) :
16thBoS of CA held on **23.12.2021**

Academic Council:
18th AC held on 24.02.2022

	PO 1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO1 1	PO 12	PSO 1	PSO2
CO1				M			L							H
CO2		H	L	M									H	
CO3							M				H			H
CO4				L			H							M
CO5							M	H			M		H	

Note: L - Low Correlation M -Medium Correlation H - High Correlation

SDG 9: Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: Software Engineering help the leaners to inculcate the tools for making business decisions and to implement real time projects. Software testing helpsthe companies for better understanding of the needs, expectations of their customers, improve the efficiency of customer service, market research carried out on social channels and increase their competitive intelligence.

CAD 2103	**RELATIONAL DATABASE**	**L**	**T**	**P**	**C**
SDG: 9	**MANAGEMENT SYSTEMS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

COB1: To learn the fundamentals of data models and to represent a database system using ER diagrams.

COB2: Tocreate a physical database from a design using DDL statements with appropriate key and constraints

COB3: To master the basics of SQL Views, Index and Triggers construct queries

COB4: To map ER into Relations and to normalize the relations

COB5: To understand the fundamental concepts of transaction processing-concurrency control techniques and recovery procedures.

MODULE I INTRODUCTION 9

Purpose of Database System - Views of data - Data Models - Database Languages - Database System Architecture - Database users and Administrator – Entity Relationship model (E-R model) - ER Diagrams - Introduction to relational databases.

MODULE II DATABASE DESIGN 9

Functional Dependencies – Non-loss Decomposition – Functional Dependencies – First, Second, Third Normal Forms, Dependency Preservation – Boyce/Codd Normal Form - Multi-valued Dependencies and Fourth Normal Form – Join Dependencies and Fifth Normal Form.

MODULE III RELATIONAL MODEL 9

The relational Model - The catalog – Types - Keys - Relational Algebra – DomainRelational Calculus - Tuple Relational Calculus - Fundamental operations – Additional Operations - SQL fundamentals (Table, Create, Select, Clause, Order by, Group by, Insert, Update, Delete, Join) – Data Constraints.

MODULE IV SQLVIEWS,INDEXANDTRIGGERS 9

Operations on Views - Integrity - Triggers - Security - Advanced SQL features - Embedded SQL - Dynamic SQL - Missing Information – Introduction to Distributed Databases and Client/Server Databases.

MODULE V TRANSACTION PROCESSING AND CONCURRENCY CONTROL 9

Transaction Concepts - Transaction Recovery – ACID Properties – System Recovery –Media Recovery – Two Phase Commit - Save Points – SQL Facilities for recovery –Concurrency – Need for Concurrency – Locking Protocols – Two Phase Locking –Intent Locking – Deadlock- Serializability – Recovery Isolation Levels – SQL Facilities for Concurrency.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Abraham Silberschatz, Henry F. Korth, S. Sudharshan, “Database System Concepts”, Tata McGraw Hill, Seventh Edition, 2020.
2. C.J.Date, A .Kannan, S.Swamynathan, “An Introduction to Database Systems ”,Pearson Education, Eighth Edition, 2006.

REFERENCES:

1. Ramez Elmasri, Shamkant B. Navathe, “Fundamentals of Database Systems”, Pearson / Addision wesley, Seventh Edition, 2016.
2. Raghu Ramakrishnan, “Database Management Systems”, McGrawHill, Third Edition, 2003.
3. S.K.Singh, “Database Systems Concepts, Design and Applications”, Pearson Education, Third Edition,2009.

COURSE OUTCOMES :

Students will be able to

CO1: Identify the data models for relevant problems and design ER diagram

CO2: Develop Relational Algebra and Relational Calculus queries

CO3: Effectively designs basic and advanced SQL queries to retrieve data from the database.

CO4: Applies various Normalization techniques for database design improvement.

CO5: Demonstrate their understanding of key notions of transaction processing and concurrency control.

Board of Studies (BoS) :
16thBoS of CA held on 23.12.2021

Academic Council:
18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H											H		
CO2		H			H										
CO3		H			H				H				H		
CO4			H						H				H		
CO5			H											M	

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: DBMSaids organizations in optimizing, storing, retrieving, and managing data in databases. It acts as a link between the database and the end user, ensuring that data is well-organized and accessible. Effective database management systems promote organizational data accessibility, allowing end users to share data more rapidly and effectively across the business. A management system aids in the rapid resolution of database queries, allowing for faster and more accurate data access.

CAD 2104	COMPUTER NETWORKS	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

The objective of the course is to help students to:

COB1: Understand the concept of layering in networks.

COB2: Learn about the various functions of physical and data link layer.

COB3: Know the principles of Circuit switching and Packet switching

COB4: Visualize the end-to-end flow of data.

COB5: Learn about the functions of Application Layer protocol

MODULE I INTRODUCTION 9

Data Communications - Data Communications Networking - Layered Architecture – OSI Model – Internet Architecture (TCP/IP) - Data Transmission media - Concepts and terminology - Networking Devices: Hubs, Bridges, Switches, Routers, and Gateways.

MODULE II PHYSICAL LAYER AND DATA LINK LAYER 9

Data encoding - Digital data Digital signals, Digital data Analog signals, Analog data Analog signals - Data link control: Framing - Flow control - Error Detection - Error Control - High Level Data Link Control (HDLC) - Media Access Control – Ethernet Basics.

MODULE III NETWORK LAYER 9

Network Layer: Internet Protocol – IPV4 Packet Format – Drawback of IPv4 - Internet Protocol version 6 (IPv6) - Benefits of IPv6 - IPv6 addressing - IPv6 Security - IPv6 Packet Structure- IP Addressing – Sub netting – Address Resolution Protocol (ARP) – Reverse Address Resolution Protocol (RARP) - Internet Control Message Protocol (ICMP) – Concept of SDN - Circuit switching: Circuit switching networks switching concepts - Routing in circuit switched networks - Packet switching principles - Routing in packet switching.

MODULE IV TRANSPORT LAYER 9

Transport Layer functions – Multiplexing and De multiplexing – User Datagram Protocol – UDP Applications – Transmission Control Protocol – Flow Control – Retransmission Strategies – Congestion Control.

MODULE V APPLICATION LAYER 9

Application Layer protocols – HTTP – FTP – SMTP – SNMP – DNS – Case study Applications: ping and traceroute commands.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Larry L. Peterson, Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers Inc., 2011.
2. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson Education, 2014.

REFERENCES:

1. Douglas E. Comer, Internetworking with TCP/IP, Principles, protocols, and architecture, Vol. 1 5th Edition,2006.
2. Behrouz A. Forouzan, Introduction to Data Communication & Networking, Mc. Graw Hill Publishers, 4th edition 2007.

COURSE OUTCOMES:

On completion of this course the students will be able to,

CO1: Identify the key functions of different network devices.

CO2: Identify the functions of Flow control and Error Control.

CO3: Apply the addressing principles such as subnetting to design different sizes of networks.

CO4: Analyze and compare transport layer protocols.

CO5: Compare the function of Application protocols.

Board of Studies (BoS): 16thBoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	L	L	M	M			M						M	
CO2	H	H												M
CO3			H	H	H	M							H	
CO4			M	M	M	M		H					H	
CO5			H					H					H	

Note: L - Low Correlation M -Medium Correlation H -High Correlation

SDG 9: Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Computer Networks help the learners to know network structure, gain the knowledge of functions of each layer, IP addressing and to learn about the functions of networking devices and various protocols. The network designers are carried out the research on constructing efficient and secured networks to build various types networks

CAD2105	PROGRAMMING IN JAVA	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Provide basic fundamentals of Java Programs

COB2: Explore classes ,Inheritances and Packages

COB3: Understand how exception handling works in Java

COB4: Read and write data using Java streams

COB5:. Demonstrate the use of AWT packages and Events

MODULE I INTRODUCTION **9**

Brief History of Java, Special Features of Java, Key words- Data Types Primitive and Non primitive data types -Variables-Expressions-Operators in Java, Control Structures, Decision making and Branching Looping statements – Arrays – Strings .

MODULE II CLASS AND INHERITANCE **9**

The Java Class - Defining a Class-Accessing class members- Constructors - Inheritance, Extending a class, Method Over-riding, Method Overloading, Access Modifiers, Abstract Class and Method, Interfaces, - Defining Interfaces –Extending Interfaces -Packages, creating a package - Imports and Class Path.

MODULE III THREADS AND EXCEPTION HANDLING **9**

Threads: Introduction, Creating Threads in Applications- Thread Priority.-Life cycle of a thread –Implementing Runnable Interface –Exceptions- Types of Errors-The Try-Catch Statement and Throw Multiple Catch statements-Finally block .

MODULE IV FILES AND I/O STREAM CLASSES **9**

File Class- Working with File Object, File I/O Basics, Creation of Files Reading and Writing to Files, Buffer and Buffer Management, Read/Write Operations with File. Concepts of streams –Stream Classes - Byte stream classes-Character stream classes - Input Stream Classes, Output Stream Classes

.

