B.Sc. COMPUTER SCIENCE

CHOICE BASED CREDIT SYSTEM(CBCS)

Curriculum and Syllabus

Regular (2024–2025)

Enable | Enlighten | Enrich
KARPAGAM
ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)

DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act,1956)

(Accredited with A+ Grade by NAAC in the Second Cycle)
Eachanari (Post), Coimbatore – 641 021.
Tamil Nadu, India
PhoneNo.0422-2980011-14FaxNo:0422-2980022-23

Email ID: info@kahedu.edu.in
Web: www.kahedu.edu.in

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established Under Section3 of UGC Act,1956)

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT UNDER– GRADUATE PROGRAMMES

(REGULAR PROGRAMME)

REGULATIONS
(2024)

CHOICE BASED CREDIT SYSTEM (CBCS)

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act,1956)

(Accredited with A+ Grade by NAAC in the Second Cycle)

Eachanari (Post),Coimbatore–641021.
Tamil Nadu, India
PhoneNo.0422-2980011-15 FaxNo:0422-2980022-23

E mail ID: info@kahedu.edu.in

Web: www.kahedu.edu.in

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established under Section 3 of UGC Act, 1956)
(Accredited with A+ Grade by NAAC in the Second Cycle)
Eachanari Post, Coimbatore - 641 021, India

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT
UNDERGRADUATE PROGRAMMES
REGULAR MODE
CHOICE BASED CREDIT SYSTEM (CBCS)

REGULATIONS – 2024

The following regulations are effective from the academic year 2024-2025 and are applicable to candidates admitted to Undergraduate (UG) programmes in the Faculty of Arts, Science, Commerce and Management, Karpagam Academy of Higher Education (KAHE) from the academic year 2024-2025 onwards.

1 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

1.1 UG Programmes Offered

A candidate may undergo a programme in any one of the undergraduate programmes approved by the KAHE as given below.

S. No.	PROGRAMME	DISCIPLINE
1.	B.Com.	Commerce
2.	B.Com.	Computer Applications
3.	B.Com.	Professional Accounting
4.	B.Com.	Business Process Services
5.	B.Com.	Financial Analytics
6.	B.Com.	International Accounting and Finance
7.	B.Com.	Information Technology
8.	B.Com.	FinTech
9.	BBA	Business Administration
10.	B.Sc.	Biotechnology
11.	B.Sc.	Microbiology
12.	B.Sc.	Computer Science
13.	B.Sc.	Information Technology
14.	B.Sc.	Computer Technology

15.	B.Sc.	Computer Science (Cognitive Systems)
16.	B.Sc.	Computer Science (Artificial Intelligence and Data Science)
17.	B.Sc.	Computer Science (Cyber Security)
18.	BCA	Computer Applications

1.2 Admission Requirements (Eligibility)

A candidate for admission to the first year of the UG degree programme shall be required to have passed the Higher Secondary Examination (10 + 2) [Academic or Vocational] prescribed by the Government of Tamil Nadu Board or any similar examination of any other Board accepted by the KAHE as equivalent thereto. (Annexure I)

1.3 Mode of Study

All programmes are offered under Full-Time Regular mode. Candidates admitted under '**Full-Time'** should be present in the KAHE during the complete working hours for curricular, co-curricular and extra-curricular activities assigned to them.

2. DURATION OF THE PROGRAMMES

2.1 The minimum and maximum period for the completion of the UG Programmes are given below:

Programme(s)	Min. No. of Semesters	Max. No. of Semesters
B.Sc., B.Com., BCA and BBA	8	14

2.2 Each semester normally consists of 90 working days or 450 Instructional hours of study. Examination shall be conducted at the end of every semester for the respective courses.

2.3 Multiple Entry and Exit

The students are allowed to exit the programme after 2 or 4 or 6 or 8 semesters with Undergraduate Certificate, Undergraduate Diploma, Undergraduate Degree and Undergraduate Degree with Honors/Honors (Research) respectively as per the regulations of NEP 2020. Similarly, the students from other institutions can join our university in the 3rd or 5th or 7th semester with an appropriate Undergraduate Certificate or Undergraduate Diploma or Undergraduate Degree certificates respectively.

3. CHOICE BASED CREDIT SYSTEM

Credit means the weightage given to each course by the experts of the Board of Studies concerned. All programmes are offered under Choice Based Credit System with a total number of 132 credits for three years. Additional credits of 40 can also be earned on successful completion of fourth year. A total of 172 credits are offered as per the UGC Guidelines for the four year UG Programme.

4. STRUCTURE OF THE PROGRAMME

4.1 Tamil or any one of the Indian / Foreign Languages *viz*, Hindi, Malayalam Sanskrit, French is offered as an Ability Enhancement Course (AEC) for Arts, Science, Commerce and Management Programmes. Twelve credits are awarded for each course and the examinations will be conducted at the end of each semester.

4.2. Major Courses, Minor Courses, Multidisciplinary Courses (MDC), Skill Enhancement Courses (SEC), Project Work, Ability Enhancement Courses, Value Added Courses (VAC) (Common to all UG Programmes), Summer Internship, Minor Project (for 3 Year programme), Research Project/Dissertation (for 4 Year programme) are part of curricular structure.

4.2.1. Major Courses

Major Courses consist of theory and practical of department domains for which examinations shall be conducted at the end of each semester. The students have to earn 82 to 86 Credits in Major Courses (Four years).

4.2.2. Minor Courses

Students have courses from disciplinary/interdisciplinary minors and skill-based courses. Students have to earn a minimum of 32 Credits in Minor Courses (Four years).

4.2.3. Multidisciplinary Courses (MDC)

All UG students are required to undergo 3 introductory-level courses relating to any of the broad disciplines. These courses are intended to broaden the intellectual experience and form part of liberal arts and science education. The students have to study three Multidisciplinary Courses and they have to earn a minimum of 09 Credits.

4.2.4. Skill Enhancement Courses (SEC)

These courses are aimed at imparting practical skills, hands-on training, soft skills, etc., to enhance the employability of students. Three Skill Enhancement Courses are offered within the first four semesters. The examination shall be

conducted at the end of respective semester. Students have to earn a minimum of 09 Credits in Skill Enhancement Courses.

4.2.5 Minor Project Work

The project work shall start at the beginning of sixth semester in the Department/Industry/Research Institute (National/International) and the project report has to be submitted at the end of the sixth semester. The project may be an individual or group task**.** The Head of Department concerned shall assign a project supervisor who in turn shall monitor the project work of the student(s). A project / dissertation work shall be carried out by the students and they have to earn 04 to 06 credits.

If the candidate undertakes the Research Project work outside the Department, the faculty concerned within the Department shall be the Supervisor and the teacher/scientist of the host institute will be the Co-supervisor. The candidate shall bring the attendance certificate from the place where the project work was carried out.

A Project Assessing Committee (PAC) shall be constituted with HoD and two senior faculty members of the Department. The PAC shall announce the dates for the reviews and demonstration. The student shall make a presentation on the progress and demonstration of their project before the PAC in the presence of their supervisor on the scheduled dates.

4.2.6.Ability Enhancement Course (AEC)

There are four Ability Enhancement Courses offered during the first four semesters. Three credits are awarded for each course and the examinations shall be conducted at the end of each semester. Students have to earn a minimum of 12 Credits in Ability Enhancement Courses.

4.2.7. Internship

The students exiting the programme after first year or second year must have completed 04 credits internship/apprenticeship during first year and second year summer term.

4.2.8. Value Added Courses (VAC)

The students will study Value Added Courses in the first four semesters of their programme. 6 to 8 credits need to be earned under VAC. The examinations will be conducted at the end of each semester for VAC courses.

The assessment of the VAC is based on Internal Evaluation. The components of evaluation and distribution of marks is as follows:

S. No.	Category	Maximum Marks
1.	Assignment	5
2.	Attendance	5
3.	Seminar	5
4.	Test – I (2 ½ Units)	12.5
5.	Test – II (2 ½ Units)	12.5
6.	Final Assessment (5 Units)	60
	Total	100

4.2.9. Research Project /Dissertation

The candidates shall undertake the Research Project work in the eighth Semester in the Department/Industry/Research Institute (National / International). The report shall be submitted at the end of the eighth semester. Students have to earn a minimum of 12 Credits in Research Project/Dissertation Work.

If the candidate undertakes the Research Project work outside the Department, the faculty concerned within the Department shall be the Supervisor and the teacher/scientist of the host Institute will be the Co-supervisor. The candidate shall bring the attendance certificate from the place where the project work was carried out.

HoD shall assign a Project Supervisor who shall monitor the student's project work(s). A Project Assessing Committee (PAC) shall be constituted with HoD and two senior faculty members of the Department. The PAC shall announce the dates for the reviews and demonstration. The student shall make a presentation on the progress and demonstration of their project before the PAC in the presence of their Supervisor on the scheduled dates.

Approval of the project
The candidate has to submit, in consultation with his/her supervisor, the title, objective and the action plan of his/her project to the PAC on the first review. Only after obtaining the approval of PAC, the student can initiate the project work.

5. ADVANCED LEARNERS AND ON-DEMAND EXAMINATION

Students
1. Who secure 7.5 CGPA and maintain an attendance of 75% in every semester.
2. Who clear all the courses in their first appearance itself.

are referred to as advanced learners. When a student fails to maintain any of the above conditions at any given time, he cannot be an advanced learner further.

These students can request for an on-demand examination for the courses in their forthcoming semester(s). These students on prior registration can appear for such examinations well in advance and complete the entire courses well before the prescribed period of study and can progress for a full time Research Project/Internship/Minor Project during the remaining prescribed period of study. The Internal and External examinations will be conducted for these courses as like the other courses. One or more faculty mentors will be allocated based on the number of students/courses enrolled for the on-demand examination.

Also, these advanced learners can register for online courses from NPTEL/SWAYAM/SWAYAM Plus portals on prior and proper registration from the department. The credits earned from those courses will be transferred to the mark statement of the students.

6. CREDIT TRANSFER THROUGH ONLINE PLATFORM / INTERNATIONAL STUDIES

Students are encouraged to enroll in courses offered by MOOC platforms and international institutions of higher learning, either virtually or in person. The equivalent credits for these courses will be determined by a committee named Subject Equivalency Committee comprising the Dean, Head of Department (HoD), and one faculty member nominated by the Vice Chancellor. The committee's decision will be submitted for ratification/approval by the Board of Studies (BoS) and the Academic Council. Additionally, the equivalent grade points for marks/grades/grade points awarded by various MOOC platforms and international institutions of higher learning will be determined by a committee named Grade Equivalency Committee duly constituted by the Vice-Chancellor. The decisions of this committee will be submitted for ratification/approval by the Academic Council. This has been approved to be implemented from the even semester of the academic year 2024-25.

7. EXTRA CURRICULAR ACTIVITIES

Every student is encouraged to participate in at least any one of the following activities:

- National Service Scheme (NSS)
- National Cadet Corps (NCC)
- Sports / Mass drill

- Youth Red Cross (YRC)
- Club activities
- Other Extra-curricular activities

The student's performance shall be examined by the staff in-charge of activities along with the faculty mentor and the Head of the respective department. Marks for Extra-curricular shall be sent to the Controller of Examination (CoE) before the commencement of the Sixth End Semester Examinations. The above activities shall be conducted outside the regular working hours of the KAHE.

8. MEDIUM OF INSTRUCTION

The medium of instruction and examinations for the courses under Language I – Tamil / Hindi / Malayalam / French / Sanskrit shall be in the language concerned. For all other courses, the medium of instruction and examination should be in English.

9. MAXIMUM MARKS

Evaluation: Evaluation of the course comprise of two parts such as the Continuous Internal Assessment (CIA) and the End Semester Examination (ESE).

All the theory and practical courses shall carry a maximum of 100 marks, out of which 40 marks is awarded for Continuous Internal Assessment (CIA) and 60 marks for End Semester Examinations (ESE).

10. FACULTY MENTOR

To help students in planning their courses of study and for general advice on the academic programme, the HoD shall allot twenty students to a faculty who will function as a faculty mentor throughout their period of study. A Faculty mentor shall advise the students and monitor their behavior and academic performance. Problems if any shall be counseled by them periodically. The faculty mentor is also responsible to inform the parents of their mentee's progress. The Faculty mentor shall display the cumulative attendance particulars of his / her mentees periodically (once in 2 weeks) on the Notice Board to know their attendance status and satisfy the clause 14 of this regulation.

11. ONLINE COURSE COORDINATOR

To help students for planning their online courses and for general orientation on online courses, the HoD shall nominate a coordinator for the online courses. The Online course coordinator shall identify the courses which students can select for their programme from the available online courses offered by different agencies periodically and inform the same to the students. Further, the coordinators shall orient the students regarding the online courses and monitor their participation.

12. CLASS COMMITTEE

Every class shall have a Class Committee consisting of the faculty members of various courses of the class concerned, student representatives (Minimum 2 boys and 2 girls of various capabilities and Maximum of 6 members) and the concerned HoD / senior faculty as Chairperson. The objective of the Class Committee Meeting is all about the teaching – learning process. Class Committee shall be convened at least once in a month. The constitution and functions of the Class Committee shall include

1. The class committee shall be constituted during the first week of each semester.
2. The Class Committee of a particular class of any department is normally constituted by the HoD/Chairperson of the Class Committee. However, if the students of different departments are mixed in a class, the Class Committee shall be constituted by the respective Dean of the Faculty.
3. The HoD/Chairperson of the Class committee is authorized to convene the meeting of the class committee.
4. The respective Dean of the Faculty has the right to participate in any Class committee meeting.
5. The Chairperson is required to prepare the minutes of every meeting, and submit the same to the Dean concerned within two days after having convened the meeting. Serious issues if any shall be brought to the notice of the Registrar by the HoD/Chairperson immediately.
6. Analyzing and solving problems experienced by students in the class room and in the laboratories.
7. Analyzing the performance of the students of the class after each test and finding the ways and means to improve the performance.

13. COURSE COMMITTEE FOR COMMON COURSES

Each common theory course offered to more than one discipline or department shall have a "Course Committee" comprising all the teachers handling the common course with one of them nominated as Course Coordinator. The nomination of the course coordinator shall be made by the respective Dean depending upon whether all the teachers handling the common course belong to a single department or to various other departments. The 'Course Committee' shall meet in order to arrive at a common scheme of evaluation for the tests to ensure a uniform evaluation of the tests. If feasible, the course committee shall prepare a common question paper for the Internal Assessment test(s). Course Committee Meeting is conducted once in a semester.

14. REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

a. Every student is expected to attend all classes and should secure 100% attendance. However, in order to allow for certain unavoidable circumstances, the student is expected to have at least 75% of attendance and the conduct of the candidate has been satisfactory during the programme.

b. A candidate who has secured attendance between 65% and 74% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness) shall be given exemption from prescribed minimum attendance requirements and shall be permitted to appear for the examination on the recommendation of the Head of Department concerned and the Dean. The Head of Department has to verify and certify the genuineness of the case before recommending to the Dean concerned. However, the candidate has to execute an undertaking from the parent and the student should assure that, this situation does not arise in the future.

c. However, a Student who has secured less than 65% in any of the semesters due to any reasons, shall not be permitted to appear for the End Semester Examinations. But he/she will be permitted to appear for his/her arrear examinations. In order to redo the semester with lack of attendance he/she has to attend the corresponding semester of the subsequent year(s) with approval of the Dean of the Faculty, Dean - Students Affairs and the Registrar.

15. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

15.1 Attendance and Assessment: Every Faculty is required to maintain an **Attendance and Assessment Record (Log book)** which consists of attendance of students marked for each lecture/practical/ project work, the CIA, Assignment and Seminar marks and the record of class work completed (topic covered), separately for each course. This should be submitted to the HoD once in a week for checking the syllabus coverage, records of test marks and attendance. The HoD shall sign with date after due verification. The same shall be submitted to respective Dean once in a fortnight. After the completion of the semester the HoD should keep this record in safe custody for five years as records of attendance and assessment shall be submitted for inspection as and when required by the KAHE/any other approved body.

15.2 Continuous Internal Assessment (CIA): The performance of students in each course will be continuously assessed. Retest will be conducted and considered based on the requirements and recommendations by the Head of the Department on valid reasons. The distribution of marks for the Continuous Internal Assessment (CIA) are given below:

Theory Courses

S. No.	Category	Maximum Marks
1.	Assignment	5
2.	Attendance	5
3.	Seminar	5
4.	Test – I (2 ½ Units)	12.5
5	Test – II (2 ½ Units)	12.5
	Total	40

Practical Courses

S.No.	Category	Maximum Marks
1.	Attendance	5
2.	Observation work	5
3.	Record work	5
4.	Internal Practical Assessment	20
5.	*Viva – voce* [Comprehensive]*	5
	Total	**40**

*

Includes *Viva- voce* conducted during the model Exam practical.

Every practical Exercise / Experiment shall be evaluated based on the conduct of Exercise/ Experiment and records maintained.

15.3 Portions for Test Question Paper

Portions for Internal Test – I : 2 ½ Units
Portions for Internal Test – II : 2 ½ Units

15.4 Pattern of Test Question Paper

Theory Courses:

Maximum Marks : 100 **Duration: 3 Hours**

Section	Marks
Part – A	Short Answer Answer ALL the Questions (10 x 2 = 20 Marks)
Part - B	Long Answer – 5 six mark questions 'either – or' type Answer ALL the Questions (5 x 6 = 30 Marks)
Part - C	Essay type Answer– 5 ten mark questions 'either – or 'type Answer ALL the Questions (5 x 10 = 50 Marks)

15.5 Attendance

Distribution of Marks for Attendance

S. No.	Attendance (%)	Maximum Marks
1	91 and above	5
2	81 - 90	4
3	76 - 80	3
4	Less than or equal to 75	0

.

16. ESE EXAMINATIONS

16.1 End Semester Examination (ESE): End Semester Examination will be held at the end of each semester for each course. The question paper is for a maximum of 100 marks.

16.2 Pattern of ESE Question Paper:

Theory Courses:

Maximum Marks: 100 **Duration: 3 Hours**

Section	Marks
Part – A	Short Answer Answer ALL the Questions (10 x 2 = 20 Marks)
Part - B	Long Answer – 5 six mark questions 'either – or' type Answer ALL the Questions (5 x 6 = 30 Marks)
Part - C	Essay type Answer– 5 ten mark questions 'either – or 'type Answer ALL the Questions (5 x 10 = 50 Marks)

The 100 Marks will be converted to 60 Marks.

Practical Courses: There shall be combined valuation by the Internal and External examiners. The pattern of distribution of marks shall be as given below.

S. No.	Category	Maximum Marks
1.	Experiments	40
2.	Record work	10
3.	*Viva – voce* [Comprehensive]	10
	Total	**60**

Record Notebooks for Practical Examination
Candidate taking the practical examination should submit Bonafide Record Notebook prescribed for the practical examination; failing which the candidate will not be permitted to take the practical examination.

In case of failures in Practical Examination, the marks awarded for the Record at the time of first appearance of the Practical Examination shall remain the same at the subsequent appearance also by the candidate.

16.3. Evaluation of Project Work

16.3.1 The project work shall carry a maximum of 100 marks.

(CIA - 40 and ESE – 60*)

*****Combined valuation of Internal and External Examiners.

16.3.2 The project report prepared according to the approved guidelines and duly signed by the supervisor(s) shall be submitted to HoD.

16.3.3 The evaluation of the project will be based on the project report submitted and a *viva-voce* examination by a team consisting of the supervisor, who will be the Internal Examiner and an External Examiner who shall be appointed by the Controller of Examination. In case the supervisor is not available, the HoD shall act as an Internal Examiner for the same.

16.3.4 If a candidate fails to submit the project report on or before the specified date given by the Examination Section, the candidate is deemed to have failed in the Project Work and shall re-enroll for the same in a subsequent semester.

If a candidate fails in the respective viva-voce examinations he/she has to resubmit the Project Report within 30 days from the date of declaration of the results. The same Internal and External examiner shall evaluate the resubmitted report in the subsequent semester.

16.3.5 A Copy of the approved project report after the successful completion

of *viva-voce* examination shall be kept in the KAHE library.

17. PASSING REQUIREMENTS

17.1 Passing minimum: A candidate needs to secure a minimum of 20 marks out of 40 marks in CIA and 30 marks out of 60 marks in ESE. The overall passing minimum in each course is 50 marks out of 100 marks (Sum of the marks in CIA and ESE examination).

17.2 If a candidate fails to secure a pass in a particular course (either CIA or ESE or Both) as per clause 15.1, it is mandatory that the candidate has to register and reappear for the examination in that course during the subsequent semester when examination is conducted for the same till, he / she receives pass both in CIA and ESE (vide Clause 2.1).

17.3 Candidate failed in CIA will be permitted to improve CIA marks in the subsequent semesters by writing tests and by re-submitting Assignments.

17.4 The CIA marks secured by the candidate in the first passed attempt shall be retained by the Office of the Controller of Examinations and considered valid for all subsequent attempts till the candidate secures a pass in ESE.

17.5 A Candidate who is absent in ESE in a Course / Practical / Project Work after having enrolled for the same shall be considered to have Absent (AAA) in that examination.

18. IMPROVEMENT OF MARKS IN THE COURSES ALREADY PASSED

The Candidates desirous to improve the marks secured in a course which they passed in their first attempt, shall reappear once (**only in ESE**) in the subsequent semester. **The improved marks shall be considered for classification but not for ranking.** If there is no improvement, there shall be no change in the marks awarded earlier.

19. AWARD OF LETTER GRADES

All the assessments of a course will be done on absolute marks basis. However, for the purpose of reporting the performance of a candidate, letter grades, each carrying certain number of points, will be awarded as per the range of total marks (out of 100) obtained by the candidate in each course as detailed below:

Letter grade	Marks Range	Grade Point	Description
O	91 - 100	10	OUTSTANDING
A+	81 - 90	9	EXCELLENT
A	71 - 80	8	VERY GOOD
B+	66 - 70	7	GOOD
B	61 - 65	6	ABOVE AVERAGE
C	55 - 60	5	AVERAGE
D	50 - 54	4	PASS
RA	<50	-	REAPPEARANCE
AAA	-	-	ABSENT

20. GRADE SHEET

After the declaration of the results, Grade Sheets will be issued to each student which will contain the following details:

i. The list of courses enrolled during the semester and the grade scored.

ii. The Grade Point Average (**GPA**) for the semester and

iii. The Cumulative Grade Point Average (**CGPA**) of all courses enrolled from first semester onwards.

iv. Remark on Extension Activities (only in the 6th Semester Grade Sheet)

GPA of a Semester and CGPA of a programme will be calculated as follows.

GPA of a Semester $\frac{\sum_i CiGPi}{\sum_i Ci}$ = Sum of the product of the GP by the corresponding credits of the courses offered in that Semester / Sum of the credits of the courses of that Semester

i.e. **GPA** of a Semester = $\frac{\sum_i CiGPi}{\sum_i Ci}$

CGPA of the entire programme = Sum of the product of the GPs by the corresponding credits of the courses offered for the entire programme / Sum of the credits of the courses of the entire programme

i.e. **CGPA** of the entire programme = $\frac{\sum_n \sum_i CniGPni}{\sum_n \sum_i Cni}$

where,

Ci is the credit fixed for the course 'i' in any semester

GPi is the grade point obtained for the course 'i' in any semester

'n' refers to the Semester in which such courses are credited.

Note: RA grade will be excluded for calculating **GPA** and **CGPA**.

21. REVALUATION

A candidate can apply for revaluation or re-totaling of his / her semester examination answer script (**theory courses only**), within 2 weeks from the date of declaration of results, on payment of a prescribed fee. The prescribed application has to be sent to the Controller of Examinations through the HoD. **A candidate can apply for revaluation of answer scripts not exceeding 5 courses at a time.** The Controller of Examinations will arrange for the

revaluation and the results will be intimated to the candidate through the HoD concerned**.** Revaluation is not permitted for Supplementary Examinations.

22.TRANSPARENCY AND GRIEVANCE COMMITTEE

Revaluation and Retotaling are allowed on representation (clause 21). Student may get the Xerox copy of the answer script on payment of prescribed fee, if he / she wishes. The student may represent the grievance, if any, to the Grievance Committee, which consists of Dean of the Faculty, (if Dean is HoD, the Dean of another Faculty nominated by the KAHE), the HoD of Department concerned, the faculty of the course and Dean from other discipline nominated by the KAHE and the CoE. If the Committee feels that the grievance is genuine, the script may be sent for external valuation and the marks awarded by the External examiner will be final. The student has to pay the prescribed fee for the same.

23. ELIGIBILITY FOR THE AWARD OF THE DEGREE

A student shall be declared to be eligible for the conferment of the Degree if he / she

- Successfully completed all the components prescribed under Part I to Part IV in the CBCS pattern to earn the minimum required credits as specified in the curriculum corresponding to his / her programme within the stipulated period (vide clause 2.1).
- No pending disciplinary enquiry/ action against him/her.
- The award of the degree must be approved by the Board of Management.

24.CLASSIFICATION OF THE DEGREE AWARDED

24.1 Candidates who qualify for the award of the Degree (vide clause 23) having passed the examination in all the courses in their first appearance, within the specified minimum number of semesters and securing a **CGPA not less than 8** shall be declared to have passed the examination in the **First Class with Distinction.**

24.2 Candidates who qualify for the award of the Degree (vide clause 23) having passed the examination in all the courses within the specified maximum number of semesters (vide clause 2.1), securing a **CGPA not less than 6.5** shall be declared to have passed the examination in the **First Class**.

24.3 Candidates (not covered in vide clauses 24.1 and 24.2) who qualify for the award of the degree (vide Clause 23) shall be declared to have passed the examination in the **Second Class**.

25. RANKING

Candidates who qualify for the UG Degree programme passing all the Examinations in the first attempt, within the minimum period prescribed for the programme of study from Semester I through Semester VI/VIII to the programme shall be eligible for ranking. Such ranking will be confined to 10% of the total number of candidates qualified in that particular programme of study subject to a maximum of 10 ranks.

26. SUPPLEMENTARY EXAMINATION

Supplementary Examination will be conducted only for the final semester students within ten days from the date of publication of results for students who have failed in one theory course only. Such students shall apply with prescribed fee to the Controller of Examinations within the stipulated time.

27. DISCIPLINE

27.1.If a student indulges in malpractice in any of the Internal / External Examinations he / she shall be liable for punitive action as prescribed by the KAHE from time to time.

27.2. Every student is required to observe discipline and decorous behavior both inside and outside the campus and not to indulge in any activity which will tend to bring down the prestige of the KAHE. The erring students will be referred to the disciplinary committee constituted by the KAHE, to enquire into acts of indiscipline and recommend the disciplinary action to be taken.

27. KAHE ENTRANCE EXAMINATION

At the end of Sixth Semester or Eighth Semester, the KAHE Entrance Examinations will be conducted who are aspiring for Higher Education (PG or Ph.D).

28. REVISION OF REGULATION AND CURRICULUM

Karpagam Academy of Higher Education may from time-to-time revise, amend or change the Regulations, Scheme of Examinations and Syllabi, if found necessary.

Annexure I

S.No.	Programme	Subject	Eligibility
1.	B. Sc.	Biotechnology	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern taking Biology or Botany or Zoology or chemistry as subjects at the Higher Secondary level.
2.	B. Sc.	Computer Science	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern. preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.
3.	B. Sc.	Microbiology	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern taking Biology or Botany Zoology or chemistry as subjects at the Higher Secondary level.
4.	B. Sc.	Information Technology	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.
5.	B. Sc.	Computer Technology	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.
6.	B.Sc.	Computer Science(Cognitive Systems)	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.

7.	B.Sc.	Computer Science (Artificial Intelligence and Data Science)	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.
8.	BCA	Computer Application	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.
9.	B. Com.	Commerce	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
10.	B.Com (CA)	Commerce with Computer Applications	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
11.	B. Com. (PA)	Commerce with Professional Accounting	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
12.	B. Com. (BPS)	Commerce with Business Process Services	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
13.	B.B.A.	Business Administration	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
14.	B. Com	Financial Analytics	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level

15.	B. Com	International Accounting and Finance	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
16.	B.Com	Information Technology	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
17.	B. Sc.	Computer Science (Cyber Security)	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern preferably taking Mathematics/Statistics/Computer/Information Science being one of the subjects (OR) 3 year diploma after 10^{th} or 10+2 pattern of education taking computer science/maths as one of the subject.
18.	B. Com	FinTech.	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level

Karpagam Innovation and Incubation Council (KIIC)

(A Section 8 Company)

Based on the 2019 National Innovation and Startup Policy and the 2019–2023 Tamil Nadu Startup Policy, KIIC has recommended to the KAHE students who are affiliated with the KIIC that it be incorporated in the university Program Regulations 2023-24 and implement from this academic year.

Norms to Student Start-Ups

a) Any (UG/PG /(Ph.D.) Research scholars, student, right from the first year of their program is allowed to set a startup (or) work part time/ full time in a startup or work as intern in a startup

b) Any (UG/PG / (Ph.D.) Research scholars) student right from the first year of their program is allowed to earn credit for working on Innovative prototypes/business Models/ Pre incubation (case to case basis).

c) Start Up activities will be evaluated based on the guidelines being given by the expert committee of the KIIC

d) Student Entrepreneurs may use the address of incubation center (KIIC) to register their venture while studying in KAHE.

e) Students engaged in startups affiliated with the KIIC or those who work for them may be exempted from KAHE's attendance requirements for academic courses under current regulations, up to a maximum of 30% attendance per semester, including claims for ODs and medical emergencies Potential Students who have been incubated at KIIC may be permitted to take their University semester exams even if their attendance is below the minimum acceptable percentage, with the proper authorization from the head of the institution.
(On case-to-case basis depends upon the applicability strength, societal benefits and quality of the Innovation and Subsequent engagement of the students with the/ her business)

f) Any Students Innovators/entrepreneurs are allowed to opt their startup in place mini project /major project, /seminar and summer training etc. (In plant training, Internship, value added Course.). The area in which the student wishes to launch a Startup may be interdisciplinary or multidisciplinary.

g) Student's startups are to be evaluated by Expert committee, formed by KIIC and KAHE

Guide lines to award Credits/ Marks to a Student startup

Student's startup stages are divided into five phases and these startup phases can be considered equally in place of the course title as mentioned below with the same credits allotted to the course title in a University curriculum.

Sl. No.	Description/Startup phases	In place of the Subject / Course title	Grades/Credits /Marks
1	**Idea stage/Problem Identification**	**Seminar**	**Same Marks/Credits can be awarded that are listed in the course title's curriculum for the respective startup phases.**
2	**Proof of Concept (POC) /Solution development**	**In-plant training /Internship**	
3	**Product Development (Lab scale) /Prototype Model/ Company Registered**	**Mini Project/ Value added Course**	
4	**Validation/Testing**	**Main Project phase I**	
5	**Business Model/Ready for Commercialization/Implementation**	**Main Project phase II,**	

PROGRAM OUTCOMES (POs):

By the end of the programme, our graduates will

1. **Disciplinary knowledge:** Possess a profound understanding of the foundational concepts, theories, methodologies, and practices within the discipline of Computer Science.
2. **Communication Skills:** Emerge as confident communicators capable of articulating complex concepts, advocating for their viewpoints, and engaging in meaningful discourse to address contemporary issues and drive positive change.
3. **Critical thinking:** Master advanced critical thinking skills, analyzing complex issues, and solving problems through evidence-based decision-making.
4. **Problem solving:** Excel in problem-solving, applying analytical techniques and creative thinking to address complex challenges in the field of Computer Science.
5. **Analytical reasoning:** Emerge as adept analytical thinkers, equipped to tackle challenging problems, make informed decisions, and contribute to the advancement of knowledge in the field of Computer Science.
6. **Research-related skills:** Demonstrate proficiency in data analysis, critical appraisal, and ethical research practices, contributing original insights to the advancements in Computer Science.
7. **Cooperation/Team work:** Develop strong cooperation and teamwork skills, collaborating effectively with diverse peers to achieve common goals.
8. **Scientific reasoning:** Excel in scientific reasoning, applying logic and evidence to analyze phenomena, solve problems, and advance knowledge in the area of Computer Science.
9. **Reflective thinking:** Master reflective thinking, fostering self-awareness and insight to evaluate experiences, perspectives, and actions critically.
10. **Information/digital literacy:** Excel information and digital literacy, adeptly locating, evaluating, and ethically using diverse sources of information
11. **Self-directed learning:** Be empowered individuals to take ownership of their educational journey, fostering autonomy, critical thinking, and adaptability.
12. **Multicultural competence:** Be enabled to effectively navigate diverse contexts, fostering empathy, understanding, and collaboration across cultures.
13. **Moral and ethical awareness/reasoning:** Possess the capacity to critically analyze ethical issues from various perspectives and apply ethical principles to real-world situations.
14. **Leadership readiness/qualities:** Develop the skills and attributes necessary to effectively lead and inspire others.
15. **Lifelong learning:** Foster a commitment to lifelong learning by cultivating curiosity, critical thinking, and a growth mindset.

PROGRAM SPECIFIC OUTCOMES (PSOs).

PSO 1: Graduates will be proficient in designing, developing, testing, and maintaining reliable software systems. They will have the ability to integrate hardware and software components effectively, considering scalability, performance, and security requirements.

PSO 2: Graduates will be able to apply critical thinking and problem-solving skills to address complex computing challenges. They will have a comprehensive understanding of network architectures, protocols, and cloud computing concepts for building and managing distributed systems. Additionally, they will possess proficiency in applying artificial intelligence techniques to develop intelligent systems and applications.

PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

PEO I: Graduates will master core computer science concepts and apply them to solve real-world problems.

PEO II: Graduates will continuously adapt to new technologies and engage in lifelong learning.

PEO III: Graduates will uphold ethical standards and demonstrate social responsibility in their professional practices.

PEO IV: Graduates will effectively communicate and lead teams in multidisciplinary and diverse environments.

