Regulations 2021
Curriculum and
Syllabi (I & II Semesters)

Bachelor of Computer Applications

REGULATIONS 2021

CURRICULUM AND SYLLABI (I & II Semesters)

BACHELOR OF COMPUTER APPLICATIONS

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

- 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

BACHELOR OF COMPUTER APPLICATIONS

PROGRAMME EDUCATIONAL OBJECTIVES

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 learning processes.

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 computational algorithms.

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 project reports.

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

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 ith course and GP_i is the Grade Point in the ith course,

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

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
BACHELOR OF COMPUTER APPLICATIONS
CURRICULUM FRAMEWORK, REGULATIONS 2021

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 algorithm	3	0	0	3
2.	CC	CAD 2102	Software Engineering	3	0	0	3
3.	CC	CAD 2103	Relational Database Management System	3	0	0	3
4.	CC	CAD 2104	Computer Networks	3	0	0	3
5.	SEC	CAD 2105	Programming in Java	3	0	0	3
6.	EC		**Technology Core I**	3	0	0	3
7.	LC	CAD 2106	Relational Database Management System 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	CC	CAD 2201	Python Programming	3	0	0	3
2	OEC		Open Elective	3	0	0	3
3	CC		**Technology Core II**	3	0	0	3
4	CC		**Technology Core III**	3	0	0	3
5	CC		**Technology Core IV**	3	0	0	3
6	EC		Programme Elective – I	3	0	0	3
7	LC	CAD 2203	Python Programming Laboratory	0	0	4	2
8	LC		**Technology Core Lab – I**	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.	EC		**Technology Core V**	3	0	0	3
4.	EC		**Technology Core VI**	3	0	0	3
5.	EC		**Technology Core VII**	3	0	0	3
6.	EC		**Programme Elective –II**	3	0	0	3
7.	LC		**Technology Core Lab – II**	0	0	4	2
8.	LC		**Technology Core Lab – III**	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	PROJ	CAD3202	Project Work	0	0	0	**12**
3	EC		**Technology Core VIII**	3	0	0	**3**

Credits   **18**

Overall Total Credits – 132

LIST OF TECHNOLOGY CORE COURSES (SEMESTER III)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 101	Introduction to Cloud Technology (CTIS)	3	0	0	3
2.	CADX 102	Introduction to Mobile Applications (MAIS)	3	0	0	3
3.	CADX 103	Introduction to Data Science (DS)	3	0	0	3
4.	CADX 104	Multimedia Tools and Techniques (MM)	3	0	0	3

LIST OF TECHNOLOGY CORE COURSES (SEMESTER IV)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 201	Information Security Fundamentals (CTIS & MAIS)	3	0	0	3
2.	CADX 202	Business Intelligence (DS)	3	0	0	3
3.	CADX 203	Introduction to Scripting Languages (MM)	3	0	0	3
4.	CADX 204	Web Design and Development (MM)	3	0	0	3
5.	CADX 205	Server Operating System (CTIS)	3	0	0	3
6.	CADX 206	Mobile and Wireless Security (MAIS)	3	0	0	3
7.	CADX 207	Big Data Analytics (DS)	3	0	0	3
8.	CADX 212	Fundamentals of Datacenter (CTIS)	3	0	0	3
9.	CADX 213	Introduction to Android Programming (MAIS)	3	0	0	3
10.	CADX 214	Exploratory Data Analytics (DS)	3	0	0	3
11.	CADX 215	Computer Graphics (MM)	3	0	0	3

LIST OF TECHNOLOGY CORE LAB I (SEMESTER IV)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 208	Web Design Laboratory(MM)	0	0	4	2
2.	CADX 209	Server Operating System – Laboratory (CTIS)	0	0	4	2
3.	CADX 210	Android Laboratory(MAIS)	0	0	4	2
4.	CADX 211	Big Data Analytics Laboratory (DS)	0	0	4	2