MODULE V APPLETS AND GRAPHICAL USER INTERFACE DESIGN **9**

Applet, Applets Life Cycle –Components and Containers, Layout Managers,

AWT Components, Adding a Menu to Window, Extending GUI Features Using Swing Components, , Loading and Viewing Images, Event Handling mechanism – Event Classes - Introduction to Java Database connectivity – JDBC Drivers and Architectures.

L – 45; Total Hours - 45

TEXT BOOKS:

1.E.Balagurusamy ," Programming with Java" 6th edition, McGraw-Hill Education, 2019.

2.Hortsmann& Cornell, "Core Java Advance Features VOL II", 9thEdition, PearsonEducation,2015.

REFERENCES:

1.Patrick Naughton, "Complete Reference: JAVA 2", 8th Edition, Tata Mc Graw Hill, July 2017.

2.Andrew Lee Rubinger, Bill Burke "Enterprise JavaBeans 3.1", 6thEdition, O'Reilly Publishers,2012.

COURSE OUT COMES :

Students will be able to

CO1: Identify classes, objects, members of a class and relationships among them needed for a specific problem.

CO2: Write Java application programs using OOP principles.

CO3: Demonstrate the concepts of polymorphism and inheritance.

CO4: Write Java programs to implement error handling techniques using exception handling.

CO5: Develop Java programs using Applets and AWT packages .

Board of Studies (BoS) : 16thBoS of CA held on **23.12.2021**

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	H	H											M		
CO2		H			H									H	
CO3		H			H				H					H	
CO4			H						H				M		
CO5			H												

Note: L- Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement : :Programming logics, design and developments taught in this course for the learners with respect to the course outcomes are measurable and useful in improving the programming skill of the learner.. Apply object oriented principles in software design process, the students will be able to analyze complex problems in the domain of software development with better effectiveness

CAD 2108	DIGITAL MARKETING	L	T	P	C
SDG : 4		3	0	0	3

COURSE OBJECTIVES :

COB1: Understand the major concepts of Digital marketing and its various tools.

COB2: Understand the major digital marketing channels- online advertising, digital display, video, mobile, search engine and social media.

COB3: Learn and develop, evaluate and execute comprehensive digital marketing strategies and plan.

COB4: Learn how to measure digital marketing efforts and calculate CPC and ROI.

COB5: Explore the latest digital ad technologies.

MODULE I INTRODUCTION TO DIGITAL MARKETING 09

Digital Marketing , History of SEO , Comparison between digital and traditional marketing , importance of digital marketing , Benefits of digital marketing , various digital marketing tools, Digital marketing strategies and goals , case study- latest trends in digital marketing.

MODULE II SEARCH EENGINE OPTIMIZATION 09

Introduction to SEO, components of SEO, SEO keyword planning, ON Page SEO, OFF Page SEO, Local SEO, Mobile SEO, Ecommerce SEO, Measuring SEO effectiveness.

MODULE III SOCIAL MEDIA MARKETING 09

Introduction to social media marketing, benefits of using SMM, Social Media Strategy and statistics, blogging , social networking , face book marketing , Instagram marketing, twitter marketing, LinkedIn marketing, Google plus marketing, SMM analytical tools.

MODULE IV SEARCH ENGINE MARKETING 09

Introduction to search engine marketing, various SEM tools, email marketing ,PPC,CPC bidding, report generation, case study –create a campaign using Google Ads.

MODULE V APPLICATION OF DIGITAL MARKETING 09

Google Analytics, display advertisement technique, online reputation management, affiliate marketing, social media analytics, Ad designing , Video creation , case study –web page analysis.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Ryan deiss and russ Hennesberry-“Digital Marketing for Dummies”2017
2. Danny star “ Digital marketing 2020 –grow business with digital marketing”

REFERENCES :

1. Jan Zimmerman, Deborah Ng “Social Media Marketing All-in-one Dummies -4th Edition / John Wiley & Sons Inc,”
2. Eric Enge, Stephan Spencer, Jessie Stricchiola “The Art of SEO “3rd Edition- O’Reilly Media Inc,

COURSE OUTCOMES :

Students who complete this course will be able to,

CO1: Define and explain various technologies associated with digital marketing.

CO2: Apply the knowledge of digital marketing concepts.

CO3: Construct an appropriate marketing model.

CO4: Analyze role and importance of digital marketing in a rapidly changing business landscape.

CO5: Implement the key elements of a digital marketing strategy.

Board of Studies (BoS) : 16th BoS of CA held on **23.12.2021**

Academic Council: 18th AC held on 24.02.2022

	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12	PS O1	PS O2	PS O3
CO1		M				L									
CO2		M			M										
CO3		H						M		L					
CO4		H											M		
CO5			H		M							L			

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4 : Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement: The understanding of concepts related to Digital Marketing and its various tools.

CAD 2106	**RELATIONAL DATABASE MANAGEMENT SYSTEMS LABORATORY**	**L**	**T**	**P**	**C**
SDG: 9		**0**	**0**	**4**	**2**

COURSE OBJECTIVES:

The Objective of this Course is to

COB1: Impart knowledge in the basics of relational database management system.

COB2: Focus on writing SQL queries and demonstrate the use of constraints.

COB3: Access and manipulate database using views and index.

COB4: Illustrate the functionalities of PL/SQL programming.

COB5: Learn to design and access the real time database.

List of Programs:

1. Demonstrate DDL commands, DML commands, DCL commands and TCL commands.
2. Design relations to implement the integrity constraints (primary key, foreign key, unique and check constraints).
3. Apply aggregate functions to group the values of multiple rows.
4. Implement group by functions with having clause.
5. Retrieval of data from one or more relations with nested sub queries.
6. Apply join operations to retrieve data from multiple relations.
7. Construct views from a single table/ multiple tables and demonstrate the manipulation of views.
8. Create Synonyms, Sequences and Index and perform SQL operations on it.
9. Demonstrate the concepts of looping, cursors and exception handling using PL/SQL statements.
10. Develop PL/SQL functions with select and update statements.
11. Develop stored and unnamed PL/SQL procedures to retrieve data from a relation.
12. Demonstrate the execution of Triggers whenever the insertion or deletion event occurs in the database.
13. Application Development using Oracle/ SQL SERVER / MYSQL / POSTGRES Db2

P – 60; Total Hours - 60

TEXT BOOKS:

1. Alan Beaulieu ,“Learning SQL - Generate, Manipulate, and Retrieve Data”, O’Reilly, 3rd Edition, 2020.
2. Steven Feuerstein, Bill Pribyl & Chip Dawes, “Oracle PL/SQL Language Pocket Reference”, O’Reilly, 5th Edition, 2015.
3. Felix Alvaro, “SQL - Easy SQL Programming & Database Management for Beginners, Your Step-By-Step Guide To Learning The SQL Database” Kindle Edition, 2016.
4. https://docs.oracle.com/cd/E11882_01/server.112/e41085.pdf

REFERENCES:

1. S. Sumathi, S. Esakki rajan, "Fundamentals of Relational Database Management Systems", Springer Science & Business Media.2013.
2. N. P. Singh, C.S. Gupta, "Relational Database Management Systems", Abhishek Publications, 2014.

COURSE OUTCOMES:

Students who complete this course will be able to

CO1: Create and manipulate databases using SQL queries.

CO2: Retrieve data using Nested sub queries and Join Queries.

CO3: Perform indexing on database and manipulate SQL queries on views.

CO4: Manipulate database using PL/SQL functions and procedures.

CO5: Develop database applications for the real-world problems.

Board of Studies (BoS) : 16thBoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H	M	M										H	M
CO2	L	L	M										H	M
CO3	M	L	M										H	M
CO4	M	L	M										H	M
CO5	M	L	M							M			H	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9: Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: The knowledge gained by the learner in this course will help them significantly improve their understanding and implement the concepts learned in real world applications to store and retrieve data effectively.

		L	T	P	C
CAD2107	**PROGRAMMING IN JAVA LABORATORY**				
SDG: 9		**0**	**0**	**4**	**2**

COURSE OBJECTIVES:

COB1: Develop the programming skills using the object oriented programming methodology to produce quality computer based solutions to real problems.

COB2: Understand the fundamentals of object-oriented programming in Java, including defining classes, objects, invoking methods etc and exception handling mechanisms

COB3: Work with collection API and develop fast programs.

COB4: Develop good multithreaded programs.

COB5: Develop user interface and painting graphics and images.

LIST OF EXERCISES:

1. Programs using basic data types, operators and control structures.
2. Class definitions and usage involving variety of constructors and finalizes
3. Programs involving various kinds of inheritances,
4. Program to demonstrate creation and handling of packages, their imports and Class Path.
5. Programs involving a variety of Exception Handling situations
6. Program involving creating and handling threads in applications and applets.
7. Program to demonstrate AWT/Swing graphic methods
8. Program for Loading and Viewing Images, Loading and Playing Sound
9. Programs to demonstrate various Layouts
10. Programs to demonstrate event handling
11. Program that connects to a database using JDBC
12. Program to connect to database using JDBC &insert values into table
13. Program to connect to a database using JDBC and delete values from table.