DEPARTMENT OF COMPUTER SCIENCE
FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT
UG PROGRAM (CBCS)–B.Sc. Computer Science
(2024–2025Batch and onwards)

Course Code	Name of the course	Category	Objectives and Outcomes		Instruction hours/week			Credit(s)	Maximum Marks			Page No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER I												
24LSUT101/ 24LUH101/ 24LUM101/ 24LUS101/ 24LUF101	Language I (Tamil I / Hindi I/ Malayalam I/ Sanskrit I/ French I)	AEC1	-	-	4	-	-	3	40	60	100	1
24ENU101	English I	MDC1	1,2	-	3	-	-	3	40	60	100	15
24CSU101	Programming in C	Major1	1,4,5,6, 8,10,	1	5	-	-	4	40	60	100	17
24CSU102	Digital Principles and Computer Architecture	Major2	1,4,5,6,8	2	3	-	-	2	40	60	100	19
24CSUA101	Numerical Methods	Minor1	1,4,5,6,8	-	4	-	-	3	40	60	100	21
24CSU111	Programming in C– Practical	Major3	1,4,5,8, 10	2	-	-	4	2	40	60	100	23
24SEC111	Office Automation-Practical	SEC1	1,2,4,5,6,7, 8,10,12,12, 14	1	-	-	5	3	40	60	100	25
24VAC101	Yoga for Youth Empowerment	VAC1	1,12	1	2	-	-	2	100	-	100	29
Semester Total					**21**	**-**	**09**	**22**	**380**	**420**	**800**	
SEMESTER II												
24LSUT201/ 24LUH201/ 24LUM201/ 24LUS201/ 24LUF201	Language II(Tamil II/ Hindi II/ Malayalam II/ Sanskrit II/ French II)	AEC2	-	-	4	-	-	3	40	60	100	32
24ENU201	English II	MDC2	1,2	-	3	-	-	3	40	60	100	45
24CSU201	Object Oriented Programming	Major4	1.3.4,5, 6	2	4	-	-	3	40	60	100	50
24CSU202	Data Structures	Major5	1,3,4,8, 9,11	1	3	-	-	3	40	60	100	53
24CSU203	Community Engagement and Social Responsibility	Major 6	1,2,3,4, 5,6,7,8, 10,15	1,2	2	-	-	2	40	60	100	55
24CSUA201	Discrete Structures	Minor2	1,3,4,5	-	4	-	-	4	40	60	100	57
24CSU211	Object Oriented Programming –	Major7	3,4,5,6	2	-	-	5	2	40	60	100	59

	Practical											
24SEC211	Web Programming –Practical	SEC2	1,3,4,5, 7, 10	2	-	-	3	3	40	60	100	61
24VAC201	Environmental Studies	VAC2	1,3,4,5,8,9 ,1213	1	2	-	-	2	100	-	100	64
	Semester Total				**22**	**-**	**08**	**25**	**420**	**480**	**900**	
SEMESTER III												
24LSUT301/ 24LUH301/ 24LUM301/ 24LUS301/ 24LUF301	Language III (Tamil III / Hindi III/ Malayalam III/ Sanskrit III/ French III)	AEC3	-	-	4	-	-	3	40	60	100	67
24ENU301	English III	MDC3	2,11	-	3	-	-	3	40	60	100	78
24CSU301	Operating Systems	Major8	1,3,4,5,6, 13	1	5	-	-	4	40	60	100	80
24CSU302	Computer Networks	Major9	1,3,4,5,6, 8	2	4	-	-	3	40	60	100	83
24CSUA301	Operations Research	Minor3	1,3,4,5,8, 10,11	-	4	-	-	3	40	60	100	85
24CSU311	Operating Systems –Practical	Major10	1,3,4,5,6, 8,10,11	2	-	-	4	2	40	60	100	87
24CSU312	Computer Networks - Practical	Major11	1,3,5,8,9, 10,11	2	-	-	4	2	40	60	100	89
24VAC301	Indian Knowledge System	VAC3	1,6,10,12 ,15	2	2	-	-	1	100	-	100	91
24CSU391	Internship*	Summer Internship	-	-	-	-	-	2	100	-	100	93
	Semester Total				**22**	**-**	**8**	**23**	**480**	**420**	**900**	
SEMESTER IV												
24LSUT401/ 24LUH401/ 24LUM401/ 24LUS401/ 24LUF401	Language IV(Tamil IV / Hindi IV/ Malayalam IV/ Sanskrit IV/ French IV)	AEC4	-	-	4	-	-	3	40	60	100	94
24ENU401	English IV	SEC3	1,2	-	3	-	-	3	40	60	100	105
24CSU401	Relational Database Management System	Major12	1,2,3,4,5, 6,9,11,12	1	4	-	-	3	40	60	100	107
24CSU402	Network Security	Major13	1,3,4,7,8,1 1,12	2	3	-	-	2	40	60	100	109
24CSU403	Cyber Security	Major14	1,3,4,5,8, 9,10,11, 12	2	4	-	-	3	40	60	100	111
24CSUA401	Probability and Statistics	Minor4	1,3,4,5,8, 9,10,11,1 2, 13	-	4	-	-	3	40	60	100	114
24CSU411	Relational Database Management System -Practical	Major15	1,3,4,5,6, 8,9,10,11 ,12	1	-	-	3	2	40	60	100	117

24CSU412	Network Security - Practical	Major16	1,3,4,5,6,7,8,9,10,11,12	2	-	-	3	2	40	60	100	119
24VAC401	Universal Human Values	VAC 4	6,7,8,9, 12	-	2	-	-	1	100	-	100	123
Semester Total					**24**	**-**	**6**	**22**	**420**	**480**	**900**	
SEMESTER V												
24CSU501	Digital Identity and Access Management	Major17	1,3,4,5,6,8,10	1	4	-	-	3	40	60	100	126
24CSU502A	Programming in Python	Major18	1,3,4,6,7,8, 9,11	2	5	-	-	3	40	60	100	129
24CSU502B	.NET Programming		1,3,4,8,9,11	2								131
24CSU503A	Full Stack Development	Major 19	1,3,4,6,8,11	2	5	-	-	3	40	60	100	133
24CSU503B	Software Testing		1,3,4,6,8,9,11	2								135
24CSUA501	Basics of Accounting	Minor5	1,3,4,7,8,9, 11	-	6	-	-	5	40	60	100	138
24CSU512A	Programming in Python –Practical	Major20	1,3,4,5,6,8, 11	1,2	-	-	5	2	40	60	100	140
24CSU512B	.NET Programming–Practical		1,3,4,5,6,8,11	1,2								142
24CSU513A	Full Stack Development - Practical	Major 21	1,3,4,6,8,11	2	-	-	5	2	40	60	100	144
24CSU513B	Software Testing - Practical		1,3,4,6,8,9,11	2								146
24CSU591	Internship*	Summer Internship	-	-	-	-	-	2	100	-	100	148
	Semester Total				**20**	**-**	**10**	**20**	**340**	**360**	**700**	
SEMESTER VI												
24CSU601	Major Elective	Major22	-	-	5	-	-	3	40	60	100	149
24CSU602A	Generative AI	Major23	1,3,4,6,8	2	5	-	-	3	40	60	100	159
24CSU602B	Big Data Analytics		1,4,8,10,4,15	1								161
24CSUA601	Entrepreneurship	Minor6	1,4,5,7,8,13	1	6	-	-	6	40	60	100	164
24CSU612A	Generative AI–Practical	Major24	1,2,3,4,5,6,8,12,14,15	2	-	-	5	2	40	60	100	166
24CSU612B	Big Data Analytics - Practical		1,2,3,4,5,8,10,11,13,15	2								168
24CSU691	Project	Minor Project	-	-	-	-	9	6	40	60	100	170
ECA / NCC / NSS / Sports /General interest etc		Good										
Semester Total					**16**	**-**	**14**	**20**	**200**	**300**	**500**	
Grand Total					**125**	**-**	**55**	**132**	**2240**	**2460**	**4700**	

SEMESTER VII												
24CSU701	Internet of Things	Major25	1,3,4,5,6,8	1	6	-	-	5	40	60	100	171
24CSU702	Advanced Java Programming	Major26	1,3,4,6,7,8,9,10,11	2	6	-		5	40	60	100	173
24CSUA701	Statistical Computing	Minor7	1,3,4,5,6,8,10	1	6	-		5	40	60	100	175
24CSU711	Artificial Intelligence – Practical	Major27	1,3,4,5,6,8,10,13	2	-	-	6	3	40	60	100	177
24CSU712	Advanced Java Programming – Practical	Major28	1,2,4,5,6,8	2	-	-	6	3	40	60	100	179
Semester Total					**18**	**-**	**12**	**21**	**200**	**300**	**500**	
	SEMESTER VIII A											
24CSU801	MongoDB	Major 29	1,4,5,6,8,10	1	6	-	-	5	40	60	100	181
24CSU802	Data Visualization	Major30	1,3,4,5,6,7,8,9,10	1	6	-	-	5	40	60	100	183
24CSUA801	Organizational Behaviour	Minor8	1,2,3,4,5,7,8,9,12,13,14	1	6	-	-	3	40	60	100	185
24CSU811	MongoDB-Practical	Major31	1,4,5,6,8,10	1	-	-	6	3	40	60	100	187
24CSU812	Data Visualization-Practical	Major32	1,2,3,4,5,6,7,9,10,14,15	1	-	-	6	3	40	60	100	190
	Semester Total				**18**	**-**	**12**	**19**	**200**	**300**	**500**	
SEMESTER VIII B												
24CSU801B	Research Methodology and IPR	Major29	1,3,4,5,6,8,13	1	6	-	-	4	40	60	100	192
24CSUA811	SPSS-Practical	Minor8	1,3,4,5,6,8,9,10,15	1	-	-	4	3	40	60	100	194
24CSU891	Research Project/Preparation of Research Project	Project	-	-		-	20	12	120	180	300	196
	Semester Total				**6**	**-**	**24**	**19**	**200**	**300**	**500**	
	Grand Total				**161**	**-**	**79**	**172**	**2640**	**3060**	**5700**	

Ability Enhancement Courses (AEC)		
Semester	**Course Code**	**Name of the Course**
I	24LSUT101/ 24LUH101/ 24LUM101/ 24LUS101/ 24LUF101	Language I (Tamil I / Hindi I/ Malayalam I/ Sanskrit I/ French I)
II	24LSUT201/ 24LUH201/ 24LUM201/ 24LUS201/ 24LUF201	Language II (Tamil II / Hindi II/ Malayalam II/ Sanskrit II/ French II)
III	24LSUT301/ 24LUH301/ 24LUM301/ 24LUS301/ 24LUF301	Language III (Tamil III / Hindi III/ Malayalam III/ Sanskrit III/ French III)
IV	24LSUT401/ 24LUH401/ 24LUM401 /24LUS401/ 24LUF401	Language IV (Tamil IV / Hindi IV/ Malayalam IV/ Sanskrit IV/ French IV)

Multi-Disciplinary Courses (MDC)		
Semester	**Course Code**	**Name of the Course**
I	24ENU101	English– I
II	24ENU201	English–II
III	24ENU301	English–III

Major		
Semester	**Course Code**	**Name of the Course**
I	24CSU101	Programming in C
	24CSU102	Digital Principles and Computer Architecture
	24CSU111	Programming in C–Practical
II	24CSU201	Object Oriented Programming
	24CSU202	Data Structures
	24CSU211	Object Oriented Programming–Practical
III	24CSU301	Operating Systems
	24CSU302	Computer Networks
	24CSU311	Operating Systems–Practical
	24CSU312	Computer Networks –Practical
IV	24CSU401	Relational Database Management System
	24CSU402	Network Security
	24CSU403	Cyber Security

	24CSU411	Relational Database Management System–Practical
	24CSU412	Network Security–Practical
V	24CSU501	Digital Identity and Access Management
	24CSU502A	Programming in Python
	24CSU502B	.NET Programming
	24CSU503A	Full Stack Development
	24CSU503B	Software Testing
	24CSU512A	Programming in Python-Practical
	24CSU512B	.NET Programming–Practical
	24CSU513A	Full Stack Development–Practical
	24CSU513B	Software Testing–Practical
VI	24CSU601	Major Elective
	24CSU602A	Generative AI
	24CSU602B	Big Data Analytics
	24CSU612A	Generative AI–Practical
	24CSU612B	Big Data Analytics–Practical
	24CSU691	Project
VII	24CSU701	Internet of Things
	24CSU702	Advanced Java Programming
	24CSU711	Artificial Intelligence-Practical
	24CSU712	Advanced Java Programming-Practical
VIIIA	24CSU801	MongoDB
	24CSU802	Data Visualization
	24CSU811	MongoDB–Practical
	24CSU812	Data Visualization-Practical
VIIIB	24CSU801B	Research Methodology and IPR
	24CSU891	Research Project/Preparation of Research Project

Minor		
Semester	**Course Code**	**Name of the Course**
I	24CSUA101	Numerical Methods
II	24CSUA201	Discrete Structures
III	24CSUA301	Operation Research
IV	24CSUA401	Probability and Statistics
V	24CSUA501	Basics of Accounting
VI	24CSUA601	Entrepreneurship
VII	24CSUA701	Statistical Computing
VIIIA	24CSUA801	Organizational Behaviour
VIIIB	24CSUA811	SPSS-Practical

Major Elective		
Semester	**Course Code**	**Name of the Course**
VI	24CSU601A	Cloud Computing
VI	24CSU601B	Soft Computing
VI	24CSU601C	Deep Learning
VI	24CSU601D	J2EE
VI	24CSU601E	Mobile Computing

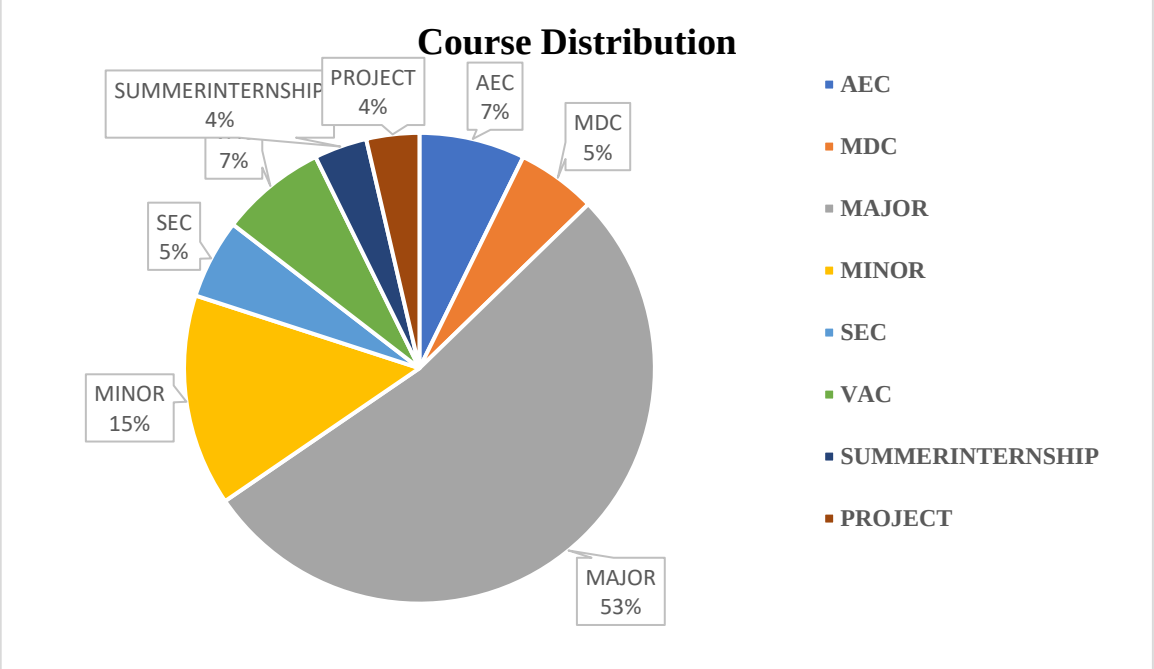
Skill Enhancement Courses (SEC)		
Semester	**Course Code**	**Name of the Course**
I	24SEC111	Office Automation–Practical
II	24SEC211	Web Programming–Practical
IV	24ENU401	English–IV

Value Added Courses (VAC)		
Semester	**Course Code**	**Name of the Course**
I	24VAC101	Yoga for Youth Empowerment
II	24VAC201	Environmental Studies
III	24VAC301	Indian Knowledge System
IV	24VAC401	Universal Human Values

Summer Internship		
Semester	**Course Code**	**Name of the Course**
III	24CSU391	Internship*
V	24CSU591	Internship*

Course Distribution Table

	No of Courses		Total
	Theory	Practical	
AEC	4	0	4
MDC	3	0	3
MAJOR	18	11	29
MINOR	7	1	8
SEC	1	2	3
VAC	4	0	4
SUMMERINTERNSHIP	0	2	2
PROJECT	0	2	2
Total	37	18	55



முதல் பருவம்

24LSUT101 **Language I: Tamil I** **4H - 3C**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

இலக்கிய இன்பம்

பாடத்திட்டப் பொதுநோக்கம்

- மாணவர்களுக்குத் தமிழ்மொழி வரலாறு மற்றும் இலக்கியங்களின் வழியாக வாழ்வியல் மதிப்புகளை உணர்த்துதல்.
- சிந்தனைத் திறனையும், படைப்பாக்கத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும் மேம்படுத்துதல்.
- வேலைவாய்புக்குரிய வகையில் மொழித்திறனை மேம்படுத்துதல்.

பாடத்திட்டப் பயன்விளைவு

- தமிழ்மொழி வரலாறு குறித்த தெளிந்த அறிவு பெற்றிருத்தல்.
- வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை பெற்றிருத்தல்.
- படைப்பிலக்கியத்திறன் பெற்றிருத்தல்.
- இந்தியக் குடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற,'தமிழ் இலக்கியவரலாறு' தமிழ் இலக்கண அறிவு மேம்பாடு பெற்றிருத்தல்.
- மொழிபெயர்ப்பியல், கணினித்தமிழ் சார்ந்த வேலைவாய்ப்புத்திறன் மேம்பாடு.

அலகு – I **10 மணிநேரம்**

சங்க இலக்கியம்–எட்டுத்தொகை-முச்சங்கங்கள் பற்றிய செய்திகள் சங்க
இலக்கியத்தின் தோற்றுவாய் – எட்டுத்தொகை அறிமுகம்

சங்க இலக்கியம் - நற்றிணை - நின்ற சொல்லர் –குறிஞ்சி – தலைவி கூற்று–1

சங்க இலக்கியம் - குறுந்தொகை - நிலத்தினும் பெரிதே–குறிஞ்சி – தலைவி கூற்று- 3

அறஇலக்கியம் - திருவள்ளுவர் – திருக்குறள் (எண்கள்-திருக்குறள் வரிசை எண்ணைக் குறிப்பன)

பாயிரம் – 8 அறவாழி அந்தணன்,13 - விண்இன்று பொய்ப்பின், 34 - மனத்துக்கண் மாசிலன் ஆதல்

இல்லற இயல் - இல்வாழ்க்கை - 41- அன்பும் அறனும் உடைத்தா 50- வையத்துள்வாழ்வாங்கு

அன்புடைமை - 80 - அன்பின்வழியது, **விருந்தோம்பல்** - 90 – மோப்பக்குழையும்,

இனியவைகூறல் - 95 – பணிவுடையன் இன்சொலன்,

செய்நன்றி அறிதல் - 103 – பயன் தூக்கார்,

புறங்கூறாமை - 190 – ஏதிலார் குற்றம், **ஒப்புரவுஅறிதல்** - 216 – பயன்மரம்

ஈகை: 228 – ஈத்துவக்கும் இன்பம், **துறவற இயல் - தவம்** - 261 – உற்றநோய்

வாய்மை - 291 – வாய்மை எனப்படுவது, **வெகுளாமை** - 306 - சினமென்னும்
இன்னாசெய்யாமை : 316-இன்னா எனத்தான் உணர்ந்தவை
நிலையாமை - 331 – நில்லாதவற்றை, **ஊழியல் - ஊழ்** - 373 – நுண்ணியநூல்
ஆள்வினை உடைமை - 618 –பொறியின்மை யார்க்கும், 620-ஊழையும் உப்பக்கம்
நட்பு - 792-ஆய்ந்தாய்ந்து, 794-குடிப்பிறந்து, 797-ஊதியம் என்பது.
காப்பியம் - சிலப்பதிகாரம்:
மங்கலவாழ்த்துப் பாடல் - பொதியில்ஆயினும் – 'கோவலன் என்பான்மன்னோ'
(14-38), 'நீலவிதானத்து' – 'நோன்புஎன்னை'(48-53).
மனையறம்படுத்த காதை - 'வார்ஒலிகூந்தலை' – 'சிறப்பின் கண்ணகிதனக்குஎன்' (84-90)
அரங்கேற்று காதை -'மாமலர்நெடுங்கண்' - 'அகம்மறந்து' (170-175).
மதுரைக்காண்டம் -கொலைக்களக்காதை,'இருமுதுகுரவர்'- 'எழுந்தனன்யான்'
(67-83),'வினைவிளைகாலம்' - ' கொணர்கஈங்குஎன' (148-153)
கட்டுரை காதை - 'கடிபொழில்' - 'இல்சாபம்பட்டனிர்' (138-170)
வழக்குரைக் காதை - 'அல்லவை செய்தார்க்கு' - 'தோற்றான்உயிர்' (82-93)
வஞ்சிக் காண்டம் - நடுகல்காதை - 'மதுரைமூதூர்' - 'மன்னவர்ஏறு' (218-234)
வாழ்த்துக் காதை - 'என்னேஇஃது' - 'தோன்றுமால்' (9)
எழுத்திலக்கணம் - முதல் மற்றும் சார்பெழுத்துகள்

அலகு- 2 **10 மணிநேரம்**
சங்க இலக்கியம் – பத்துப்பாட்டு அறிமுகம்
சங்க இலக்கியம் - பதிற்றுப்பத்து : ஏழாம்பத்து- எறிபிணம் இடறிய செம்மறுக்– 65
சங்க இலக்கியம் - கலித்தொகை : அகன்ஞாலம் விளக்கும் - நெய்தல்கலி – தலைவிகூற்று- 119.
அற இலக்கியம் -முன்றுறையரையனார் - பழமொழி நானூறு 5 பாடல்கள்
காப்பியம் -மணிமேகலை : விழாவறைகாதை : 'தேவரும் மக்களும்' - 'மருங்குஎன்' (66-72)
ஊரலர் உரைத்தகாதை : 'நாவல்ஓங்கிய' - 'உண்டுகொல்'(1-17), 'கற்றுத்துறைபோகிய' – 'தீத்தொழில்படாஅள்' (32-57).
பாத்திரம் பெற்றகாதை : 'போதிநீழல்' - 'நல்அறம்கண்டனை' (73-98)
சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கியகாதை -'வாழிஎம்கோ' - 'அரசுஆள்வேந்துஎன்' (129-163)
சொல்இலக்கணம் - பெயர், வினை, இடை, உரிச்சொல்- விளக்கமும்பயிற்சியும்

அலகு– 3 **10 மணிநேரம்**

அறஇலக்கியங்கள் அறிமுகம்

சங்க இலக்கியம் - பரிபாடல்: வையை : பாடல்-6. - நிறைகடல் முகந்து உராய் – சேறுஆடுபுனலதுசெலவு 1-50.

சங்க இலக்கியம் -அகநானூறு - ஈன்று புறம்தந்த எம்மும் உள்ளாள் – பாலை–

நற்றாய்கூற்று-35

அற இலக்கியம் -ஔவையார்- கொன்றை வேந்தன் (1-50 பாடல்கள்**)**

காப்பியம் - சூளாமணி–அரசியல்சருக்கம்- 1. நாவியே கமழும்(1131), 2. கண்மிசை கனிந்த (1132),3. விரைசெலலிவுளித்(1133), 4. அரைசர்கள் வருக (1134), 5. அருளுமாறடிகள் (1135), 6. விஞ்சையருலக (1136), 7. சொரிகதிர் (1137), 8. கரியவன் வளைந்த(1138), 9. மடித்தவா யெயிறு (1139),10. விஞ்சயரதனைக் (1140), **துறவுச்சருக்கம்** – பயாபதி மன்னனின் துறவுநெறி -1. மன்னிய புகழி(1840), 2. திருமகிழலங்கன் (1841) , 3. ஆங்கவ ரணைந்த (1842),4. அலகுடன் விளங்கு (1843), 5. தன்னையோர் அரசனாக்கி (1844), 6. சென்றநாள்(1845), 7. எரிபுரை (1846.), 8. பிறந்தனர்(1847), 9. பிறந்தநாம் (1848), 10. தொகைமலர் (1849) 11. ஒழுகிய(1850).

பொருள் இலக்கணம் - அகத்திணை மற்றும் புறத்திணை இலக்கணங்கள்.

அலகு- 4 **10 மணிநேரம்**

சிற்றிலக்கியங்கள் தோற்றமும் வளர்ச்சியும்

சங்க இலக்கியம் - ஐங்குறுநூறு : தாய்சாப்பிறக்கும் – தோழிகூற்று – மருதம் - களவன்பத்து: 24

சங்க இலக்கியம் - புறநானூறு : உற்றுழிஉதவியும்-183, பல்சான்றீரே – பொதுவியல்-195

அற இலக்கியம் – வேதநாயகம் பிள்ளை -நீதி நூல்- தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள் மட்டும்

சின்னவோர் பொருள், கடவுளை வருத்தி, எப்புவிகளும், வைத்தவர், ஈன்றவர்.

காப்பியம் – கம்பராமாயணம் – சுந்தரகாண்டம் (தேர்ந்தெடுக்கப்பட்ட பாடல்கள்

மட்டும் **)** வண்மையில்லை 84 - தாய் ஒக்கும் 171 - ஒரு பகல் 284 - எதிர் வரும் 314 – தருவனத்துள் 327 - எண் இலா 328 - சொல் ஒக்கும் 413 – இவ்வண்ணம் 559 - எண் அரு 598 - தடுத்து இமையாமல் 1979 - தோள் கண்டார் 1008 – மைந்தரை 1339 – அந்நகர் 1445 - சிவந்த வாய் 1550 - ஏய வரங்கள் 1593 – நின்மகன் 1526 – ஆழிசூழ் 1601 – மன்னவன் 1604 – பின்னும் 1752 – கிள்ளையொடு 1701 – எந்தையும் 2159 - பஞ்சி ஒளிர் 2762 - மயில் உடை 3248 – ஆண்டு 3390 –மற்றுஇனி 3812- கண்டனன் 5249 – வேலையுள் 6037 – மண்ணொடும் 6038- வாங்கிய 6170 – இங்குஉள 6172 – கண்டனென் 6031 - பைய பைய 6174 – அந்நெறி 6185 – குகனொடும் 6507 –கூவி 7131 –மாக்கூடு 7760 – அற்றவன் 9168 - ஆள் ஐயா 7271 - கார்நின்ற-10043.

கடிதப்பயிற்சி

1. வேலைவேண்டி விண்ணப்பம் எழுதுதல்

2.பல்கலைக்கழகப் பன்னாட்டுக் கருத்தரங்கச் செய்தியை நாளிதழில் வெளியிட வேண்டி நாளிதழின் பதிப்பாசிரியருக்குக் கடிதம்
3. கருத்தரங்கப் பங்கேற்புக்கான அனுமதிக் கடிதம்
4. பல்கலைக்கழக விழாவுக்குத் தலைமையேற்க வேண்டி, மாவட்ட ஆட்சியருக்கு விண்ணப்பம்.

அலகு – 5 **8 மணிநேரம்**

காப்பியங்கள் - தோற்றமும் வளர்ச்சியும்
சங்க இலக்கியம் - பத்துப்பாட்டு: சிறுபாணாற்றுப்படை
வானம் வாய்த்த – யாம் அவண்நின்றும் வருதும் (அடிகள்: 84-143),
செய்நன்றி அறிதலும் – நல்லியக்கோடனை நயந்தனிர் செலினே (207-269).
அற இலக்கியம் – குமரகுருபரர் - நீதி நெறி விளக்கம்
(தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள் மட்டும்)
உறுதி பயப்ப, முயலாது வைத்து, உலையாமுயற்சி, காலம் அறிந்து, மெய்வருத்தம்
கடிதப்பயிற்சி
5. கல்விக் கடன்வேண்டி வங்கிமேலாளருக்கு விண்ணப்பம்
6. வசிப்பிடத்திற்கு அடிப்படை வசதிவேண்டி வட்டாட்சியருக்கு விண்ணப்பம்
7. விருதுபெற்ற நண்பனுக்குப் பாராட்டுக் கடிதம்
8. புத்தகங்கள் அனுப்பி உதவவேண்டி, பதிப்பகத்தாருக்கு விண்ணப்பம்.

மொத்த மணிநேரம் 48

பார்வை நூல்கள்

1. **கற்பகச் சோலை – தமிழ்ப்பாட நூல், இலக்கிய நெறிகள்,** தமிழ்த்துறை வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் – 21.
2. **தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன்,** கலையக வெளியீடு, நாமக்கல்.

இணையதளம்

1. www.tvu.org.in
2. www.maduraitamilproject.com

இதழ்கள்

1. International Research Journal of Indian Literature, irjil.in
2. International Tamil Research Journal, iorpress.in

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.8**	**2.6**	**2.4**	**-**	**-**	**-**	**-**	**-**	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester I

24LUH101 **Language I: Hindi I** **4H-3C**

(Prose, Non-detailed, Nibandh, Grammar)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

- Understand the text styles and grammatical elements
- Discuss the content of a reading passage
- Develop an interest in the appreciation of short stories

COURSE OUTCOMES(COs) :

- Develop an interest in the appreciation of literature.
- Discuss and respond to content of a reading passage.
- Learning the literacy knowledge of Hindi specially reading and writing .
- Learning the literary knowledge specially reading and understanding of Hindi short Stories
- Learning the history of Hindi literature.

UNIT I a) Prose - Bharathiya Sangrah **9 HOURS**

b) Non-Detailed - Naya Mehman

c) Nibandh - Anushasan

d) Grammar - Bhasha Aur Vyakaran

UNIT II a) Prose - Pahtha Pani Nirmal **9 HOURS**

b) Non-Detailed - Eakankki ki Visheshatha

c) Nibandh - Onam

d) Grammar – Varna Vichar , Sangya

UNIT III a) Prose – Rashtriya Pitha Mahathma **10 HOURS**

b) Non-Detailed – Maha Bharat ki Eak Sanjh

c) Nibandh – Eakatha Ka Mahathva

d) Grammar – Sarvanam , Gender

UNIT IV a) Prose – Gapshap **10 HOURS**

b) Non-Detailed – Yahang Sona Mana Hai

c) Nibandh – Ganga Pradhushan Ki Samasy

d) Grammar – Number , Karak , Visheshan

UNIT V a) Prose – Nindha Ras **10 HOURS**

b) Non – Detailed Eakanki ki Katha Vasthu

c) Nibandh – Paropkar

c) Nibandh – Paropkar

d) Grammar - Kriya , Kriya Visheshan

TOTAL: 48 HOURS

REFERENCE BOOKS::

I. Prose :Nuthan Gathya Sangrah (lesson-1,5,6,8,9).

Editor : Jayaprakash

Publisher : Sumithra Prakasan,

16|5.Hasting Road,

Illahabad.211001.

II. Non-detailed: Naveen Ekhanki Sangrah

Editor : Dr. Srimathi Malathi Tiwari

Publisher: Sumithra Prakashan,

204.Leela Apartment,

Ashok Nagar, Illahabad-211001.

III. Nibandh : Subod Hindi Nibandh

Editor : Dr. Braj Kishor Prasad Sing

Publisher: Manoj Publication

1583-84 Dariba Kala, Chandni Chouk,

Delhi – 110006.

IV Grammar: Sugam Hindi Vyakaran

Writer: Pro. Vamshidhar & Dharmapal

Publication: Shiksha Bharathi, Kashmir Gat, Delhi - 110006

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO14	PO14	PO15	PSO2	PSO1
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.8**	**2.4**	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester I

24LUM101 **Language I: Malayalam I** **4H-3C**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVE(CO):

- Improves grammatical knowledge
- Will continue to read and learn about articles and think about them
- It is possible to read and understand short stories and understand the thoughts and life ofthe people of this state.

COURSE OUTCOME(COs):

- Understand the text styles and grammatical elements
- Discuss the content of a reading passage
- Develop an interest in the appreciation of short stories
- Comprehend the grammatical structures and sentence making
- Understand the language and developing English to Malayalam translation skill

	PART I MALAYALAM PAPER I	
Unit No.		**HOURS**
I	Novel – Pathummayude Aadu - Vaikam Muhammed Basheer	**10**
II	Novel- - Pathummayude Aadu - Vaikam Muhammed Basheer	**10**
III	Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)	**09**
IV	Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)	**10**
V	Composition &Translation(English to Malayalam)	**09**
	TOTAL	**48**

TEXT BOOKS:

1. Novel- PathummayudeAadu - Vaikam Muhammed Basheer(D.C.Books, Kottayam, Kerala)
2. Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)(D.C. Books, Kottayam, Kerala)
3. Expansion of ideas, General Eassay and Translation. (A simple passage)

REFERENCE BOOKS:

1. Malayala Novel Sahithya Charitram-K.M.Tharakan (N.B.S.Kottayam)
2. Cherukatha Innale Innu-M.Achuyuthan (D.C Books, Kottayam)
3. Sahithya CharitramPrasthanangalilude- Dr.K.M George, (D.C.Books Kottayam)
4. MalayalaSahithyavimarsam-Sukumar Azheekode (D.C.books)

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	-	3	3	-	-	-	3	-	-	-	-	2	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24LUS101 **Language I: Sanskrit I** **4H-3C**
(POETRY, GRAMMAR AND TRANSLATION**)**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

- The fundamental objective of the curriculum is to impart effective science education at the undergraduate level, exposing them to recent trends and developments in the subject.
- Creating scientific temper is another major objective of this curriculum.
- Another major thrust given here is to develop an environmental concern in all activities of the students. 'Go green', the motto of the syllabus emphasizes the urgent need to conserve nature without destruction of natural resources.

COURSE OUTCOMES(COs) :

- **Critical Thinking** :Take informed actions after identifying the assumptions that frame students' thinking and actions.
- **Problem Solving**: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.
- **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development.
- **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

UNIT I **9 HOURS**

Introduction to Poetry, Definition of Poetry

UNIT II **9 HOURS**

Five Maha Kavyas

UNIT III **10 HOURS**

Text Prescribed : Raghuvamsa (Canto – 1) First Ten Slokas

UNIT IV **10 HOURS**

Text Prescribed : Raghuvamsa (Canto – 1) Slokas Eleven to Thirty

UNIT V **10 HOURS**

Text Prescribed : Raghuvamsa (Canto – 1) Slokas Thirty One to Fifty

Grammar: Text prescribed : Sanskrit Self Teacher
By Dr.V.Varadhachari
(Present tense and Declension of „a‟ endingnouns
(Masculine)

TOTAL: 48 HOURS

TEXT BOOKS:

1. 1.Raghuvamasa (Canto – 1)R.S.Vadhyar and Sons Palghat, Kerala
2. 2.Sanskrit Self Teacher By Dr.V.VaradhachariT.S.Sriraman 32, Tank Bund Road Near Loyola College, Nungambakkam Chennai 600 034.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester I

24LUF101 **Language I: French I** **4H-3C**

(Leçon, Communication, Grammaire, Verbes, Lexique, Culture)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

- To enable the learner to communicate effectively and appropriately.
- To develop and integrate the use of the four language skills.
- To train students to acquire proficiency in French by reading different genres of literature and learning grammar

.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Retrieve fundamentals of French language to construct error free sentences.	Apply
CO2	Construct and maintain social relationships.	Analyze
CO3	Construct business letters, proposals and E-Mail communication	Apply
CO4	Adopt the skills of planning, structuring, and delivery techniques in group discussions and presentations.	Understand
CO5	Classify communication skills in business environment	Understand

UNITE I **9 HOURS**

a) Leçon – Bienvenue
b) Communication –Un cours de francais,Entrer en contact saluer,
c) Verbes - être ou avoir
d) Lexique –Les couleurs, l' alphabet
e) Culture – La France

UNITE II **9 HOURS**

a) Leçon -Bonjour ça va ?
b) Communication -Demander et dire,Comment ça va
c) Verbes – Les verbes réguliers en –er.
d) Lexique - Les Pays et les nationalités , Les animaux domestiques, Les jours de la semaine.
e) Culture – La France et la Francophonie

UNITE III **10 HOURS**

a) Leçon - Salut ! Je m'appelle Agnès

b) Communication - Se présenter et présenter quelqu'un Demander et dire la date

c) Grammaire - Les pronoms personnels sujets ,Les verbes être et avoir , Les articles définis et indéfinis

d) Verbes - Les verbes aller et venir

e) Lexique - Les mois de l'année, Les nombres de 0 à 69 » La famille (1)

f) Culture - La France physique et politique

UNITE IV **10 HOURS**

a) Leçon - Qui est-ce ? Dans mon sac, j ' ai

b) Communication - Demander et répondre poliment ,Demander des informations Personnelles

c) Grammaire - La formation du feminine, La formation du pluriel , Le adjectifs possessifs

d)Verbes -Les verbes ir et re

e)Lexique -Les professions ,Quel ques objets ,La fiche d'identité

f)Culture -Les symbols de la France,

UNITE V **10 HOURS**

a) Leçon - Il est comment ? Allô ?

b)Communication - Décrire l'aspect physique et le caractère Parler au téléphone

c)Grammaire - La formation du féminin , La phrase interrogative Qu'est-ce que... ? La phrase négative

d)Verbes - Le verbe Faire

e) Lexique - L'aspect physique , Le caractère, Les prépositions de lieu , Les nombres à partir de 70

f) Culture - Les frontiers de la france,les villes connues en france.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de francais**, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud **Deldphin, Saison 1 – Cahier d'activites** , Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, Marie- Françoise Gliemenn,**Les exercices de grammaire**,Hachette FLE, Paris,2005

REFERENCE BOOKS:

1. Christian Beaulieu, Je **pratique, Exercises de grammaire A1**, Dider,Paris,2015
2. Nathalie BIE, philippe SANTINAN,**Grammaire pour adolescents-250 exercises,** CLE International , Paris , 2005

WEBSITES :

1. http:// enseigner.tv5 monde.com/
2. bonjourdumonde.com /exercises/contenu/le – francais-du- tourisme.html
3. http://www.bonjurdefrance.com/
4. https://www.lepointdufle.net/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester I

24ENU101 **ENGLISH I** **3H-3C**

Instruction Hours/week: L:3 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

- To enable the learner to communicate effectively and appropriately.
- To develop and integrate the use of the four language skills.
- To train students to acquire proficiency in English by reading different genres of literature and learning grammar.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Retrieve fundamentals of English language to construct error free sentences.	Apply
CO2	Construct and maintain social relationships.	Analyze
CO3	Construct business letters, proposals and E-Mail communication	Apply
CO4	Adopt the skills of planning, structuring, and delivery techniques in group discussions and presentations.	Understand
CO5	Classify communication skills in business environment	Understand

UNIT I **8 HOURS**

LISTENING: Listening –Types of Listening
SPEAKING: Face to Face Conversation
READING: Reading – Types of Reading
WRITING: Jumbled Sentences
LITERATURE: Ode on a Grecian Urn by John Keats
GRAMMAR: Parts of Speech

UNIT II **7 HOURS**

LISTENING: Principles of Listening Skills
SPEAKING: Descriptions
READING: Reading Techniques
WRITING: Paragraph Writing
LITERATURE: Of Friendship by Francis Bacon
GRAMMAR: Articles

UNIT III **7 HOURS**

LISTENING: Barriers of Listening
SPEAKING: Telephone Conversations

READING: Reading Comprehension Passages
WRITING: Precise Writing
LITERATURE: The Umbrella man by Roald Dahl
GRAMMAR: Tense

UNIT IV **7 HOURS**

LISTENING : Story Narrations
SPEAKING : Group Discussion
READING : Reading Reports and profiles
WRITING : Letter Writing
LITERATURE: Tyger by William Blake
GRAMMAR : Subject and Predicate-Question Tags

UNIT V **7 HOURS**

LISTENING: Listening Strategies
SPEAKING: Interview Skills
READING: Tips for MOC- Anchoring
WRITING: Circular Writing and Summary Writing
LITERATURE: Short story: Rapunzel by the Brothers Grimm
GRAMMAR: Framing Questions

TOTAL: 36 HOURS

TEXT BOOK :

1. Board of Editors , *Acrostic I* (2024*)*. Karpagam Academy of Higher Education

REFERENCE BOOKS:

1. Martin's, St (2013). Oxford Handbook of Writing: Handbook of Writing. Cambridge University Press.
2. Julian Treasure ,Sound Business, (2012). Oxford University Press
3. Hornby, A,S.(1975). The Guide to patterns and usage in English: oxford university Press.
4. Ellis, R.(1990). Instructed second language acquisition, Oxford: oxford university Press New York:Pergamon Press.