LIST OF TECHNOLOGY CORE COURSES (SEMESTER V)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 105	Computer Forensics and Investigation (CTIS& MAIS)	3	0	0	3
2.	CADX 106	Machine Learning Algorithms (DS)	3	0	0	3
3.	CADX 107	Games, Arts and Design (MM)	3	0	0	3
4.	CADX 108	R Programming (DS)	3	0	0	3
5.	CADX 109	Virtualization And Cloud Security (CTIS)	3	0	0	3
6.	CADX 110	XML And Web Services (MAIS & MM)	3	0	0	3
7.	CADX 111	Principles of Virtualization (CTIS)	3	0	0	3
8.	CADX 112	IOS Applications (MAIS)	3	0	0	3
9.	CADX 113	Time Series Analysis (DS)	3	0	0	3
10.	CADX 114	Specialization in 3D Productions (MM)	3	0	0	3

LIST OF TECHNOLOGY CORE LAB II (SEMESTER V)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 115	Computer Forensics and Investigation Laboratory (CTIS & MAIS)	0	0	4	2
2.	CADX 116	Machine Learning Algorithms Laboratory (DS)	0	0	4	2
3.	CADX 117	Animation Laboratory (MM)	0	0	4	2

LIST OF TECHNOLOGY CORE LAB III (SEMESTER V)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 118	R Programming Laboratory (DS)	0	0	4	2
2.	CADX 119	Virtualization Laboratory (CTIS)	0	0	4	2
3.	CADX 120	IOS Laboratory (MAIS)	0	0	4	2
4.	CADX 121	XML and Web Services Laboratory (MM)	0	0	4	2

LIST OF TECHNOLOGY CORE COURSES (SEMESTER VI)

Sl. No.	Course Code	Course Title	L	T	P	C
1.	CADX 216	IT governance, Risk and Information security Management (CTIS & MAIS)	3	0	0	3
2.	CADX 217	Data Science Project Management (DS)	3	0	0	3
3.	CADX 218	Web and E-Business (MM)	3	0	0	3

LIST OF PROGRAMME ELECTIVE COURSES

Sl. No.	Course Code	Course Title	L	T	P	C
		PROGRAMME ELECTIVES – 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 Computer Advertising	3	0	0	3
5	CADX 254	PHP Programming	3	0	0	3
		PROGRAMME ELECTIVES – 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 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

#	Code	Course	L	T	P	C	Dept
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

9

MODULE III

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

9

MODULE IV

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 Hour - 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 குறித்துஎடுத்துரைத்தல்
- 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 ஒர் ஆண்டி, கி.இராஜநாராயணன்– கதவு, சு.சமுத்திரம் - ஏழை-ஆப்பிள்-நட்சத்திரம், மாதவிக்குட்டி–நெய்ப்பாயாசம், தி.ஜானகிராமன்–முள்முடி.

அலகு IV	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

ஞறிப்புகள்

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

வெளிப்பா டு

- 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

	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							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):   **Academic Council:**
14th BoS of the Department of Commerce   17th AC held on 15.07.2021
held on 22.04.2021

	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	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): (المرور ،2 حجرة الدراسة ، حجرة الدراسة) - 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 – 30; Total Hours – 30

TEXT BOOKS:

1. Al QirathulArabiyya Lil Mubtadiyeen القراءة 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 GhairinNatiqeenBiha, 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.

3	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							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 | L | T | P | C |
| SDG: 4 | METHODS | 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   9+3
                AND INTERPOLATION**

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 eigenvector 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

SDG: 9

	COMPUTER FUNDAMENTALS AND ORGANIZATION	L	T	P	C
		3	0	0	3

COURSE OBJECTIVES:

COB 1: Impart the knowledge on historical development of Computers, different number systems and logic gates.

COB 2: Learn the basic structure of CPU, computer memory and Input - Output units.

COB 3: Understand the concepts of Boolean algebra and Circuit reduction methods.

COB 4: Describe the components of Sequential logic circuits.