EXTRA PROGRAMS:

1. Write a program to create a frame using AWT. Implement mouseClicked(), mouseEntered() and mouseExited() events. Frame should become visible when mouse enters it
2. Using AWT, write a program to display a string in frame window with

pink colour as background.

3. Using AWT, write a program to create two buttons named “Red” and “Blue”. When a button is pressed the background colour should be set to the colour named by the button’s label.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Patrick Naughton, "Complete Reference: JAVA 2", 8th Edition, Tata McGrawHill, 2011.

REFERENCES:

1. Keyur shah, “Gateway to Java Programmer Sun Certification”, Tata McGraw Hill 2002.
2. Herbert Schildt, The Complete Reference – Java 2, 4th Edition, Tata McGraw Hill,2007

COURSE OUTCOMES:

CO1: Implement Java classes from specifications.

CO2: Effectively create and use objects from predefined class libraries.

CO3: Implement primitive data types and arrays.

CO4: Write programs using interfaces, inheritance, and polymorphism.

CO5: Develop programs using Applet.

Board of Studies (BoS) : 16thBoS of CA held on **23.12.2021**

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO 2
CO1	M		H											
CO2		M	M											
CO3							M							
CO4	M		M							L				
CO5			M											L

Note: L- Low Correlation M -Medium Correlation H -High Correlation

SDG 9:Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Object-oriented programming aims to implement real-world entities like inheritance, hiding, polymorphism etc in programming. Mainly it is used create application based on object oriented concepts.

GED 2102	APTITUDE AND INTERPERSONAL SKILLS	L	T	P	C
SDG: 8		0	0	2	1

COURSE OBJECTIVES:

COB1: To enhance problem solving skills

COB2: To train the students to face competitive examination

COB3: To recognize communication barriers and act accordingly

COB4: To learn the nuances of Group discussion and basic Etiquettes.

MODULE I GENERAL MENTAL ABILITY 8

Problems on Age - Time & Work – Speed, Distance & Time – Problems on Train - shortcut techniques - Simple & Compound Interest.

MODULE II QUANTITATIVE APTITUDE AND REASONING 7

Percentage - Profit & Loss – Ratios and Proportions –Verbal Reasoning: Direction, Blood relations, Calendar and Clocks

MODULE III COMMUNICATION AND INTERPERSONAL SKILL 7

Communication skill - Effective listening skills – Problem Solving – Positive Attitude – Maintaining Trust.

MODULE IV PERSONALITY DEVELOPMENT 8

Presentation skills - Group Discussion techniques - Grooming Basics – Etiquettes - Body Language.

P – 30 ; Total Hours - 30

REFERENCES:

1. Bhattacharya. Indrajit (2008). An Approach to Communication Skills, DhanpatRai& Co., (Pvt.) Ltd. New Delhi.
2. Swan, Michael (2005). Practical English Usage, Oxford University Press.
3. Tyra .M, Magical Book On Quicker Maths, BSC Publishing Company Pvt. Limited, 2009
4. R. S. Aggarwal , Quantitative Aptitude for Competitive Examinations, S. Chand Limited, 2017
5. R. S. Aggarwal , A Modern Approach to Verbal & Non-Verbal Reasoning , S. Chand Limited, 2010
6. KhattarDinesh , The Pearson Guide to Quantitative Aptitude for

Competitive Examinations, 3e, Pearson India , 2016.
7. Bhattacharya. Indrajit, An Approach to Communication Skills, DhanpatRai& Co., (Pvt.) Ltd. New Delhi, 2008
8. Swan, Michael, Practical English Usage, Oxford University Press, 2005
9. P.A. Anand , Wiley's Quantitative Aptitude, 1st Edition,Wiley,2015
10. InduSijwali, A New Approach to Reasoning Verbal & Non-Verbal, Arihant Publications India limited, 2018
11. DishaExperts , Shortcuts in Reasoning (Verbal, Non-Verbal, Analytical & Critical) for Competitive Exams 2nd Edition, Disha Publication, 2018
12. Jaikishan, Premkishan, How to Crack Test Of Reasoning, Arihant Publications India limited, 2018.

COURSE OUTCOMES:

CO1: Apply the concept of aptitude in competitive examination

CO2: Identify simple methods and solutions on problem solving

CO3: Break the glass ceiling and the hurdles of communication barriers

CO4: Present them self positively and master the art of Group discussion and basic etiquettes.

Board of Studies (BoS) :
13thBoS of Department of English held on 17.6.2021

Academic Council:
17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10
CO1					L				L	
CO2					M					
CO3								M		
CO4								M		

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG No. 8:Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

This Course offers the employability and creates decent working environment.

SEMESTER IV

CAD 2201	PYTHON PROGRAMMING	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

COB 1: Introduce the basic concepts of python programming with values and variables.

COB 2: To know the basic arithmetic expression and conditional statement in python.

COB 3: To understand the code reusability by using function concept.

COB 4: Explore the various python data collection techniques.

COB 5: Understand the logic of array and file handling techniques in python environment.

MODULE I INTRODUCTION 9

Introduction to Python Programming, development tools, values and variables, integer values, variables and assignment, identifiers, floating point types, control codes with strings, user input, eval function, print function.

MODULE II ARITHMETIC EXPRESSION & CONDITIONAL STATEMENT 9

Expression and arithmetic, operator precedence and associatively, comments and errors, syntax errors, run time errors, logic errors, arithmetic operators. Conditional execution, Boolean expressions, simple if statement, if/else, compound Boolean expressions, nested conditions, decision statements, conditional expressions. Iterations, while statement, definite vs indefinite loops, nested loops, abnormal loop termination.

MODULE III FUNCTIONS & OOPS CONCEPT 9

Functions, standard mathematics functions, time function, random function, importing function, writing own functions, parameter passing, custom function vs standard functions. Global variables, default variables, recursion, reusable functions, functions as data – Exception Handling. OOPS - Class/Objects, encapsulation/data hiding, Inheritance, Polymorphism.

MODULE IV PYTHON COLLECTIONS 9

Lists, List assignment, list bounds, slicing, list and functions, prime generation with list, sorting, flexible sorting, search, linear search, binary search, list permutation, random permutation, objects, string objects, list

objects, Tuples & its operations, Dictionaries & its operations.

MODULE V NUMPY, FILE HANDLING & PANDAS BASICS 9

NumPy array attributes – Array indexing – Array slicing – Computation on Numpy Arrays – Aggregations – Sorting arrays. Files I/O -Printing to the Screen - Reading Keyboard Input - Opening and Closing Files - Reading and Writing Files - Renaming and Deleting Files. Pandas Basics – Creation of Data Frame, Manipulation of Data Frame.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Kenneth A. Lambert, The Fundamentals of Python: First Programs, Cengage Learning, ISBN: 978-1111822705, 2011.
2. Dusty Phillips, Python Object Oriented Programming, PACKT Press, ISBN: 9781789615852, 2018.
3. Jake VanderPlas, Python Data Science Handbook: Essential tools for working with data, O'Reilly Media, CA, 2016.

REFERENCES:

1. Mark Lutz, Programming Python, O'Reilly Media, 5th Edition, 2013.
2. Tony Gaddis, Starting Out with Python, Pearson, 3rd Edition, ISBN-13: 978-0133862256, 2011.
3. Downey, Allen B, Think Python: How to Think Like a Computer Scientist, O'Reilly, 2nd Edition, 2016.
4. David M. Baezly, Python Cookbook, O'Reilly Media,3rd edition, 2013.

COURSE OUTCOMES:

Students who complete this course will be able to

CO 1: Apply the programming logic in python environment.

CO 2: Provide arithmetic and logical solutions to the real-time applications.

CO 3: Implement the code reusability technique for programming efficiency.

CO 4: Collect various real-time data in appropriate repository for Programming.

CO 5: Explore the array data using Numpy & handle data using file system.

Board of Studies (BoS) : 16thBoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO9	PO 10	PO1 1	PO 12	PSO 1	PS O2
CO1			M										H	
CO2							M						M	
CO3					M								M	
CO4			H						H				H	
CO5									M		M		H	H

Note:L- Low Correlation M -Medium Correlation H -High Correlation

SDG 4: Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement:

The Python programming and its techniques were taught in this course. Understanding the insights and importance of python programming will motivate the student to deploy business applications in real-time scenario. The knowledge attained through python programming will improve the skills set of the student to meet industrial demand.

CAD 2204	WEB DESIGN AND DEVELOPMENT	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: To introduce the concepts and technologies used in website design.

COB2: Learn the use of Hypertext markup tags for web site design

COB3: Identify appropriate style properties to design web pages with style sheets

COB4: Develop basic programming skills using Javascript

COB5: Understand the principles of creating an effective dynamic web page using a framework.