WEB SITES:

1. https://langster.org/en/blog/fundamentals-of-english-grammar-everything- you- need-to-know/
2. https://medium.com/@phonicstandardvideo.am/fundamentals-of-english- grammar-for-novices-24b355d2cd83

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	**-**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-I

24CSU101 **Programming in C** **5H - 4C**

Instruction Hours/week: L:5 T:0 P: 0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

- Provide knowledge about C fundamentals.
- Teach concepts and techniques in C programming.
- Enable understanding and application of concepts in arrays, user-defined functions, pointers, structures, unions, and file management.

COURSE OUTCOMES(CO'S):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental knowledge of C.	Understand
CO2	Apply the concepts of programming with C through Decision making and Looping.	Apply
CO3	Apply the major concepts to implement Problem Solving by Arrays and User-Defined Functions.	Apply
CO4	Analyze the Program development using Pointers, Structures and Unions.	Analy
CO5	Apply the File Management concept.	Apply

UNIT I Overview of C **12 HOURS**

Overview of C - Introduction – History of C-Features of C-Structure and Execution of C-Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables – Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators-Arithmetic Expressions Evaluation of expression- precedence of arithmetic operators - Type conversion in expression – operator precedence & associativity-Mathematical functions- Reading &Writing a character-Formatted input and output.

UNIT II Decision Making and Looping **12 HOURS**

Decision Making, Looping and Arrays: Introduction – if, if…. else, nesting of if …else statements- else..if ladder – The switch statement, The ?: Operator – The goto Statement. Decision Making and Looping: Introduction- The while statement- the do statement – the for statement-jumps in loops.

UNIT III Arrays and User-Defined Functions **12 HOURS**

Arrays- Arrays–Character Arrays and Strings. **User-Defined Functions**: User-Defined Functions: Introduction–Need and Elements of User-Defined Functions-Definition-Return Values and their types-Function Calls–Declarations–Category of Functions-Nesting of Functions-Recursion–Passing Arrays and Strings to Functions- The Scope, Visibility and Lifetime of Variables.

UNIT IV Pointers, Structures and Unions **12 HOURS**

Pointers: Introduction-Understanding pointers -Accessing the address of a variable Declaration and Initialization of pointer Variable – Accessing a variable through its pointer Chainof pointers-Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers to Functions–Pointers and Structures -Structures and Unions.

UNIT V File Management **12 HOURS**

File Management in C: Introduction-Understanding File Management-Defining and Opening a file-Closing a File-IO Operations on file-Error Handling during IO Operation-Random Access to files-Command Line Arguments – Macros – types of macros.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Balagurusamy, E. (2018). *Programming in ANSI C* (7th ed.). McGraw-Hill Education.
2. Kernighan, B. W., & Ritchie, D. M. (2015). *The C programming language* (2nd ed.). Prentice Hall.

REFERENCE BOOKS:

1. Balagurusamy, E. (2008). *Computing fundamentals & C programming* (2nd reprint ed.). Tata McGraw-Hill.
2. Forouzan, B. A., & Gilberg, R. F. (2000). *Computer science: A structured programming approach using C* (3rd ed.). Brooks/Cole.
3. Schildt, H. (2000). *C: The complete reference* (4th ed.). McGraw-Hill.

WEBSITES:

1. Introduction to Programming in C-NPTEL
2. Problem solving through Programming in C -SWAYAM
3. C for Everyone: Programming Fundamentals-Coursera
4. https://www.w3schools.com/c/
5. https://www.youtube.com/watch?v=5Bn8h6Id14U

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	2		3	-	-	-	-	-	-	-	1	-
CO2	3	-	-	3	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO4	3	-	-	-	-	-	-	3	-	-	-	-	-	-	-	1	-
CO5	3	-	-	3	3	-	-	3		2	-	-	-	-	-	1	-
Average	3	-	-	3	3	2	-	3	-	2	-	-	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU102 **Digital Principles and Computer Architecture** **3H-2C**

Instruction Hours/week: L:3 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**
End Semester Exam:3 Hours

PREREQUISITE:

- Number Systems And Boolean Algebra

COURSE OBJECTIVES(CO):

- Understand the basic structure of number system methods and Boolean algebra.
- Observe the characteristics of various sequential and logic circuits.
- Interpret the concepts of memory organization, I/O concepts, and multiprocessors.

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to::

COs	Course Outcomes	Blooms Level
CO1	Explain the basic structure of number system methods like binary, octal and hexadecimal and understand the arithmetic and logical operations are performed by computers.	Understand
CO2	Apply the building up of Sequential and combinational logic from basic gates.	Apply
CO3	Understand the concepts of Combinational Sequential Circuits	Understand
CO4	Categorize the functioning of CPU AND DMA.	Analyze
CO5	Analyze on Memory Organization and also Infer the knowledge on Multiprocessors	Analyze

UNIT I NUMBER SYSTEM AND BINARY CODES **8 HOURS**

Number System and Binary Codes: Number Systems and Codes - Binary Number System: Binary to Octal, Decimal, Hexadecimal Conversions– Decimal Number System: Decimal to Binary, Octal, Hexadecimal Conversions – Octal Number System: Octal to Binary, Decimal, and Hexadecimal Conversions - Hexadecimal Number System: Hexadecimal to Binary, Octal, Decimal Conversions –ASCII Code – Excess – 3 Code – Gray Code.

UNIT II DIGITAL LOGIC AND COMBINATIONAL SEQUENTIAL CIRCUITS
8 HOURS

Digital Logic : The Basic Gates – AND, OR, NOT – Universal Logic Gates : NAND and NOR – AND,OR-Invert Gates.**Combinational Logic Circuits** : Boolean Laws and Theorems – Sum-of-Products Method- Truth Table to Karnaugh Map – Pairs, Quads and Octets – Karnaugh Simplification - Don't Care Conditions-Product-of Sums Method.

UNIT III INPUT– COMBINATIONAL CIRCUITS **7 HOURS**

Multiplexers - Demultiplexers – 1-of-16 Decoders – BCD-Decimal Decoders - Encoders – Flip-

flops: RS Flip-flops- Edge-triggered RS Flip-flops - Edge-triggered D Flip-flops - Edge-triggered JK Flip-flops.

UNIT IV CPU AND DMA **7 HOURS**

Central Processing Unit: General Register Organization - Stack Organization – Instruction Formats -Addressing Modes. Input–Output Organization: Peripheral Devices * - Input-Output Interface – Asynchronous Data Transfer (strobe control & handshaking) – Priority Interrupt – Direct Memory Access – Input – Output Processor
–Serial Communication.

UNIT V MEMORY ORGANIZATION AND MULTIPROCESSORS **6 HOURS**

Memory Organization: Memory Hierarchy – Main Memory – Cache Memory – Virtual Memory. **Multiprocessors**: Characteristics of Multiprocessors * - Interconnection Structures.

TOTAL: 36 HOURS

TEXT BOOKS:

1. *Malvino, A., & Leach, D. P. (1995).* Digital principles and applications *(3rd ed.). McGraw-Hill.*
2. *Mano, M. M. (1999).* Computer system architecture *(3rd ed.). Pearson Education.*

REFERENCE BOOKS:

1. *Bartee, T. C. (2003).* Digital computer fundamentals *(6th ed.). Tata McGraw-Hill.*
2. *Hayes, J. P. (1998).* Computer architecture and organization *(3rd ed.). Tata McGraw-Hill.*

WEBSITES:

1. https://nios.ac.in/media/documents/vocational/CLS/Certificate_Course_in_Library_Science_english/M4_PDF/M4L1.pdf
2. https://www.tutorialspoint.com/computer_fundamentals/computer_fundamentals_tutorial.pdf
3. https://www.javatpoint.com/digital-computer

CO,PO,PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	2
CO2	3	-	-	3	2	-	-	3	-	-	-	-	-	-	-	-	2
CO3	3	-	-	3	2	-	-	3	-	-	-	-	-	-	-	-	2
CO4	3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
CO5	3	-	-	-	2	1	-	-	-	-	-	-	-	-	-	-	2
Average	3	-	-	3	2	1	-	3	-	-	-	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-I

24CSUA101 **Numerical Methods** **4H-3C**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Understanding of basic calculus.

COURSE OBJECTIVES (CO):

- To learn the fundamental methods for solving numerical algebraic and transcendental equations.
- To understand various techniques for solving simultaneous linear algebraic equations.
- To gain knowledge of interpolation, numerical differentiation, numerical integration, and numerical solutions of ordinary differential equations.

COURSE OUTCOMES (COs):

Upon completion of this course, the student will be able to:

COs	Course Outcomes	Blooms Level
CO1	Apply numerical analysis which has enormous application in the field of science.	Apply
CO2	Implement numerical methods to solve systems of simultaneous linear algebraic equations.	Apply
CO3	Summarize the principles of Gregory-Newton forward and backward and Lagrange's Interpolation formulas.	Understand
CO4	Explain numerical differentiation and numerical integration formulas.	Understand
CO5	Implement numerical methods to solve ordinary differential equations.	Apply

UNIT I **10 HOURS**

SOLUTIONS OF NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS Bisection method -Iteration method- False Position method - Newton's method.

UNIT II **10 HOURS**

SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATION

Gauss elimination method- Gauss Jordon method- Gauss Jacobi method- Gauss Seidel methods.

UNIT III INTERPOLATION **10 HOURS**

Gregory-Newton forward and backward interpolation Formula– equidistant terms with one or more missing values - Lagrange and Inverse Lagrange Interpolation formula.

UNIT IV NUMERICAL DIFFERENTIATION AND INTEGRATION 9 HOURS

Numerical Differentiation: Newton 's forward Difference and Newton 's Backward Difference formula. Numerical Integration: Trapezoidal Rule & Simpson 's Rule.

UNIT V: 9 HOURS

NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

Taylor's series - Euler's method –Modified Euler's method - Runge-Kutta methods (fourth order Runge - Kutta method only).

TOTAL: 48 HOURS

TEXT BOOKS:

1. Kandasamy P., Dr. Bhagavathi K., and Dr. Gunavathi K., (2015). Numerical Methods, Published by Chand & Company Pvt. Ltd., New Delhi.
2. Jain M.K., Iyengar S.R.K., and Jain R.K. (2012). Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi.
3.

REFERENCE BOOKS:

1. Veera Rajan T., and Ramachandran T., (2008). Numerical Methods with Programs in C, Tata McGraw-Hill Publishing company limited, New Delhi.
2. Bradie B., (2007). A Friendly Introduction to Numerical Analysis, Pearson Education, India.

WEBSITES:

1 https://testbook.com/maths/bisection-method

2 https://kanchiuniv.ac.in/coursematerials/Numerical%20-%20Algebraic%20equations.pdf

3 https://youtu.be/TIWRyzzFUYQ?si=rK4kUBpTzVpavVdU

4 https://theengineeringmaths.com/wp-content/uploads/2017/11/num-diff-integ-web.pdf

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	-
CO2	3	-	-	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO3	3	-	-	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	-	-	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	3	2	1	-	3	-	-	-	-	-	-	-	-	-
Average	3	-	-	3	2	1	-	3	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU111 **Programming in C - Practical** **4H-2C**

Instruction Hours/week: L:0 T:0 P:4 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

- Provide knowledge about the structure and fundamentals of C programming.
- Equip students with problem-solving skills and techniques using C.
- Enable students to develop programs using user-defined functions, structures, unions, pointers, and file management.

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental knowledge of C Programming Structure	Understand
CO2	Apply the concepts of programming with C .	Apply
CO3	Apply the major concepts to implement Problem Solving using C.	Apply
CO4	Develop the Programs using User-Defined Functions, Structures and Unions.	Apply
CO5	Develop programs using Pointers & File Management.	Apply

List of Programs

1. Write a C program to find the sum, average, standard deviation for a given set of numbers.
2. Write a C program to generate n prime, perfect, Armstrong numbers.
3. Write a C program to generate Fibonacci series.
4. Write a C program to print magic square of order n where n>3and n is odd.
5. Write a C program to sort the given set of numbers in ascending order.
6. Write a C program to check whether the given string is a palindrome or not using pointers.
7. Write a C program to count the number of Vowels in the given sentence.
8. Write a C program to find the factorial of a given number using recursive function.
9. Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5 subjects in a structure. Create an array of structures and print the mark sheet in the
   University pattern.
10. Write a function using pointers to add two matrices and to return the resultant matrix to the calling function.
11. Write a C program which receives two filenames as arguments and check whether the file contents are same or not. If same delete the second file

12. Write a program which takes a file as commandline argument and copy it to another file. At the end of the second file write the total i) no.of chars ii) no.of words and iii)no.of lines.

TOTAL: 48 HOURS

TEXT BOOKS:

1 Balagurusamy, E. (2018). *Programming in ANSI C* (7th ed.). McGraw-Hill Education.
2 Kochan, S. G. (2014). *Programming in C* (4th ed.). Addison-Wesley.
3 Balagurusamy, E. (2008). *Computing fundamentals & C programming* (2nd reprint ed.). Tata McGraw-Hill.
4 Forouzan, B. A., & Gilberg, R. F. (2000). *Computer science: A structured programming approach using C* (3rd ed.). Brooks/Cole.
5 Schildt, H. (2000). *C: The complete reference* (4th ed.). McGraw-Hill.
6 Kernighan, B. W., & Ritchie, D. M. (1988). *The C programming language* (2nd ed.). Prentice Hall.

WEBSITES:

1 www.programmingsimplified.com
2 www.programiz.com / c-programming
3 www.cplusplus.com
4 www.learncpp.com
5 www.udemy.com
6 www.hackerrank.com
7 www. leetcode.com
8 www. codewars.com.com
9 www. codechef.com

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	2
CO2	3	-	-	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO3	3	-	-	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO4	3	-	-	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO5	3	-	-	2	2	-	-	3	-	1	-	-	-	-	-	-	2
Average	3	-	-	2	2	-	-	3	-	1	-	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24SEC111 **Office Automation - Practical** **5H - 3C**

Instruction Hours/week: L: 0 T: 0 P:5 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Familiarity with office software applications such as word processors, spreadsheets, and presentation tools

COURSE OBJECTIVES(CO):

- Perform documentation and accounting operations.
- Develop presentation skills using various tools.
- Study and apply concepts of LibreOffice, spreadsheets, and presentation tools in an office environment.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the dynamics of an office environment.	Understand
CO2	Understand the basics of computer systems and its components.	Understand
CO3	Understand and create a presentation using PowerPoint tool.	Understand
CO4	Understand and apply the basic concepts of electronic spreadsheet software	Understand
CO5	Analyze file mangers, word processors, spreadsheets, presentation software's.	Analyze

List of Programs (MS-Word)

1. Create a news-paper document with at least 200 words,
   i. Use margins as, top:1.5, bottom:2, left:2, right:1 inch.
   ii. Use heading "Gandhi Jayanti", font size: 16, font color: red, font face: Arial Black.
   iii. With first letter "dropped" (use drop cap option) of the first paragraph containing a picture at the right side
   iv. Use three columns from the second paragraph onwards till the half of the page.
   v. Then use heading "Computer basics"
   vi. Create paragraph using two columns till the end of the page.

2. Create a Mathematical question paper using, at least five equations
   i. With fractions, exponents, summation function
   ii. With at least one „m*n" matrix
   iii. Basic mathematical and geometric operators.
   iv. Use proper text formatting, page color and page border.
3. Create a flowchart using,
   i. Proper shapes like ellipse, arrows, rectangle, and parallelogram.
   ii. Use grouping to group all the parts of the flowchart into one single object.
4. Create a table using table menu with,
   i. At least 5 columns and 10 rows.
   ii. Merge the first row into one cell.

iii. Merge the second row into one cell, then split the second row into three cells.
iv. Use proper table border and color.
v. Insert proper content into the table with proper text formatting.

5. Create a table using two columns,
   i. The left column contains all the short-cut keys and right-side column contains the function of the short-cut keys.
   ii. Insert a left column using layout option. Name the heading as Serial No.
6. Create two letters with the following conditions in Ms Word and find the difference.
   i. Write a personal letter to your friend using at least 100 words and two paragraphs. The date must be in top-right corner. Use „justify" text- alignment and 1.5 line spacing for the body of the letter. Letter must contain proper salutation and closing.
   ii. Use step by step mail-merge wizard to design a letter.
7. Create a letter, which must be sent to multiple recipients.
   i. Use Mail-Merge to create the recipient list.
   ii. Use excel sheet to enter the recipient.
   iii. Start the mail merge using letter and directory format. State the difference.

List of Programs (MS-Excel)

1 Create a table "Student result" with following conditions.
   i. The heading must contain, Sl. No., Name, Mark1, Mark2, Mark3, Total, average and result with manual entry.
   ii. Use formulas for total and average.
   iii. Find the name of the students who has secured the highest and lowest marks.
   iv. Round the average to the nearest highest integer and lowest integer (use ceiling and floor function respectively).

2 Do as directed
   i. Create a notepad file as per the following fields
   Sl.no. name th1 th2 th3 th4 th5 total % grade

3 Import this notepad file into excel sheet using data from text option.

4 Grade is calculated as,
   i. If %>=90, then grade A
   ii. If %>=80 and <90, then grade B
   iii. If %>=70 and <80, then grade C
   iv. If %>=60 and <70, then grade D
   v. If %<60, then grade F

5 Create a sales table using the following data,

Item	Year1	Year2	Year3	Year4
Item1	1000	1050	1100	1200
Item2	950	1050	1150	1200
Item3	1100	1200	1200	1300

   i. Draw the bar-graph to compare the sales of the three items for four years using insert option.
   ii. Draw a line-graph to compare the sales of three items for four years using insert option.
   iii. Draw different pie-charts for the given data using insert option.
   iv. Use condition, to highlight all the cells having value >=1000 with red color (use conditional formatting).

List of Programs (MS-Power Point)

1. Create a power-point presentation with minimum 5 slides.

i. The first slide must contain the topic of the presentation and name of the presentation.
ii. Must contain at least one table.
iii. Must contain at least 5 bullets, 5 numbers.
iv. The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue.
v. The body must be, font size: 24, font-face: Comic Sans MS, font-color: green.
vi. Last slide must contain, "thank you".

2. Create a power-point presentation with minimum 10 slides
   i. Use word art to write the heading for each slide.
   ii. Insert at least one clip-art, one picture
   iii. Insert at least one audio and one video
   iv. Hide at least two slides
3. Create a power-point presentation with minimum 5 slides
   i. Use custom animation option to animate the text; the text must move left to right one line at a time.
   ii. Use proper transition for the slides.

List of Programs (MS-Access)

1 Create a database "Student" with,
   i. At least one table named "mark sheet" with field name "student name, roll number, mark1, mark2, mark3, mark4, total"
   ii. The data types are, student name: text, roll number: number, mark1 to mark4: number, total: number. Roll number must be the primary key.
   iii. Enter data in the table. The total must be calculated using update query.
   iv. Use query for sorting the table according to the descending/ascending order of the total marks.
2. With addition to the table above,
   i. Add an additional field "result" to the "mark sheet" table.
   ii. Enter data for at least 10 students
   iii. Calculate the result for all the students using update queries, if total>=200, then pass, else fail.
   iv. Search the students, whose name starts with "sh".
   v. Show the names and total marks of the students who have passed the examination.

TOTAL: 60 HOURS

TEXT BOOKS:

1 Gupta, V. (n.d.). *Comdex 14-in-1 computer course kit*. Dream Tech
2 Kumar, B. (n.d.). *Master in MS Office*.
3 Rajaraman, V. (n.d.). *Fundamentals of computers*. Prentice-Hall of India.
4 Walkenbach, J., Tyson, H., Wempen, F., Prague, C. N., Groh, R., Aitken, P. G., & Bucki, L. A. (2007). *Microsoft Office 2007 Bible*. Wiley India Pvt. Ltd.
5 Leon, A., Leon, M., & Leon, L. (2013). *Introduction to information technology*. Vijay Nicole Imprints Pvt. Ltd.

WEBSITES:

1 https://wiki.openoffice.org/wiki/Documentation
2 https://bosslinux.in/sites/default/files/BOSS4.0-Usermanual.pdf
3 http://windows.microsoft.com/en-in/windows/windows-basics-all-topics

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	1	-	-	-	-	1	3	-	-	-	2
CO2	3	-	-	-	-	-	-	1	-	3	-	-	3	-	-	-	1
CO3	-	1	-	-	-	-	-	-	-	3	-	-	-	1	-	-	1
CO4	3	-	-	2	-	-	-	-	-	3	-	-	3	-	-	-	1
CO5	3	-	-	2	2	1	-	-	-	3	-	-	3	-	-	-	1
Average	3	1	-	2	2	1	1	1	-	3	-	1	3	1	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-I

24VAC101 **Yoga for Youth Empowerment** **2H-2C**

Instruction Hours / week: L: 2 T: 0 P: 0 **Marks:** Internal: **100** External: **-** Total: **100**

End Semester Exam: - Hours

PREREQUISITE:

- Openness to learning yoga principles and practices

COURSE OBJECTIVES(CO):

- Create awareness about yoga and physical health.
- Provide value education to improve students' character and understanding of the greatness of life force and mind.
- Develop good qualities and eliminate bad ones through introspection practices like analysis of thoughts, moralization of desires, neutralization of anger, and eradication of worries.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts of about Yoga and Physical Health	Understand
CO2	Study the concepts a Greatness of Life force and Mind	Understand
CO3	Learn the aspects of Personality Development - Sublimation	Understand
CO4	Practices Human Resource Development	Apply
CO5	Understand about the yoga, life and Law of Nature	Apply

UNIT 1 YOGA AND PHYSICAL HEALTH **5 HOURS**

Manavalakalai (SKY) Yoga: Introduction Education as a means for youth empowerment-Greatress of Education Yoga for youth Empowerment. Simplified Physical Exercises Hand, Leg, Breathing, Eye exercises Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acupressure, Relaxation exercises Benefits Yogasanas 1: Pranamasana Hastha Uttanasana Pada Hasthasana - Aswa Sanjalana Asana Thuvipatha asva Sarjalana asana Astanga Namaskara - Bhujangasana Atha Muktha Savasana Aswa Sanjalana Asara Pada Hasthasana-Hastha Uttanasana Pranamasana - Pranayama: Naddi sudei-Clearance Practice-Benefits - Simplified Physical Exercise-Kayakalpa Practices - Meditation Practices.

Philosophy of life: Purpose of life Philosophy of life (Needs Protections Virtues Developmentof knowledge) Five Types of duties-Protection of the natural resources

UNIT II GREATNESS OF LIFE FORCE AND MIND **5 HOURS**

Reasons for Diseases Natural reasons (Genetic/imprints, Planetary Position, Natural calamities and climatic changes) Unnatural reasons (Food habits, Thoughts, Deeds) Philosophy of Kaya Kalpa: Physical body-Sexual vital fluid-Life force- Bio-Magnetism-Mind Maintaining youthfulness: Postponing old age seven components - Importance of sexual vital fluid Transformation of food into Measure and method in five aspects of life-Controlling undue Passion.

Kayakalpa practice: Aswini Mucra-Ojas breath-Benefits of Kaya Kapa.

UNIT III PERSONALITY DEVELOPMENT - SUBLIMATIO 5 HOURS

Mental Frequencies: Beta, Alpha, Theta and Delta wave Agna Meditation explanation benefits. Shanti meditation: Shanthi Meditation explanation-benefits - Thuriya Meditation: Thuriya Meditation explanation-benefits - Benefits of Blessing Self blessing (Auto suggestion) Family blessing Blessing the others World blessing- Divine protection

Human Values: Set-cortio- Sell-confidence Honesty Contentment Humility Modesty To erance Adjustment- Sacrifice-Forgiveness Punty (Bocy, Dress, Enviorment) Physica purity- Mental purity-Spiritualpurity. Social Values: Nonviolence-Service Patriotism-Equality Respect for parents and elders care and protection Respect for teacher Punctuality-Time Management

UNIT IV HUMAN RESOURCE DEVELOPMENT 5 HOURS

Morality (virtues): Importance of Introspection: 1 Mine (Ego, Possessiveness) Six Evi Temperaments-Greed-Anger-Miserliness Immoral sexual passion - Inferionty and superiority Complex - Vengeance Maneuvering of Six Temperaments: Contentment-Tolerance-Charity-Chastity -Equality-Pardon (Forgiveness) - Five essential Qualities acquired through Meditation: Perspicacity Magnanimity Receptivity Adaptability-Creativity (Improved Memory Power)

UNIT V LAW OF NATURE 4 HOURS

Ten stages of the Mind - Five kosas of the mind Maintaining good Relationships Thought-Importance of thoughts - Reasons for Thoughts Practice of Analysis of Thoughts Definition of Desire-Root causes for desires Types of desires Desires Essential for success Practice for Moralization of Desires Thought-Reformation-Frugality. Anger- Reasons for Anger-Anger and Peace Ill effects of anger Tolerance and Forgiveness - Neutralization of Anger- practice. Diversity in Men (Why Men Differ) Love and compassion, Eradication of Worries: Reasons for Worries-Fout types of worries Il effects-results-Practice for Eradication of Worries

Yoga Practices: Thandasana Chakrasana (sideways) Vruchasana Thirikonasana Varasana

TOTAL: 24 HOURS

TEXT BOOKS:

1. Kayakapam Thathuvagnani Vethathiri Maharishi
2. Light on yoga BKS. lyenger
3. Manavalakala Part-1-Thathuvagnani Vethathiri Maharishi.
4. Manavalakala part-2-Thathuvagnani Vethathiri Maharishi

REFERENCE BOOKS:

1. Mind Thathuvagnari Vethathir Maharishi
2. Simplified Physical Exercises- Thathuvagnani Vethathiri Maharishi
3. Sound Health through yoga - Dr.Chandrasekaran
4. The world orcer of Holistic unity- Thathuvagnani Vethathiri Mahanshi
5. Thirukkural-Rev. Dr.G.U.pope
6. Yoga for modern age Thathuvagnani Vethathin Maharishi

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1
CO2	1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1
CO3	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1
CO4	2	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1
CO5	1	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1
Average	1.4	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

இரண்டாம் பருவம்

24LSUT201 **Language II: Tamil II** **4H - 3C**

Instruction Hours / week: L: 4 T: 0 P: 0 **Marks:** Internal: **40**External: **60** Total: **100**
End Semester Exam: 3 Hours

இலக்கிய நெறிகள்

பாடத்திட்டப் பொதுநோக்கம்

- மாணவர்களுக்குத் தமிழ்மொழி வரலாறு மற்றும் இலக்கியங்களின் வழியாக வாழ்வியல் மதிப்புகளை உணர்த்துதல்.
- சிந்தனைத் திறனையும், படைப்பாக்கத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும் மேம்படுத்துதல்.
- வேலைவாய்புக்குரிய வகையில் மொழித்திறனை மேம்படுத்துதல்.

பாடத்திட்டப் பயன்விளைவு

- தமிழ்மொழி வரலாறு குறித்த தெளிந்த அறிவு பெற்றிருத்தல்.
- வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை பெற்றிருத்தல். படைப்பிலக்கியத்திறன் பெற்றிருத்தல்.
- இந்தியக் குடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற,'தமிழ் இலக்கியவரலாறு' தமிழ் இலக்கண அறிவு மேம்பாடு பெற்றிருத்தல்.
- மொழிபெயர்ப்பியல், கணினித்தமிழ் சார்ந்த வேலைவாய்ப்புத்திறன் மேம்பாடு.

அலகு I **8 மணிநேரம்**

நாயன்மார்கள் : தமிழ் இலக்கிய வரிசையில் திருமுறைகளும் நாலாயிரத் திவ்யப்பிரபந்தமும் – பன்னிரு திருமுறைகள் அறிமுகம் – திருமுறை ஆசிரியர்களின் இலக்கியப் பங்களிப்பு

சைவம்-பெரியபுராணம் - காரைக்கால் அம்மையார் புராணம் .
முக்கூடற்பள்ளு - 2 பாடல்கள் - சித்திரக்காலிவாலான் (நெல் வகைகள்)
குற்றாலத் திரிகூடமால்வரை (மீன்வகைகள், காளை வகைகள்)
கவிதை : மகாகவி பாரதியார் - யோகசித்தி
கவிதை : கவிமணி தேசிக விநாயகம் பிள்ளை - வாழ்க்கைத் தத்துவங்கள்
கவிதை : கவிஞர் சுகந்திசுப்பிரமணியம் - புதையுண்டவாழ்க்கை
சிறுகதை : மகாமசானம் - புதுமைப்பித்தன்
இலக்கணம் - வாக்கியஅமைப்பு : தனிவாக்கியம் – தொடர்வாக்கியம் – கலவைவாக்கியம் -தன்வினை வாக்கியம் – பிறவினை வாக்கியம்- செய்வினை, செயப்பாட்டு வினைவாக்கியம், கட்டளைவாக்கியம் – வினாவாக்கியம் – உணர்ச்சி வாக்கியம். நன்னூல் – பொதுவியல் - அறுவகைவினா (385) - எண்வகைவிடை (386).

அலகு 2 **12 மணிநேரம்**

ஆழ்வார்கள் : இலக்கியப் பங்களிப்பு - திவ்யப் பிரபந்தத்தில் பக்திநெறியும் இலக்கிய நயமும்
உரைநடை : தோற்றமும் வளர்ச்சியும்
வைணவம் : பெரியாழ்வார் திருமொழி: 3 -ஆம் பத்து – பத்தாம் திருமொழி 'நெறிந்தகருங்குழல் மடவாய்' – சீதைக்கு அனுமன் தெரிவித்த அடையாளம்.
கவிதை - கவிஞர் வைரமுத்து - வித்தியாசமான தாலாட்டு
சிற்பி பாலசுப்பிரமணியன் - பாரதி எங்கள் கண்மணி
அரங்க பாரி - கண்ணீர்! கண்ணீர்!
தமிழலங்காரம் – வண்ணச்சரபம் தண்டபாணி சுவாமிகள் - 10 பாடல்கள் 1. கடல் நீரில் கல்மிதக்கும், 2. வண்டமிழ் ஆற்றுதி, 3. கோளத்தை முட்டி 4. எக்காலம்என்று, 5. கடவூர் மயானத்தொர், 6. தேவாதிதேவன், 7. விண்மாரி, 8. தேவர்முனிவர், 9. அழுதேங்கிநஞ்சிட்ட,
10. அத்தனை பொத்து.
சிறுகதை : ஆர். சூடாமணி - அந்நியர்கள்
கட்டுரை : ஆளுமைத்திறன் அறிவோம்- தன்னம்பிக்கை மாதஇதழிலிருந்து
அணிஇலக்கணம் : உவமையணி – பிறிதுமொழிதல் அணி – சிலேடை அணி – தீவக அணி- ஏகதேச உருவக அணி – வேற்றுமையணி – பின்வருநிலையணி

அலகு 3 **10 மணிநேரம்**
புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்
சிற்றிலக்கியம் -தோற்றமும்வளர்ச்சியும்
மதுரைசொக்கநாதர் - தமிழ்விடுதூது – தமிழின் சிறப்பு பாடியருள பத்துப்பாட்டும் - விளம்பக்கேள்.
கவிதை- ஈரோடுதமிழன்பன் – இன்னொரு சுதந்திரம்
சிறுகதை - கு. அழகிரிசாமி - இருவர் கண்ட ஒரேகனவு
கட்டுரை - ஔவைதுரைசாமி - ஏட்டில் இல்லாத இலக்கியம்
படைப்பிலக்கியப் பயிற்சிகள் - மரபுக்கவிதை, புதுக்கவிதை, சிறுகதை, கட்டுரை படைப்பாக்க உத்திகள் – பயிற்சிகள்

அலகு 4 **10 மணிநேரம்**
சிறுகதை - தோற்றமும் வளர்ச்சியும்
கலிங்கத்துப்பரணி – தேவாசுரம், உடலின்மேல், நெடுங்குதிரை மிசைக்கலணை, விருந்தினரும் வறியவரும், தரைமகள் தன்கொழுநன்றன், பொருதடக்கை
வாளெங்கே, வெயில்தாரை.
அருள்தரும் பூங்கோதையன்னை அந்தாதி - 11பாடல்கள் 1. பகவன்பெயரை,
2. மெல்லியல்மேலை, 3.வாலின்குரங்கு, 4.தவளேஇவள், 5.சுரக்கும் திருவருட், 6. வதிவாய்விளைபயில், 7. உறைவான், 8.பச்சைப்பேர், 9.வித்தகம், 10.துணையாய், 11.கலந்தார்.
கவிதை - கவிஞர்தாமரை - தொலைந்துபோனேன்

சிறுகதை – அம்பை - ஜ - வல்லூறுகள்
கட்டுரை- முனைவர் ப. தமிழரசி - நொய்யல்,
சொல்லின் செல்வர் ரா.பி.சேதுப்பிள்ளை - காளத்திவேடனும் கங்கைவேடனும்
மொழிபெயர்ப்புப் பயிற்சிகள் : தமிழ்-ஆங்கில மொழிபெயர்ப்புப் பயிற்சிகள் -2.

அலகு 5 **8 மணிநேரம்**
நாட்டுப்புற இலக்கியங்கள் – அறிமுகம்
கவிதை – புரட்சிக்கவிஞர் பாரதிதாசன் - தமிழின் இனிமை
கவிதை - கவிஞர் அறிவுமதி - நட்புக்காலம்
சிறுகதை - நாஞ்சில்நாடன் - இந்நாட்டு மன்னர்
கீழடி - வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்
மொழிபெயர்ப்புப் பயிற்சிகள் : ஆங்கிலம் - தமிழ் மொழிபெயர்ப்புப் பயிற்சிகள்-2.**மொத்த மணிநேரம் 48**

பார்வை நூல்கள்

1. **கற்பகச் சோலை – தமிழ்ப்பாட நூல், இலக்கிய நெறிகள்,** தமிழ்த்துறை வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் – 21.
2. **தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன்,** கலையக வெளியீடு, நாமக்கல்.

இணையதளம்

1. www.tvu.org.in
2. www.maduraitamilproject.com

இதழ்கள்

1. International Research Journal of Indian Literature, irjil.in
2. International Tamil Research Journal, iorpress.in

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.6**	**2.8**	**2.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-

1 **- Low, 2 - Medium, 3 - High, '-' - No Correlation**

24LUH201 **Language II: Hindi II** **4H-3C**

(Modern Poetry, Drama, Novel, Grammar)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

- Understand the text styles and grammatical elements
- Discuss the content of a reading passage
- Develop an interest in the appreciation of short stories

COURSE OUTCOMES(COs) :

- Basic knowledge of Hindi language will be improved.
- Knowledge of glossaries will increase.
- Hindi language expression will rise.
- Learners will enrich their grammar in Hindi.
- The desire to read literature, such as the essay on a poem, develops.