COB 5: 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   9
                     METHODS**

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 a 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:

COB 1: Learn the fundamental concepts of Programming

COB 2: Understand the basics of C language

COB 3: Learn about advanced concepts of C language

COB 4: Understand how pointer works in C language

COB 5: 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 Hil, 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) :   **Academic Council:**

15th BoS of CA held on 22.06.2021   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										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, 2ndEdition, 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.

CAD1104   **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 nth 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.
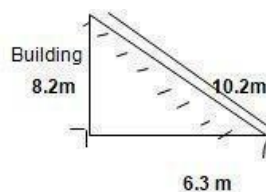
8. Rahul's birthday falls on 28thFebruary 1994. Write a C program to check if given year is a leap year or not.
9. A patient is suffering from high fever with 104.2 F. Write a C program to find his body temperature in Celsius.
10. Write a C program using string function to display the newly changed password 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, 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, Wiley Publications, 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

	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	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 (learnenglish)

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 analyze literary texts

CO3 : Display effective LSRW skills in academic and professionalcontexts

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

	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 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 யாத்திரிகம் - 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	PSO1	PSO2	PSO3	PSO4
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 :

COB 1: To enable the learners to listen and understand the spoken German language which uses the elementary spoken structures.

COB 2: To enable the learners to speak and engage in simple dialogues in German.

COB 3: To enable the learners to read and understand the elementary texts in German.

COB 4: To enable the learners to write simple sentences and short paragraphs in German.

COB 5: 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.

COB 6: 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, 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 | **MODERN COMMUNICATIVE ARABIC** | **L** | **T** | **P** | **C** |
| SDG 4 | | **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 (بكم - أي)

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 (مع المضارع ،أين – كم :الاستفهام 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.**

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
		3	1	0	4

SDG: 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   9
                 PROGRAMMING**

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 withC++, 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) :

15thBoS of CA held on 22.06.2021

Academic Council:

17th AC held on 5.07.2021

	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												
CO2							H							
CO3			H				H							
CO4			H											
CO5					M			M						

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.

CAD1202   **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**   **9**
                           THREADS

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, 4[th]edition,Pearson Education,2012
2. Operating System by H.M.Deitel, 2nd Edition, Pearson Education, 2002.
3. Operating Systems by Nutt, 3rd Pearson Education, 2004.
4. Beginning Ubuntu Linux, Keir Thomas, Andy Channelle and Jaime Sicam, 4th edition, 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) :
15[Th] 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   8
ENVIRONMENTAL STUDIES AND NATURAL
RESOURCES

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   6
HEALTH

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. Erach Bharucha, "Textbook for Environmental Studies for Undergraduate Courses of all Branches of Higher Education for University Grants Commission", Orient Blackswan Pvt. Ltd., Hyderabad, India, 2013.

2. Benny Joseph, "Environmental Studies", Tata McGraw-Hill Education, India, 2009.

3. Ravikrishnan A, "Environmental Science and Engineering", Sri Krishna Publications, Tamil Nadu, India, 2018.

4. Raman Sivakumar, "Introduction to Environmental Science and Engineering", McGraw Hill Education, India, 2009.

5. Venugopala Rao P, "Principles of Environmental Science and Engineering", Prentice Hall India Learning Private Limited; India, 2006.

6. Anubha Kaushik and Kaushik C.P., "Environmental Science and Engineering", New Age International Pvt. Ltd., New Delhi, India, 2009.

REFERENCES:

1. Masters G.M., "Introduction to Environmental Engineering and Science", Prentice Hall, New Delhi, 1997.
2. Henry J.G. and Heike G.W., "Environmental Science and Engineering", Prentice Hall International Inc., New Jersy, 1996.
3. Miller T.G. Jr., "Environmental Science", Wadsworth Publishing Co. Boston, USA, 2016.
4. "Waste to Resources: A Waste Management Handbook", the Energy and Resources Institute, 2014.
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 Chem 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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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) Stackunderflow.
12. Create a file called **studen**t   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 fourthEdition, 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) :   **Academic Council:**
15th BoS of CA held on 22.06.2021   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) :   **Academic Council:**

15th BoS of CA held on 22.06.2021   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.