MODULE I INTRODUCTION 9

Introduction to WWW - Introduction to Network, Internet and Intranet, Application and Services, Internet Addressing – URL, Elements of Web – Web Page, Designing Principles-Web Site Building, Web Languages – HTML/DHTML, JavaScript, PHP.

MODULE II HYPER TEXT MARKUP LANGUAGE 9

Building Web Based Application using Visual Studio- HTML-Html Document Structure, Various HTML Tags –Image Tag, Table Tag, Line Breaks, Frames, and Forms. HTML5 Tags –HTML5 New Elements- Event Attributes – HTML5: Google maps, GEO Location - HTML Canvas Tag - Audio, Video

MODULE III CASCADING STYLE SHEET 9

Introduction to Style sheet - Types of Style sheet, concept of class &ID – CSS Property– Background Property - Font property- Text property- Borders -Margins- Padding.

MODULE IV CLIENT-SIDE SCRIPTING LANGUAGE 9

Types of Scripting language, Introduction to JavaScript- JavaScript Operators- Conditional Structure & Looping Structure-Dialog Boxes- Arrays- Built-in Functions (String, Math, Date, Array)- Document Object Model-Form Objects and events-Form validation using JavaScript.

MODULE V SERVER-SIDE SCRIPTING LANGUAGE 9

Introduction to PHP-Basic PHP syntax-PHP tags, PHP statements-Variables-Global-Local-Static- Operators- Conditional and Looping Structure-Arrays-

Indexed-Associative-Multidimensional- PHP MyAdmin- Performing basic database operations. Domain and Hosting, Introduction to Cpanel - Installing the wordpress – Installing themes and plugins – Deploy - Yoast SEO.

L – 45; Total Hours – 45

TEXT BOOKS:

1. HTML&CSS: The Complete Reference ,Fifth edition,Thomas A. Powell ,2010(I,II&III)
2. Beginning JavaScript 2nd Edition, Wrox, Nicholas C. Zakas,2007(IV)
3. PHP Bible, Wiley Publication, Tim Converse, Joyce Park,2002(V)

REFERENCES:

1. Developing Web Application, Wiley India Publication, Ralph Moseley,Wiley India,2007.
2. Web Enabled Commercial Application Development Using HTML, JavaScript, DHTML and PHP,Ivan Bayross, 4th Edition ,2010.
3. Mastering Html, Css & Java script Web Publishing ,by Laura Lemay (Author), Rafe Colburn (Author), Jennifer Kyrnin (Author)BPB Publications First Edition– 15 July 2016.
4. https://www.tutorialspoint.com/cpanel/cpanel_tutorial.pdf

COURSE OUTCOMES:

CO1: Demonstrate the knowledge and ability to apply the design principles and techniques in creating websites.

CO2: Identify HTML tags to construct the basic webpage

CO3: Incorporate CSS properties to provide effective presentation of information in web pages

CO4: Develop interactive dialog box using Javascript

CO5: Build dynamic web pages using word press framework

Board of Studies (BoS) : 16th BoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO 4	PO 5	PO 6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1			H		H	M	M					M	H	
CO2			H		H	M	M					M	H	
CO3			H		H	M	M					M	H	
CO4			H		H	M	M					M	H	
CO5			H		H	M	M					M	H	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Web designing Principles and Programming concepts taught in this course for the learners with respect to the course outcomes are measurable and useful in applying one's disciplinary knowledge and transferable skills to new/unfamiliar contexts. As the future industrial personnel, the learner would be able to improve skill set to demonstrate competence in the practical art of providing quality content in websites and social media.

CAD 2205	DATA MINING AND DATA WAREHOUSING	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: To provide an overview of basic principles, concepts of data mining and architecture of data ware housing .

COB2: To introduce the different data preprocessing techniques.

COB3: To disseminate knowledge on mining patterns.

COB4: To provide insight to various of data mining techniques

COB5: To understand the concepts of classification and clustering

MODULE I INTRODUCTION ON DATA MINING 9

Introduction on Data mining, Data mining on various kinds of data– Relational databases – Data Warehouses - Transactional Databases – Advanced Data and Information Systems and Advanced Applications. Data mining Functionalities: Concept / Class Description, Characterization - Classification and Prediction – Cluster Analysis.

MODULE II DATA WAREHOUSES AND OLAP 9

Data Warehouse- Differences between Operational Database Systems and Data Warehouses- A Multidimensional Data Model- From Tables and Spreadsheets to Data Cubes- Data Warehouse Architecture- Steps for the Design and Construction of Data Warehouses, A Three-Tier Data Warehouse Architecture, Types of OLAP Servers: ROLAP versus MOLAP versus HOLAP.

MODULE III DATA PREPROCESSING 9

Descriptive Data Summarization– Data Cleaning - Data Integration and Transformation – Data Reduction – Data Discretization and Concept Hierarchy Generation-Attribute-Oriented Induction for Data Characterization - Presentation of the Derived Generalization Mining Class Comparisons: Discriminating between Different Classes.

MODULE IV MINING – FREQUENT PATTERNS, ASSOCIATIONS CORRELATIONS 9

Market Basket Analysis: A Motivating Example Frequent Itemsets, Closed Itemsets, and Association Rules, Frequent Pattern Mining: A Road Map, The Apriori Algorithm: Finding Frequent Itemsets Using Candidate Generation, Generating Association Rules from Frequent Itemsets, From Association

Mining to Correlation Analysis Strong Rules.

MODULE V CLASSIFICATION & CLUSTERS ANALYSIS 9

Classification – Issues regarding Classification - Classification by Decision Tree Induction – Bayesian Classification – Rule Based Classification - KNN Classifiers.

Clusters Analysis: Types of Data In Cluster Analysis- Categorization of Major Clustering Methods: Partitioning Methods: k-Means, k-Medoids – Hierarchical Methods: BIRCH, Chameleon – Density based Methods: DBSCAN, OPTICS. Applications.

L – 45; Total Hours – 45

TEXT BOOKS:

1. Data Mining: The Data Mining Guide for Beginners, Including Applications for Business, Data Mining Techniques, Concepts, and More by Herbet Jones 2020.

REFERENCES:

1. Jiawei Han and Micheline Kamber : “Data Mining Concepts and Techniques”, 3rd Edition,Elsevier,2012.
2. Joshi, Siva kumar & Yesha, Data Mining Next Generation Challenges and Future Directions, Prentice Hall of India,2007
3. G.K. Gupta, PHI Private limited, Introduction to Data mining with case studies, New Delhi, 2008. 2nd Edition, PHI,2011.

COURSE OUTCOMES:

On completion of this course students will be able to:

CO1: Understand the need of Data mining and their functionalities.

CO2: Select the appropriate preprocess technique to cleanse the data.

CO3: To analyze the data and mine patterns from the given data set.

CO4: Select the suitable classification / clustering algorithm and implement the same given dataset

CO5: Design exclusive data warehouse for a given business vertical.

Board of Studies (BoS) : 16thBoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO 5	PO6	PO 7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2	PSO 3
CO1	M														
CO2		M			L					H			H		
CO3		M								H			H		
CO4				H						H			H		
CO5		H								H			H		

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation

Data mining is a process used by companies to turn raw data into useful information. Using software tools to look for patterns in large batches of data, businesses can learn more about their customers to develop more effective marketing strategies, increase sales and decrease costs. Data warehousing improves the speed and efficiency of accessing different data sets and makes it easier for corporate decision-makers to derive insights

CAD 2206	OBJECT ORIENTED ANALYSIS AND DESIGN	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Understand the necessity of object orientation and development methodologies.

COB2: Write scenarios for the business use cases.

COB3: Design data model and system flow using UML diagrams.

COB4: Design the interface and input screens

COB5: Construct classes from the activity diagram and write test cases

.

MODULE I INTRODUCTION **9**

An overview – Object basics – Object state and properties – Behavior – Methods – Messages – Information hiding – Class hierarchy – Relationships – Associations – Aggregations- Identity – Dynamic binding – Persistence – Meta classes – Object oriented system development life cycle.

MODULE II METHODOLOGY AND UML **9**

Introduction – Survey – Rumbugh, Booch, Jacobson methods – Patterns – Frameworks – Unified approach – Unified modeling language – Static and Dynamic models – UML diagrams – Class diagram – Use case diagrams – Dynamic modeling – Model organization –Extensibility.

MODULE III OBJECT ORIENTED ANALYSIS **9**

Identifying Use case – Business object analysis – Use case driven object oriented analysis – Use case model – Documentation – Classification – Identifying object, relationships, attributes, methods – Super-sub class – A part of relationships Identifying attributes and methods – Object responsibility. Case Study Analyzing ViaNet Bank ATM – The use case driven process.

MODULE IV OBJECT ORIENTED DESIGN **9**

Design process – Axioms – Corollaries – Designing classes – Class visibility – Refining attributes – Methods and protocols – Object storage and object interoperability – Databases – Object relational systems – Designing interface objects – Macro and Micro level processes – The purpose of a view layer interface – Case study : Designing user interface for Bank ATM system.