UNIT I a) Poetry – Nagarjun **9 HOURS**

b) Drama -Dhruva Swamini

c) Novel - Nirmala , Thotharam

d) Grammar – Kaal , Theen Prakar

UNIT II a) Poetry – Sita , Ram **9 HOURS**

b) Drama – Mandhakini , Koma

c) Novel – Mansaram , Jiyaram

d) Grammar – Upsarg, Prathyay

UNIT III a) Poetry – Lakshman, Valmiki **10 HOURS**

b) Drama – Ramaguptha , Chandhraguptha

c) Novel – Sudha, Bhuvan Mohan Singh

d) Grammar – Sabda Vyutpathi

UNIT IV a) Poetry -Vishvaamithra, Thrijada **10 HOURS**

b) Drama –Sikhar Swami,Shakraj

c) Novel – Udhaybanulaal, Siyaram

d) Grammar – Sambandh Chochak

UNIT V a) Poetry – Bhagirath , Sagar **10 HOURS**

b) Drama – Khingal , Mihirdev , Prohith

c) Novel – bhalchandra Sinha,Kalyani, Rangili Bai

d) Samuchchaybodhak, Vishmayathibodhak

TOTAL: 48 HOURS

REFERENCE BOOKS:

1. Modern Poetry : Bhoomija

Writer : Nagarjun

Editors : Somdev & shobhakanth

Publisher : Rdha Krishna Publication

New Delhi - 110051

2. Drama : Dhruva Swamini

Writer : Jaysankar Prasad

Publisher : Sakshi Publication

S 16,Naveen Shahdhara

Delhi – 110032

3. Novel : Nirmala

Writer : Premchandh

Publisher : Prabhath Prakashan

4/19 Asaf Ali Road

New Delhi – 110002

4. Grammar : Sugam Hindi Vyakaran

Writer : Pro. Vamsidhar & Dharmapal

Publisher : Siksha Bharathi

Madharsa Road

New Delhi – 110006.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**2.4**	**2.4**	**-**	**-**	**-**	**-**	**-**	-	**-**	**-**	-	-	**-**	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester II

24LUM201 Language II : Malayalam II 4H-3C

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVE(CO):

- A basic understanding of contemporary poetry can be gained and the nature of modern poetry can be realized.
- Realizing the nature of drama and its nature and improving the knowledge of reading and understanding the nature of contemporary plays.
- Understands the benefits of correspondence and can enhance the correspondence you need.

COURSE OUTCOME(COs):

- Get a basic understanding of Memories
- It will create basic knowledge about Environmental Psychology.
- It will create awareness about our environment.
- Knowledge is gain about our country, culture etc.
- It will be an eye opener to the students towards our Mother Earth.

	PART I – MALAYALAM II	
Unit No.		**Hours**
I	Novel -Enmakaje	**10**
II	Novel – Enmakaje	**10**
III	Memmories – Neermaathalam Pootthakaalam	**10**
IV	Memmories – Neermaathalam Pootthakaalam	**9**
V	Translation(English to Malayalam)	**9**
	TOTAL	**48**

TEXT BOOKS:

1. .Emakaje – AmbikasuthanMangad – DC Books Kottayam,Kerala
2. NeermaathalamPootthakaalam - Madhavikutty -DC Books Kottayam, Kerala

REFERENCE BOOKS:

1. Athmakathasahithyam Malayalathil-Dr.Vijayalam Jayakumar (N.B.S.Kottayam)Malayala Novel SahithyaCharitram-K.M.Tharakan (N.B.S.Kottayam) SahithyaCharitramPrasthanangalilude- Dr.K.M George,
2. (D.C.Books Kottayam)
3. MalayalaSahithyavimarsam-Sukumar Azheekode (D.C.books)

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
Average	-	3	3	-	-	-	3	-	-	-	-	2	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester II

24LUS201 **Language II : Sanskrit II** **4H-3C**

(PROSE, GRAMMAR AND TRANSLATION**)**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

- The fundamental objective of the curriculum is to impart effective science education at the undergraduate level, exposing them to recent trends and developments in the subject.
- Creating scientific temper is another major objective of this curriculum.
- Another major thrust given here is to develop an environmental concern in all activities ofthe students. 'Go green', the motto of the syllabus emphasizes the urgent need to conserve nature without destruction of natural resources.

COURSE OUTCOMES(COs) :

- **Critical Thinking** :Take informed actions after identifying the assumptions that frame students' thinking and actions.
- **Problem Solving**: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.
- **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development.
- **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

UNIT I **9 HOURS**

Introduction to Sanskrit Prose, Important prose works in Sanskrit

UNIT II **9 HOURS**

Balaramayana – Balakanda

UNIT III **10 HOURS**

Balaramayana – Ayodhyakanda

UNIT IV **10 HOURS**

Balaramayana – Aranyakanda

UNIT V **10 HOURS**

Athmanepada Declension of ending nouns (feminine)

Passages from Sanskrit Self Teacher (Simple sentences)

TOTAL: 48 HOURS

TEXT BOOK:

1. Balaramayana – a simple prose version.R.S. Vadhyar and sons,Palghat, Kerala.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24LUF201 **Language II: French II** **4H-3C**

(Leçon, Communication, Grammaire, Verbes, Lexique, Culture)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

- To make the students to speak and write errors free French.
- To help the students develop their listening, speaking, reading and writing skills.
- Introducing literary works to the students to enhance their analytical and aesthetic skills.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Strengthen the foundation of the language.	Remember
CO2	Standardize and demonstrate understanding of LSRW skills.	Understand
CO3	Utilize fundamentals of language for reading, writing and effective communication.	Apply
CO4	Enhancing the reading skill to build the leadership quality.	Apply
CO5	Develop the moral and aesthetic values.	Evaluate

UNITÉ I **9 HOURS**

a) Leçon - Les loisirs
b) Communication - Parler de ses goûts et de ses préférences
c) Grammaire - Les adjectifs interrogatifs , Les nombres ordinaux, L'heure, Les pronoms personnels COD
d) Verbes -savoir et connaitre
e) Lexique - Les loisirs, Les activités quotidiennes ,Les matières
f) Culture - les grands fleuves de france.

UNITÉ II **9HOURS**

a) Leçon - La routine
b) Communication - Décrire sa journée
c) Grammaire - Les verbes pronominaux, Les verbes du premier groupe en -e_er, -é_er, -eler, -eter, Le verbe prendre
d) Verbes - manger, boire
e) Lexique - Le temps et l'heure ,La fréquence
f) Culture - les bandes dessinees.

UNITÉ III **10 HOURS**

a) Leçon -Où faire ses courses
b) Communication - Au restaurant : commander et commenter
c) Grammaire - Les articles partitifs, Le pronom en (la quantité) très ou beaucoup ? La phrase négative
d) Verbes - les verbs irregulliers
e) Lexique - Les aliments, Les quantités, Les commerces et les commerçants
f) Culture -Les plats francais

UNITÉ IV **10 HOURS**

a) Leçon - Decourvez et dégustez
b) Communication - Inviter et répondre ,à une invitation
c) Grammaire - L'impératif ,Il faut, c'est/ il est,future proche
d) Verbes - Les verbes devoir, pouvoir, savoir, vouloir
e) Lexique - Demander et dire le prix, Les services, Les moyens de paiement
f) Culture - Le festival du mot

UNITÉ V **10 HOURS**

a) Leçon - Tout le monde s'amuse, Les ados au quotidien
b) Communication - Décrire une tenue , Écrire un message amical
c) Grammaire -Les adjectifs demonstratives, La formation du féminin
Le pronom indéfini on, passé compose'.
d) Verbes - Les verbes du premier groupe en –yer, Les verbes voir et sortir
e) Lexique - Les sorties Situer dans le temps, La famille ,(2) Les vêtements et les accessoires
f) Culture - Le pays des gourmands

TOTAL: 48 HOURS

TEXT BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de francais,** Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, **Saison 1 – Cahier d'activites ,** Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, Marie- Françoise Gliemenn,**Les exercices de grammaire,**Hachette FLE, Paris,2005

REFERENCE BOOKS:

1. Christian Beaulieu, Je **pratique, Exercises de grammaire A1,** Dider,Paris,2015
2. Nathalie BIE, philippe SANTINAN,**Grammaire pour adolescents-250 exercises,** CLE International , Paris , 2005

WEBSITES :

1. http:// enseigner.tv5 monde.com/

2. bonjourdumonde.com /exercises/contenu/le – francais-du- tourisme.html
3. http://www.bonjurdefrance.com/
4. https://www.lepointdufle.net/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Average	--	2.5	2.5	-	-	-	-	-	2	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24ENU201 **ENGLISH II** **3H-3C**

Instruction Hours/week: L:3 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

- To make the students to speak and write errors free English.
- To help the students develop their listening, speaking, reading and writing skills.
- Introducing literary works to the students to enhance their analytical and aesthetic skills.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Strengthen the foundation of the language.	Remember
CO2	Standardize and demonstrate understanding of LSRW skills.	Understand
CO3	Utilize fundamentals of language for reading, writing and effective communication.	Apply
CO4	Enhancing the reading skill to build the leadership quality.	Apply
CO5	Develop the moral and aesthetic values.	Evaluate

UNIT I **8 HOURS**

LISTENING : Listening for Pleasure
SPEAKING : Developing speaking skills
READING : Reading strategies
WRITING : Developing a story with pictures
LITERATURE: Refuge Mother and Child by Chinua Achebe (Poetry)
GRAMMAR : Voice

UNIT II **7 HOURS**

LISTENING : Listening for Pleasure (Story)
SPEAKING : Oral presentation
READING : Reading Passages
WRITING : Essay writing
LITERATURE : Prose: Dimensions of Creativity by A.P.J. Abdul Kalam (Story)
GRAMMAR : Subject, verb, agreement

UNIT III **7 HOURS**

LISTENING : Dictation
SPEAKING : Public speaking and secrets of good delivery
READING : Note Making
WRITING : Writing agendas, memos and minutes
LITERATURE: River by A.K. Ramanujan

GRAMMAR : Degrees of comparison

UNIT IV **7 HOURS**

LISTENING : Listening to instructions and announcements
SPEAKING : Debating
READING : Silent reading and methods of reading
WRITING : Writing Notices
LITERATURE: Two Gentlemen of Verona by A.J. Cronin
GRAMMAR : Phrases and clauses

UNIT V **7 HOURS**

LISTENING : Testing listening
SPEAKING : Situational Conversation
READING : Developing reading activities
WRITING : E - Mail Writing
LITERATURE: The Postmaster by Rabindranath Tagore
GRAMMAR : Direct and indirect speech

TOTAL: 36 HOURS

TEXT BOOK :

1. Board of Editors (2024), Acrostic II. Karpagam Academy of Higher Education

REFERENCE BOOKS:

1. Martin's, St (2013). Oxford Handbook of Writing: Handbook of Writing. Cambridge University Press.
2. Julian Treasure, Sound Business, (2012). Oxford University Press
3. Hornby, A,S.(1975). The Guide to patterns and usage in English: oxford university Press.
4. Ellis, R. (1990). Instructed second language acquisition. Oxford: oxford university Press.

WEB SITES:

1. https://shortstoryproject.com/stories/the-postmaster/
2. https://www.gradesaver.com/rabindranath-tagore-short-stories/study- guide/summary-the-postmaster

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Average	**--**	**2.5**	**2.5**	**-**	**-**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-II

24CSU201 **Object Oriented Programming** **4H - 3C**

Instruction Hours/week: L:4 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Not Applicable

COURSE OBJECTIVES (CO):

The goal of this course is for students to:

- To objective of this course is to provide the student with the fundamental knowledge and skills to become a proficient C++ programmer.
- To learn to transpose the physical problem domain into a hierarchy of objects.
- To understand the basics of AWT and other available packages and able to accomplish real world task in an easier way.

COURSE OUTCOMES (COs)

Upon completion of this course, the student will be able to:

COs	Course Outcomes	Blooms Level
CO1	Classify the difference between top-down and bottom-up approach.	Understand
CO2	Apply the concepts of object-oriented programming in constructor and destructor.	Apply
CO3	Apply the major object-oriented concepts to implement inheritance and polymorphism.	Apply
CO4	Analyze the basics of Java and can develop java desktop application.	Analyze
CO5	Discover Java applications using AWT and other packages	Analyze

UNIT I Introduction to Object Oriented Programming **10 HOURS**

Object Oriented Programming : Object Oriented Paradigm – Structured Programming Versus Object Oriented Development – Basic Concepts - Arrays and Strings – Functions – Inline Functions – Functions with Default Arguments – References - Classes and Objects – Constructors – Destructors - Array of Objects - Pointers to Objects – ‘this’ Pointer - Dynamic Allocation Operators - Dynamic Objects - Static Data Members and Static Objects – Objects as Arguments – Returning Objects – Friend Function and Friend Class.

UNIT II Classes and Objects **8 HOURS**

Classes and Objects: Specifying a class – Creating Objects – Accessing Class Members – Defining Member Functions – Static Data Members – Static Member Functions – Array of Objects – Friend Functions. Constructors and Destructors: - Constructors – Parameterized Constructors – Multiple Constructors in a Class – Constructors with Default Arguments – Copy Constructor – Dynamic Constructor – Destructors.

UNIT III Templates and Files **10 HOURS**

Template Functions and Template Classes – Streams: Stream Classes – Formatted and Unformatted Data – Manipulators – User Defined Manipulators – File Streams – File Pointer Manipulation – Sequential File Access- Random File Access – String Class.

UNIT IV Java Basics **10 HOURS**

Overview of Java - Java Features – comparison of Java with C and C++ - Java and Internet – Java Environment – Java Program structure – Java Tokens – Implementing a Java Program – Java Virtual Machine. **Constants, Variables, Data Types:** Constants – Variables – Data types – Declaration of variable – Scope of Variables. **Class, Objects and Methods:** Defining a Class – Field Declaration – Method Declaration – Creating Objects -Accessing Class Members – Constructor - Method Overloading – Overriding Methods. Inheritance – **Interfaces:** Multiple Inheritance.

UNIT V Packages and AWT **10 HOURS**

Package Putting Class Together: Java API Packages – Naming, Creating, Accessing and Using a Package – Adding a Class to a Package. **Multithreaded Programming**: Creating, Extending the Thread Class – Life Cycle of Thread – Managing Errors and Exception

Applet Programming: Difference between Application and Applets – Applet Life cycle – creating an Executable Applet – Designing a Web Page – Adding Applet to HTML File – Passing Parameters to Applets.

TOTAL: 48 HOURS

TEXT BOOKS:

1. E.Balagurusamy " Object Oriented Programming with C++", TMH 2/e
2. Mastering C++ A.R.Venugopal, Rajkumar, T. Ravishanker, TMH
3. E. Balagurusamy, "Programming with Java – A primer", Second Edition, Tata McGraw Hill Publishing Company, Delhi, 2002.

REFERENCE BOOKS:

1. Stefan Bjornander, 2016. C++ Windows Programming, Published by Packt Publishing Ltd.
2. Herbert Schildt, "The complete Reference – Java 2", Fifth Edition, Tata McGraw Hill Publishing Company, Delhi, 2002.

WEBSITES:

1. www.programmingsimplified.com
2. https://nptel.ac.in/courses/106/105/106105171
3. www.programiz.com/cpp-programming
4. www.cplusplus.com

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	2	-	-	3	-	2	2	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	3	-	2	2	-	-	-	-	-	-	-	-	-	-
Average	2	-	-	3	2	2	2	-	-	-	-	-	-	-	-	2	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-II

24CSU202 **Data Structures** **3H-3C**

Instruction Hours/week: L:3 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

- To understand the fundamental concepts of data structures
- To Learn linear data structures lists, stacks, and queues
- To apply Tree and Graph structures
- To understand sorting, searching and hashing algorithms

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Determine appropriate data structure as applicable to specified problem definition	Apply
CO2	Apply the concept of stack, queue and linked list	Apply
CO3	Construct a tree and perform various operations on a tree along with implementation	Apply
CO4	Examine the solution for solving various computing problems using graph data structure	Analyze
CO5	Illustrate sorting and searching techniques	Understand

UNIT I Arrays and Stacks **8 HOURS**

Definition, Structure and properties of algorithm – Development of an algorithm – data structures and algorithms – Data Structure definition and classification – Arrays: Introduction – array operations – Number of elements in an array – Representation of arrays in memory – Applications of arrays. Stacks: Introduction- Stack Operations - Applications of stacks: Evaluations of postfix expressions.

UNIT II Queues and Linked Lists **8 HOURS**

Queues: Introduction – Operations on queues – Circular Queues – Other types Queue – Application of Linear queues: Time sharing system– Linked Lists: Introduction – Singly linked lists - Circularly linked lists - Doubly Linked Lists – Application of Linked List-Polynomial addition.

UNIT III Trees **7 HOURS**

Tree: Introduction – Trees Definitions and basic terminologies – representation of tress - Binary Trees: Basic terminologies and types - Representation of Binary Trees – Binary tree traversals – Threaded of Binary Tree – Applications of Tress- Expression trees.

UNIT IV Graphs **7 HOURS**

Introduction – Graph terminology – Representation of Graphs –Operations on Graphs – Applications of Graph - Topological Sort – Minimum Spanning Tree – Finding Shortest paths - Articulation Points, Bridges, and Biconnected Components, Strongly connected components – Eulerian Tour – Hamiltonian Tour.

UNIT V Sorting, Searching and Hashing **6 HOURS**

Sorting: Introduction – Bubble sort – Selection sort –Insertion Sort – Bucket / Radix Sort - Merge Sort – Quick Sort – Heap Sort – Tree sort – Shell Sort – Searching: Linear – Binary search – Merging. Hashing: Introduction – Direct Address table - Hash Table – Hash Function – Resolving collisions: Synonyms Chaining– Open Addressing - Rehashing.

TOTAL: 36 HOURS

TEXT BOOKS:

1 Salaria, R. S. (2022). *Data structures & algorithms using C* (5th ed.). Khanna Book Publishing Co. Pvt. Ltd. SRS Enterprises.

2 Aho, A. V., Ullman, J. D., & Hopcroft, J. E. (2002). *Data structures and algorithms* (1st ed.). Pearson

REFERENCE BOOKS:

1 Tremblay, J. P., & Sorensen, P. G. (2017). *An introduction to data structures with applications* (2nd ed.). Tata McGraw-Hill

2 Pai, V. G. A. (2017). *Data structures and algorithms: Concepts, techniques, and applications* (1st ed.). McGraw-Hill Education.

3 Lipschutz, S. (2014). *Data structures* (1st ed.). McGraw-Hill Education.

WEBSITES:

1 https://www.cs.usfca.edu/~galles/visualization/Algorithms.html

2 https://www.docsity.com/en/data-structures-and-algorithm-explaination-and-types/8851110/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	2	-	-	-	1	3	-	3	-	-	-	-	1	-
CO2	3	-	2	2	-	-	-	1	3	-	3	-	-	-	-	1	-
CO3	3	-	2	2	-	-	-	1	3	-	3	-	-	-	-	1	-
CO4	3	-	2	2	-	-	-	1	3	-	3	-	-	-	-	1	-
CO5	3	-	2	2	-	-	-	1	3	-	3	-	-	-	-	1	-
Average	3	-	2	2	-	-	-	1	3	-	3	-	-	-	-	1	

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU203 Community Engagement and Social Responsibility 2H-2C

Instruction Hours/week: L:2 T:0 P:0 **Marks:** Internal**:40** External**: 60** Total**:100**

End Semester Exam:3 Hours

PRE-REQUISITE:

- Not required

COURSE OBJECTIVES (CO):

- To gain insights into the structures, challenges, and opportunities within communities
- To explore ethical frameworks and dilemmas related to community engagement and social responsibility
- To develop skills in monitoring, evaluating, and reporting on the outcomes of community engagement efforts to ensure effectiveness and accountability.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Understand the concept, ethics, and spectrum of community engagement	Understand
CO2	Recognize the significance in local community development and rural culture.	Understand
CO3	Know the rural development programs, institutions	Understand
CO4	Analyze the role of local administration in fostering community involvement and social networking.	Analyze
CO5	Develop skills in conducting community engaged research with a focus on ethics, rural distress, poverty alleviation, and disaster mitigation.	Apply

UNIT I INTRODUCTION AND PRINCIPLES 8 HOURS

Concept, Ethics and Spectrum of Community engagement, Local community, Rural culture and Practice of community engagement - Stages, Components and Principles of community development, Utility of public resources. Contributions of self-help groups

UNIT II RURAL DEVELOPMENT 8 HOURS

Rural Development Programs and Rural institutions Local Administration and Community Involvement- Social contribution of community networking, Various government schemes. Programmes of community engagement and their evaluation.

UNIT III COMMUNITY AND RESEARCH 8 HOURS

Community Engaged Research and Ethics in Community Engaged Research Rural Distress, Rural Poverty, Impact of COVID-19 on Migrant Laborers, Mitigation of Disaster

TOTAL: 24 HOURS

TEXT BOOK:

1. Principles of Community Engagement, (2011).2nd Edition, NIH Publication No. 11-7782.

WEBSITES:

1. https://youtu.be/-SQK9RGBt7o
2. https://www.uvm.edu/sites/default/files/community_engagement_handout.pdf (Community Engagement)
3. https://www.atsdr.cdc.gov/communityengagement/pce_concepts.html (Perspectives of Community)
4. https://egyankosh.ac.in/bitstream/123456789/59002/1/Unit1.pdf (community concepts)
5. https://sustainingcommunity.wordpress.com/2013/07/09/ethics-and-community-engagement/(Ethics of community engagement)
6. https://www.preservearticles.com/sociology/what-are-the-essential-elements-of-community/4558 (Elements of Community)
7. https://www.yourarticlelibrary.com/sociology/rural-sociology/rural-community-top-10-characteristics-of-the-rural-community-explained/34968 (features of rural community)
8. https://www.mapsofindia.com/my-india/government/schemes-for-rural-development-launched-by-government-of-india (Government programmes for rural development)
9. https://www.yourarticlelibrary.com/sociology/rural-sociology/rural-community-top-10-characteristics-of-the-rural-community-explained/34968 (rural lifestyle)
10. https://www.insightsonindia.com/social-justice/issues-related-to-rural-development/government-schemes-for-rural-development-in-india/ (schemes for rural development)
11. https://www.mpgkpdf.com/2021/09/community-development-plan-in-hindi.html?m=1
12. https://images.app.goo.gl/sNF2HMWCuCfkqYz56
13. https://images.app.goo.gl/VaMNNMEs77XyPMrP7

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	-	-	3	-	-	-	-	-	-	-	-	-	2	-	-
CO2	3	2	-	-	3	-	2	1	-	2	-	-	-	-	-	-	1
CO3	3	-	2	3	-	2	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	2	-	-	2	-	1	-	3	-	-	-	-	2	-	1
CO5	3	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**2.5**	**2**	**2**	**3**	**2**	**2**	**1**	**-**	**2.5**	**-**	**-**	**-**	**-**	**2**	**-**	**1**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-II

24CSUA201 **Discrete Structures** **4H – 4C**

Instruction Hours/week: L:5 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Understanding of basic algebra and calculus.

COURSE OBJECTIVES (CO):

- To learn the basic concepts of logical connectives, sets, functions, and relations.
- To understand permutation and combination, mathematical induction, and linear difference equations.
- To know the fundamental definitions and concepts of graph theory, including paths, circuits, and trees.

COURSE OUTCOMES(COs):

Upon completion of this course, the student will be able to:

COs	Course Outcomes	Blooms Level
CO1	Interpret logical connectives and truth tables in well-formed formulas.	Understand
CO2	Explain the basic concepts of set theory and operations on sets.	Understand
CO3	Apply permutation and combination techniques to solve counting problems.	Apply
CO4	Solve linear recurrence relations using the characteristic root method and generating functions.	Apply
CO5	Define basic terminology and concepts in graph theory.	Understand

UNIT I PREPOSITIONAL LOGIC **10 HOURS**

Prepositions - Truth tables - Logical connectives - Well-formed Formulas - Demorgan's Law - Tautologies and contradictions - PDNF and PCNF – Equivalences - Inference theory - Rules of universal specification and generalization.

UNIT II SETS **10 HOURS**

Introduction – Basic concepts of set theory – Operations on sets – Venn diagram - Relations - Properties of binary relations - Types of relation – Functions - Types of functions - Composition of functions - Inverse functions.

UNIT III COMBINATORICS **10 HOURS**

Pigeonhole principle - Permutation and Combination - Principle of inclusion and exclusion - Mathematical induction.

UNIT IV RECURRENCES **10 HOURS**

Recurrence Relations - Solving linear recurrence relation with constant coefficient - Characteristic root method - Generating Functions.

UNIT V GRAPH THEORY **8 HOURS**

Introduction - Basic definitions and terminology - Graph isomorphism – Paths and connectivity - Euler and Hamiltonian paths and circuits. Trees - Basic terminology and properties of trees. (Excluding theorems).

TOTAL: 48 HOURS

TEXT BOOKS:

1. Tremblay, J. P. and Manohar, R. (2008). Discrete Mathematical Structures with Applications to Computer Science (1st ed.), McGraw-Hill Book Company, New Delhi.
2. Kenneth Rosen, (2019). Discrete Mathematics and Its Applications (8th Ed.), McGraw Hill Company, New Delhi.

REFERENCE BOOKS:

1. Sharma, J. K. (2011). Discrete Mathematics (Third Edition), Rajiv Beri for Macmillan Publishers India Ltd. New Delhi.
2. Singaravelu, A. and Jeyaraman M.P. (2019). Discrete Mathematics, Meenakshi Agency Chennai.
3. Hunter, D.J. (2016). Essentials of Discrete Mathematics (3rd Ed.), Jones and Bartlett Publishers, New Delhi.
4. Hein, J.L. (2010). Discrete Structures, Logic, and Computability (3rd Ed.), Jones and Bartlett Publishers, New Delhi.

WEBSITES:

1. https://www.youtube.com/watch?v=xlUFkMKSB3Y&list=PL0862D1A947252D20.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**-**	**-**	**1.3**	**2.4**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU211 **Object Oriented Programming - Practical** **5H - 2C**

Instruction Hours/week: L:0 T: 0 P:5 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES (CO):

- Understand how C++ improves C with object-oriented features and learn the syntax and semantics of classes in C++ programming language.
- Learn how to perform Constructor/Destructor and File Manipulation in C++, and program using Inheritance, Interface, Package, and Exception handling concepts in Java.
- Reinforce concepts of software quality, reliability, and maintainability, and learn AWT and JDBC in C++.

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the difference between top-down and bottom-up approach.	Understand
CO2	Apply the concepts of object-oriented programming in Conditional and Looping Statements, Arrays and Friend functions.	Apply
CO3	Understand how to apply the major object-oriented concepts to implement Constructor and Destructor and File manipulation.	Understand
CO4	Apply Inheritance, Interface, Package and Exception handling concepts in Java	Apply
CO5	Make use of the concepts of AWT in Java and JDBC.	Apply

List of Programs

1. Write a C++ program to implement the Classes and Objects.
2. Write a C++ program using Conditional and Looping Statements.
3. Build a C++ program to display Names, Roll No., and grade of 3 students who have appeared in the examination. Declare the class of name, roll no., and grade. Create an array of class objects. Read and display the contents of the array.
4. Develop a program in C++ to perform matrix operation using multi-dimensional array
5. Write a C++ program to use pointer for both base and derived classes and call the member function. Use Virtual keyword.
6. Write a program to find maximum out of 2 numbers using friend function.
7. Develop a program to apply Copy constructor to copy data of an object to another object.
8. Write a program in JAVA to demonstrate the method and constructor overloading
9. Develop a java program that implements String handling functions.
10. Write a program to demonstrate File Manipulation by copying the contents of one file into another.
11. Write a Java program to demonstrate Multilevel Inheritance.

12. Write a Java program to implement Interface.
13. Write a Java code to implement Package(must contain a file KAHE ,in that content must be INDIA).
14. Build a java program to invoke Exception handling using multiple catch blocks (FileNotFoundException,IOException).
15. Develop a java code that connects to a database using JDBC.

TOTAL: 60 HOURS

TEXT BOOKS:

1 Mallia, A., & Zoffoli, F. (2019). *C++ fundamentals*. Packt Publishing.

2 Murach, J., & Delamater, M. (2018). *C++ programming*. Mike Murach & Associates, Inc.

3 Stroustrup, B. (2014). *Programming: Principles and practice using C++* (2nd ed.). Addison-Wesley.

4 Bjornander, S. (2016). *C++ Windows programming*. Packt Publishing.

5 Stegman, R. L. (2016). *Focus on object-oriented programming with C++* (6th ed.). CreateSpace Independent Publishing Platform.

WEBSITES:

1. www.programmingsimplified.com
2. www.programiz.com / cpp –programming
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.com
6. www.hackerrank.com
7. www. leetcode.com
8. www. codewars.com.com

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO2	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	-	2
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO5	-	-	-	3	2	2	-	-	-	-	-	-	-	-	-	-	2
Average	-	-	1	3	2	2	-	-	-	-	-	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-II

24SEC211 **Web Programming - Practical** **3H-3C**

Instruction Hours/week: L: 0T: 0 P: 3 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Basic knowledge of HTML, CSS, and JavaScript.

COURSE OBJECTIVES (CO):

- Introduce the fundamentals of Internet and Web functions, and impart essential skills necessary to use the internet and its various components effectively.
- Develop the ability to find, evaluate, and use online information resources, and use Google Apps for education effectively.
- Equip students with the skills to logically plan and develop web pages.

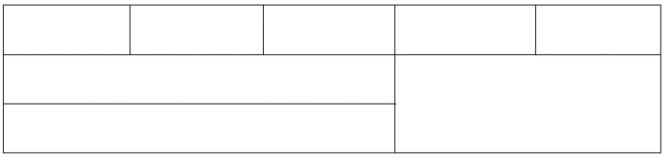
COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

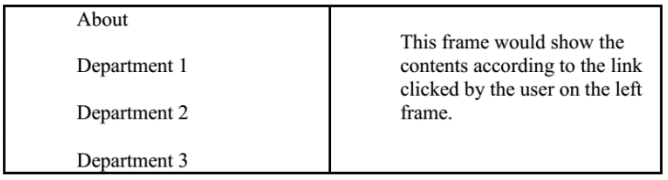
COs	Course Outcomes	Blooms Level
CO1	Understand the fundamentals of Internet and the Web concepts	Understand
CO2	Understand the various component of web concepts	Understand
CO3	Examine the usage of internet concepts and analyze its components.	Analyze
CO4	Apply and identify the online information resources and to develop web pages	Apply
CO5	Utilize the appropriate Google Apps for education effectively	Analyze

List of Programs

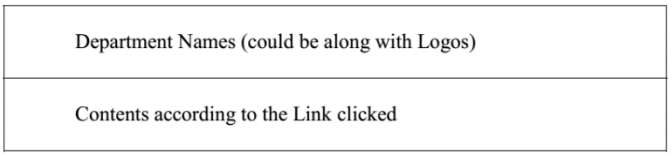
1. Create a web page using following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Breaks, Horizontal Line, Blinking text as well as marquee text.
2. Create a web page using Ordered Lists, Unordered Lists, Inserting images, Internal and External Links.
3. Create a Table using HTML.



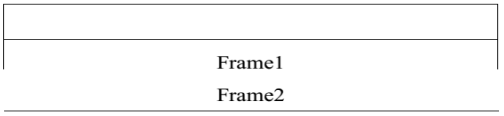
4. Create a web page using input type, select and Text Area in HTML.
5. Create a HTML Form containing Roll No, name of the student and Grades in a tabular form.
6. Create a web page using Frames in HTML.

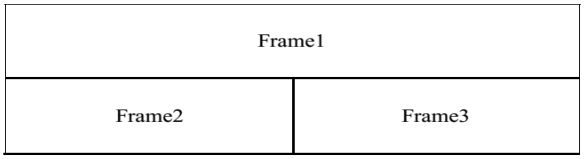


7. Create a web page using Horizontal Frames in HTML.



8. Create a web page using Inline Cascading Style Sheet.
9. Create a web page using Internal / Embedded Style Sheet.





10. Create a web page using External Style Sheet.
    a. Text Box
    b. Option/radio buttons
    c. Check boxes
    d. Reset and Submit buttons

List of Programs using JavaScript: Create event driven program for following:

11. Write JavaScript program to compute squares and cubes of numbers from 5 to 15.
12. Write JavaScript program to find the largest of three numbers.
13. Write JavaScript program to find the factorial of a number.
14. Write JavaScript program to calculate sum and average of numbers.
15. Write JavaScript program to count the number of negative numbers, positive numbers and zeros in the list.
16. Write JavaScript program to prompt username and display it.

TOTAL: 36 HOURS

TEXT BOOKS:

1 Sklar, J. (2015). *Principles of web design* (6th ed.).
2 "McFedries, P. (2018). *Web coding & development all-in-one for dummies*. For Dummies.
3 Connolly, R., & Hoar, R. (2017). *Fundamentals of web development*. Pearson
4 Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
5 Duckett, J. (2014). *HTML and CSS: Design and build websites*. Wiley.

WEBSITES:

1 https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide.
2 https://www.youtube.com/watch?v=PKuBtQuFa-8
3 https://www.youtube.com/watch?v=hGER1hP58ZE
4 http://www.freeCodeCamp Guides.com/
5 http://www.codropsCSSReference.com/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	1	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO4	3	-	-	2	-	-	-	-	-	3	-	-	-	-	-	2	-
CO5	-	-	-	-	3	-	2	-	-	3	-	-	-	-	-	2	-
Average	3	-	1	2	3	-	2	-	-	3	-	-	-	-	-	2	

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-II

24VAC201	**Environmental Studies**	**2H-2C**

Instruction Hours/week: L:2 T:0 P: 0 **Marks:** Internal: **100** External: - Total: **100**

End Semester Exam:- Hours

PREREQUISITE:

- Understanding of environmental issues and general science.

COURSE OBJECTIVES (CO):

- To create awareness about environmental problems among people
- To learn about the environment, resources available, biodiversity and its conservation
- To understand the current scenarios- to find ways for protection and betterment of or habitat

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts and methods f[rom ecological and physical sciences and their application in environmental problem solving	Understand
CO2	Study the concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions	Understand
CO3	Learn the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems	Apply
CO4	Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales	Apply
CO5	Apply systems concepts and methodologies to analyze and understand interactions between social and environmental processes	Apply

UNIT I INTRODUCTION **5 HOURS**

Environmental Studies and Ecosystems: Environment Definition, Scope and importance; Ecosystem, Structure, classification, and functions of ecosystem. Energy flow, Food chains and food webs, Ecological succession. Forest ecosystem, Grassland Ecosystem, Desert ecosystem, Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries).

UNIT II NATURAL RESOURCES - RENEWABLE AND NON-RENEWABLE RESOURCES

5 HOURS

Natural resources - Renewable and Non – Renewable resources. Land resources, Land degradation, desertification. Forest resources – Deforestation : Causes and impacts due to mining. Water resources- Use and over-exploitation of surface and ground water.

UNIT III BIODIVERSITY AND ITS CONSERVATION **5 HOURS**

Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity. Values of Biodiversity - Ecological, economic, social, ethical, aesthetic value. Bio-geographical classification of India. Hot-

spots of biodiversity. Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT IV ENVIRONMENTAL POLLUTION **5 HOURS**

Definition, causes, effects and control measures of Air pollution, Water pollution, Soil pollution, Noise pollution. Nuclear hazards and human health risks.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT **4 HOURS**

Concept of sustainability and sustainable development. Climate change, global warming, ozone layer depletion, acid rain and its impacts on human communities and agriculture. Environment Laws (Environment Protection Act, Air Act, Water Act, Wildlife Protection Act, Forest Conservation Act).

TOTAL: 24 HOURS

TEXT BOOKS:

1. Anonymous. 2004. A Text book for Environmental Studies, University Grants Commission and Bharat Vidypeeth Institute of Environmental Education Research, New Delhi.
2. Anubha Kaushik., and Kaushik, C.P.(2008). Perspectives in Environmental Studies, 3rd Edition, New Age International Pvt. Ltd. Publications, New Delhi.
3. Arvind Kumar,(2009). A Textbook of Environmental Science, APH Publishing Corporation, New Delhi.
4. Mishra, D.D,(2010). Fundamental Concepts in Environmental Studies. S. Chand & Company Pvt. Ltd., New Delhi.
5. Odum, E.P., Odum, H.T. and Andrews, J. (1971). Fundamentals of Ecology, Philadelphia: Saunders.
6. Sing, J.S., Sing. S.P. and Gupta, S.R.(2014). Ecology, Environmental Science and Conservation, S. Chand & Publishing Company, New Delhi.
7. Tripathy. S.N., and Sunakar Panda. (2011). Fundamentals of Environmental Studies, 3rd Edition, Vrianda Publications Private Ltd, New Delhi.
8. Uberoi, N.K. (2010). Environmental Studies, 2nd Edition, Excel Books Publications, New Delhi.