MODULE V SOFTWARE QUALITY 9

Quality assurance – Testing strategies – Object orientation testing – Test cases– Test Plan –Debugging principles – Usability – Satisfaction –Usability testing– Satisfaction testing – Case Study : Developing Test plans and Test cases for the Bank ATM system.

L – 45 ; Total Hours – 45

TEXT BOOKS:

1. Ali Bahrami, “Object Oriented System Development”, McGraw Hill International Edition, Reprint 2009.

REFERENCES:

1. Craig Larman, Applying UML and Patterns, 2ndEdition, Pearson, 2002.
2. Grady Booch, James Rumbaugh, Ivar Jacobson, “The Unified Modeling Language User Guide”, Addison Wesley Long man,1999.
3. Bernd Bruegge, Allen H. Dutoit, Object Oriented Software Engineering using UML, Patterns and Java, Pearson2004.

COURSE OUTCOMES:

CO1: Describe basics of object orientation and development methodologies.

CO2: Identify the stakeholders as actors and develop sequence diagrams.

CO3: Construct classes from the activity diagram.

CO4: Design data base model and provide data base connectivity.

CO5: Write test cases and perform software testing.

Board of Studies (BoS) : 16th BoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1			H		H	M	M					M	H	
CO2		H	H		H	M	M					M	H	M
CO3			H		H	M	M					M	H	
CO4			H		H	M	M					M	H	
CO5			H		H	M	M	M	H	M	M	M	H	M

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Object oriented Analysis and Design Concepts taught in this course for the learners with respect to the course outcomes are measurable measurable and useful in applying one's disciplinary knowledge and transferable skills to new/unfamiliar contexts. The Leaner's can able analyze and model Software specifications.

CAD 2203	**PYTHON PROGRAMMING LABORATORY**	**L**	**T**	**P**	**C**
SDG: 9		**0**	**0**	**4**	**2**

COURSE OBJECTIVES:

COB1: To write, test, and debug simple Python programs

COB2: To implement Python programs with conditionals and loops.

COB3: To learn Syntax and create Functions in Python.

COB4 To represent compound data using Python Lists, Tuples, Dictionaries

COB5: To handle Strings and Files in Python

LIST OF PROGRAMS

1. Write a program for addition, subtraction, multiplication and division of two numbers
2. Write a program to print Fibonacci number series
3. Write a program to incorporate Fizz for any number divisible by 3 and Buzz for any number divisible for 5 and FizzBuzz for any number divisible by 3 and 5 as well.
4. Write a Python program to display Reverse String.
5. Write a Python program to display a Multiplication Table.
6. Write a Python program to display all Prime Numbers between 1 to 10000.
7. Write a Python program to demonstrate the Array Operations and Methods.
8. Write a Python program to demonstrate Recursive Functions.
9. Write a Python program to display all List operations.
10. Write a Python program to demonstrate all Tuple Operations.
11. Write a Python program to demonstrate all Dictionary Operations.
12. Write a program to create a game “Rock, Paper and Scissor”
13. Write a Python program to demonstrate Linear and Binary search.
14. Write a program to convert speech to text.
15. Write a Python program to Create a file, Read the content in a file, Write the content in a file, Delete the content in a file.

P – 60; Total Hours - 60

TEXT BOOKS:

1. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 2021.
2. John V Guttag, “Introduction to Computation and Programming Using Python: With Applications to Computational Modeling and Understanding Data ‘‘, Third Edition, MIT Press, 2021.

3. Eric Matthes, “Python Crash Course, A Hands – on Project Based Introduction to Programming”,2nd Edition, No Starch Press, 2019.

REFERENCES:

1. Martin C. Brown, “Python: The Complete Reference”, 4th Edition, Mc-Graw Hill, 2018.
2. Allen B. Downey, “Think Python: How to Think like a Computer Scientist”, 2nd Edition, O’Reilly Publishers, 2016.
3. Karl Beecher, “Computational Thinking: A Beginner’s Guide to Problem Solving and Programming”, 1st Edition, BCS Learning & Development Limited, 2017.
4. https://www.w3schools.com/python/default.asp.

COURSE OUTCOMES:

CO1: Examine Python syntax and semantics in the use of Python programs.

CO2: Implement programs in Python using conditionals and loops for solving problems.

CO3: Implement the various functions prototype in Python program.

CO4: Understand and implement various data structures Lists, Tuple, Dictionaries and strings.

CO5: Demonstrate proficiency in handling Strings and File Systems

Board of Studies (BoS) : 16th BoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO 2
CO1	L		M		H	L					L		M	
CO2	M	M	H		H								M	L
CO3	L		H			L							H	
CO4	M		M		L									
CO5	H		M		L	L							L	

Note: L - Low Correlation M – Medium Correlation H - High Correlation

SDG 4: Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Programming concepts, plan & features are taught in this course for the learners with respect to the course outcomes are measurable and useful in improving the programming and logical skill of the learner. As the software industries growing rapidly, this course will enable the learner to explore various technologies such as web development, Artificial Intelligence, Data Science and IoT by using python programming.

CAD 2207	WEB DESIGN LABORATORY	L	T	P	C
SDG: 9		0	0	4	2

COURSE OBJECTIVES:

COB1: To develop web pages that present information, graphics and hypertext links to other web pages in a cohesive manner.

COB2: Identify most HTML tags and CSS properties and use a text editor to construct the basic HTML and CSS structure for a webpage.

COB3: To validate forms using JavaScript and its use for dynamic effects.

COB4: To develop an ability to design and implement static and dynamic website.

COB5: To understand how to effectively implement it in the web environment.

PRACTICALS

List of Experiments:

1. Create a webpage to illustrate text formatting tags, order and unordered list.
2. Create a HTML document giving details of your [Name, Age], [Address, Phone] and [Register Number, Class] aligned in proper order using alignment attributes of Paragraph tag.
3. Write HTML code to create a Web Page that contains an Image at its Centre, hyperlinks and book marks.
4. Develop a web page to display table and frames.
5. Create a web page to embed an image map in a web page.
6. Image tags & embedding a multimedia on to a web page (video, audio, zip).
7. Create a web page with all types of Cascading style sheets.
8. Design a web page using different CSS properties like border, background, text, and font.
9. Implement the following web applications using
   (a) PHP
   (b) Servlets
   (c) JSP
   i) Write a PHP Program to display current Date, Time and Day.
   ii) A web application that takes name and age from an HTML page. (If the age is less than 18, it should display a

page with a message like “Hello, you are not authorized to visit the site” message. Else, it will display “Welcome to this site”.)

10. Implement the web applications with Database using (a) PHP, (b) Servlets and (c) JSP.
11. Create client Side Scripts for Validating Web Form Controls.
12. Develop a simple calculator using JavaScript.
13. Designing a digital clock using JavaScript.
14. Demonstrate string and math objects predefined methods available in JavaScript.
15. To create a html registration form and perform validation.

P – 60; Total Hours - 60

TEXT BOOKS:

1. Web Designing and Publishing Paperback – 25 June 2020by Prof. Satish Jain (Author), M. Geetha Iyer.
2. Mastering Html, Css&Javascript Web Publishingby Laura Lemay, Rafe Colburn, et al. | 15 July 2016.
3. Developing Web Application, Wiley India Publication, Ralph Moseley, Wiley India, 2007.
4. Web Enabled Commercial Application Development Using HTML, DHTML, PERL, Java Script, BPB Publications, Ivan Bayross, 2005.

REFERENCES:

1. HTML: The Complete Reference**,**Thomas A. Powell , 2000(I,II&III).
2. Beginning JavaScript 2nd Edition, Wrox, Nicholas C. Zakas, 2004(IV).
3. PHP Bible, Wiley Publication, Tim Converse, Joyce Park, 2002(V).

COURSE OUTCOMES:

On completion of the course, Students will be able to

CO1: Demonstrate an understanding of basic HTML, CSS structures and JavaScript.

CO2: Design and implement dynamic websites with good aesthetic sense of designing and latest technical know-how's.

CO3: Have a Good grounding of Web Application Terminologies, Internet Tools, E – Commerce and other web services.

CO4: Design the web environment in a professional way.

CO5: Design a graphics design ineffective manner.

Board of Studies (BoS) :
16thBoS of CA held on 23.12.2021

Academic Council:
18th AC held on 24.02.2022

	PO1	PO 2	PO 3	PO4	PO5	PO6	PO7	PO8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1													M	
CO2											M			
CO3		L	H	H					L				H	H
CO4			M	M										
CO5									M					

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: The holistic understanding of the components of web design packages and methods leads to constructing auser-friendly interfaces platform.

GED 2204	APTITUDE AND WORKPLACE SKILL	L	T	P	C
SDG: 8		0	0	2	1

COURSE OBJECTIVES:

COB1: To enlighten students with the basic logical reasoning concept

COB2: To prepare the students to face competitive examination

COB3: To efficiently make use of goal setting and to inculcate the elements of being a good leader and a team member

COB4: To prepare the students holistically to face the Personality Test

MODULE I GENERAL MENTAL ABILITY 8

Probability- Permutations & Combinations - Allegations and mixture –Data interpretation.

MODULE II ANALYTICAL AND LOGICAL REASONING 7

Order & Ranking – Seating Arrangements – Statement and Conclusions – Letter and alpha numeric series – Venn Diagram – Logical Puzzles – Coding and Decoding

MODULE III MANAGEMENT SKILLS 7

Goal setting - Leadership styles – Team Building – Teamwork – Time Management – Stress Management

MODULE IV INTERVIEW SKILLS 8

Interview Preparation – CV's and Resume building - Preparation of Self Introduction- Facing Personal Interview – Mock interview

P -30; TOTAL HOURS – 30

REFERENCES:

1. Tyra .M, Magical Book on Quicker Maths, BSC Publishing Company Pvt. Limited, 2009.
2. R. S. Aggarwal, Quantitative Aptitude for Competitive Examinations, S. Chand Limited, 2017.
3. R. S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S. Chand Limited, 2010.
4. Khattar Dinesh, The Pearson Guide to Quantitative Aptitude for Competitive Examinations, 3e, Pearson India, 2016.
5. Rajesh Verma, Fast Track Objective Arithmetic Paperback, Arihant Publications (India) Limited, 2018.

6. Arun Sharma Teach Yourself Quantitative Aptitude Useful for All Competitive Examinations, McGraw Hill Education (India) Pvt. Limited, 2019.
7. Bhattacharya. Indrajit, An Approach to Communication Skills, Dhanpat Rai & Co., (Pvt.) Ltd. New Delhi, 2008.
8. Swan, Michael, Practical English Usage, Oxford University Press, 2005.
9. P.A. Anand, Wiley's Quantitative Aptitude, 1st Edition,Wiley,2015.
10. Indu Sijwali, A New Approach to Reasoning Verbal & Non-Verbal, Arihant Publications India limited, 2018.
11. Disha Experts, Shortcuts in Reasoning (Verbal, Non-Verbal, Analytical & Critical) for Competitive Exams 2nd Edition, Disha Publication, 2018.
12. Jaikishan, Premkishan, How to Crack Test of Reasoning, Arihant Publications India limited, 2018.

COURSE OUTCOMES:

CO1: Apply and solve the difficult problems of logical reasoning

CO2: Solve aptitude problems efficiently

CO3: Become a Leader or an effective team member and manage time and stress effectively

CO4: Face the Personality Test / Interview with confidence

Board of Studies (BoS):
13th BoS of Department of English held on 17.6.2021

Academic Council:
17th AC held on 15.07.2021

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10
CO1							L		M	
CO2					H					
CO3								L		
CO4								H		

Note: L- Low Correlation M - Medium Correlation H - High Correlation

SDG 8: Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

This course helps to learn the skills such as active listening, collaboration, presenting ideas, effective communication and employability skills which are highly valued in the modern workplace.

PROGRAMME ELECTIVE – I

CADX 250	E-COMMERCE	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1: Introduce basic e-commerce concepts

COB2: Learn the installation procedure of Content management System with appropriate user interface.

COB3: Learn to integrate Payment Gateway

COB4: Understand the security measures.

COB 5: Analyse the ecommerce case studies of different business verticals

MODULE I INTRODUCTION TO E-COMMERCE & WEB DESIGNING TECHNIQUES. 9

E-Commerce business models - Overview of developments in Information Technology and Defining E- Commerce:, Electronic Market, Internet Commerce, Benefits and limitations of E- Commerce, Changing Your Background Graphic, CSS selectors - CSS IDs and classes - CSS properties and values - Understanding Basic HTML5 Techniques.

MODULE II CONTENT MANAGEMENT SYSTEM 9

WordPress Basics: Exploring Basic Wordpress Concepts - Wordpress Community. Setting Up the Wordpress Software: Understanding the System Requirements – Xampp server - Installing WordPress on Your Web Server. Configuring WordPress for Optimum Security. Exploring the WordPress Dashboard. – Installing the themes -Publishing Your Site with WordPress – Design and development of personal page .

MODULE III CMS PLUGINS & PAYMENT GATEWAY 9

Introducing Wordpress Plugins - Installing and Managing Plugins - Configuring and using Plugins: Contact form 7 - Woo Commerce. E-mail, Google Analytics plugin. Appmaker: convert wordpress to mobile app. Payment gateway : WooCommerce PayPal Checkout Payment Gateway. Digital economy: Identify the methods of payments on the net – Electronic Cash, cheques and credit cards on the Internet.

MODULE IV B2B & SECURITY 9

Wholesale Suite – WooCommerce Wholesale Prices & B2B Plugin. Threats in Computer Systems: Virus, Cyber Crime Network Security: Encryption, Protecting Web server with a Firewall, Firewall and the Security Policy, wordpress Firewalls and security, Proxy Server.

MODULE V BUSINESS CASE STUDIES 9

B2B Healthcare Portal, Chennaibazaar.com Automartindia.com, ModelSulekha.com, Sify.com, eGurucool.com.

L – 45; Total Hours - 45

TEXT BOOKS:

1. E-commerce Business: 3 Books in 1: The Ultimate Guide to Make Money Online From Home and Reach Financial Freedom - Passive Income Ideas 2020,4 by Ronald Anderson.
2. Web Coding & Development All - in - One For Dummies
3. The Complete E-Commerce Book: Design, Build & Maintain a Successful Web-based Business Paperback – 30 March 2004 by Janice Reynolds .
4. Elias. M. Awad, " Electronic Commerce", Prentice-Hall of India Pvt Ltd, January 2002.
5. Ravi Kolkata, Andrew B. Whinstone, "Electronic Commerce-A Manager's guide", Addison-Wesley.
6. P.T.Joseph, E-Commerce An Indian Perspective, Fourth Edition, PHI Learning private limited.

REFERENCES:

1. Efraim Turban, Jae Lee, David King, H.Michael Chung, “Electronic Commerce–A ManagerialPerspective", Addison- Wesley.
2. Elias M Award, “Electronic Commerce from Vision to Fulfilment”, 3rd Edition, PHI, Judy Strauss, Adel El-Ansary, Raymond Frost, “E-Marketing”, 3RDEdition, Pearson Education.
3. Kenneth C. Laudon, E-Commerce: Business, Technology, Society, 4th Edition, Pearson
4. S. J. Joseph, E-Commerce: an Indian perspective, PH

COURSE OUTCOMES:

Upon completion of the course students should be able to:

CO1: Design the basic framework of ecommerce website

CO2: Install the CMS and provide UI/UX

CO3: Integrate payment gateway in the web portal

CO4: Design and Develop exclusive B2B web portals

CO5: Demonstrate the various functionalities of the ecommerce technologies in the business case studies.

Board of Studies (BoS) :
16thBoS of CA held on 23.12.2021

Academic Council:
18th AC held on 24.02.2022

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO1	H													
CO2		H			M			L			H		H	
CO3			H	H		H				M				H
CO4				M								H		
CO5													M	

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 9 : Build resilient Infrastructure, promote inclusive and sustainable industrialization and foster innovation.

E-commerce is a complex system and the digital transformation of our economies and societies requires a partnership between companies and the international industrialization community to create awareness of the impact on E-business sustainbale innovation .

CADX 251	INFORMATION RETRIEVAL	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES:

COB1 : To introduce students about insights of the several topics of Information retrieval such as – Boolean retrieval model, Vector space model, indexing.

COB2: To provide an overview of Text classification & Text clustering.

COB3: To introduce students about insights of the Content Based Image Retrieval

COB4: To provide implementation insight about the Dictionary and Postings.

COB5: To provide comprehensive details about the various application of Information Retrieval.

MODULE I INTRODUCTION TO INFORMATION RETRIEVAL 9

Meaning, Process and Indexing of Information retrieval, Information retrieval model-Boolean, Vector and Probabilistic IR models.

MODULE II TEXT CLASSIFICATION & TEXT CLUSTERING 9

Overview of classification & clustering of Text, Problem of text classification, Naive Bayes text classification, k- nearest neighbors, Support vector Machine , Feature Selection, Vector-space clustering.

MODULE III CONTENT BASED IMAGE RETRIEVAL 9

Introduction to content Based Image retrieval, Challenges in Image retrieval, Image representation, Indexing and retrieving images, Relevance feedback.

MODULE IV DICTIONARY AND POSTINGS 9

Simple tokenizing, stop-word removal, and stemming; inverted indices; efficient processing with sparse vectors; NLP toolkit in Python.