REFERENCE BOOKS:

1. Botkin., and Keller, (2014). Environmental Science: Earth as a Living Planet. 9th Edition, Wiley
2. Rajagopalan, R. (2016). Environmental Studies: From Crisis to Cure, Oxford University Press.
3. Singh, M.P., Singh, B.S., and Soma, S. Dey,(2004). Conservation of Biodiversity and Natural Resources, Daya Publishing House, New Delhi.
4. Verma, P.S., and Agarwal V.K(2016). Environmental Biology (Principles of Ecology). S. Chand and Company Ltd, New Delhi.
5. Bruce Rittmann and Perry Mc Carty, Environmental Biotechnology: Principles and Applications,(2020). 2nd Edition.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1	-
CO2	3	-	2	-	1	-	-	-	-	-	-	-	-	-	-	1	-
CO3	3	-	-	-	-	-	-	-	1	-	-	2	1	-	-	1	-
CO4	3	-	2	-	-	-	-	-	-	-	-	2	-	-	-	1	-
CO5	3	-	-	1	1	-	-	1	-	-	-	-	-	-	-	1	-
Average	3	-	2	1	1	-	-	1	1	-	-	2	1	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

மூன்றாம் பருவம்

24LSUT301 **Language III: Tamil III** **4H - 3C**

Instruction Hours/week: L:4 T: P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

தமிழ் இலக்கிய வரலாறு

பாடத்திட்டப் பொதுநோக்கம்

- தமிழ் மொழியின் சிறப்புகளை அறியச் செய்தல்.
- முச்சங்கங்கள் சங்ககால இலக்கண நூல்கள் பற்றித் தெரிந்து கொள்ளுதல்.
- பல்வேறு சமயம் சார்ந்த இலக்கியங்களை ஒப்பீடு செய்தல்,தொன்ம இலக்கியங்களை அறியச் செய்தல்

பாடத்திட்டப் பயன்விளைவு

- சங்க இலக்கிய மேன்மைகள்- திணைக்கோட்பாடுகள் அறிவு பெற்றிருத்தல்.
- வேற்றுமொழிப் படையெடுப்புகளுக்குஈடுகொடுத்து நிற்கும்திறன் குறித்து அறிதல்.
- ஐம்பெருங்காப்பியங்கள் ஐஞ்சிறுகாப்பியங்களின் சிறப்பை உணர்தல்.
- பிற அறநூல்களின் கருத்துக்களைத் தெரிந்து கொள்ளுதல்.
- செம்மொழியின் சிறப்பையும், தொன்மையையும் அறிதல்.

அலகு:1 சங்க இலக்கியம் **10 மணிநேரம்**

தமிழ் இலக்கிய வரிசை-அறிமுகம்-முச்சங்க வரலாறு-பாட்டும் தொகையுமாகிய சங்க இலக்கியத் தொகுப்பு-அறிமுகம்-எட்டுத்தொகையில் அகத்திணை-புறத்திணை-பத்துப்பாட்டில் அமைந்த ஆற்றுப்படை இலக்கியங்கள்-பத்துப்பாட்டில் அகமும் புறமும்-புலவர்களும் பாடல்களும்-பெண்பாற் புலவர்கள்.

அலகு: 2 அற இலக்கியமும் காப்பியமும் **10 மணிநேரம்**

திருக்குறள்-அமைப்பு-இலக்கியச் சிறப்பு-உலகப் பொதுமைத் தன்மை-பொருட் சிறப்பு-இலக்கியச் சிறப்பு-நாலடியார் முதலாக குமரகுருபரரின் நீதிநெறிவிளக்கம் ஈறாக அமைந்த நீதி இலக்கியங்கள்-நீதி நூல்களில் அகமும் புறமும்-தமிழ் இலக்கிய வரிசையில் ஐம்பெருங் காப்பியங்களும், ஐஞ்சிறு காப்பியங்களும்- சிலம்பும் மணிமேகலையும் – இரட்டைக்காப்பியங்கள்- கம்பராமாயணம்-பெரியபுராணம் - சீறாப்புராணம்-தேம்பாவணி-இராவண காவியம்.

அலகு:3 திருமுறைகளும் திவ்யப்பிரபந்தமும் **10 மணிநேரம்**

தமிழகத்தில் பக்தி இயக்கத்தின் தோற்றமும் வளர்ச்சியும்-பன்னிரு திருமுறைகளும், பதிநான்கு சித்தாந்த சாத்திரங்களும்-திவ்யப்பிரபந்தமும், இராமானுஜ நூற்றந்தாதி முதலான வைணவ இலக்கியங்களும்.

அலகு: 4 சிற்றிலக்கியங்களும் இக்கால இலக்கியங்களும் **10 மணிநேரம்**

குற்றாலக்குறவஞ்சி, முக்கூடற்பள்ளு, மதுரை மீனாட்சியம்மை பிள்ளைத்தமிழ், மதுரை சொக்கநாதர் தமிழ்விடு தூது, அழகர் கிள்ளைவிடு தூது முதலான சிற்றிலக்கிய வரிசை-தமிழில் புதுக்கவிதை இயக்கங்களின் தோற்றமும் வளர்ச்சியும்-தமிழ்ப் புதுக்கவிதை வடிவங்கள்-தமிழின் நாடக இலக்கியங்கள்- மனோண்மணீயம் – தமிழின்

உரைநடை இலக்கிய வளர்ச்சி-தமிழின்பம் முதலான உரைநடை நூல்கள்-தமிழில் சிறுகதை இலக்கிய வளர்ச்சி-இருபதாம் நூற்றாண்டுச் சிறுகதைகள்-தமிழில் புதின இலக்கியங்கள்-இக்கால இலக்கியங்களில் காலந்தோறும் தனி மனிதப் பதிவுகளும், சமுதாயப் பதிவுகளும்.

அலகு: 5 தமிழின் ஐந்திலக்கணம் **8 மணிநேரம்**

தமிழின் எழுத்து – சொல் – பொருள் – யாப்பு - அணி இலக்கணச் சிந்தனைகள் .

பாடநூல்:

தமிழ் இலக்கிய வரலாறு - மொழிகள் துறை - தமிழ்ப்பிரிவு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் -21.

மொத்த மணிநேரம் 48

பார்வை நூல்கள்:

1. தமிழ் இலக்கிய வரலாறு – தமிழண்ணல், மீனாட்சி புத்தக நிலையம்-மதுரை.
2. தமிழ் இலக்கிய வரலாறு – வேங்கடராமன்.கா.கோ. கலையகம் பதிப்பகம், நாமக்கல்.
3. புதிய நோக்கில் தமிழ் இலக்கிய வரலாறு-சுந்தரமூர்த்தி.செ, அவ்வை பதிப்பகம், திருவாரூர்.
4. தற்காலத் தமிழ் இலக்கிய வரலாறு - கவிஞர் திலகம் மானூர் புகழேந்தி, நிலாப் பதிப்பகம், 63,பாரதிதாசன் நகர், இராமநாதபுரம், கோவை – 641045.

இணையதளம்

1. www.tvu.org.in
2. www.maduraitamilproject.com

இதழ்கள்

1. International Research Journal of Indian Literature, irjil.in
2. International Tamil Research Journal, iorpress.in

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**2.6**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester III

24LUH301 **Language III: Hindi III** **4H-3C**

(Story, History of Hindi Literature, Novel, Letter Writing

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

- Knowledge of contemporary drama contents of Hindi literature
- Learn novels and its techniques. The ability to read novels and express criticism about it and the ability to express social thoughts will improve
- There will also be litigation messages in Hindi and news on speech techniques

COURSE OUTCOMES(COs):

- Develop an interest in the appreciation of literature.
- Discuss and respond to content of a reading passage.
- Learning the literacy knowledge of Hindi specially reading and writing .
- Learning the literary knowledge specially reading and understanding of Hindi short Stories
- Learning the history of Hindi literature

UNIT I a) Story – Bade Ghar Ki Beti **9 HOURS**
b) Hindi Bhasha Ka Vikas
c) Novel – Ramnath,Jalpa
d) Letter Writing –Personal Letter

UNIT II a) Story – Puraskar **9 HOURS**
b) Kaal Vibhajan , Char Prakar
c) Ramesh Babu ,Devdeen
d) Letter Writing – Leave Letter

UNIT III a) Story – Usne Kaha Tha **10 HOURS**
b) Literature – Adhikaal
c) Indhubhooshan, Rathna,Johra
d) Letter Writing – Letter for the Publisher

UNIT IV a) Story – Paanchminte **10 HOURS**
b) Poorva Madhya Kaal
c) Manibhooshan,Dhayanath,Rameshwari
d) Letter Writing – Application for job

UNIT V a) Story – kafan **10 HOURS**

b) Reethi Kaal,Adhunik Kaal

c) Dheen Dhayal,Manaki,

d) Letter Writing – Complaint Letter

TOTAL: 48 HOURS

REFERENCE BOOKS:

1.Story : Kahani Manjari

Publisher : D.B.Hindi Prachar Sabha

T.Nagar , Chennai – 600017

2.History of Hindi

Literature : Hindi Sahithya ka Saral Ithihas

Writer : Rajnath Sharma.A

Publisher : Vinoth Pusthak Mandir

Aagra – 02

3.Novel : Gaban

Writer : Premchandh

Publisher : Rajkamal Prakashan

New Delhi – 110002

4.Letter Writing : Sumitha Hindi Nibandh Aur Pathra Lekhan

Writer : Sri Sharan

Publisher : Kalda Publication

Mukhar Ji Nagar, Delhi - 09

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-		-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-		-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-		-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-		-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-		-	-
Average	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	-	-	-	-	-	-		-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester III

24LUM301 **Language III : Malayalam III** **4H-3C**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVE(CO):

- May have knowledge of the contents of primitive poetry
  Learn about contemporary poetry and its techniques.
- Interest in reading poetry and the ability to express social thoughts will improve
- This will help you to understand the basics of Malayalam Poetry and to understand Malayalamliterature properly

COURSE OUTCOME(COs):

- Get a basic knowledge of the history of Malayalam literature.
- Enhances the art and taste of Malayalam literary works
- Literary genres can be learned
- Create more to read and enjoy Malayalam poetry
- Get the basic Knowledge of poetry techniques

Unit No	PART I – MALAYALAM III	Hours
I	Poetry – Chinthavishtayaya Seetha	**10**
II	Poetry – Chinthavishtayaya Seetha	**10**
III	Poetry – Mrugasikshakan-(Murgasikshakan,Kausalya,Varavu,Vittupoku Ekalavyan,Mazha) 6 poetries	**10**
IV	Poetry – Mrugasikshakan-(Kayal,Karkkadakam,Bhagavatham,Vazhivakkilenaikutty,Edavelayil oru nimisham,Verumoru kathu) 6 poetries	**09**
V	Poetry - Aayisha	**09**
	TOTAL	**48**

TEXT BOOKS:

1. Chinthavishtayaya Seetha –Kumaranasan,Kerala Book Store Publishers.
2. Mrugasikshakan – Vijayalakshmi,DC Books, Kottayam
3. Aayisha – VayalarRamavarma - Kerala Book Store Publishers

REFERENCE BOOKS:

1. Kavitha SahithyaCharitram-Dr.M.Leelavathi (Kerala SahithyaAcademy,Trichur)
2. Kavitha Dwani-Dr.M.Leelavathi (D.C.Books, Kottayam)
3. Aadhunika SahithyacharithramPrasthanangalilude-Dr.K.M.George (D.C.Books, Kottayam)
4. Padya Sahithya Charithram – T.M.Chummar (Kerala Sahithya Academy,Trichur)

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	2.5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24LUS301 **Language III: Sanskrit III** **4H-3C**
(Drama and History of Sanskrit Literature)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

- The fundamental objective of the curriculum is to impart effective science education at the undergraduate level, exposing them to recent trends and developments in the subject.
- Creating scientific temper is another major objective of this curriculum.
- Another major thrust given here is to develop an environmental concern in all activities ofthe students. 'Go green', the motto of the syllabus emphasizes the urgent need to conserve nature without destruction of natural resources.

COURSE OUTCOMES(COs) :

- **Critical Thinking** :Take informed actions after identifying the assumptions that frame students' thinking and actions.
- **Problem Solving**: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.
- **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development.
- **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

UNIT I **9 HOURS**

History of Sanskrit Drama and its origin.

UNIT II **9 HOURS**

Important Sanskrit Dramas and important authors.

UNIT III **10 HOURS**

Text Prescribed: "Dutavakyam" of Bhasa, (First half)

UNIT IV **10 HOURS**

Text Prescribed: "Dutavakyam" of Bhasa, (Second half)

UNIT V **10 HOURS**

Translation : From the known passages of the above text.

TOTAL: 48 HOURS

TEXT BOOK :

1."Dutavakyam of Bhasa" R.S.Vadhyar and Sons Palghat, Kerala.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.4**	**2.2**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester III

24LUF301 **Language III: French III** **4H-3C**

(Histoire, histoire de la littérature frencais,roman, rédaction de lettres)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES (CO):

- To enable students to recognizenative accent and usage of French language.
- To help students to become autonomous and self-directed French language learners.
- To produce entrepreneurs among students by making them French language trainers and take communicative French to schools and colleges around.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Identify new words by employing vocabulary building techniques.	Apply
CO2	Build correct sentence structures and grammatical patterns in oral and written communication	Apply
CO3	develop the ability to speak French language with the way of pronunciation.	Understand
CO4	Follow leadership, work ethics and management principles	Analyze
CO5	express values and skills gained through effective communication to other disciplines.	Analyze

UNITE I **9 HOURS**

a) Leçon – Vivre la ville,,Visiter une ville
b) Communication - Indiquer le chemin
c) Grammaire - La comparaison,Les prépositions avec les noms géographiques,Les pronoms personnels COI
d) Lexique –La ville, Les lieux de la ville, Les transports
e) Culture – Le français : une ouverture sur le monde

UNITÉ II **9 HOURS**

a) Leçon **-•** On vend ou on garde ?
b) Communication -Demander des renseignements touristiques

c) – Grammaire - Le pronom y (le lieu), La position des pronoms compléments Les verbes du premier groupe en -ger et -cer,
d) Les verbes ouvrir et accueillir
e) Lexique - Les points cardinaux,Les prépositions de lieu (2)
f) Culture –Le français : une ouverture sur le monde

UNITÉ III **10 HOURS**

a) Leçon
b) Communication- permetter,defendre.
c) Grammaire -La formation du pluriel (2)
Les adjectifs de couler, Les adjectifs beau, nouveau, vieux
d) Lexique - Les couleurs, Les formes,Les me
e) culture – les grandes fleuves en Francais.

UNITE IV **10 HOURS**

a) Leçon – Félicitations !
b) Communication - Décrire un objet
c) Grammaire - Les pronoms relatifs qui et que,
. L'imparfait, Les verbes connaître, écrire, mette et vendre
d) Lexique – Les mesures, L'informatique
DIRE, LIRE, ECRIRE , Les sons [E] / [O] / [Œ]
e) Culture –Les lieux de la ville.

UNITÉ V **10 HOURS**

a) Leçon -En voyage !
b) Communication -• Présenter ses vœux, Faire une réservation
c) Grammaire - Les pronoms démonstratifs,La question avec Inversion,Les adverbes de manière,
d) Lexique -Les voyages,L'aéroport et l'avion,Les fêtes
e) Culture –Noël

TOTAL: 48 HOURS

TEXT BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de franca**is, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, S**aison** 1 – **Cahier d'activites** , Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, **Marie- Françoise Gliemenn,Les exercices de grammaire,Hachette FLE, Paris,200**5

REFERENCE BOOKS:

1. Christian Beaulieu, **Je pratiqu**e, Exercises de grammaire A1, Dider,Paris,2015
2. Nathalie BIE, philippe SANTINAN,**Grammaire pour adolescents-250 exercises, CLE International , Paris , 2005**

WEBSITES :

1. http:// enseigner.tv5 monde.com/
2. bonjourdumonde.com /exercises/contenu/le – francais-du- tourisme.html
3. http://www.bonjurdefrance.com/
4. https://www.lepointdufle.net/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**2.5**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester III

24ENU301 **ENGLISH III** **3H-3C**

Instruction Hours/week: L:3 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES (CO):

- To enable students to recognizenative accent and usage of English language.
- To help students to become autonomous and self-directed English language learners.
- To produce entrepreneurs among students by making them English language trainers and take communicative English to schools and colleges around.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Identify new words by employing vocabulary building techniques.	Apply
CO2	Build correct sentence structures and grammatical patterns in oral and written communication	Apply
CO3	develop the ability to speak English language with the correct pronunciation.	Understand
CO4	Follow leadership, work ethics and management principles	Analyze
CO5	express values and skills gained through effective communication to other disciplines.	Analyze

UNIT I **8 HOURS**

LISTENING: Listening Comprehension-Listening for Specific Information- Interpreting Chartsand Diagrams

UNIT II **7 HOURS**

SPEAKING: Essentials of effective Communication- **Telephone Skills**: Understanding Telephone Conversation-Handling Calls-Leaving Messages-Making Requests-Giving Instructions and Orders.

UNIT III **7 HOURS**

READING: Reading with a purpose-Skimming and Scanning-Locating Main Points-Reading Critically- Sequencing of Sentences-Reading Comprehension

UNIT IV **7 HOURS**

WRITING: Descriptive and Narrative-Safety Instructions- Suggestions- Expansion of Abbreviations-Spellings Rules Translation- Translating Short Sentences and Passages from English to Tamil

UNIT V **7 HOURS**

VOCABULARY: Synonyms-Antonyms-Prefixes-Suffixes- Idioms- Different Types of English-Homonyms and Homophones (British and American)

TOTAL: 36 HOURS

TEXT BOOKS:

1. Board of Editors (2024). Proficiency in Communication I. Karpagam Academy of Higher Education

REFERENCE BOOKS:

1. Martin's, St (2013). Oxford Handbook of Writing: Handbook of Writing. Cambridge University Press.
2. Wren & Martin, (2008). High School English Grammar & Composition, S.Chand & Company Ltd,Board of Editors,
3. Krashen, Stephen D (1982). Principles and Practice in Second Language Acquisition, New York:Pergamon Press

WEB SITES:

1. https://www.scribbr.com/
2. https://www.quora.com/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**2.5**	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU301 **Operating Systems** **5H-4C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60** Total**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Knowledge in computer language.

COURSE OBJECTIVES(CO):

- Provide knowledge about Operating Systems, including process management techniques and memory management.
- Teach concepts related to file organization and virtual memory management.
- Analyze operating system production, security, and their practical applications.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the operating systems objectives, function, structure, components and services.	Understanding
CO2	Understand the various process scheduling algorithms techniques	Understanding
CO3	Understand the various memory management techniques	Understanding
CO4	Apply and implement the file organization	Applying
CO5	Analyze the concepts of production and security	Analyzing

UNIT I INTRODUCTION **12 HOURS**

Introduction to Operating System: Introduction, Objectives and Functions of OS, Evolution of OS, OS Structures, OS Components, OS Services, System calls, System programs, Virtual Machines.

UNIT II PROCESS MANAGEMENT **12 HOURS**

Process Management: Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems. **Threads**: Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, Threading issues.

CPU Scheduling :Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models.
Process Synchronization : Mutual Exclusion, Critical –section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions

Deadlocks: System Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock Avoidance, Deadlock Detection, Recovery from Deadlock

UNIT III MEMORY MANAGEMENT **12 HOURS**

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging.

Virtual Management: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation.

UNIT IV FILE ORGANIZATION **12 HOURS**

Memory Management: Logical and physical Address Space, Swapping, Contiguous Memory Allocation, Paging, Segmentation with Paging.

Virtual Management: Demand paging, Process creation, Page Replacement Algorithms, Allocation of Frames, Thrashing, Operating System Examples, Page size and other considerations, Demand segmentation.

UNIT V PRODUCTION AND SECURITY **12 HOURS**

Protection and Security: Protection: Goals of Protection, Domain of Protection, Access Matrix, Implementation of Access Matrix, Revocation of Access Rights, Capability- Based Systems, Language–Based Protection Security: Security Problem, User Authentication, One –Time Password, Program Threats, System Threats, Cryptography, Computer – Security Classifications.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Tanenbaum, A. S. (2001). *Operating systems: Design and implementation* (2nd ed.). Pearson Education.
2. Silberschatz, A., Galvin, P. B., & Gagne, G. (2013). *Operating system concepts* (6th ed.). WileyAndrew S. Tanenbaum, "Modern Operating Systems", Prentice Hall,2000
3. Silberschatz, A. (2011). *Operating system concepts: Windows XP update*. Wiley

REFERENCE BOOKS:

1. Deitel, P. J., Deitel, H. M., & Choffnes, D. (2003). *Operating systems* (3rd ed.). Pearson Education.
2. Madnick, S. E., & Donovan, J. J. (2003). *Operating systems* (3rd ed.). Tata McGraw-Hill.

WEBSITES:

1. https://www.geeksforgeeks.org/operating-systems/
2. https://www.tutorialspoint.com/operating_system/index.htm
3. https://www.javatpoint.com/operating-system
4. https://www.studytonight.com/operating-system/
5. https://www.guru99.com/os-tutorial.html

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	1	-	3	-	-	-	-	-	-	-	-	-	-	1	-
CO2	1	-	1	3	3	-	-	-	-	-	-	-	-	-	-	1	-
CO3	-	-	1	3	3	-	-	-	-	-	-	-	-	-	-	1	-
CO4	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	1	-
CO5	-	-	-	3	3	1	-	-	-	-	-	-	1	-	-	1	-
Average	1	-	1	3	3	1	-	-	-	-	-	-	1	-	-	1	-

2 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

Semester-III

24CSU302 **Computer Networks** **4H-3C**

Instruction Hours/week: L: 4 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60** Total**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Basic understanding of Networks Concept.

COURSE OBJECTIVES(CO):

- Understand the basics of computer networks and the data link layer.
- Learn about protocols, routers, cellular networks, and routing algorithms for the network layer.
- Analyze the application layer concepts and network security.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

Cos	Course Outcomes	Blooms Level
CO1	Understand the fundamentals concepts of computer network	Understand
CO2	Understand the DLL services and different protocol uses in computer networks	Understand
CO3	Understand the uses of various protocols and Connection devices	Understand
CO4	Analyze the network layer and transport layer services	Analyze
CO5	Analyze the application layer and network security in trouble shooting the network	Analyze

UNIT I INTRODUCTION TO COMPUTER NETWORK **10 HOURS**

Networking Fundamentals: Basics of Networking, Networking Terms- Host, Workstations, Server, Client, Node, Advantages of Networking, Types of Networks, Network Topologies, Types of Transmission Media- Guided and Unguided, Communication Modes. Data communication protocols and standards, Network models – OSI model-layers and their functions, TCP / IP protocol suite.

UNIT II DATA LINK LAYER **8 HOURS**

Data link layer: Error Detection and Correction, Framing, flow and error control, Protocols - Noiseless channels (Simplest, Stop and Wait) and Noisy channels (Stop and Wait and Piggy Backing), PPP.

UNIT III MULTIPLE ACCESS PROTOCOLS **8 HOURS**

Multiple Access Protocols, Random Access – ALOHA, CSMA. Connecting Devices - Repeater, Modem, Hub, Switch, Bridge, Router, Gateway. Wired LANs - IEEE standards, wireless LANs - Bluetooth, Cellular Telephony, Satellite Networks, SONET.

UNIT IV NETWORK LAYER AND TRANSPORT LAYER **10 HOURS**

Network layer and Transport layer: Logical addressing – IPv4 addressing, IPv4 address Classes, Subnet Mask, Public & Private IP Address and IPV6 addressing, Address mapping-ICMP, IGMP.

Connectionless and Connection-Oriented Services: Transport layer services, UDP and TCP. Congestion Control, Quality of Service. Introduction to Routing and Switching concepts.

UNIT V APPLICATION LAYER **12 HOURS**

Application Layer: DHCP, DNS, HTTP / HTTPS, FTP, TFTP, SFTP, Telnet, Email: SMTP, POP3 / IMAP. Virtual Private Networking, Network security: Common Threats – Firewalls (advantages and disadvantages), Digital Signature, Troubleshooting the network.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Forouzan, B. A. (2006). *Data communications and networking with TCP/IP protocol suite* (4th ed.). Tata McGraw-Hill.
2. Tanenbaum, A. S. (2003). *Computer networks* (4th ed.). Pearson Education.
3. Jain, M. (2002). *Data communications and networking*. BPB Publications.
4. Jain, M. (2002). *Data communications and networking*. BPB Publications.

REFERENCE BOOKS:

1. Tanenbaum, A. S. (2012). *Computer networks* (5th ed.). PHI Learning.
2. Jain, S., Jain, M., Pillai, V., & Kratika. (2010). *A level data communication & network technologies*. BPB Publications.

WEBSITES:

1. https://www.geeksforgeeks.org/computer-network-tutorials/
2. https://www.javatpoint.com/computer-network-tutorial
3. https://www.vssut.ac.in/lecture_notes/lecture1423905560.pdf
4. https://www.tutorialspoint.com/data_communication_computer_network/index.htm
5. https://www.scaler.com/topics/computer-network/

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	3	-	3	-	-	3	-	-	-	-	-	-	-	2	-
CO2	2	-	3	-	3	-	-	3	-	-	-	-	-	-	-	2	-
CO3	2	-	3	1	3	-	-	3	-	-	-	-	-	-	-	2	-
CO4	2	-	3	1	3	-	-	3	-	-	-	-	-	-	-	2	-
CO5	-	-	3	1	3	1	-	3	-	-	-	-	-	-	-	2	-
Average	2	-	3	1	3	1	-	3	-	-	-	-	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

Semester-III

24CSUA301 **Operations Research** **4H-3C**

Instruction Hours/week: L:4 T: 0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Basic understanding of algebra and mathematical modeling.

COURSE OBJECTIVES (CO):

- To learn the basic concepts and applications of linear programming and to impart knowledge in concepts and tools of Operations Research.
- To make the student capable of formulating the various real-life decision-making problems as Mathematical programming problems.
- To enable the practical application of operations research methods for decision-making in real-world scenarios.

COURSE OUTCOMES(COs):

Upon completion of this course, the student will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the basic concepts and formulate real-world problems as a linear programming model.	Understand
CO2	Apply methods to find initial basic feasible solutions and optimal solutions for transportation problems.	Apply
CO3	Apply different queuing models and assignment problem to solve real-life problems.	Apply
CO4	List and understand the costs involved in inventory management.	Understand
CO5	Construct project networks and perform time calculations using CPM and PERT methods.	Apply

UNIT I LINEAR PROGRAMMING **9 HOURS**

Mathematical Model assumption of linear Programming – Graphical method - Principles of Simplex method- Big-M Method- Duality in LPP.

UNIT II TRANSPORTATION MODEL **9 HOURS**

Introduction – Mathematical Formulation – Finding Initial Basic Feasible Solutions – Optimum Solution for Non degeneracy and Degeneracy Model - Unbalanced Transportation Problems and Maximization case in Transportation Problem.

UNIT III ASSIGNMENT PROBLEM AND QUEUEING THEORY **10 HOURS**

Mathematical Formulation of the Problem – Hungarian Method – Unbalanced Assignment Problem- Maximization Case in Assignment Problem - Travelling Salesman Problem.

Introduction – Characteristics of Queueing System. Problems in (M/M/1):(∞/FIFO) and (M/M/1):(N/FIFO) models .

UNIT IV INVENTORY CONTROL **10 HOURS**

Introduction – Costs involved in Inventory – Deterministic EOQ Models – Purchasing Model without and with Shortage, Manufacturing Model without and with Shortage - Price Break.

UNIT V PERT AND CPM **10 HOURS**

Introduction - Network scheduling by PERT / CPM – Network and basic components – Rules of Network construction – Time calculation in Networks – CPM. PERT – PERT calculations.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Kandiswarup, P. K. Gupta and Man Mohan. (2011). *Operations Research*, 12th Revised edition, S. Chand & Sons Education Publications, New Delhi.
2. Sharma S.D. (2017). *Operations Research Theory, Methods & Applications*, Kedar Nath Ram Nath Publications, India.

REFERENCE BOOKS:

1. Hamdy A. Taha., (2017). *Operations Research-An Introduction*, Tenth Edition, published by Dorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
2. Prem Kumar Gupta and Hira D.S., (2014). *Operations Research*, S. Chand & Company Ltd, Ram Nagar, New Delhi.
3. Srinivasan G., (2017). *Operations Research: Principles and Applications*, PHI, New Delhi

WEBSITES:

1. https://youtu.be/vUMGvpsb8dc
2. https://youtu.be/ItOuvM2KmD4

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	1	3	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	**-**	**-**	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlatio

Semester-III

24CSU311 **Operating Systems - Practical** **4H-2C**

Instruction Hours/week: L:0 T: 0 P: 4 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Knowledge in computer Language.

COURSE OBJECTIVES(CO):.

- To implement various CPU Scheduling Algorithms.
- To implement Process Creation and Inter Process Communication.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Compare the performance of various CPU Scheduling Algorithms.	Understand
CO2	Illustrate Deadlock avoidance and Detection Algorithms.	Understand
CO3	Apply and Implement Semaphores.	Apply
CO4	Analyze processes and implement IPC.	Analyze
CO5	Analyze the performance of the various Page Replacement Algorithms.	Analyze

List of Programs

1. Basics of UNIX commands
2. Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir
3. Write Simple programs using Shell
4. Write C programs to implement the various CPU Scheduling Algorithms
5. Write a C Program to Implementation of Semaphores
6. Write a C Program to Implementation of Shared memory and IPC
7. Write a C Program to implement the Bankers Algorithm for Deadlock Avoidance
8. Write a C Program to Implementation of Deadlock Detection Algorithm
9. Write a C Program to Implementation of the following Memory Allocation Methods for fixed partition
   a) First Fit b) Worst Fit c) Best Fit
10. Write a C Program to Implementation of Paging Technique of Memory Management
11. Write a C Program to Implementation of the following Page Replacement Algorithms
    a) FIFO b) LRU c) LFU
12. Write a C Program to Implementation of the following File Allocation Strategies
    a) Sequential b) Indexed c) Linked

TOTAL: 48 HOURS

TEXT BOOKS:

1 Silberschatz, A., Galvin, P. B., & Gagne, G. (2013). *Operating system concepts* (9th ed.). Wiley India

2 Deitel, P. J., Deitel, H. M., & Choffnes, D. (2003). *Operating systems* (3rd ed.). Pearson Education.

3 Madnick, S. E., & Donovan, J. J. (2003). *Operating systems* (3rd ed.). Tata McGraw-Hill.

4 Tanenbaum, A. S. (2008). *Modern operating systems* (3rd ed.). Pearson Education

5. Kerrisk, M. (2010). *The Linux programming interface: A Linux and UNIX system programming handbook*

WEBSITES:

1 http://spoken-tutorial.org/

2 https://www.studocu.com/

3 https://infinite.education/view/ZCbZM02MLnA8KcU3ElWRaAre

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	3	3	3	-	-	2	-	-	-	-	-	-	-	2	-
CO2	2	-	-	3	3	-	-	2	-	-	-	-	-	-	-	2	-
CO3	2	-	3	3	3	-	-		-	1	1	-	-	-	-	2	-
CO4	-	-	3	3	3	-	-	2	-	1	-	-	-	-	-	2	-
CO5	-	-	3	3	3	-	-	2	-	-	-	-	-	-	-	2	-
Average	2	-	3	3	3	-	-	2	-	1	1	-	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

Semester-III

24CSU312	**Computer Networks - Practical**	**4H-2C**

Instruction Hours/week: L: 0 T: 0 P: 4 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Basic understanding of Networks Concept.

COURSE OBJECTIVES(CO):

- Study the taxonomy, terminology, and layers of the OSI and TCP/IP models, including Application, Presentation, and Session layers.
- Acquire knowledge of Transport and Network layers, focusing on routing protocols, IP addressing, and data link layer concepts and protocols.
- Understand the basics of the Physical layer and apply these fundamentals in real-time applications.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	**Course Outcomes**	**Blooms Level**
CO1	Construct the functions of each layer in OSI and TCP/IP model.	Apply
CO2	Explain the functions of Application layer and Presentation layer paradigms and Protocols.	Understand
CO3	Experiment with the Session layer design issues and Transport layer services.	Apply
CO4	Classify the routing protocols and analyze how to assign the IP addresses for the given network.	Understand
CO5	Apply the types of transmission media with real time applications	Apply

List of Programs

1. Simulate Cyclic Redundancy Check (CRC) error detection algorithm for noisy channel.
2. Simulate and implement stop and wait protocol for noisy channel.
3. Simulate and implement go back n sliding window protocol.
4. Simulate and implement selective repeat sliding window protocol.
5. Simulate and implement distance vector routing algorithm
6. Simulate and implement Dijkstra algorithm for shortest path routing.

TOTAL: 48 HOURS

TEXT BOOKS::

1 Forouzan, B. A. (2017). *Data communications and networking* (5th ed.). Tata McGraw Hill Education.

2 Leon-Garcia, A., & Widjaja, I. (2017). *Communication networks* (2nd ed.). McGraw-Hill Education.
3 Tanenbaum, A. S. (2012). *Computer networks* (5th ed.). PHI Learning.
4 Jain, S., Jain, M., Pillai, V., & Kratika. (2010). *A level data communication & network technologies*. BPB Publications.
5 Tomasi, W. (2007). *Introduction to data communications and networking* (1st ed.). Pearson.

WEBSITES:

1 https://forgetcode.com/c/1203-crc-generation-in-computer-networks
2 https://gist.github.com/ankurdinge/1202643
3 https://www.thelearningpoint.net/computer-science/c-program
4 www.w3schools.com/tcpip/default.asp
5 http://172.16.25.76/course/view.php?id=1835

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	2	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	-	2	-	-	-	-	-	3	2	-	-	-	-	-	2	-
CO3	-	-	-	-		-	-	-	-	-	-	-	-	-	-	2	-
CO4	-	-	-	-	3	-	-	1	-	-	-	-	-	-	-	2	-
CO5	-	-	-	-	3	-	-	-	-	2	1	-	-	1	1	2	-
Average	2	-	2	-	3	-	-	1	-	2	1	-	-	1	1	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

24VAC301 **Indian Knowledge System** **2H - 1C**

Instruction Hours/week: L:2 T:0 P:0 **Marks:** Internal: **100** External: - Total: **100**

End Semester Exam: - Hours

PREREQUISITE:

- Indian history, culture, and philosophy.

COURSE OBJECTIVES(CO):

- Understand the origin, evolution, and ontological approach of Indian knowledge systems.
- Comprehend Indian knowledge approaches related to time, language, and key figures in the field.
- Gain insights into the life and mind within the Indian knowledge system and the role of women in ancient and modern India.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the rich heritage that resides in our traditions.	Understand
O2	Comprehend the Indian knowledge	Understand
CO3	Understand the importance of philosophical concepts	Understand
CO4	Understand the origin of Indic thought and practices	Understand
CO5	Understand role of Women in ancient and modern India.	Understand

UNIT I **5 HOURS**

Tradition - Conception and Constitution of Knowledge in Indian Tradition, The Oral Tradition, Knowledge Maintenance and Renewal Mechanisms, Nature and Character of Knowledge, Models and Methods of Indian Knowledge Systems, Nature and Conception of Reality, Means of Knowledge of Reality –Uniqueness of Indian Ontology and Epistemology.

UNIT II **5 HOURS**

Time and Language - Time – Concept of Kala, Cycles of Time, Measurement of Time, Knowledge of Time – the Science of Light. Language – Philosophy of Word and Meaning, The Sphota Doctrine, Sadhu and Asadhu words, Levels of Speech, Silence as the eternal language

UNIT III **5HOURS**

Environment and Management - Environment – Concept of Nature in Indian Tradition, Panchbhutas – Elements of Nature, Concept of Rta, Sacred Environment, Panchvati. Management – Indian conception of Economy and Management, Insights from Arthashastra, Management by Consciousness.

UNIT IV **5 HOURS**

Life and Mind - The Science of Life – History and Basic Principles of Ayurveda, Prana, Ojas and Tejas, Health, Balance and Routine in Ayurveda. The Science of Mind – Origin, Nature and Evolution of Yoga, Types and Schools of Yoga, Yoga Darshana.

.

UNIT V **4 HOUR**

Torchbearers - Ancient – Sankara, Nanak, Tulsi, Caitanya. Modern – Dayananda, Ramakrishna, Sri Aurobindo, Ananda Coomaraswamy. Women's Empowerment in India: Ancient Period to Modern Time Period.