MODULE V INFORMATION RETRIEVAL APPLICATIONS 9

IR applications, Information extraction, Question answering, Opinion summarization and Social Network.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Christopher D. Manning, PrabhakarRaghavan and HinrichSchütze, Introduction to Information Retrieval, Cambridge University.

http://nlp.stanford.edu/IR-book/information-retrieval-book.htmlApril 1, 2009.
2. Natural Language Processing And Information Retrieval by TanveerSiddiqui and U. S. Tiwary, Oxford University Press, 2008.
3. Information Retrieval Algorithm & Heuristics by David A.Grossman ISBN 9789402416787 Springer India, 2019.
4. Leonard Richardson, "Beautiful Soup Documentation Release 4.4.0" - Dec 24, 2019.

REFERENCES:

1. Cheng XiangZhai, Statistical Language Models for Information Retrieval (Synthesis Lectures Series on Human Language Technologies), Morgan & Claypool Publishers, 2008.
2. “Speech and Language Processing, 2nd Edition”, by Daniel Jurafsky and James H. Martin, ISBN: 978-0131873216, Prentice Hall 2008.
3. “Solr in Action” by Trey Grainger, Timothy Potter, ISBN: 9781617291029, Manning Publications 2014.
4. Ryan Mitchell, "Web Scraping with Python" - Collecting Data from the Modern Web, June 2015.

COURSE OUTCOMES:

After completing the course the students will be able to:

CO1: Describe the different Information retrieval models**.**

CO2 : Get the understanding the overview of Text classification & Text clustering.

CO3 : Demonstrate the Content Based Image Retrieval

CO4 : Describe the concept of Dictionary and Postings.

CO5: Apply the information retrievals model.

Board of Studies (BoS) :
16thBoS of CA held on 23.12.2021

Academic Council:
18th AC held on 24.02.2022

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2
CO1		M	M											
CO2					M									
CO3					M									
CO4														H
CO5														H

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement: The learner would develop skills for building the information modeling required for the government's projects on infrastructure by mastering the information retrieval methods included in the above subject. Information highway itself is a modern infrastructure required for the SMART cities.

CADX 252	SOCIAL MEDIA ANALYSIS	L	T	P	C
SDG: 4		3	0	0	3

COURSE OBJECTIVES:

The objective of the course is to

COB 1: Understand the social, economic, and technological networks and human behavior in social web and related communities.

COB 2: Understand the social network concepts and various methods of analysis.

COB 3: Acquire techniques for analyzing social network data.

COB 4: Understand the various methods of social media analysis.

COB 5: Expose and train on various tools and techniques for analyzing and visualizing social media networks.

MODULE I INTRODUCTIONTO SOCIAL NETWORKS 9

Connected World – Networks: Actors, Relations and Attributes - Networks as Information Maps - Networks as Conduits – Leaders and Followers – Psychological foundations of social networks – Basic building Blocks – Brief history of Social Network Analysis. Introduction to various social media platforms – facebook , twitter, linkedin ,blogs ,Instagram ,YouTube etc.

MODULE II NETWORK CONCEPTS FUNDAMENTAL 9

Individual Members of the Network – Sociological Questions about Relationships –Whole Social Networks- Distributions – Multiplexity – Roles and Positions – NetworkSegmentation – Graph Theory – Notations for Social Network Data. Points, Lines and Density – Centrality and Centralization – Components, Cores andCliques – Positions, Roles and Clusters – Dimensions and Displays.

MODULE III SOCIAL NETWORK ANALYSIS 9

Introduction to Social Network Analysis (SNA): definition and origin, core features of the SNA, Foundation of social network analysis. Networks: nodes, edges, adjacency matrix, one and two-mode networks, node degree, centrality, betweenness, reach, cliques, and paths. Graph Mining: Community detection, Clustering, Community structure, Modularity, Overlapping communities. Graphs – Matrices.

MODULE IV CATEGORIZATION ALGORITHMS 9

Feature selection and text categorization algorithms: Naive Bayes, k Nearest Neighbor (kNN), Logistic Regression, Support Vector Machines and Decision

Trees. Evaluation of text classification: precision and recall, confusion matrix, F-score.

MODULE V TOOLS AND TECHNOLOGIES 9

Twitter Analytics – Facebook Analytics – Google+ Analytics – Google+ Ripples – R for Social Network Analysis – Pajek – Network Visualization Tools – Analyzing Social Media Networks with NodeXL.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Charles Kadushin, “Understanding Social Networks: Theories, Concepts, and Findings”, Oxford University Press,USA,2011.
2. David Knoke, Song Yang, “Social Network Analysis”, 2ndEdition,SAGE Publications,2007
3. Mathew A. Russel “Mining the Social Web: Analyzing Data from Facebook, Twitter, LinkedIn, and Other Social Media Sites “ Jan 2011-First edition.
4. Ed. Charu Aggarwal, “Data Classification: Algorithms and Applications” CRC Press, 2014.
5. Gohar F. Khan “Seven Layers of Social Media Analytics:” Mining Business Insights from social media Text, Actions, Networks, Hyperlinks, Apps, Search Engine, and Location Data- 2015.Luke Welling, Laura Thomsan, PHP and MySQL Web Development (Developer's Library), Pearson Education Publishers, 5th edition, US, 2017.

REFERENCES:

1. Christina Prell, “Social Network Analysis: History, Theory and Methodology”, 1st Edition, SAGE Publications Ltd, 2012.
2. Tracy L. Tuten, Michael R. Solomon “Social Media Marketing”, SAGE Publications Ltd, 2015.

COURSE OUTCOMES:

On completion of this course, students will be able to

CO1: Predict and Analyze human behavior in social web and related communities.

CO 2: Apply basic principles of network analysis in social media environment.

CO 3: Implement the various SNA methods in real-time business scenario.

CO 4: Model the evolution of social networks.

CO 5: Construct marketing strategies based on social network analysis.

Board of Studies (BoS) : 16th BoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO1 1	PO 12	PSO 1	PS O2
CO1				M			H						H	
CO2		M		M									M	
CO3							M				M			M
CO4				L			M							L
CO5							L				H		M	

Note: L - Low Correlation M - Medium Correlation H - High Correlation

SDG 4: Quality Education – Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

Statement:

The social media analysis and its techniques were taught in this course. Understanding the insights of social media analysis will motivate the student to deploy innovative strategies in real-time scenarios. The knowledge attained through social media analysis will improve the skills set of the student to meet industrial demand.

CADX 253	ONLINE ADVERTISEMENT	L	T	P	C
SDG: 9		3	0	0	3

COURSE OBJECTIVES :

COB1: The objective of the course is to understand about the Internet in advertising and the process of selling in online through advertisements.

COB2: Develop, evaluate, and execute a comprehensive digital marketing strategy and plan.

COB3: Provides an understanding of the ever evolving digital landscape that examines the strategic role of digital marketing processes and tools in designing the overall Marketing strategy.

COB4: Familiarise about the methodologies, tools and technologies involved in digital marketing and Explore the latest digital ad technologies.

COB5: Develop the skill which enables to design the promotion strategies as well as to gain knowledge about the current trends in marketing that empower to pursue the careers in the Digital Marketing area.

MODULE I INTRODUCTION TO INTERNET ADVERTISING 09

Internet advertising – Definition – Benefits of Online advertisement – Types of Online Advertising –Online Ad Models – Online advertising markets –Interstitials Ads –Developments and advancements in E-mail Marketing – Mapping industry trends –case studies of digital strategy.

MODULE II SEARCH ENGINE OPTIMIZATION(SEO) 09

SEO fundamentals– Need for SEO – Difference between portal and search engines –SEO techniques (On page and Off page) – SEO Keyword analysis – Meta Tags and Meta Description, Website Content Optimization –Introductions on Search Engine Algorithms – Optimizing with Google Algorithms – Google webmaster tool –Measuring SEO Efficacy.

MODULE III SOCIAL MEDIA MARKETING (SMM) 09

Definition of Social Media Marketing & Social Media – Identifying Goals for Social Media Marketing such as eWOM, Customer Evangelists – Face book Marketing – LinkedIn Marketing –YouTube Marketing –Twitter, Instagram, and Pinterest Marketing – Google plus marketing – Social Media Analytical Tools.

MODULE IV SEARCH ENGINE MARKETING (SEM) 09

Introduction to SEM–Effective Ad Campaign Creation –Overview of Google Adwords, Microsoft AdCenter and Yahoo Search–Use of Different Social Media Platforms– Strategizing PPC Campaign –Display advertising techniques, Ad writing Techniques –Demographic Targeting/Bidding – Report generation.