TOTAL: 24 HOURS

TEXT BOOKS:

1 B. Mahadevan, Vinayak Rajat Bhat, and Nagendra Pavana R.N. (2022). Introduction to Indian Knowledge System: Concepts and Applications (1st ed.). PHI Publishers, New Delhi, India

WEBSITES:

1 https://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf

2 https://www.sanskritimagazine.com/india/traditional-knowledge-systems-of-india/

CO,PO,PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	2
CO2	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	-	2
CO3	3	-	-	-	-	-	-	-	-	2	-	-	3	-	-	-	2
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	1	-	2
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
Average	3	-	-	-	-	1	-	-	-	2	-	-	3	-	1		2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

		Semester-III
24CSU391	**Internship**	**0H- 2C**
Instruction Hours/week: L:0 T:0 P: 0	**Marks:** Internal**:100** External**: -** Total**:100**	

நான்காம் பருவம்

24LSUT401 **Language IV: Tamil IV** **4H - 3C**

Instruction Hours/week: L:4 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

தமிழர் நாகரிகமும் பண்பாடும்

பாடத்திட்டப் பொதுநோக்கம்

- வரலாற்றுக்கு முற்பட்ட தமிழகத்தின் சிறப்பை அறியச்செய்தல்.
- தமிழின் தொன்மையை மாணர்களுக்கு எடுத்துரைத்தல்.
- பழந்தமிழர் வாழ்க்கை முறையை உணர்த்துதல்.

பாடத்திட்டப் பயன்விளைவு

- தமிழ்மொழி வரலாறு குறித்த தெளிந்த அறிவு பெற்றிருத்தல்.
- தமிழரின் மரபு சார்ந்த மொழியின் செல்வாக்கை அறிதல்.
- பழந்தமிழ் இலக்கியங்களின்வழி பண்பாடு கலாச்சாரம் போன்றவற்றை அறிதல்.
- ஐவகை நிலஅமைப்பு, வாழ்வியல் ஒழுக்கலாறுகளைப் பெற்றிருத்தல்.
- இலக்கியங்களின்வழி கலைகளின் வளர்ச்சி மற்றும் அமைப்பு முறையை அறிதல்.

அலகு I வரலாற்றுக்கு முற்பட்ட தமிழகமும் சங்ககால வரலாறும் **10 மணிநேரம்**

வரலாறும் நிலஅமைப்பும் - வரலாற்றின் செல்வாக்கு - பல்வேறு காலங்களில் வரலாறு உண்டாக்கிய நாட்டுப் பிரிவுகள் - பழைய கற்காலம் - புதிய கற்காலம் - இரும்புக் காலம்.

அலகு 2 தமிழின் தொன்மை **10 மணிநேரம்**

தமிழ் தோன்றிய இடம் - குமரிக்கண்டத் தமிழ் நாடுகள் - தமிழ் என்னும் பெயர் வரலாறு - திராவிட மொழிக்குடும்பம் - தமிழ்மொழிச் சிறப்பு - தமிழுக்குத் தமிழ் நாட்டவர் செய்ய வேண்டியவை - தமிழுக்கு வெளிநாட்டிற் செய்ய வேண்டியவை.

அலகு 3 தமிழர் வாழ்வியல் **10 மணிநேரம்**

ஐவகை நிலங்கள் - களவு வாழ்க்கை - கற்பு வாழ்க்கை - அரசர் கடமை - கல்வி நிலை - தொழில் நிலை - ஆடவர் நிலை - பெண்டிர் நிலை.

அலகு 4 கட்டடக்கலையும் தமிழர் பண்பாடும் **10 மணிநேரம்**

கட்டடக்கலை தோற்றுவாய் - முதற்கலை - கட்டடக்கலையின் பழைமை - புதிய கற்காலம் - சங்ககாலம் - கோயில்கள் - அரண்மனைகள் - கோட்டைகள் - வீடுகள் - நீர்ப்பாசனக் கட்டடக்கலை - தமிழர் கட்டடக் கலையின் தனிச்சிறப்பு.

அலகு 5 ஆற்றங்கரை நாகரிகம் **8 மணிநேரம்**

ஆறும் நாகரிகமும் - ஆறுகளின் தோற்றமும் நீளமும் - காவிரிக்கரை நாகரிகம் - இலக்கியச் சிறப்பு - கலைச்சிறப்பு - வைகைக்கரை நாகரிகம் - இலக்கியச் சிறப்பு - கலைச்சிறப்பு , நொய்யல்கரை நாகரிகம்.

மொத்த மணிநேரம் 48

பார்வை நூல்கள்

1. முனைவர் அரங்க இராமலிங்கம் (பதிப்பாசிரியர்), தமிழர் நாகரிகமும் தமிழ் மொழிவரலாறும் (தொகுதி -1, 6, 2, 5, 10), வர்த்தமானன் பதிப்பகம், தியாகராயநகர், சென்னை-17.
2. கே.கே.பிள்ளை, தமிழக வரலாறு மக்களும் பண்பாடும், உலகத்தமிழ் ஆராய்ச்சி நிறுவனம் தரமணி, சென்னை-13.
3. நா.வானமாமலை, தமிழர் வரலாறும் பண்பாடும், நியூசெஞ்சுரி புக்ஹவுஸ், சென்னை -98.

இணையதளம்

1. www.tvu.org.in
2. www.maduraitamilproject.com

இதழ்கள்

1. International Research Journal of Indian Literature, irjil.in
2. International Tamil Research Journal, iorpress.in

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	-	**-**	**-**	-	**-**	**-**	**-**	-	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24LUH401 **Language IV: Hindi IV** **4H-3C**

(Modern Poetry, One Act, Essay, Translation)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

- Develop an interest in the appreciation of short stories
- Comprehend the grammatical structures and sentence making
- Understand the language and developing English to Hindi translation skill

COURSE OUTCOMES(COs):

- Learning the literacy knowledge of Hindi specially reading and writing .
- Learning the literary knowledge specially reading and understanding of Hindi short Stories
- Learning the history of Hindi literature.
- The ability to translate from Hindi to English and from English to Hindi will be improved.
- Develop a skill in spoken Hindi.

UNIT I	a) Poetry – Lakshmanan ke Bare Me b) Bharath ka Bhagya c) Essay – Dhokha d) Translation – Lesson – 1 to 3	**9 HOURS**
UNIT II	a) Poetry – Soorpanakha Ki Visheshatha b) Bahu Ki Vida c) Essay – Jabaan d) Translation– Lesson – 4 to 6	**9 HOURS**
UNIT III	a) Poetry– Kavya Ke AdharPar b) Reed Ki Haddi c) Essay – Kya Janvar Bhee Sochthi Hai d) translation– Lesson – 7 to 9	**10 HOURS**
UNIT IV	a) Khanda Kavya Ke Adhar Par Panchavati b) Rajputhni Ka Badhala c) Essay – Shradha-Bhakthi d) Translation– Lesson – 10 to 12	**10 HOURS**

UNIT V a) Kavya Ke Adhar Par Prakruthik Varnan **10 HOURS**

b) Bheem Aur Raakshas

c) Essay – Adhunik Nari

d) Translation – Lesson –13 to 15

TOTAL: 48 HOURS

REFERENCE BOOKS::

1.Poetry : Panchavati

Writer : Mythili Sharan Guptha

Publisher : Bharathiya Sahithya Sangrah

Kanpur – 208002, Uttar Pradesh

2.One Act Play : Adarsh Akanki

Publisher : D.B.Hindi Prachar Sabha

T. Nagar,Chennai – 600017, Tamil Nadu

3.Essay : Nibandh Nishchay

Editor : Dr.Sharadh Ranjan

Publisher : Hindi Sahithya Sammelan Prayag

12.Sammelan Marg, Illahabadh

4.Translation : Anuvadh Abhyas – III

Publisher : D.B.Hindi Prachar Sabha

T.Nagar, Chennai – 600017, Tamil Nadu

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**2.6**	**2.6**	**-**	**-**	**-**	**-**	**-**	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester IV

24LUM401 **Language IV: MALAYALAM IV** **4H-3C**

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVE(CO):

- Knowledge of contemporary drama contents of Malayalam literature
- Learn Screen play and its techniques. The ability to read drama and express criticism about it and the ability to express social thoughts will improve
- There will also be litigation messages in Malayalam and news on speech techniques
- Able to write articles on their own and improve their creative skills.

COURSE OUTCOME(COs):

- Get a basic knowledge of drama
- Can read and critique Screenplay
- Create interest in art literature courses
- The hope of writing a Drama or a Screen Play
- The idea of creating new works and critique knowledge willimprove.

Unit No.	PART I – MALAYALAM IV	Hours
I	Screen Play - Perumthachan	10
II	Screenplay - Perumthachan	10
III	Drama - Saketham	10
IV	Drama - Saketham	09
V	Drama - Saaketham	09
	TOTAL	48

TEXT BOOKS:

1. Perumthachan – M.T.VasudevanNair,DC Books
2. Saketham – C.N.SreekandanNair,DC Books

REFERENCE BOOKS:

1.MalayalaNatakaSahithyaCharithram. G Sankara Pillai (Kerala SahithyaAkademi, Trissur) 2. Malayala Nataka Sahithya Charithram, Vayala Vasudevan Pillai (Kerala Sahithya Akademi Thrissur).

3. Natakam- OruPatanam (C.J. SmarakaPrasanga Samithi, Koothattukulam) Natakaroopacharcha, Kattumadam Narayanan (NBS, Kottayam)

4.Chalachithrasameeksha–Vijayakrishanan.

5. Cinemayude Paadangal-VisakalanavumVeekshanavum – Jose-K.Manual.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24LUS401 **Language IV: Sanskrit IV** **4H-3C**
(Lyrics, Grammar and Translation)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:
- Not required

COURSE OBJECTIVES(CO):
- The fundamental objective of the curriculum is to impart effective science education at the undergraduate level, exposing them to recent trends and developments in the subject.
- Creating scientific temper is another major objective of this curriculum.
- Another major thrust given here is to develop an environmental concern in all activities of the students. 'Go green', the motto of the syllabus emphasizes the urgent need to conserve nature without destruction of natural resources.

COURSE OUTCOMES(COs) :
- **Critical Thinking** :Take informed actions after identifying the assumptions that frame students' thinking and actions.
- **Problem Solving**: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.
- **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.
- **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development.
- **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

UNIT I **9 HOURS**

Introduction to Sanskrit Lyrics and erotic literature.

UNIT II **9 HOURS**

Devotional Literature, Important works

UNIT III **10 HOURS**

Krishnakarnamrita of Leelasuka (Second Section only)

UNIT IV **10 HOURS**

Grammar – Past tense, Declension of personal pronouns

UNIT V **10 HOURS**

Simple sentences from Sanskrit Self Teacher

TOTAL: 48 HOURS

TEXT BOOK:

1. Krishnakarnamrita of Leela Suka Sri Ramakrishna Mud Mylapore, Chennai.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**2.6**	**2.4**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester IV

24LUF401 **Language IV: French IV** **4H-3C**

(Comprehension,Tradusion, Reduction,Une act)

Instruction Hours/week: L:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Applicable

COURSE OBJECTIVES (CO):

- To provide the students with an ability to build and enrich their communication skills.
- To help them think and write imaginatively and critically.
- To strengthen their professional skills.

COURSE OUTCOMES (COS):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	make the students proficient communicators in French.	Apply
CO2	develop learners' ability to understand French.	Understand
CO3	understand the nuances of listening, speaking and reading French.	Understand
CO4	prepare the learners to face situations with confidence and to seek employment in the modern globalized world.	Apply
CO5	build the students' ability to listen and to speak French better.	Apply

UNITE I **9 HOURS**

a) Leçon – On fait le ménage !
b) Communication - Protester et réagir
c) Grammaire - Le présent progressif, Les pronoms possessifs
La phrase négative (3)
d) Lexique –• Le logement,La maison,Les pièces

e) Culture – Paris et ses symboles

UNITE II **9 HOURS**

a) Leçon – À propos de logement
b) Communication – Exprimer l'intérêt et l'indifférence

c) Grammaire – Quelques adjectifs et pronoms indéfinis
Les verbes lire, rompre et se plaindre
d) Lexique – Meubles et équipement,Les tâches ménagères

e) Culture – Les fêtes et les traditions en France

UNITE III **10 HOURS**

a) Leçon – Tous en forme ! Accidents et catastrophes
b) Communication – Raconter au passé
c) Grammaire – Le passé composé et l'imparfait
Le passé récent, L'expression de la durée,
d) Lexique – Le corps humain : l'extérieur,Le corps humain : l'intérieur Les maladies et les remèdes
e) Culture – La longue histoire de la Francophonie

UNITE IV **10 HOURS**

a) Leçon – Faire ses études à l'étranger
b) Communication -• Exprimer la peur et rassurer
c) Grammaire - Les adjectifs et les pronoms ,indéfi nis : rien, personne, aucun Les verbes dire, courir et mourir
d) Lexique – Les accidents,Les catastrophes naturelles
e) Culture - Les jeux de la Francophonie .

UNITE V **10 HOURS**

a) Leçon – Bon voyage !La mété
b) Communication - Exprimer son opinion, Parler de la météo
c) Grammaire -• Les pronoms démonstratifs neutres
Le futur simple, Situer dans le temps
d) Lexique – Le système scolaire,Les formalités pour partir à l'étranger
La météo
e) Culture- Le français hors de France

TOTAL: 48 HOURS

TEXT BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de francais**, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin**, Saison 1 – Cahier d'activites ,** Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, Marie- Françoise Gliemenn,Les **exercices de grammaire,Hachette FLE,** Paris,2005

REFERENCE BOOKS:

1. Christian Beaulieu, **Je pratique**, **Exercises de grammaire A**1, Dider,Paris,2015
2. Nathalie BIE, philippe SANTINAN,Gra**mmaire pour adolescents-250 exercises, CLE International , Paris , 2005**

WEBSITES:

1. http:// enseigner.tv5 monde.com/
2. bonjourdumonde.com /exercises/contenu/le – francais-du- tourisme.html
3. http://www.bonjurdefrance.com/
4. https://www.lepointdufle.net/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester IV

24ENU401 **ENGLISH IV** **3H-3C**

Instruction Hours/week: L:3 T:0 P:0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

- To provide the students with an ability to build and enrich their communication skills.
- To help them think and write imaginatively and critically.
- To strengthen their professional skills.

COURSE OUTCOMES (COs):

At the end of this course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	make the students proficient communicators in English.	Apply
CO2	develop learners' ability to understand English.	Understand
CO3	understand the nuances of listening, speaking and reading English.	Understand
CO4	prepare the learners to face situations with confidence and to seek employment in the modern globalized world.	Apply
CO5	build the students' ability to listen and to speak English better.	Apply

UNIT I **8 HOURS**

Concept of Communication- Barriers to Communication- Body Language-Personality Development-Etiquette and Manners-Soft Skills

UNIT II **7 HOURS**

Listening Comprehension-Reading Comprehension-Paragraph Writing-Precis Writing-Collocation

UNIT III **7 HOURS**

Writing-Writing Resume and Covering Letter- Types of Letter Writing-Writing MoU- Dicto Composition--Term Paper-Book Reviews

UNIT IV **7 HOURS**

Speaking-Interview Skills-Preparing Welcome address and Vote of Thanks-Compering -

UNIT V **7 HOURS**

Punctuation Marks- Figures of Speech

TOTAL: 36 HOURS

TEXT BOOK:

1. Board of Editors (2024). *Proficiency in Communication II*, Karpagam Academy of Higher Education

REFERENCE BOOKS:

1. Martin's, St (2013). Oxford Handbook of Writing: Handbook of Writing. Cambridge University Press.
2. Wren & Martin, (2008). High School English Grammar & Composition, S.Chand & Company Ltd, Board of Editors,
3. Krashen, Stephen D (1982). Principles and Practice in Second Language Acquisition. New York:Pergamon Press.

WEB SITES:

1. https://www.skillsbuilder.org/blog/top-5-speaking-skills-for-success-in-interviews
2. https://www.coursera.org/articles/interviewing-skills

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	**3**	**3**	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-IV

24CSU401 **Relational Database Management System** **4H-3C**

Instruction Hours/week: L:4 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Basic understanding of databases and SQL.

COURSE OBJECTIVES(CO):

- Understand the basic concepts and applications of database systems, including SQL query
- Master transaction processing and concurrency control in databases.
- Learn about database storage structures, techniques, and review relevant case studies.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Demonstrate the basic elements of a relational database management system.	Understand
CO2	Identify the data models for relevant problems.	Understand
CO3	Analyze entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data	Analyze
CO4	Develop the understanding of key notions of query evaluation and optimization techniques.	Apply
CO5	Apply normalization for the development of application software‘s along with case studies.	Apply

UNIT I INTRODUCTION and DATABASE DESIGN MODEL **10 HOURS**

Introduction: Database System Applications - View of Data - Database Architecture. Database Design and the E-R Model: Overview of the Design Process - The Entity-Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets - Entity Relationship Diagrams - Extended E-R Features.

UNIT II INTRODUCTION TO SQL **10 HOURS**

Overview of SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - DDL, DML, TCL and DCL statements - SELECT Operations - Set Operations - Null Values - Aggregate Functions - Nested Sub-Queries - Modification of the Database.

UNIT III RELATIONAL DATABASE DESIGN **10 HOURS**

Features of Good Relational Designs - Functional Dependency - Atomic Domains and First Normal Form – Second Normal Form - Third Normal Form - Boyce-Codd Normal Form - Multivalued Dependency and Fourth Normal Form - Join Dependency and Fifth Normal Form.

UNIT IV INTERMEDIATE and PL/ SQL **10 HOURS**

Intermediate SQL: Join Expressions - Views - Materialized Views - Transactions - Commit - Rollback – Integrity Constraints - Assertions - SQL Data Types and Schemas - Authorization. PL/SQL: Introduction to PL/SQL-Variable-Constants-Conditional Statements-Cursor-Implicit Cursors-PL/SQL Explicit Cursors - PL/SQL Procedures - PL/SQL Functions - PL/SQL Exception Handling - PL/SQL Triggers.

UNIT V TRANSACTIONS and CONCURRENCY CONTROL **8 HOURS**

Transactions: Transaction Concept - A Simple Transaction Model – Storage Structure - Transaction Atomicity and Durability - Transaction Isolation - Serializability. Concurrency Control: Lock Based Protocols - Timestamp Based Protocols - Validation Based Protocols.

case study : Database Connectivity with Front End Tools - Case Study using real life database applications-SQLite Database.

TOTAL: 48 HOURS

TEXT BOOKS:

1 Silberschatz, A., Korth, H. F., & Sudarshan, S. (2018). *Database system concepts* (6th ed.). McGraw-Hill Education.

2 Elmasri, R., & Navathe, S. B. (2016). *Fundamentals of database systems* (7th ed.). Pearson Education.

REFERENCE BOOKS:

1. Ramakrishnan, R., & Gehrke, J. (2014). *Database management systems* (3rd ed.). McGraw-Hill Education
2. Shah, N. (n.d.). *Database systems using Oracle* (2nd ed.). PHI Learning.
3. Date, C. J. (2003). *An introduction to database systems* (7th ed.). Addison-Wesley.

WEBSITES:

1 http://www.digimat.in/nptel/courses/video/106105175/L01.html

2 https://www.tutorialspoint.com/oracle_sql/index.htm

CO,PO,SO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	3	-	-	-	-	2	2	-	-	-	-	1
CO2	-	-	-	2	3	-	-	-	-	-	-	-	-	-	-	-	1
CO3	-	-	3	-	3	3	-	-	-	-	-	-	-	-	-	-	1
CO4	3	-	3	-	-	3	-	-	-	-	-	-	-	-	-	-	1
CO5	-	2	-	-	-	-	-	-	1	-	-	-	-	-	-	-	1
Average	3	2	3	2	3	3	-	-	1	-	2	2	-	-	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

Semester-IV

24CSU402	Network Security	3H-2C

Instruction Hours/week: L: 3 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Computer networks and cybersecurity fundamentals.

COURSE OBJECTIVES(CO):

- Familiarize students with network protection tools, including firewalls, intrusion detection systems, and proxies.
- Introduce secure communication protocols, techniques, and LAN attack methods such as ARP cache poisoning and VLAN hopping.
- Provide knowledge about web security, IP security, and firewalls.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

Cos	Course Outcomes	Blooms Level
CO1	Understand the principles of network protection and the role of firewalls.	Understand
CO2	Understand the principles and usage of secure communication protocols like SSH, SSL/TLS, and VPN.	Understand
CO3	Understand the concepts of Encrypting and Signing Emails	Understand
CO4	Analyze the Network based malware techniques	Analyze
CO5	Analyze network Security in LAN attacks	Analyze

UNIT I INTRODUCTION TO NETWORK SECURITY 7 HOURS

Techniques for Network Protection, Monitoring and Detection: Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls – IP tables, Proxies, NAT, Intrusion Detection System-Snort, Signature and Anomaly based detection, Honeypots and Honeynets. Network Log management-syslog or SPLUNK;

UNIT II SECURE NETWORK COMMUNICATION 7 HOURS

Secure Network Communication: SCP, SSH, SSL3.0, TLS1.2, START TLS, IPSec, VPN and Secure HTTP; Attacks on SSL / TLS: SSL stripping, Drown and Poodle attack;

UNIT III ENCRYPTING AND SIGNING EMAILS 7 HOURS

Encrypting and Signing Emails: PGP – GPG / open PGP, DKIM and SPF; Network packet creation and Manipulation using scapy and dpkt libraries; SDN Securit

UNIT IV ATTACK TECHNIQUES **7 HOURS**

Attack Techniques: Network reconnaissance – Nmap and vulnerability audits – open VAS; DNS based attacks, Phishing – DNS Twist ; Network based malware attacks: Remote access Trojan – Poison Ivy and Domain name generation algorithm – based Botnets

UNIT V LAN ATTACKS **8 HOURS**

LAN attacks: ARP Cache poisoning- Ettercap / arpspoof, MAC flooding, Port Stealing, DHCP attacks, VLAN hopping; Network Sniffing – Wire shark and Password Cracking-John the Ripper

TOTAL: 36 HOURS

TEXT BOOKS:

1. Stallings, W. (2020). *Cryptography and network security: Principles and practice* (8th ed.). Pearson Education.
2. Forouzan, B. A. (2015). *Cryptography and network security* (3rd ed.). McGraw-Hill Education.
3. Stallings, W. (2016). *Network security essentials: Applications and standards* (6th ed.). Pearson.

REFERENCE BOOKS:

1. Kaufman, C., Perlman, R., & Speciner, M. (2002). *Network security: Private communication in a public world* (2nd ed.). Prentice Hall.
2. Nestler, V. J., & others. (2014). *Principles of computer security: Lab manual* (4th ed.). McGraw-Hill Education.

WEBSITES:

1. https://dl.hiva-network.com/Library/security/Cryptography-and-network-security-principles-and-practice.pdf
2. https://daxinimehul321.wordpress.com/wp-content/uploads/2014/11/cryptography-and-network-security-forouzan-copy.pdf
3. https://aitskadapa.ac.in/ebooks/CSE/COMPUTER%20NETWORKS/PrinciplesEdition.pdf

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2		3	2	-	-	-	-	-	-	-	-	-	-	-	2	-
CO2	-	-	-	-	3	-	-	2	-	-	-	-	-	-	-	2	-
CO3	-	-	-	-	3	-	-	-	-	-	3	-	-	-	-	2	-
CO4	-	-	3	-	-	-	1	-	-	-	-	1	-	-	-	2	-
CO5	-	-	3	-	-	-	-	-	-	-	3	-	-	-	-	2	-
Average	2	-	3	2	3	-	1	2	-	-	3	1	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-IV

24CSU403 **Cyber Security** **4H-3C**

Instruction Hours/week: L:4 T: 0 P: 0 **Marks:** Internal**:40** External**:60** **Total:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Computer systems, networks, and information security principles.

COURSE OBJECTIVES(CO):

The Objectives of the course are to

- Define basic concepts in cyberspace, cybersecurity issues, and challenges.
- Explore classification of cybercrimes, along with remedial and mitigation strategies.
- Understand social media security, e-commerce, digital payments, and digital device security tools.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Illustrate the concept of Cyber Security and issues and Challenges associated with it.	Understand
CO2	Infer the cybercrimes, their nature, legal remedies and how report the crimes through available platforms and procedures	Understand
CO3	Understand the appreciate various privacy and security concerns on online social media and reporting procedures.	Understand
CO4	Interpret the basic concepts related to E-commerce and digital payments.	Understand
CO5	Discover the basic security aspects related to computer and mobiles	Analyze

UNIT I INTRODUCTION TO CYBER SECURITY **10 HOURS**

Defining Cyberspace and Overview of Computer and Web-Technology-Architecture of cyberspace- Communication and web technology, Internet, World wide web, Advent of internet-Internet infrastructure for data transfer and governance- Internet society- Regulation of cyberspace- Concept of cyber security-Issues and challenges of cyber security.

UNIT II - CYBERCRIME AND CYBER LAW **10 HOURS**

Classification of cybercrimes, Common cybercrimes- cybercrime targeting computers and mobiles- cybercrime against women and children- financial frauds- social engineering attacks, malware and ransomware attacks, zero day and zero click attacks- Cybercriminals modus-operandi Reporting of cybercrimes- Remedial and mitigation measures-Legal perspective of cybercrime- IT Act 2000 and its amendments-Cybercrime and offences ,Organizations dealing with Cybercrime and Cyber security in India-Case studies

UNIT III – SOCIAL MEDIA OVERVIEW AND SECURITY **10 HOURS**

Introduction to Social networks- Types of Social Media-Social Media Platforms-Social media monitoring, Hashtag, Viral content, Social media Marketing-Social media privacy, Challenges,

opportunities and pitfalls in online social Network-Security issues related to social media-Flagging and reporting of inappropriate Content-Laws regarding posting of inappropriate content, Best practices for the use of Social media- Case studies.

UNIT IV - E-COMMERCE AND DIGITAL PAYMENTS 10 HOURS

Definition of E- Commerce-Main components of E-Commerce- Elements of E-Commerce security- E-Commerce threats-E-Commerce security best practices-Introduction to digital payments- Components of digital payment and stake holders-Modes of digital payments- Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures- RBI guidelines on digital payments and customer protection in unauthorized banking transactions- Relevant provisions of Payment Settlement Act,2007,

UNIT V - DIGITAL DEVICES SECURITY, TOOLS AND TECHNOLOGIES FOR CYBER SECURITY 8 HOURS

End Point device and Mobile phone security- Password policy- Security patch management- Data Backup-Downloading and management of third party software- Device security policy- Cyber Security best practices- Significance of host firewall and Ant-virus- Management of host firewall and Anti-Virus-Wi-Fi security- Configuration of basic security policy and permissions.

TOTAL:48 HOURS

TEXT BOOKS::

1. Godbole, N., & Belapure, S. (2013). *Cyber security*. Wiley India Pvt. Ltd
2. Godbole, N. (2009). *Information systems security: Metrics, frameworks, and best practices*. Wiley India.

REFERENCE BOOKS::

1. Awad, E. M. (n.d.). *Electronic commerce*. Prentice Hall of India Pvt Ltd.
2. Kumar, K. (n.d.). *Cyber laws: Intellectual property & e-commerce security*. Dominant Publishers
3. Cole, E., Krutz, R. L., & Conley, J. W. (2010). *Network security bible* (2nd ed.). Wiley India Pvt. Ltd.

WEBSITES:

1. www.cybercrime.gov.in
2. https://gac.gov.in/
3. https://www.india.gov.in/password-policy-ministry-electronics-and-information-technology?page=3
4. https://mahe.gov.in/mobile-app-policy/

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	3	3	-	-	-	-	2	-	-	-	-	-	2	-
CO2	-	-	3	3	-	-	-	3	-	-	2	-	-	-	-	2	-
CO3	-	-	-	-	3	-	-	-	2	-	-	2	-	-	-	2	-
CO4	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2	-
CO5	-	-	-	-	3	-	-	3	2	-	-	2	-	-	-	2	-
Average	3	-	3	3	3	-	-	3	2	2	2	2	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

24CSUA401 **Probability and Statistics** **4H-3C**

Instruction Hours/week: L:4 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:

- Basic understanding of algebra, arithmetic, elementary statistics, and probability.

COURSE OBJECTIVES (CO):

- To understand the basic concepts in probability theory and the nature of uncertainty.
- To develop the ability to work with discrete and continuous probability distributions, understand their properties, and apply the Central Limit Theorem.
- To equip students with skills in univariate and bivariate analysis, including measures of central tendency, dispersion, correlation, regression, and the construction of index numbers.

COURSE OUTCOMES(COs):

Upon completion of this course, the student will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the counting principles, probability rules, and theorems to solve probability problems.	Understand
CO2	Apply probability distributions such as Binomial, Poisson, Uniform, Normal, and Exponential to real-world scenarios.	Apply
CO3	Solve measures of central tendency and dispersion to data sets.	Apply
CO4	Utilize the correlation or regression methods to find the relationship between two variables.	Apply
CO5	Understand the basic concept of index numbers and weighted index numbers.	Understand

UNIT I BASICS OF PROBABILITY **10 HOURS**

Trial, event -Sample space – Mutually exclusive event – Exclusive and exhaustive events – Dependent and independent events – Simple and compound events – Mathematical properties – Counting Principle for equally likely outcomes; probability rule -; Law of Total Probability, Addition and multiplication theorem, Combinations and Permutations. Conditional Probability Bayes Rule.

UNIT II DISCRETE AND CONTINUOUS PROBABILITY DISTRIBUTIONS

10 HOURS

Random variables (discrete and continuous) - Mathematical expectation - Binomial distribution - Poisson distribution and its properties. Central Limit theorem, Uniform distribution - Normal distribution -conditions and properties, Standard normal distribution - Exponential distribution.

UNIT III BASICS OF STATISTICS AND UNI VARIATE ANALYSIS 10 HOURS

Meaning and definition of statistics - Frequency Distribution, Concepts of measurement, scales of measurement of data, Different types scales (ratio, interval, nominal and ordinal); Measures of central tendency: Arithmetic Mean, Median, Mode. Measures of dispersion – Range, Coefficient of range - Quartile deviation - Coefficient of Quartile deviation - Standard deviation and Coefficient of variation.

UNIT IV BIVARIATE ANALYSIS 9 HOURS

Correlation – Meaning and definition - Scatter diagram –Karl Pearson's Correlation Coefficient. Rank Correlation. Regression: Regression in two variables – Properties of Regression, uses of Regression.

UNIT V INDEX NUMBERS 9 HOURS

Definition – Types of Index numbers – Problems in the construction of index numbers – Construction of simple index numbers – Simple aggregate method and Simple average of price relatives using A.M, G.M – Construction of weighted index numbers – Laspeyre's, Paasche's, Dorbish Bowley's, Marshall Edge worth and Fisher's ideal index numbers - Simple problems.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Pillai, R.S.N. and Bagavathi, V. (2002). *Statistics*, S. Chand & Company Ltd, New Delhi.
2. Srivastava, T.N. and Shailaja Rego. (2012). *Statistics for Management*, 2nd Edition, McGraw Hill Education, New Delhi.
3. Evans James, R. (2017). *Business Analytics*, 2nd Edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Dinesh Kumar, U. (2017). *Business Analytics: The Science of Data - Driven Decision Making*, Wiley, New Delhi.
2. Sheldon Ross, (2007). *Introduction to Probability Model*, Ninth Edition, Academic Press, Indian Reprint.
3. Robert V. Hogg, Joseph W. McKean and Allen T. Craig., (2007). *Introduction to Mathematical Statistics*, Pearson Education, Asia.
4. Irwin Miller and Marylees Miller, John E. Freund, (2006). *Mathematical Statistics with Application*, Seventh Edition, Pearson Education, Asia.

WEBSITES:

1. https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statist spring-2014/
2. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDb nE0PixKs2JE
3. https://nptel.ac.in/courses/110107114/
4. http://172.16.25.76/course/view.php?id=1642

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	1	3	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	**-**	**-**	**1**	**3**	**1**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU411 Relational Database Management System- Practical 3H-2C

Instruction Hours/week: L:0 T:0 P: 3 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Basic understanding of SQL and database concepts.

COURSE OBJECTIVES(CO):

- Describe data organization, database administration, and familiarization with storage structures and access techniques.
- Master SQL basics, including query construction, and gain practical knowledge in designing and creating relational database systems.
- Understand advanced query execution techniques, including relational constraints, joins, set operations, aggregate functions, triggers, views, and embedded SQL.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Classify the program-data independence, data models for database systems, database schema and database instances.	Understand
CO2	Identify the basic elements of a relational database management system.	Apply
CO3	Identify the data models for relevant problems.	Apply
CO4	Demonstrate their understanding of key notions of query evaluation and optimization techniques.	Understand
CO5	Extend normalization for the development of application software‘s.	Understand

List of Programs

1. Basic SQL SELECT Statements – Creating and managing tables using DDL, DML, Integrity constraints.
2. DCL, TCL and DB Object (View, Sequence, Index, Synonym, Alias) commands
3. Single row Functions (character, mathematical and date functions) and Aggregate functions
4. Displaying Data from Multiple Tables using SQL operators, GROUPBY, HAVING and ORDERBY clause and also perform join operation.
5. Write a program to perform Basic PL/SQL programs
6. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
7. Write a PL/SQL block that handles exceptions.
8. Write SQL Triggers for insert, delete, and update operations in a database table.
9. Create a Trigger for EMP table it will update another table SALARY while inserting values

10. To retrieve all students who have registered for Diploma and store their details into another table called diploma (id,name) using cursors.

TOTAL: 36 HOURS

TEXT BOOKS::

1 Silberschatz, A., Korth, H. F., & Sudarshan, S. (2018). *Database system concepts* (6th ed.). McGraw-Hill Education.

2 Elmasri, R., & Navathe, S. B. (2016). *Fundamentals of database systems* (7th ed.). Pearson Education.

3 Ramakrishnan, R., & Gehrke, J. (2014). *Database management systems* (3rd ed.). McGraw-Hill Education

4 Shah, N. (n.d.). *Database systems using Oracle* (2nd ed.). PHI Learning.

5 Date, C. J. (2003). *An introduction to database systems* (7th ed.). Addison-Wesley

WEBSITES:

1 http://www.digimat.in/nptel/courses/video/106105175/L01.html

2 https://www.tutorialspoint.com/oracle_sql/index.htm

CO,PO,SO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	-	-	-	3	-	-	-	-	3	2	-	-	-	1	-
CO2	-	-	2	3	2	-	-	-	-	-	-	-	-	-	-	1	-
CO3	-	-	-	3	-	-	-	3	--	-	-	-	-	-	-	1	-
CO4	-	-	-	-	-	3	-	3	-	1	-	-	-	-	-	1	-
CO5	-	-	-	-	-	3	-	-	1	-	3	-	-	-	-	1	-
Average	2	-	2	3	2	3	-	3	1	1	3	2	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU412 **Network Security – Practical** **3H-2C**

Instruction Hours/week: L: 0 T: 0 P: 3 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Network security concepts and hands-on experience with networking tools.

COURSE OBJECTIVES(CO):

- Configure and manage a simple LAN with Linux and Windows machines, set up VLANs using Kali Linux, and generate RSA keys.
- Capture, analyze traffic for encryption, export and analyze web traffic files, and investigate Bluetooth communications and WPA handshake.
- Perform vulnerability assessments, penetration testing on Wi-Fi networks, and use automated attack tools like NetStumbler, Kismet, CowPatty, and Airsnort.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

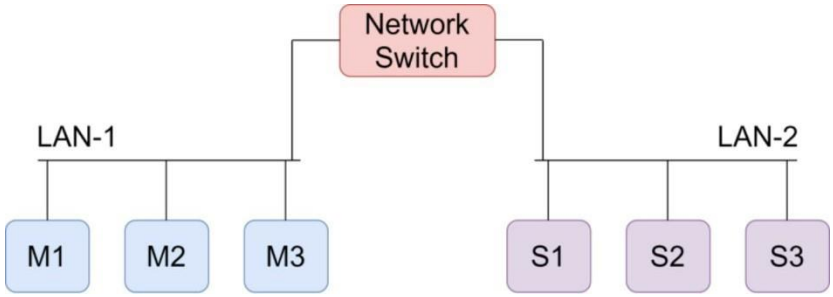
COs	Course Outcomes	Blooms Level
CO1	Understand the basics of LAN with Linux and windows machines and configure separate VLAN using Kali Linux and open-source tools.	Understand
CO2	Analyze the RSA public and private key for client	Analyze
CO3	Analyse the traffic between hosts to ensure proper encryption, Export files from web traffic and analyze for secret information.	Analyze
CO4	Apply the Bluetooth device communications and analyze WPA handshake for wireless security	Apply
CO5	Apply the Vulnerability Assessment (VA) and Penetration Testing (PT) on local Wi-Fi networks, automated attacks with tools like NetStumbler, Kismet, CowPatty, and Airsnort.	Apply

List of Programs:

The experiments make use of Kali Linux distros and other open-source security tools.

Install Kali Linux on Virtual Machine and most of the open-source tools are available along with Kali Linux

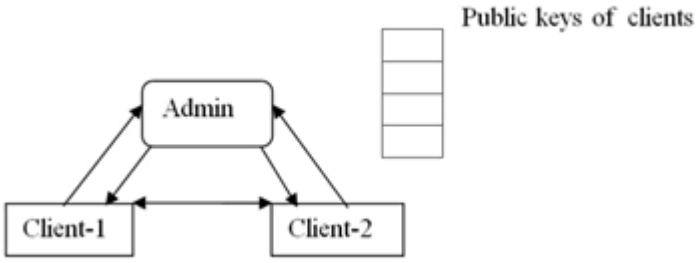
LAN based Network Security: Set up a simple LAN as shown in below figure. M1-3 and S1-3 are machine which have Linux and Windows running.



1. Configure LAN-1 and LAN-2 as separate VLANs in the network switch (use inter VLAN ACL).
2. Create a SPAN port in the network switch and send the mirrored traffic to a promiscuous mode port for the purpose of IDS and other packet analysis. Practice port based and VLAN based mirroring.
3. Familiarize with 802.1x, Network Admission Control, Microsoft NAP, RADIUS protocol, RADIUS per port ACL

Application of Cryptographic algorithms using Crypto tools :

4. Establish a Client-Client Secure communication protocol as shown in below Figure.



The Client machines (Client-1 and Client-2) and Admin machine are installed in different VMs. All the three machines are interconnected through a network switch with different IP addresses. The Admin runs a program that generates 2048 bit RSA public and private key for a Client that wants to communicate. Admin generates 2048 bit RSA public and private key for Client-1 and Client-2. The private keys are distributed to client machines and public keys are stored in a structure in the admin machine. When Client-1 wants to send message to Client-2, it encrypts the messages with public key of Client-2. The message is decrypted by Client-2 with its private key. Similar communication pattern from Client-2 to Client-1 need to be maintained.

Manually capture the traffic between the hosts to ensure the proper working of the encryption. Construct an asynchronous communication between Client-1 and Client-2. Run a Wireshark/

TCPdump at the SPAN/Promiscuous port of the network switch and identify the communication between the communicating entities (Admin, Client-1, and Client-2).

Network Security Lab: Network Packet analysis using Wireshark.

Use Wireshark to solve the below scenarios:

5. You, as a SOC analyst noted that someone try to send information (PING) to unknown IP address and you are suspecting some malicious information might transferred in it. Analyse the log file and find the data.

a) Find the source and destination IP of that log.

b) Find the Data length (Bytes) and verify the checksum status on destination.

6. Now you have found that some kind of file is been downloaded by insider in unencrypted web traffic. Your task is to

a) Find the type of file.

b) Export that file from that web traffic, then analyse the file for any secret information.

c) Find the hostname in which the file is stored.

7. Based upon their activities, auditing team has started investigation against them and found that the insider passed some sensitive information via call to someone. The traffic is been captured. Analyse the traffic and find those conversations and extract the sensitive information in it.

a) Find the call-ID when the status of the call is ringing.

8. On further investigation, you have a suspect on some wireless device communications. List out the Bluetooth devices communications from this traffic and find the details about native Bluetooth adapter.

9. Analyse the captured WPA handshake from this traffic and report in detail about it to your administrator.

a) Geo locate all the endpoint of wireless devices.

b) Analyse the protocol level information transfer between wireless devices.

Wireless Security Lab :

10. Perform a VA/PT on your local Wi-Fi network and try automated attacks with NetStumbler and Kismat to gather information wireless network and try attacks like CowPatty and Airsnort. Further execute aircrackng to simulate attacks 802.11 WEP and WPA-PSK keys for auditing wireless networks and performing airodump, aircrack, airmon, airbase, aireplay and airtun using Kali 2.0 (Sana) Linux. Attempt a Wi-Fi sniffing to gather location data which can be used to identify device parameters of wireless communication devices.

Tools Recommendation:

Firewall UTM Box – Fortigate 40F

Open Source SIEM – ELK (https://www.elastic.co/elastic-stack)

Kali Linux OS included with Burpsuite Community Version, OWASP ZAP, Metasploit, OpenVAS

TOTAL: 36 HOURS

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	2	-	3	-	-	-	-	-	-	-	-	-	-	2	-
CO2	2	-	-	-	-	1	-	-	-	3	-	-	-	-	-	2	-
CO3	-	-	-	2	3	-	2	-	--	3	-	-	-	-	-	2	-
CO4	-	-	2	-	3	-	-	-	2	-	-	-	-	-	-	2	-
CO5	-	-	-	-	-	-	-	3	-	-	3	3	-	-	-	2	-
Average	2	-	2	2	3	1	2	3	2	3	3	3	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation.

24VAC401 **Universal Human Values** **2H-1C**

Instruction Hours/week: L: 2 T: 0 P: 0 **Marks:** Internal: **100** External: **0** Total: **100**

End Semester Exam: - Hours

PREREQUISITE:

- Ethics and Social Principles.

COURSE OBJECTIVES(CO):

- To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
- To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
- To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and manually enriching interaction with Nature.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

1. To become more aware of themselves, and their surroundings (family, society, nature).
2. To become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.
3. To have better critical ability.
4. To become sensitive to their commitment towards what they have understood (human values, human relationship and human society).
5. To apply what they have learnt to their own self in different day-to-day settings in real life, at least a beginning would be made in this direction.

UNIT I: NEED, BASIC GUIDELINES, CONTENT AND PROCESS FOR VALUE EDUCATION **5 HOURS**

Purpose and motivation for the course, recapitulation from Universal Human Values-I - Self-Exploration–what is it? - Its content and process; 'Natural Acceptance' and Experiential Validation- as the process for self-exploration - Continuous Happiness and Prosperity- A look at basic Human Aspirations - Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority - Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario - Method to fulfil the above human aspirations: understanding and living in harmony at various levels.

UNIT II : UNDERSTANDING HARMONY IN THE HUMAN BEING - HARMONY IN MYSELF!

Understanding human being as a co-existence of the sentient 'I' and the material 'Body' - Understanding the needs of Self ('I') and 'Body' - happiness and physical facility - Understanding

the Body as an instrument of 'I' (I being the doer, seer and enjoyer) - Understanding the characteristics and activities of 'I' and harmony in 'I' - Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail - Programs to ensure Sanyam and Health.

UNIT III : UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMAN- HUMAN RELATIONSHIP 5 HOURS

Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship - Understanding the meaning of Trust; Difference between intention and competence - Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship - Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals - Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT IV : UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE - WHOLE EXISTENCE AS COEXISTENCE 5 HOURS

Understanding the harmony in the Nature - Interconnectedness and mutual fulfilment among the four orders of nature-recyclability and selfregulation in nature - Understanding Existence as Co-existence of mutually interacting units in all-pervasive space - Holistic perception of harmony at all levels of existence. Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc.

UNIT V : IMPLICATIONS OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS 4 HOURS

Natural acceptance of human values - Definitiveness of Ethical Human Conduct - Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order - Competence in professional ethics: Ability to utilize the professional competence for augmenting universal human order, Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, Ability to identify and develop appropriate technologies and management patterns for above production systems.- Case studies of typical holistic technologies, management models and production systems - Strategy for transition from the present state to Universal Human Order: At the level of individual: as socially and ecologically responsible engineers, technologists and managers, At the level of society: as mutually enriching institutions and organizations - Sum up.

TOTAL: 24 HOURS

TEXT BOOKS:

1. Human Values and Professional Ethics by R R Gaur, R Sangal, G P Bagaria, Excel Books, New Delhi, 2010
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews.

REFERENCE BOOKS:

1. Economy of Permanence - J C Kumarappa
2. Bharat Mein Angreji Raj - PanditSunderlal
3. Rediscovering India - by Dharampal
4. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
5. India Wins Freedom - Maulana Abdul Kalam Azad
6. Vivekananda - Romain Rolland (English)

CO,PO,PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	-	-	-	3	3	1	1	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	2	1	2	1	-	-	3	-	-	-	-	-
CO3	-	-	-	-	-	1	2	1	1	-	-	3	-	-	-	-	-
CO4	-	-	-	-	-	3	3	3	1	-	-	3	-	-	-	-	-
CO5	-	-	-	-	-	3	3	3	1	-	-	3	-	-	-	-	-
Average	-	-	-	-	-	2.4	2.4	2	1	-	-	3	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU501 **Digital Identity and Access Management** **4H-3C**

Instruction Hours/week: L: 4 T: 0 P:0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Digital identity concepts and access control principles.

COURSE OBJECTIVES (CO):

- Impart knowledge about digital identity and its management concepts and techniques.
- Understand the importance of identity and access management in organizations and apply access control techniques through user groups.
- Develop the ability to prepare and implement various access control mechanisms.

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand about the Digital Identity.	Understand
CO2	Understand the importance privileged access	Understand
CO3	Apply and Analyze various partitions	Apply
CO4	Categorize the various access control techniques through user Authentication.	Analyze
CO5	Develop capacity to prepare various access control mechanism	Apply

Unit I DIGITAL SECURITY & GOVERNANCE **10 HOURS**

Access control & identity management, Identification, Authentication and Authorization, Classification of Information, Separation of Duties, need for strong credentials. Access Controls: Models, Authentication Factors, Network Access Control

Security Governance: Managing Information Security, Organization and responsibilities, Information Security Governance, Security Incident Management, Application Security, Data and information Analyze, Role of databases and database management systems, Knowledge management systems and data warehouses, Secure Coding Practices, ISO 27001 - Domains, Introduction to SOX, HIPAA, CoBlT.

Unit II IDENTITY AND ACCESS MANAGEMENT **10 HOURS**

Introduction to IAM: Introduction to IAM, Enterprise or Organizational Identities, Electronics and non-electronics Identities, AM Frame work, Key Principles, and Definitions, Common Challenges and Key Considerations, IAM Roadmap and Strategy

Implementation: Implementation Methodology and Approach,Access Request, Approval, andProvisioningEnforcement: Authentication, Authentication Implementation Approaches, Authorization, Logging and Monitoring

Access Review and Certification: Benefits and Objectives, Access Review and Certification ProcessesRoles and Rules: Rules and Enforcement, The RBAC Model and the Access Management Life Cycle, RBAC Implementation Considerations, Guiding Principles and Lessons Learned

Privileged Access Management: Understanding Privileged Access, Key Business Drivers, Privileged Access Management Program

UNIT III DIRECTORY SERVICES 10 HOURS

The LDAP Protocol,LDAP Basics:Objects in LDAP, Object Classes, Attributes, and Schema, ServerConfiguration,FirstStepswithLDAP,UpdatingaDirectorywithaBatch Process,The LDIF StandardLDAP Models: Information Model (Object classes, Object Identities, Attributes, Matching Rules) Naming model, Functional Model (LDAP operations), Security Model (Authentication and Authorization)
Directory Architectures: Introduction to Replication and Partitioning, Data Distribution betweenLDAPandNon-LDAPSystems,Partitioning,Replication,DataDistributionbetween LDAP and Non-LDAP Systems

UNIT IV SECURED ACCESS PARADIGMS: EXPLORING MULTI-FACTOR AUTHENTICATION, SSO, AND FEDERATED SYSTEMS 10 HOURS

Multi-Factor Authentication (MFA): Introduction to Authentication Methods, Principles of Multi - Factor Authentication, Biometrics and Behavioural Authentication, Security and Privacy Considerations in MFA, Implementing MFA in Different Environments

UNIT V SSO, AND FEDERATED SYSTEMS 8 HOURS

Secured Access Paradigms: Exploring Multi-Factor Authentication, SSO, and Federated Systems Federated Systems and SSO: Introduction to Federated Identity, Federated Identity Standards and Protocols, Design and Implementation of Federated Systems Single Sign-On: Fundamentals of Single Sign-On, Single Sign – On Protocols(SAML, OAuth, OpenID Connect), Implementing SSO in Different Environments, SSO Security Best Practices

TOTAL: 48 HOURS

TEXT BOOKS:

1. Godbole, N. (2016). *Cybersecurity*. Wiley India Pvt. Ltd.
2. Brooks, C. J., Grow, C., Craig, P., & Short, D. (2016). *Cybersecurity essentials*. John Wiley & Sons
3. Peltier, T. R. (2001). *Information security risk analysis*. CRC Press

REFERENCE BOOKS:

1. Whitman, M., & Mattord, H. (2008). *Principles of information security* (2nd ed.). Thomson Course Technology
2. *Single Sign-On: The Comprehensive Guide* by Johnson, D. (2020). Springer.

WEBSITES:

1. https://nptel.ac.in/courses/106/105/106105171
2. https://www.simplilerarn.com
3. .http://elarning.vtu.ac.in/econtent/courses/video/BS/14CPL.16.html
4. https://learndata.com

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	2	-	-	-	-	-	1	-
CO1	2	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO3	-	-	-	3	3	2	-	-	-	2	-	-	-	-	-	1	-
CO4	-	-	-	3	3	-	-	3	-	-	-	-	-	-	-	1	-
CO5	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	1	-
Average	2	-	1	3	3	2	-	3	-	2	-	-	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-V

24CSU502A **Programming in Python** **5H-3C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Programming concepts and logic.

COURSE OBJECTIVES (CO):

- Provide basic knowledge of Python and its programming fundamentals.
- Learn how to design and program Python applications, including the use of lists, tuples, and dictionaries.
- Understand file operations, database creation, and explore Python packages and GUI programming.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the basic concept of Python	Understand
CO2	Identify how to design and program Python applications	Apply
CO3	Demonstrate how to use lists, tuples, and dictionaries in Python programs	Understand
CO4	Applying file operations and database creation.	Apply
CO5	Build knowledge about python packages and GUI programming	Apply

UNIT I OVERVIEW OF PROGRAMMING AND INTRODUCTION TO PYTHON

12 HOURS

Overview of Programming: Structure of a Python Program- Elements of Python. Introduction to Python: Python Interpreter- Using Python as calculator- Python shell- Indentation. Atoms- Identifiers and keywords- Literals- Strings- Operators (Arithmetic operator, Relational operator, Logical operator, Boolean operator, Assignment, Operator, Ternary operator, Bit wise operator, Increment or Decrement operator).

UNIT II CREATING PYTHON PROGRAMS **12 HOURS**

Creating Python Programs: Input and Output Statements- Control statements (Branching, Looping, Conditional Statement, Exit function, Difference between break, continue and pass.)- Defining Functions- default arguments- Errors and Exceptions.

UNIT III PYTHON COMPLEX DATA TYPES **12 HOURS**

Python Complex data types: Using string data type and string operations- Defining list and list slicing- Use of Tuple data type. String- List and Dictionary- Manipulations building blocks of python programs- String manipulation methods- List manipulation. Dictionary manipulation- Programming using String- List and Dictionary in-built functions. Python Functions- Organizing python codes using functions.

UNIT IV PYTHON FILE OPERATIONS **12 HOURS**

Python File Operations: Reading files- Writing files in python- Understanding read functions- read()- readline()- readlines(). Understanding write functions- write() and writelines() Manipulating file pointer using seek Programming- using file operations. Database Programming: Connecting to a database- Creating Tables- INSERT, UPDATE, DELETE, and READ operations- Transaction Control- Disconnecting from a database- Exception Handling in Databases.

UNIT V PYTHON PACKAGES AND OBJECTS AND CLASSES **12 HOURS**

Python packages: Simple programs using the built-in functions of packages matplotlib- numpy- pandas etc. GUI Programming: Tkinter introduction- Tkinter and Python Programming- Tk Widgets- Tkinter examples. Python programming with IDE. Objects and Classes: Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super – In self Defense – Get and Set Attribute Values with Properties – Name Mangling for Privacy – Method Types – Duck Typing – Special Methods –Composition.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Downey, A. B., Elkner, J., & Meyers, C. (2012). *How to think like a computer scientist: Learning with Python* (1st ed.). Green Tea Press
2. Lambert, K. A. (2011). *The fundamentals of Python: First programs*. Cengage Learning.
3. Chun, W. J. (2016). *Core Python applications programming* (3rd ed.). Pearson Education.

REFERENCE BOOKS:

1. Dierbach, C. (2015). *Introduction to computer science using Python*. Wiley
2. Jose, J., & Sojan Lal, P. (n.d.). *Introduction to computing and problem solving with Python*,
3. Lubanovic, B. (2014). *Introducing Python* (1st ed., 2nd release). O'Reilly Media.
4. Lutz, M. (2013). *Learning Python* (5th ed.). O'Reilly Media.

WEBSITES

1. http://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/ pythons
3. http://www.ibiblio.org/g2swap/byteofpython/read/
4. https://www.netacad.com/courses/networking/ccna-switching-routing-wireless-essentials

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	2
CO1	-	-	3	-	-	-	-	-	2	-	3	-	-	-	-	-	2
CO3	-	-	3	3	-	3	-	3	-	-	-	-	-	-	-	-	2
CO4	-	-	3	-	-	-	-	-	-	-	3	-	-	-	-	-	2
CO5	-	-	-	3	-	3	-	3		-	3	-	-	-	-	-	2
Average	1	-	3	3	-	3	-	3	2	-	3	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-V

24CSU502B **.NET Programming** **5H-3C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Programming concepts and object-oriented programming.

COURSE OBJECTIVES(CO):

- Understand the .NET framework and develop web-centric applications using VB.NET and ASP.NET.
- Learn the basics of I/O operations, object-oriented programming, and ASP.NET controls, along with ADO.NET.
- Gain knowledge on building and deploying web services.

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the basics of .NET framework and the object-oriented programming.	Understand
CO2	Understand the procedures, File I/O, Error handling and Message queues.	Understand
CO3	Understand and remember the components in VB.NET IDE, ADO.NET and also the window forms.	Understand
CO4	Understand the HTML server controls, Web controls, Validation controls and state management and tracing.	Understand
CO5	Apply the knowledge on SOAP, building web services and deploying and publishing web services, Finding and consuming web services.	Apply

UNIT I INTRODUCTION TO .NET FRAMEWORK **12 HOURS**

Introduction to .NET: .NET framework features & architecture, CLR, common Type system, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of projects in .NET, IDE of VB .NET – Menu bar, Tool bar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object browser. The environment: Editor tab, format tab, general tab, docking tab. Visual development & event driven programming – Methods and events.

UNIT II VB .NET LANGUAGE **12 HOURS**

The VB .NET Language: The VB .NET Language – Variables- declaring variables, Data type of variables, forcing variables declarations, scope & lifetime of a variable, constants, arrays, types of arrays, control array, Structure programming – Modularity – Information hiding – abstraction – events – subroutines and functions – message box – input box. Control flow statement: conditional statement, loop statement.

UNIT III BASIC WINDOWS CONTROLS **12 HOURS**

Textbox Control- List Box, Checked List Box-Scrollbar and Track Bar Controls-More Windows Control-The common Dialog Controls-The Rich Text Box Control - Handling Strings, characters and Dates. The Tree View and List View Controls: Examining the Advanced Controls-The Tree View Control-The List View Control.

UNIT IV WORKING WITH FORMS **12 HOURS**

Working with Forms: Loading, showing and hiding forms, controlling One form within another. Using MDI form. Working with Menus: creating menu, inserting, deleting, assigning short cut keys, pop up menu. Windows Form Control (with Properties, Methods and events). Built-in Dialog Box: Open File Dialog, Save File Dialog, Font Dialog, Color Dialog, Print Dialog, Printing.

UNIT V DATABASE PROGRAMMING WITH ADO .NET **12 HOURS**

Database programming with ADO .NET: overview of ADO, from ADO-to-ADO .NET, accessing data using server explorer. Creating connection, command, data adapter and data set with OLEDB and SQLDB. Display data on data bound controls, display data on a data grid. Generate reports using Crystal Report Viewer.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Petronas, E. (2019). *Mastering Visual Basic .NET*. BPB Publications.
2. Bai, Y. (2018). *Practical database programming with Visual Basic .NET* (2nd ed.). John Wiley & Sons
3. Chavan, S. (2017). *Visual Basic .NET* (1st ed.). Pearson Education.

REFERENCE BOOKS:

1. Willis, T., & Newsome, B. (n.d.). *Beginning Visual Basic 2016*. Wrox Publishing.
2. Roman, S., & Lomax, P. (2016). *VB.NET in a nutshell* (2nd ed.). O'Reilly Media.

WEBSITES

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.vbtutot.com
4. https://freevideolectures.com/course/3002/dot-net-tutorial

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	2
CO1	-	-	3	-	-	-	-	-	-	-	3	-	-	-	-	-	2
CO3	-	-	3	-	-	-	-	-	2	-	3	-	-	-	-	-	2
CO4	-	-	3	-	-	-	-	-	2	-	3	-	-	-	-	-	2
CO5	2	-	3	1	-	-	-	1		-	3	-	-	-	-	-	2
Average	2	-	3	1	-	-	-	1	2	-	3	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU503A **Full Stack Development** **5H-3C**

Instruction Hours /week: L: 5 T: 0 P: 0 **Marks:** Internal : **40** External : **60** Total: **100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Web development (HTML, CSS, JavaScript) and programming fundamentals.

COURSE OBJECTIVES (CO):

- Understand the basic concepts of Full Stack application development, including user-interface design and application development fundamentals.
- Gain knowledge about Node.js, AngularJS, and ReactJS for front-end and back-end development.
- Acquire working knowledge of backend development with MongoDB..

COURSE OUTCOMES (COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts of Full Stack Development	Understand
CO2	Develop applications with Node JS.	Apply
CO3	Identify various concepts of developing applications using Node JS	Apply
CO4	Develop React JS to test and run the applications.	Apply
CO5	Utilize rapid prototyping techniques to design and develop sophisticated database connectivity through MONGO DB.	Apply

UNIT I INTRODUCTION TO FULL STACK DEVELOPMENT **12 HOURS**

Introduction: History of Full Stack Development – Features- - The Python Full Stack-Advantages of Full Stack-Applications of Full Stack - Technologies included in Full Stack Development: Frontend-Backend – Database- Examples Stacks in Development: The MEAN Stack - The MERN Stack AND The Python Full Stack.

UNIT – II ANGULAR JS **12 HOURS**

What is AngularJS?, Why AngularJS?, Features of AngularJS, AngularJS architecture, Setting up the Environment, Model-View-Controller explained, My first AngularJS app All about Angular expressions, How to use expressions, Number and String Expressions, Object Binding and Expressions, Working with Arrays, Forgiving Behaviour, Angular expressions v/s Javascript expressions

UNIT III NODE JS **12 HOURS**

ode.js basics - Local and Export Modules - Node Package Manager - Node.js web server - Node.js File system - Node Inspector - Node.js EventEmitter - Frameworks for Node.js - Express.js Web App - Serving static Resource - Node.js Data Access

UNIT – IV REACT JS **12 HOURS**

Introduction to React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication.

UNIT – V: MONGO DB **12 HOURS**

Introduction-History and features of MONGODB -Differences between SQL,MYSQL and NOSQL- Benefits of NoSQL- MongoDB Installation-Collections in MongoDb- Documents In mongoDb- Inserting data into database- Filter queries in Mongodb Database- Schema Validation-Indexing-Aggregation-Embedded Document.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Sasidharan, D. K., & Kumar, S. N. (2017). *Full stack development with JHipster*. Packt Publishing.
2. DiMarzio, J. (n.d.). *Beginning Android programming with Android Studio* (4th ed.)
3. Phillips, B., Stewart, C., & Marsicano, K. (2021). *Android programming: The big nerd ranch guide* (4th ed.). Big Nerd Ranch Guides.

REFERENCE BOOKS:

1. Meier, R. (n.d.). *Professional Android 2 application development*. Wiley India Pvt Ltd
2. Murphy, M. L. (n.d.). *Beginning Android*. Wiley India Pvt Ltd.
3. Burd, B. (n.d.). *Android application development all-in-one for dummies* (1st ed.). For Dummies.

WEB REFERENCES:

1. https://developer.android.com/guide
2. https://en.wikipedia.org/wiki/Android_10
3. Develop App for Free
4. https://flutter.dev/
5. http://ai2.appinventor.mit.edu
6. https://en.wikipedia.org/wiki/Android_version_history
7. https://aws.amazon.com/mobile/mobile-application-development/ (Unit 1)

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	-
CO1	-	-	1	-	-	3	-	-	-	-	-	-	-	-	-	2	-
CO3	-	-	-	3	-	3	-	3	-	-	-	-	-	-	-	2	-
CO4	-	-	1	3	-	3	-	3	-	-	-	-	-	-	-	2	-
CO5	-	-	-	3	-	3	-	3	-	-	2	-	-	-	-	2	-
Average	1	-	1	3	-	3	-	3	-	-	2	-	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU503B **Software Testing** **5H-3C**

Instruction Hours /week:L: 5 T: 0 P: 0 **Marks:** Internal : **40** External : **60** Total: **100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Programming and software development concepts.

COURSE OBJECTIVES(CO):

- Introduce fundamental concepts, issues, and techniques in software testing.
- Familiarize students with various testing activities, methodologies, and tools for software verification and validation.
- Provide an in-depth understanding of system testing techniques, including integration, functional, acceptance testing, and software reliability analysis

.**COURSE OUTCOMES(COs):**

Upon completion of this course the students will be able to

COs	Course Outcomes	Blooms Level
CO1	Understanding of software testing principles and techniques, allowing for the creation of effective test plans and strategies.	Understand
CO2	Construct test cases for software testing techniques	Apply
CO3	Apply acquired knowledge and skills to assess software quality, identify areas for improvement, and implement strategies to enhance the overall quality of software products.	Apply
CO4	Identify defect prevention techniques and software quality assurance metrics.	Apply
CO5	Demonstrate proficiency in utilizing test tools and automation techniques to enhance testing efficiency and effectiveness.	Understand

UNIT I – SOFTWARE TESTING - CONCEPTS, ISSUES, AND TECHNIQUES 12 HOURS

Quality Revolution, Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Testing Activities, Test Case Selection White-Box and Black, test Planning and design, Test Tools and Automation, Power of Test. Test Team Organization and Management-Test Groups, Software Quality Assurance Group, System Test Team Hierarchy, Team Building.

UNIT II – SYSTEM TESTING 12 HOURS

System Testing - System Integration Techniques-Incremental, Top-Down Bottom-Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built- in Testing. functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models

Unit III - SYSTEM TEST CATEGORIES **12 HOURS**

System test categories Taxonomy of System Tests, Interface Tests Functionality Tests. GUI Tests, Security Tests Feature Tests, Robustness Tests, Boundary Value Tests Power Cycling Tests Interoperability Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Regulatory Tests.

UNIT IV – SOFTWARE QUALITY **12 HOURS**

Software quality - People 's Quality Expectations, Frameworks and ISO-9126, McCall 's Quality Factors and Criteria – Relationship. Quality Metrics. Quality Characteristics ISO 9000:2000 Software Quality Standard. Maturity models

UNIT V - AUTOMATION TESTING USING SELENIUM **12 HOURS**

Introduction of Selenium- Selenium components- Overview of the Testing framework-Selenium Architecture- Selenium Features- Selenium IDE- IDE-Features- IDE Commands IDE-First Test Case-Selenium Web Driver- Web Driver-Architecture- Web Driver-Features- WebDriver Commands-Locating Strategies

TOTAL: 60 HOURS

TEXT BOOKS:

1. Desai, S., & Srivastava, A. (2018). *Software testing: A practical approach*. PHI Learning.
2. Limaye, M. (2016). *Software quality assurance*. Tata McGraw-Hill Education.
3. Tian, J. (2016). *Software quality engineering: Testing, quality assurance, and quantifiable improvement*. John Wiley & Sons, Inc.

REFERENCE BOOKS:

1. Desikan, S., & Ramesh, G. (2007). *Software testing: Principles and practices*. Pearson Education.
2. Hutcheson, R. (2003). *Software testing fundamentals*. John Wiley & Sons, Inc.
3. Beizer, B. (2000). *The future of software testing techniques*. Dreamtech Publishing.

WEBSITES:

1. https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
2. https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-the-basics-of-software-quality-management/
3. http://softwaretestingfundamentals.com/software-quality-assurance/
4. https://www.softwaretestinghelp.com/software-quality-assurance/
5. https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
6. https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-the-basics-of-software-quality-management/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	2	-
CO1	-	-	3	-	-	3	-	-	2	-	1	-	-	-	-	2	-
CO3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	2	-
CO4	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	2	-
CO5	-	-	3	3	-	3	-	3	-	-	-	-	-	-	-	2	-
Average	1	-	3	3	-	3	-	3	2	-	1	-	-	-	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-V

24CSUA501 **Basics of Accounting** **6H-5C**

Instruction Hours/week: L:6 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Financial concepts

COURSE OBJECTIVES(CO):

- Understand basic accounting concepts and prepare various subsidiary books.
- Prepare financial statements and account for depreciation on fixed assets.
- Prepare accounts for nonprofit organizations.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand basic concepts on Accounting	Understand
CO2	Prepare various subsidiary books	Understand
CO3	Prepare financial statements	Apply
CO4	Carry out depreciation on fixed assets	Apply
CO5	Prepare accounts for nonprofit organizations	Apply

UNIT I **14 HOURS**

Accounting – Definition- Fundamentals of Book Keeping – Branches of Accounting – Nature of Accounts - Accounting Concepts and Conventions – Journal – Ledger.

UNIT II **14 HOURS**

Subsidiary books – Introduction – Types of subsidiary books - purchases book - sales book- returns book - cash book - single column cash book – Two column cash book - Three column Cash book - petty cash book

UNIT III **14 HOURS**

Trial balance - Errors and their rectification - Final accounts of a sole trader with adjustments - Trading and Profit and Loss Account - Balance Sheet – Difference between Profit and Loss Account and Balance Sheet.

UNIT IV **15 HOURS**

Depreciation- Definition- Methods of depreciation- straight line method- written down value method- annuity value method- sinking fund method- provisions and reserves

UNIT V **15 HOURS**

Accounts for Non-Profit organization- Receipts and Payments and income and expenditure account and Balance sheet – Difference between Receipts and Payments and income and expenditure account and Balance sheet

Note: Distribution of Marks between problems and theory shall be 75% and 25%.

TOTAL: 72 HOURS

TEXT BOOKS:

1. N.Vinayakam, P.L.Maniam and K.L.Nagarajan , (2012)Principles of Accountancy New Delhi .S.Chand & Company Ltd
2. S. P. Jain & K. L. Narang, 2010, Advanced Accountancy, Sultan Chand & Sons. New Delhi
3. T.S.Grewal,(2011)Introduction to Accountancy, New Delhi S.Chand & Company Ltd.
4. R.L.Gupta, V.K.Gupta and M.C.Shukla,2010, New Delhi Financial Accounting,Sultan Chand .

REFERENCE BOOKS::

1. T.S.Grewal, S.C.Gupta and S.P.Jain, 2010, New Delhi Advanced Accountancy, Sultan Chand .
2. K.L.Narang and S.N.Maheswari ,2010, New Delhi Advanced Accountancy-Kalyani Publishers.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
CO1	-	-	3	2	-	-	3	-	-	-	3	-	-	-	-	-	-
CO3	-	-	3	-	-	-	3	-	2	-	3	-	-	-	-	-	-
CO4	-	-	3	-	-	-		-	2	-	3	-	-	-	-	-	-
CO5	-	-	3	2	-	-	3	2	-	-	3	-	-	-	-	-	-
Average	1	-	3	2	-	-	3	2	2	-	3	-	-	-	-	-	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-V

24CSU512A **Programming in Python - Practical** **5H-2C**

Instruction Hours/week: L:0 T:0 P: 5 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Programming concepts and logic.

COURSE OBJECTIVES(CO):

- Develop simple Python programs and use packages for mathematical and statistical problem-solving.
- Create Python programs for data visualization and analyze datasets.
- Understand and draw charts using different data sets.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the essentials of Python programming	Understand
CO2	Understand basic programs using python modules and packages	Understand
CO3	Build simple algorithms with and without using packages	Apply
CO4	Analyze and interpret algorithm and visualize the results with real time datasets	Analyze
CO5	Apply draw charts using different data sets.	Apply

List of Programs

1. Write a program to showcase different Python data types such as integers, floats, strings, and boolean values.
2. Write a program to demonstrate various operators in Python, including arithmetic, relational, logical, assignment, ternary, bitwise, and increment/decrement operators.
3. Develop Python Calculator using arithmetic operations
4. Write a python program to implement insertion sort and merge sort using lists.
5. Write a simple GUI application using Tkinter .
6. Write a Python program to manipulate strings.
7. Write programs to implement dictionaries, including adding, updating, and deleting key-value pairs.
8. Implement transaction control and exception handling in database operations.
9. Write a program to demonstrate file input and output operations.
10. Write a program to connect to a database, create tables, perform INSERT, UPDATE, DELETE, and READ operations.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Downey, A., Elkner, J., & Meyers, C. (2012). *How to think like a computer scientist: Learning with Python* (1st ed.). Green Tea Press.
2. Lambert, K. A. (2011). *The fundamentals of Python: First programs*. Cengage Learning.
3. Chun, W. J. (2016). *Core Python applications programming* (3rd ed.). Pearson

Education.
4. Dierbach, C. (2015). *Introduction to computer science using Python*. Wiley.
5. Jose, J., & Sojan Lal, P. (2016). *Introduction to computing and problem solving with Python*. Khanna Publishers.
6. **Lubanovic, B. (2014).** *Introducing Python* (1st ed., 2nd release). O'Reilly Media.

WEBSITES:

1. http://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/pythons
3. http://www.ibiblio.org/g2swap/byteofpython/read/
4. https://www.netacad.com/courses/networking/ccna-switching-routing-wireless-essentials
5. http://spoken-tutorial.org/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	3	-	-	-	-	-	-	-	3	-	-	-	-	1	2
CO1	-	-	3	1	--	3	-	2	-	-	-	-	-	-	-	1	2
CO3	-	-	3	-	-	3	-	-	-	-	3	-	-	-	-	1	2
CO4	-	-	-	-	1	3	-	2	-	-	-	-	-	-	-	1	2
CO5	-	-	--	-	-	3	-		-	-	3	-	-	-	-	1	2
Average	1	-	3	1	1	3	-	2	-	-	3	-	-	-	-	1	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-V

24CSU512B	**.NET Programming - Practical**	**5H-2C**

Instruction Hours/week: L:0 T:0 P: 5 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- .NET framework concepts and programming in C# or VB.NET.

COURSE OBJECTIVES(CO):

- Create Windows forms using arrays and flow control statements, and develop web applications using ASP.NET.
- Learn about basic Windows controls with Visual Basic.NET, and understand classes, namespaces, and the .NET Framework class library.
- Understand Multiple Document Interface (MDI) concepts, .NET architecture, and assemble multiple forms, modules, and menus into working VB.NET solutions.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Develop Windows based applications using Visual Basic.Net	Understand
CO2	Understand the various tools in .net applications	Understand
CO3	Summarize the ADO.Net concept in VB.Net and ASP.Net applications	Understand
CO4	Apply server-side web applications using ASP.NET	Apply
CO5	Classify techniques to develop error-free software	Analyze

List of Programs

VB.NET

1. Write a Program to perform various string manipulation functions.
2. Using windows application form, create a form, place controls and manipulate data.
3. Write a program to create inventory control using class library.
4. Write a program to create Web Services Using VB.NET
5. Write a program to create a screen saver using controls
6. Create an ActiveX program with simple example.
7. Using windows Application: Design Employee Details, use SQL Server as back end and also use checked list box.

ASP.NET

8. Write a program to create an on-line quiz using content page holder.
9. Write a program to retrieve Cookies information
10. Write a program to count web page hits

TOTAL: 60 HOURS

TEXT BOOKS:

1. Content Development Group. (2007). *Visual Basic 6.0 programming* (8th reprint). Tata McGraw-Hill Education.
2. Azam, M. (2006). *Programming with Visual Basic 6.0* (4th reprint). Vikas Publishing House.
3. Cornell, G. (2003). *Visual Basic 6 from the ground up* (1st ed.). Tata McGraw-Hill Education.
4. Roman, S., & Lomax, P. (2016). *VB.NET in a nutshell* (2nd ed.). O'Reilly Media
5. Deitel, H. M., Deitel, P. J., & Nieto, T. R. (1998). *Visual Basic 6: How to program* (1st ed.). Pearson Education.