MODULE V TOOLS AND TECHNIQUES 09

Email Marketing Analytics Tools: Google Analytics– MailChimp–Talkwalker-Followerwonk – Screaming Frog SEO Spider Tool– Conversion Optimization Tools: Hubspot, Lucky Orange, Unbounce–SMM Tools: Tailwind-Sprout Social–SEM Tools: Google Ads, SpyFu.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Joe Plummer, Steve Rappaport, Taddy Hall, and Robert Barocci, The Online Advertising Playbook, John Wiley & Sons, Inc. (Hoboken, New Jersey), 2007.
2. Gerry T. Warner,Joe Wilson Schaefer,Online Marketing: 2 Books in 1: Social Media Marketing + Content Marketing to Learn Step-by-Step the Best Online Marketing Strategies to Boost Your Business ... (Internet Marketing,Digital Marketing 2019)

REFERENCES :

1. RobbinZeff and Brad Aronson (ZA book from here on), Advertising on the Internet, 2nd edition, John Wiley & Sons, Inc. (New York, NY),1999.
2. A.J. O'Brien,Online Marketing Millionaire: Affiliate Marketing Top 10 Programs You Can Make Money Online with Today (Book 2 of Series)

COURSE OUTCOMES :

Students who complete this course will be able to,

CO1: The objective of the course is to understand about the Internet in advertising and the process of selling in online through advertisements.

CO2: Develop, evaluate, and execute a comprehensive digital marketing strategy and plan.

CO3: Provides an understanding of the ever evolving digital landscape that examines the strategic role of digital marketing processes and tools in designing

the overall Marketing strategy.

CO4: Familiarise about the methodologies, tools and technologies involved in digital marketing and Explore the latest digital ad technologies.

CO5: Develop the skill which enables to design the promotion strategies as well as to gain knowledge about the current trends in marketingthat empower to pursue the careers in the Digital Marketing area.

Board of Studies (BoS) : 16thBoS of CA held on 23.12.2021

Academic Council: 18th AC held on 24.02.2022

	PO1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO1	PSO2
CO1							H							
CO2			L	L	L		M			L		M	L	H
CO3				H	H			M		L			M	
CO4			H		H			L	H		H	H	M	H
CO5						L	H	L	H		H	H	H	H

SDG 9 : Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

The learner would be able to develop the relevant theories, practice, digital ads, legal issues, ethical challenges in the fields of advertising and marketing communication. The outcomes of the course would enable the learner to Develop advertising media with productive buying and innovative planning strategies with computational knowledge and multimediaintelligence.

CADX 254	PHP PROGRAMMING	L	T	P	C
SDG 9:		3	0	0	3

COURSE OBJECTIVES:

The objective of the course is to,

CO1: Learn how to build good web applications using PHP language.

CO2: Install PHP and work with arrays and regular experiments.

CO3: Perform fundamental database operations.

CO4: Ability to handle the exceptions and sessions.

CO5: Understand the frameworks for easy debugging process.

MODULE I INTRODUCTION TO PHP **9**

PHP installation and Introduction, Syntax, Variables – Data types – Operators and expressions – Decisions and Loops – Function – Arrays with attributes – Creating and String – String related Library functions – Regular Expressions.

MODULE II PHP FORMS AND IMAGES **9**

Form Handling–PHP Interactive Forms- PHP GET & POST-Form Validation-PHP Form sanitization-PHP Form URL/ E-mail–Basics of Computer Graphics-Creating Image- Manipulating Image-Using Text in Image- Watermarks to Image.

MODULE III ADVANCED PHP **9**

Introduction to OOPS – Class – methods-Constructors and Destructors, Access Modifiers – Inheritance-Abstract class – Interface-Error and Exceptional Handling-File Handling-PHP date and time-PHP Session Handling.

MODULEIV PHP WITHMYSQL **9**

Database Basics-Connection with My SQL database-My SQL Create – database- My SQL Create Table- Basic operations: Insert, Update, Select, Retrieve, Delete -Executing queryJoin (Cross joins, Inner joins, Outer Joins, Self joins.

MODULE V PHP WITHMYSQL **9**

Web Development Frameworks – Introduction –Yii Fundamental concepts of Yii–PHP XML Parsers-PHP XML Expat-PHPXMLDOM-Ajax PHP-PHP Mail.

L – 45; Total Hours - 45

TEXTBOOK:

KevinTatroe,PeterMacIntyre,RasmusLerdorf,“ProgrammingPHP”,CreatingDynamic WebPages,O'ReillyMedia,3rdEdition,2013.

REFERENCES:

1. Luke Welling, Laura Thomson, “PHP and MySQL Web Development (Developer's Library) 5th Edition”
2. http://php.net
3. http://www.tutorialspoint.com/php/index.html

COURSE OUTCOMES:

CO1: Design a web project to use real-time processing capabilities to interact with a database.

CO2: Test and debug PHP application.

CO3: Apply the Model View controller pattern or web applications.

CO4: Pass information from client browser to web server for transaction processing.

CO5: Work with high- performance PHP framework for developing Web2.0 applications.

Board of Studies (BoS) :
16thBoS of CA held on 23.12.2021

Academic Council:
18th AC held on 24.02.2022

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO12	PSO1	PSO2
CO1						M	L		M			H	H	H
CO2														H
CO3				H				M						
CO4				H										M
CO5					M						M	H		H

Note:L- Low Correlation M - Medium Correlation H -High Correlation

SDG 9:Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

The learner would be able to develop web applications and build the computerized ecosystem for the enterprise in a cost effective manner. The outcomes of the course would enable the learner to be productive in industrialization process with innovative computerization ideas.

OPEN / GENERAL ELECTIVE COURSES

GEDX 311	**CUSTOMER RELATIONSHIP**	**L**	**T**	**P**	**C**
SDG: 9	**MANAGEMENT ANALYTICS**	**3**	**0**	**0**	**3**

COURSE OBJECTIVES:

COB1: Introduce the Basic concepts and definition of CRM analytics.

COB2: Apply the right strategy to customize the CRM module in a Business Application.

COB3: Provide the conceptual understanding of various components of Modules.

COB4: Train the Installation procedure of CRM software and customize for report generation.

COB5: Design the appropriate CRM Module for the business requirement.

MODULE I INTRODUCTION 9

Evolution of Customer Relationship: CRM-Definition - Emergence of CRM Practice - Factors responsible for CRM growth - framework of CRM - Benefits of CRM, Types of CRM, Scope of CRM, Customer Profitability, Features Trends in CRM.

MODULE II CRM STRATEGY 9

Elements of CRM – CRM Process – Strategies for Customer acquisition – Retention and Prevention of defection – Models of CRM – CRM road map for business applications - Strategic CRM planning process – CRM Implementation.

MODULE III COMPONENTS OF CRM 9

CRM - Issues and Strategies - CRM as a business strategy - Effective CRM through Customer Knowledge Management - Customer Interaction Management - Call Centre management in CRM. Customer Centricity in CRM-Concept of Customer centricity - Customer Service - Measuring Customer life time value-. Customer life cycle Management.

MODULE IV TECHNOLOGICAL TOOLS FOR CRM IMPLEMENTATION 9

CRM Tools- Analytical CRM – Operational CRM –Sugar CRM (Open Source)

MODULE V CASE STUDIES 9

Implementing CRM in Banking sector – CRM in Insurance - CRM in B2C Market: Telecom – Airlines.

L – 45; Total Hours - 45

TEXT BOOKS:

1. Jagdish N Sheth, Parvatiyar Atul, G Shainesh, “Customer Relationship Management: Emerging Concepts, Tools and Applications”, 1st Edition, Tata McGraw Hill, June 2017.
2. V. Kumar, Werner Reinartz, “Customer Relationship Management Concept, Strategy and Tools”, 3rd Edition, Springer Texts in Business and Economics, 2018.
3. Francis Buttle and Stan Maklan, “Customer Relationship Management Concepts and Technologies”, 3rd Edition,2015.

REFERENCES:

1. Ed Peelen and Rob Beltman, “Customer Relationship Management”, 2nd Edition, Pearson Education 2013.
2. Makkar, U. and Makkar, H.K., “Customer Relationship Management”, Tata McGraw-Hill Education, 2012.
3. Alok Kumar, Chabi Sinha, Rakesh Sharma, “Customer Relationship Management: Concepts and applications”, Dreamtech Press,2007.

COURSE OUTCOMES:

CO1: Define the undertaken CRM problem statement.

CO2: Apply the business strategy and prepare the project proposal for the respective data and technology requirements.

CO3: Integrating the identified CRM Modules.

CO4: Implement the CRM Software modules and generate reports.

CO5: Analyze the generated reports and provide business insights.

Board of Studies (BoS) :	**Academic Council:**
16thBoS of CA held on 23.12.2021	18th AC held on 24.02.2022

	PO 1	PO 2	PO 3	PO 4	PO5	PO6	PO7	PO8	PO9	PO 10	PO11	PO 12	PSO1	PSO2
CO1	M	H	H											
CO2		M		H										
CO3														
CO4					H					H			H	H
CO5			H						H	H				H

Note: L - Low Correlation M – Medium Correlation H - High Correlation

SDG 9: Industry, Innovation and Infrastructure – Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Statement: The course outcomes are measurable and help the learner to implement CRM solution methodologies to achieve the Sustainable development goal on Industry, Innovation and infrastructure. The proposed CRM solution by the learner would improve the customer retention capacity of the system. The proposed business strategy and innovative application of the tools by the learner would also improve the business profitability.