WEBSITES:

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.vbtutot.com
4. https://freevideolectures.com/course/3002/dot-net-tutorial
5. https://www.nptelvideos.com/video.php?id=1760&c=21

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	3	-	-	-	-	1	-	-	-	-	1	2
CO1	-	-	2		-	-	-	-	-	-	1	-	-	-	-	1	2
CO3	-	-		3	-	3	-	3	-	-	-	-	-	-	-	1	2
CO4	-	-	2	3	-	3	-	3	-	-	-	-	-	-	-	1	2
CO5	-	-		3	-	3	-	3	-	-	-	-	-	-	-	1	2
Average	1	-	2	3	-	3	-	3	-	-	1	-	-	-	-	1	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-V

24CSU513A **Full Stack Development-Practical** **5H – 2C**

Instruction Hours/week: L:0 T:0 P:5 **Marks:** Internal**: 40** External**: 60** Total**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- HTML/CSS, JavaScript

COURSE OBJECTIVES(CO):

- Gain knowledge of the basic concepts, characteristics, user-interface design, and fundamentals of Full Stack application development.
- Learn and apply AngularJS and React JS to build dynamic and interactive user interfaces.
- Obtain practical experience in developing applications with Node.js and managing data using MongoDB.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts of Full Stack Development	Understand
CO2	Develop applications with Node JS.	Understand
CO3	Identify various concepts of developing applications using Node JS	Understand
CO4	Apply and implement React JS to test and run the applications.	Apply
CO5	Utilize rapid prototyping techniques to design and develop sophisticated database connectivity through MONGO DB.	Understand

List of Programs

1. Develop Angular JS program that allows user to input their first name and last name and display their full name. Note: The default values for first name and last name may be included in the program.
2. Develop an Angular JS application that displays a list of shopping items. Allow users to add and remove items from the list using directives and 7: The default values of items may be included in the program.
3. Develop a simple Angular JS calculator application that can perform basic mathematical operations (addition, subtraction, multiplication, division) based on user input.
4. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
5. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
6. Write a program to create a voting application using React JS
7. Write a program to create a simple calculator Application using React JS
8. Create a Simple Login form using React JS
9. Execute the Commands of MongoDB and operations in MongoDB : Insert, Query, Update, Delete and Projection.
10. Implementation of Aggregation and Map Reduce functions in MongoDB.

TOTAL: 60 HOURS

TEXT BOOKS:

1. T1. Lauren Darcey and Shane Conder, (2011) "Android Wireless Application Development", PearsonEducation, 2nd ed.
2. Jerome DiMarzio, "*Beginning Android Programming with Android Studio*", 4thEdition
3. Android Programming: (2021)The Big Nerd Ranch Guide" (4th Edition) by Bill Phillips, Chris Stewart, and Kristin Marsicano.
4. R1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
5. R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
6. R3. Android Application Development All in one for Dummies by Barry Burd, Edition: I
7. Dawn Griffiths, David Griffiths, "*Head First Android Development: A Brain-Friendly Guide"*, 2017.
8. Neil Smyth , "*Android Studio 3.0 Development Essentials: Android",* 8th Edition.
9. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN

REFERENCES:

1. https://developer.android.com/guide
2. https://en.wikipedia.org/wiki/Android_10
3. Develop App for Free
4. https://flutter.dev/
5. http://ai2.appinventor.mit.edu
6. https://en.wikipedia.org/wiki/Android_version_history
7. https://aws.amazon.com/mobile/mobile-application-development/ (Unit 1)
8. https://en.wikipedia.org/wiki/Mobile_app_development

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2
CO1	3	-	3	3	-	2	-	3	-	-	-	-	-	-	-	-	2
CO3	3	-	3	3	-	-	-	3	-	-	-	-	-	-	-	-	2
CO4	3	-	-	3	-	2	-	3	-	-	-	-	-	-	-	-	2
CO5	-	-	3	3	-		-	1	-	-	-	-	-	-	-	-	2
Average	3	-	3	3	-	2	-	2.5	-	-	1	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU513B **Software Testing - Practical** **5H-2C**

Instruction Hours/week: L:0 T:0 P: 5 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Testing Concepts and Methodologies

COURSE OBJECTIVES(CO):

- Learn to conduct comprehensive test suites for web links, ensuring thorough coverage and functionality of web applications.
- Acquire skills to dynamically select checkboxes and radio buttons, and to handle web page scrolling, using Selenium WebDriver for improved automation testing.
- Gain the ability to write and test programs for logging into web pages using Selenium, enhancing your overall automation testing capabilities.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to::

COs	**Course Outcomes**	**Blooms Level**
CO1	Develop proficiency in conducting test suites for web links, ensuring comprehensive coverage and functionality testing of web applications.	Applying
CO2	Understanding and implementation of Selenium WebDriver program	Understanding
CO3	Develop and test programs for logging into specific web pages, showcasing their ability to automate user authentication processes.	Applying
CO4	Explain mouse actions using Selenium WebDriver, enhancing their ability to simulate user interactions during testing.	Understanding
CO5	Identify suitable tests to be carried out using Selenium	Applying

List of Programs

Using Testing Tool: Selenium

1. Conduct a test suite for any two WEB LINKS.
2. Program to Select Checkbox in Selenium Driver.
3. Program to Select Radio Button in Selenium Driver.
4. Write a Program to Scroll a web page in Selenium WebDriver.
5. Write and test a program to login a specific webpage.
6. Create Locators in Selenium using IDE.
7. Find Element and Find Elements in Web using Selenium WebDriver.
8. Program To Perform Mouse Actions Listener Using Selenium.
9. Navigate between Pages using Selenium.
10. Handle cookies using Selenium

TOTAL: 60 HOURS

TEXT BOOKS:

1. Desai, S., & Srivastava, A. (2018). *Software testing: A practical approach*. PHI Learning.
2. Limaye, M. (2016). *Software quality assurance*. Tata McGraw-Hill Education.
3. Tian, J. (2016). *Software quality engineering: Testing, quality assurance, and quantifiable improvement*. John Wiley & Sons.
4. Beizer, B. (2000). *The future of software testing techniques*. Dreamtech Publishing.

WEBSITES:

1. https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
2. https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-the-basics-of-software-quality-management/
3. http://softwaretestingfundamentals.com/software-quality-assurance/
4. https://www.softwaretestinghelp.com/software-quality-assurance/
5. https://nptel.ac.in/courses/106105150/
6. http://ijiet.com/wp-content/uploads/2016/04/15.pdf

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	2
CO1	-	-	3	3	-	-	-	-	2	-	-	-	-	-	-	-	2
CO3	-	-	-	3	-	-	-	3	-	-	1	-	-	-	-	-	2
CO4	-	-	3	3	-	-	-	3	-	-	-	-	-	-	-	-	2
CO5	-	-	3	3	-	2	-	3	-	-	-	-	-	-	-	-	2
Average	1	-	3	3	-	2	-	3	2	-	1	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

SEMESTER-V

24CSU591	**Internship**	**0H-2C**

Instruction Hours/week: L:0 T:0 P:0 **Marks:** Internal**: 100** External**: - T**otal**: 100**

End Semester Exam:- Hours

Semester-VI

24CSU601A **Cloud Computing** **5H-3C**

Instruction Hours/week: L:5 T: 0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Computer Networking, virtualization, operating systems, and security concepts

COURSE OBJECTIVES(CO):

- Provide a good understanding of concepts and standards in cloud computing, and make students understand cloud service providers and their usage.
- Teach how to secure data in the cloud and explain resource management and security in the cloud.
- Explore trends and the future of cloud computing.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the recent trends in the field of cloud computing and providing exposures tosome open source and commercial clouds.	Understand
CO2	To understand the technologies based on clouds.	Understand
CO3	To understand the students to work based on the various cloud architecture, services and storage.	Understand
CO4	To infer the knowledge relevant resource management and security in cloud.	Understanding
CO5	Apply and implement the understanding with the cloud technologies such as Hadoop and Google App Engine, etc.	Apply

UNIT I INTRODUCTION **12 HOURS**

Introduction to Cloud Computing – Definition of Cloud – Evolution of Cloud Computing – Underlying Principles of Parallel and Distributed Computing – Cloud Characteristics – Elasticity in Cloud – On-demand Provisioning. Recent trends in Computing: Grid Computing, Cluster Computing, Utility Computing, Cloud Computing.

UNIT II CLOUD ENABLING TECHNOLOGIES **12 HOURS**

Service Oriented Architecture – REST and Systems of Systems – Web Services – Publish? Subscribe Model – Basics of Virtualization – Types of Virtualization – Implementation Levels of Virtualization – Virtualization Structures – Tools and Mechanisms – Virtualization of CPU –Memory – I/O Devices –Virtualization Support and Disaster Recovery.

UNIT III CLOUD ARCHITECTURE,SERVICES AND STORAGE **12 HOURS**

Layered Cloud Architecture Design – NIST Cloud Computing Reference Architecture – Public, Private and Hybrid Clouds – laaS – PaaS – SaaS – Architectural Design Challenges – Cloud Storage – Storage-as-a-Service – Advantages of Cloud Storage – Cloud Storage Providers – S3.

UNIT IV RESOURCE MANAGEMENT AND SECURITY IN CLOUD **12 HOURS**

Inter Cloud Resource Management – Resource Provisioning and Resource Provisioning Methods – Global Exchange of Cloud Resources – Security Overview – Cloud Security Challenges –Software-

as-a-Service Security – Security Governance – Virtual Machine Security – IAM –SecuritStandards.

UNIT V CLOUD TECHNOLOGIES AND ADVANCEMENTS **12 HOURS**

Hadoop – MapReduce – Virtual Box — Google App Engine – Programming Environment for Google App Engine – Open Stack –Federation in the Cloud – Four Levels of Federation –Federated Services and Applications –Future of Federation. **Emerging Trends and Future of Cloud Computing:** Serverless computing-Edge computing-AI and machine learning in the cloud-Quantum computing and its implications for the cloud.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Sosinsky, B. (2019). *Cloud computing bible*. Wiley India.
2. Erl, T., & Mahmood, Z. (2019). *Cloud computing: Concepts, technology & architecture*. Prentice Hall
3. Antonopoulos, N., & Gillam, L. (2018). *Cloud computing: Principles, systems and applications*. Springer.
4. Krutz, R. L., & Vines, R. D. (2016). *Cloud security: A comprehensive guide to secure cloud computing*. Wiley India.

REFERENCE BOOKS:

1. Velte, T., Velte, A., & Elsenpeter, R. (2018). *Cloud computing: A practical approach*. McGraw-Hill.
2. Chorafas, D. N. (2017). *Cloud computing strategies*. CRC Press

WEBSITES:

1. wikipedia.org/wiki/Cloud_computing
2. www.ibm.com/cloud-computing/in/en/
3. www.oracle.com/CloudComputing
4. www.microsoft.com/en-us/cloud/default.aspx
5. https://nptel.ac.in/courses/106105167/
6. http://172.16.25.76/course/view.php?id=1785
7. wikipedia.org/wiki/Cloud_computing

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	1	3	2	3	3	-	2	-
CO1	3	-	-	-	-	-	-	-	2	2	3	3	3	3	-	2	-
CO3	3	-	-	-	-	-	-	-	2	1	3	2	3	3	-	2	-
CO4	3	-	-	-	-	-	-	-	2	3	2	3	3	3	-	2	-
CO5	3	-	-	-	-	-	-	-	2	1	3	1	3	3	-	2	-
Average	3	-	-	-	-	-	-	-	2	2.2	2.8	2.2	3	3	-	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU601B **Soft Computing** **5H-3C**

Instruction Hours/week: L:5 T:0 P:0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Knowledge of mathematics, algorithms, and programming

COURSE OBJECTIVES(CO):

- To understand the various applications of Fuzzy sets.
- To impart the knowledge on Artificial Neural Networks.
- To analyze the concepts of Neuro Fuzzy Technology.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

SCOs	Course Outcomes	Blooms Level
CO1	Explain about the need and importance of Soft Computing	Understand
CO2	Analyze the various applications of Fuzzy sets.	Analyze
CO3	To infer the knowledge of basic of Artificial Neural Networks	Understand
CO4	Understand the Genetic Algorithms.	Understand
CO5	Understand the concepts of Neuro Fuzzy Technology	Understand

UNIT I INTRODUCTION TO SOFT COMPUTING 12 HOURS

Aims of Soft Computing-Foundations of Fuzzy Sets Theory-Basic Concepts and Properties of Fuzzy Sets- Elements of Fuzzy Mathematics-Fuzzy Relations-Fuzzy Logic

UNIT II APPLICATIONS OF FUZZY SETS 12 HOURS

Applications of Fuzzy Sets-Fuzzy Modeling – Fuzzy Decision Making-Pattern Analysis and Classification-Fuzzy Control Systems-Fuzzy Information Processing- Fuzzy Robotics.

UNIT III ARTIFICIAL NEURAL NETWORKS 12 HOURS

Artificial Neural Networks-Models of Neuron-Architecture of Feed Forward Neural Networks, Recurrent Neural Networks-Learning methods-supervised and unsupervised learning-Time Delay Neural Networks-Radial Basis Function Neural Networks- Adaptive Resonance Theory (ART) Neural Networks- Associative Neural Memory Models-Application of ANN.

UNIT IV GENETIC ALGORITHMS 12 HOURS

Main Operators- Genetic Algorithm Based Optimization-Principle of Genetic Algorithm- Genetic Algorithm with Directed Mutation- Comparison of Conventional and Genetic Search Algorithms Issues of GA in practical implementation. Introduction to Particle swarm optimization-PSO operators-GA and PSO in engineering applications.

UNIT V NEURO-FUZZY TECHNOLOGY 12 HOURS

Fuzzy Neural Networks and their learning-Architecture of Neuro- Fuzzy Systems- Generation of Fuzzy Rules and membership functions - Fuzzification and Defuzzification in Neuro-Fuzzy

Systems- Neuro-Fuzzy Identification - Neuro Fuzzy Control- Combination of Genetic Algorithm with Neural Networks- Combination of Genetic Algorithms and Fuzzy Logic

TOTAL: 60 HOURS

TEXT BOOKS:

1 Sivanandam, S. N., & Deepa, S. N. (2011). *Principles of soft computing* (2nd ed.). Wiley India Pvt Limited: New Delhi.
2 Jang, J. S. R., Sun, C. T., & Mizutani, E. (1997). *Neuro-fuzzy and soft computing*. Prentice Hall: New Delhi.

REFERENCE BOOKS:

1 Jang, J. S. R., Sun, C. T., & Mizutani, E. (1997). *Neuro-fuzzy and soft computing*. Prentice Hall: Upper Saddle River, NJ.
2 Yager, R. R., & Zadeh, L. A. (1992). *An introduction to fuzzy logic applications in intelligent systems*. Kluwer Academic Publishers.

WEBSITES:

1 https://archive.nptel.ac.in/courses/106/105/106105173/
2 https://www.cet.edu.in/noticefiles/274_soft%20computing%20LECTURE%20NOTES
3 https://lastmomenttuitions.com/course/soft-computing/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO1	3	-	3	3	3	-	-	-	-	-	2	-	-	-	3	-	1
CO3	3	-	3	3	3	-	-	-	-	-	2	-	-	-	3	-	1
CO4	3	-	3	3	3	-	-	-	-	-	2	-	-	-	3	-	1
CO5	3	-	3	3	3	-	-	-	-	-	2	-	-	-	3	-	1
Average	3	-	3	3	3	-	-	-	-	-	2	-	-	-	3	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU601C **Deep Learning** **5H-3C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Machine learning concepts

COURSE OBJECTIVES(CO):

- Learn about the working principles of backpropagation networks, including the selection of various parameters, and get introduced to different architectures of neural networks.
- Explore the ideas of Adaptive Resonance Theory.
- Discuss the concept of fuzzy logic systems..

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	To understand the knowledge about basic Concepts of Neural Networks.	Understand
CO2	To Understand the concept of fuzziness involved in various systems.	Understand
CO3	To understand comprehensive knowledge of fuzzy sets, Crisp sets, Fuzzy relations and Crisp relations.	Understand
CO4	Apply the concepts of Fuzzy Rule Based System and Defuzzification Methods.	Apply
CO5	Apply and implement the working principles of back propagation networks.	Apply

UNIT I INTRODUCTION TO NEURAL NETWORKS **12 HOURS**

Introduction, Humans and Computers, Organization of the Brain, Biological Neuron, Biological and Artificial Neuron Models, Hodgkin-Huxley Neuron Model, Integrate-and-Fire Neuron Model, Spiking Neuron Model, Characteristics of ANN, McCulloch-Pitts Model, Historical Developments, Potential Applications of ANN.

UNIT II ESSENTIALS OF ARTIFICIAL NEURAL NETWORKS **12 HOURS**

Types of Neuron Activation Function,ANN Architectures, Classification Taxonomy of ANN – Connectivity, Neural Dynamics(Activation and Synaptic), Learning Strategy (Supervised, Unsupervised, Reinforcement),Learning Rules, Types of Application

UNIT III SINGLE LAYER FEED FORWARD NEURAL NETWORKS **12 HOURS**

Introduction, Perceptron Models: Discrete, Continuous and Multi-Category, TrainingAlgorithms: Discrete and Continuous Perceptron Networks, Perceptron Convergence theorem,Limitations of the Perceptron Model, Applications.

UNIT IV MULTILAYER FEED FORWARD NEURAL NETWORKS **12 HOURS**

Credit Assignment Problem, Generalized Delta Rule, Derivation of Backpropagation (BP)Training, Summary of Backpropagation Algorithm, Kolmogorov Theorem, Learning Difficulties and Improvements.

UNIT V CLASSICAL & FUZZY SETS **12 HOURS**

Introduction to classical sets - properties, Operations and relations; Fuzzy sets, Membership,Uncertainty, Operations, properties, fuzzy relations, cardinalities, membership functions.Fuzzy Logic System

Components- Fuzzification, Membership value assignment, development of rule base and decision making system, Defuzzification to crisp sets, Defuzzification methods.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Skorohod, B. A. (2017). *Diffuse algorithms for neural and neuro-fuzzy networks*. Pearson Education.
2. Flasiński, M. (2016). *Introduction to artificial intelligence*. Tata McGraw-Hill Education.
3. Rajasekhara, B., & Rai, B. (2016). *Neural networks, fuzzy logic, genetic algorithms: Synthesis and applications*. PHI Learning.

REFERENCE BOOKS::

1. Das, R. P. (2016). *Neural networks and fuzzy logic* (1st ed.). Tata McGraw-Hill Education
2. Freeman, J. A., & Skapura, D. M. (2016). *Neural networks: Algorithms, applications, and programming techniques*. Pearson Education.
3. Haykin, S. (2016). *Neural networks: A comprehensive foundation*. Prentice Hall.

WEB SITES

1. http://neuralnetworksanddeeplearning.com/chap1.html
2. https://www.tutorialspoint.com/fuzzy_logic/fuzziness_in_neural_networks.htm
3. https://www.philadelphia.edu.jo/academics/kaubaidy/uploads/Syria-FN-2002.pdf
4. https://www.cse.unr.edu/~looney/cs773b/FNNtutorial.pdf
5. https://nptel.ac.in/courses/127105006/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO1	2	-	1	2	-	-	-	1	-	-	2	-	-	-	-	1	-
CO3	-	-	-	3	3	2	-	-	-	-	2	-	-	-	-	1	-
CO4	-	-	-	3	3	-	-	3	-	-	-	-	-	-	-	1	-
CO5	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	1	-
Average	2.5	-	1	2.75	3	2	-	2.3	-	-	2	-	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU601D **J2EE** **5H-3C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Java programming, object-oriented concepts, and web technologies

COURSE OBJECTIVES(CO):

- Understand in-depth concepts of J2EE, including the lifecycle of servlets and JSP.
- Learn communication techniques in Java, such as JDBC, and handle errors and exceptions in web applications.
- Use NetBeans IDE for creating J2EE applications.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	To understand the In-depth concepts of JEE	Understand
CO2	To understand the in-depth Life cycle of servlets and JSP.	Understand
CO3	To understand how to communicate with databases using Java.	Understand
CO4	Make use of NetBeans IDE for creating J2EE Applications.	Apply
CO5	To understand J2EE as an architecture and platform for building and deploying web-based, n-tier, transactional, component-based enterprise applications.	Understand

UNIT I- J2EE OVERVIEW **12 HOURS**

Beginning of Java – Java Byte code – Advantages of Java –J2EE and J2SE. J2EE Multi Tier Architecture – Distributive Systems – The Tier – Multi Tier Architecture – Client Tier Web Tier Enterprise Java Beans Tier Enterprise Information Systems Tier Implementation.

UNIT II - J2EE DATABASE CONCEPTS **12 HOURS**

Data – Database – Database Schema. Introduction- Jdbc Architecture- Types of Drivers. Statement-ResultSet- Read Only ResultSet -Updatable ResultSet--Forward Only ResultSet - Scrollable ResultSet - PreparedStatement—Metadata- Connection Modes-SavePoint- Batch Updations-CallableStatement-BLOB & CLOB.

UNIT III - JAVA SERVLETS **12 HOURS**

Benefits – Anatomy – HTML Forms- HTTP: Request-response, headers, GET, POST -Servlet Lifecycle: init(), service(), destroy()- Requests and responses- Core Servlet API: GenericServlet, ServletRequest, and ServletResponse-HTTP Servlets: HttpServletRequest, HttpServletResponse and HttpServlet-Accessing Parameters.

UNIT IV - ENTERPRISE JAVA BEANS **12 HOURS**

Entity Java Bean - Session Java Bean – Home and Remote Interfaces-Stateless bean- Stateful bean- EJB Exceptions- EJB deployment process Message Driven Bean.

UNIT V – JSP **12 HOURS**

Introduction-. Advantages of JSP over Servlet-JSP Architecture- JSP Lifecycle -Integration of JSP & Servlet API-JSP implicit objects-Use of JSP Tags, Actions and Directives- JSP Scripting

Elements: declaratives-scriptlets-expressions-JSP Actions: Standard Actions-Custom Actions- JSTL & Tag Library-Error Handling in JSP-Using Java Beans in JSP-Defining Custom Tags

TOTAL: 60 HOURS

TEXT BOOKS:

1. Keogh, J. (2018). *The complete reference J2EE* (1st ed.). Tata McGraw-Hill Education.
2. Fields, D. K., & Kolb, M. A. (2017). *Web development with JavaServer Pages* (1st ed.). Manning Publications.
3. Johnson, R. (2017). *J2EE development without EJB* (1st ed.). Wiley DreamTech.

REFERENCE BOOKS::

1. Johnson, R., & Johnson, P. H. (2016). *Expert one-on-one J2EE design and development*. John Wiley & Sons.
2. Perrone, P. J., Chaganti, V. S. R., Krishna, V. S. R., & Schwenk, T. (2016). *J2EE developer's handbook*. Sams Publishing.
3. Bambara, J. J., & others. (2016). *J2EE unleashed* (1st ed.). Tech Media.

WEBSITES

1. https://www.oracle.com/technetwork/java/javaee/appmodel-135059.html
2. https://www.geeksforgeeks.org/introduction-java-servlets/
3. http://media.datadirect.com/download/docs/jdbc/alljdbc/jdbcconnect/j2ee.html
4. https://www.javatpoint.com/ejb-tutorial
5. https://www.javatpoint.com/jsp-tutorial
6. https://nptel.ac.in/courses/106105191/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	2
CO1	2	-	1	3	-	-	-	3	-	-	2	-	-	-	-	-	2
CO3	-	-	-	3	3	2	-	-	-	-	2	-	-	-	-	-	2
CO4	-	-	-	3	3	-	-	3	-	-	-	-	-	-	-	-	2
CO5	-	-	-	3	-	-	-	3	-	-	2	-	-	-	-	-	2
Average	2	-	1	3	3	2	-	3	-	-	2	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VI

24CSU601E **Mobile Computing** **5H-3C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Computer networks, wireless communication, and programming concepts.

COURSE OBJECTIVES(CO):

- Impart knowledge of wireless communication and fundamental principles of mobile computing, including wireless protocols and mobile device architectures.
- Learn about wireless technologies, planning ad-hoc networks, and understand network and transport layers in mobile computing.
- Explore database and service issues in mobile computing.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	To understand concepts of Mobile Communication.	Understand
CO2	To analyze next generation Mobile Communication System.	Analyze
CO3	To understand network and transport layers of Mobile Communication	Understand
CO4	Analyze various protocols of all layers for mobile and ad hoc wireless communication networks.	Analyze
CO5	To understand IP and TCP layers of Mobile Communication.	Understand

UNIT I-WIRELESS COMMUNICATION FUNDAMENTALS **12 HOURS**

Cellular systems- Frequency Management and Channel Assignment- types of handoff and their characteristics, dropped call rates & their evaluation -MAC – SDMA – FDMA –TDMA – CDMA – Cellular Wireless Networks.

UNIT II-TELECOMMUNICATION NETWORKS & WIRLESS LAN **12 HOURS**

Telecommunication systems – GSM – GPRS - Satellite Networks ,Wireless LAN – IEEE 802.11 - Architecture – services – MAC – Physical layer – IEEE 802.11a -802.11b standards – HIPERLAN – Blue Tooth.

UNIT III-MOBILE NETWORK LAYER & TRANSPORT LAYER **12 HOURS**

Mobile IP – Dynamic Host Configuration Protocol - Routing – DSDV – DSR – Alternative Metrics. Traditional TCP, Mobile TCP

UNIT IV-APPLICATION LAYER WAP **12 HOURS**

Model- Mobile Location based services -WAP Gateway –WAP protocols – WAP user agent profile-caching model-wireless bearers for WAP - WML – WML Scripts

UNIT V-DATABASE ISSUES **12 HOURS**

Database Issues : Hoarding techniques, caching invalidation mechanisms, client server computing with adaptation, power-aware and context-aware computing, transactional models, query processing, recovery, and quality of service issues.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Jochen Schiller Schiller, J. (2003). *Mobile communications* (2nd ed.). Pearson Education
2. William Stallings Stallings, W. (2002). *Wireless communications and networks*. Pearson Education.
3. Pahlavan, K., & Krishnamoorthy, P. (2003). *Principles of wireless networks*. PHI Learning.
4. Hansmann, U., Latherer, M. S., & Stober, T. (2003). *Principles of mobile computing*. Springer.

REFERENCE BOOKS:

1. Kamal, R. (2007). *Mobile computing*. Oxford University Press
2. Talukdar, A. K. (2010). *Mobile computing*. Tata McGraw-Hill Education.

WEB SITES:

1. http://www.wirelessdevnet.com/
2. https://www.protocol.com
3. https:/developer.apple.com
4. https:/www.udemy.com
5. https://archive.nptel.ac.in/courses/106/106/106106147/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	3	-	-	-	-	-	-	-	-	3	1	-	-	-	1
CO1	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	1
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO4	-	-	1	2	1	-	-	-	-	-	-	-	-	-	-	-	1
CO5	2	-	2	-	-	1	-	-	-	2	-	2	2	-	-	-	1
Average	1.2	-	1.6	2	1	1	-	-	-	2	-	2.5	1.3	-	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU602A **Generative AI** **5H-3C**

Instruction Hours/week: L:5 T: 0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam:3 Hours

PREREQUISITE:

- Machine learning, neural networks, and programming (Python)

COURSE OBJECTIVES(CO):

- Understand the basic concepts of Generative AI models and applications, including language models and LLM architecture.
- Gain knowledge about GPT (Generative Pre-trained Transformer) and its practical applications.
- Develop a working knowledge of use cases for Generative AI.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the basics of Generative AI Models and Applications.	Understand
CO2	Apply basic principles of AI in solutions that require problem solving.	Apply
CO3	Understand the various concepts of GPT for Artificial Intelligence.	Understand
CO4	Experiment with Future application and emerging Trends	Apply
CO5	Utilize the Use case of Generative AI	Apply

UNIT I: INTRODUCTION TO GENERATIVE AI **12 HOURS**

Definition and scope of Generative AI - Overview of generative models and their applications- Importance of Generative AI in various domains - Brief discussion on ethical considerations and challenges- Machine learning paradigms – Natural Language Processing.

UNIT – II: LANGUAGE MODELS AND LLM ARCHITECTURES **12 HOURS**

Introduction to language models and their role in AI Traditional approaches to language modelling - Characteristics of Large Language Models (LLMs) -Deep learning-based language models and their advantages Overview of popular LLM architectures: RNNs, LSTMs, and Transformers – Pre-processing Techniques for LLMs.

UNIT – III UNDERSTANDING GPT (GENERATIVE PRE-TRAINED TRANSFORMER) 12 HOURS

Introduction to GPT and its significance – Open AI GPT Models - Pre-training and fine-tuning processes in GPT - Overview of GPT variants and their use cases – Applications of GPT – Training strategies of GPT.

UNIT IV CHAT GPT: A PRACTICAL APPLICATION OF GPT 12 HOURS

Introduction to Chat GPT and its purpose – Text generation and completion - Training data and techniques for Chat GPT - Handling user queries and generating responses - Tips for improving Chat GPT's performance – Machine Learning and Deep Learning.

UNIT – V USE CASES OF GENERATIVE AI 12 HOURS

Overview of various domains and industries benefiting from Generative AI - Use cases in natural language processing, content generation, and creative applications - Case studies highlighting successful implementations Potential future applications and emerging trends.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Knight, K., Rich, E., & Nair, B. (2021). *Artificial intelligence (SIE)*. McGraw-Hill Education.
2. Patterson, D. W. (Year). *Introduction to artificial intelligence and expert systems*. Pearson Education.
3. Brako, I. (Year). *PROLOG: Programming for artificial intelligence* (3rd ed.). Pearson

REFERENCE BOOKS:

1 Flasiński, Mariusz. (2018). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.
2. Chandra, S. S. V. (2017). *Artificial intelligence and machine learning*. Kindle Edition.
3. Rich, E., & Knight, K. (2021). *Artificial intelligence*. McGraw-Hill Education.

WEBSITES:

1. https://www.tutorialspoint.com/
2. https://www.geeksforgeeks.org/
3. https://www.slideshare.net/slideshow/
4. https://www.quora.com/
5. https://www.ibm.com/blog/
6. https://www.analyticsvidhya.com/blog/2023/03/
7. https://www.techtarget.com/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO1	2	-	-	2	-	-	-	3	-	-	-	-	-	-	-	-	2
CO3	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	2
CO4	-	-	1	2	-	1	-	3	-	-	-	-	-	-	-	-	2
CO5	-	-	-	2	-	-	-	3	-	-	-	-	-	-	-	-	2
Average	2	-	1	2	-	1	-	3	-	-	-	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU602B **Big Data Analytics** **5H-3C**

Instruction Hours/week: L: 5 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Statistics, programming Python or R and databases

COURSE OBJECTIVES(CO):

- Provide an overview of the growing field of big data analytics and the skills required to design scalable systems for handling large volumes of unstructured data.
- Teach fundamental techniques and tools for designing and analyzing large data sets, including principles for scalability and streaming capabilities.
- Equip students with skills to solve complex real-world problems and support decision-making through big data analytics..

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Explain the motivation for big data systems and identify the main sources of Big Data in the real world.	Understand
CO2	Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.	Understand
CO3	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.	Understand
CO4	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	Understand
CO5	Apply the adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.	Apply

UNIT I INTRODUCTION TO BIG DATA **12 HOURS**

Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases- Characteristics of Big Data Applications – Perception and Quantification of Value -Understanding Big Data Storage – A General Overview of High-Performance Architecture – HDFS – MapReduce and YARN – Map Reduce Programming Model.

UNIT II CLUSTERING AND CLASSIFICATION **12 HOURS**

Advanced Analytical Theory and Methods: Overview of Clustering – K-means – Use Cases – Overview of the Method – Determining the Number of Clusters – Diagnostics – Reasons to Choose and Cautions .- Classification: Decision Trees – Overview of a Decision Tree – The General Algorithm – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Trees in R – Naïve Bayes – Bayes‘ Theorem – Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM 12 HOURS

Advanced Analytical Theory and Methods: Association Rules – Overview – Apriori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Finding Association& finding similarity – Recommendation System: Collaborative Recommendation- Content Based Recommendation – Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY 12 HOURS

Introduction to Streams Concepts – Stream Data Model and Architecture – Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform (RTAP) applications.

UNIT V NO SQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION 12 HOURS

NoSQL Databases : Schema-less Models‖: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores – Tabular Stores – Object Data Stores – Graph Databases Hive – Sharding –- Hbase – Analyzing big data with twitter – Big data for E-Commerce Big data for blogs – Review of Basic Data Analytic Methods using R.

TOTAL: 60 HOURS

TEXT BOOKS:

1 EMC Education Services. (2018). *Data science and big data analytics: Discovering, analyzing, visualizing, and presenting data*. Wiley.

2 Jannach, D., & Zanker, M. (2017). *Recommender systems: An introduction*. Cambridge University Press .

3 Pries, K. H., & Dunnigan, R. (2016). *Big data analytics: A practical guide for managers*. CRC Press.

REFERENCE BOOKS:

1 Lin, J., & Dyer, C. (2015). *Data-intensive text processing with MapReduce* (Vol. 3, No. 1, pp. 1-177). Morgan & Claypool Publishers.

2 Loshin, D. (2016). *Big data analytics: From strategic planning to enterprise integration with tools, techniques, NoSQL, and graph*. Morgan Kaufmann/Elsevier.

WEBSITES

1. https://www.ibm.com/analytics/big-data-analytics

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO1	-	-	-	3	-	-	-	1	-	-	-	-	-	-	-	1	-
CO3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-	1	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-	-	-	2	1	-
Average	2	-	-	2	-	-	-	1	-	2	-	-	-	1	2	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSUA601 **Entrepreneurship** **6H-6C**

Instruction Hours/week: L: 6 T: 0 P: 0 **Marks:** Internal**: 40** External**: 60 T**otal**: 100**

End Semester Exam:3 Hours

PREREQUISITE:

- Concepts and management principles

COURSE OBJECTIVES(CO):

- Explain entrepreneurship concepts and how entrepreneurs handle business situations.
- Analyze various aspects, scope, and challenges of entrepreneurial ventures, and understand the objectives of entrepreneurs.
- Discuss venture development steps, new trends in entrepreneurship, and analyze the role of government in entrepreneurship development.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Categorize the foundation of Entrepreneurship Development and its theories.	Analyze
CO2	Learners will explore entrepreneurial skills and management function of a company with special reference to SME sector	Understand
CO3	Identify the type of entrepreneur and the steps involved in an entrepreneurial venture.	Remember
CO4	Apply the new trends in entrepreneurship& starting a venture and to explore marketing methods	Apply
CO5	Examine the Entrepreneurship Development and Government	Apply

UNIT I INTRODUCTION TO ENTREPRENEURSHIP **15 HOURS**

Introduction - Entrepreneur - meaning- Importance-Qualities, nature, types, traits, culture, similarities and economic and differences between Entrepreneur and Intrapreneur. Entrepreneurship development- its importance- Role of Entrepreneurship -Entrepreneurial environment

UNIT II EVOLUTION OF ENTREPRENEURS **15 HOURS**

Entrepreneurial promotion. Training and developing motivation: factors - mobility of Entrepreneurs - Entrepreneurial change - occupational mobility-factors in mobility - Role of consultancy organizations in promoting Entrepreneurs-Forms of business for Entrepreneurs.

UNIT III CORPORATE ENTREPRENEURSHIP **15 HOURS**

Creating and starting the venture - Steps for starting a small industry - selection of types of organization - International entrepreneurship opportunities. Need for corporate entrepreneurship, domain of corporate entrepreneurship, conditions favourable for Corporate entrepreneurship, benefits of Corporate entrepreneurship.

UNIT IV FAMILY AND NON FAMILY ENTREPRENEUR & WOMEN ENTREPRENEURS **14 HOURS**

Managing, growing and ending the new venture - Family and Non Family Entrepreneur & Women entrepreneurs: Role of Professionals, Professionalism vs family entrepreneurs, Role of Woman entrepreneur, Factors influencing women entrepreneur, Challenges for women entrepreneurs, Growth and development of women entrepreneurs in India

UNIT V ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT ROLE **13 HOURS**

Entrepreneurship Development and Government: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available. Women Entrepreneurs Reasons for low / no women Entrepreneurs their Role, Problems and Prospects.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Desai, V. (2009). *Dynamics of entrepreneurial development and management*. Himalaya Publishing House.

2 Srinivasan, N. P., & Gupta, G. P. (2020). *Entrepreneurial development*. Sultanchand & Sons

3 Burns, P. (2020). *Corporate entrepreneurship and innovation*. Bloomsbury Academic.

REFERENCE BOOKS::

1 Unni. (2021). *Women entrepreneurship in Indian middle class*. Orient Blackswan Pvt. Ltd.

2 Kumar, S. A., Poornima, S. C., Abraham, M. K., & Jayshree, K. (2021). *Entrepreneurship development* (1st ed.). New Age International Pvt. Ltd.

WEBSITES

1 https://www.udemy.com/topic/cyber-security/
2 https://www.coursera.org/courses?query=cybersecurity
3 https://www.simplilearn.com/cyber-security
4 https://onlinecourses.swayam2.ac.in/cec21_ge10/preview

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO1	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	-	1
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	1
CO4	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-	1
CO5	-	-	-	-	3	-	-	-	-	-	-	-	2	-	-	-	1
Average	1	-	-	3	3	-	2	2	-	-	-	-	2	-	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU612A **Generative AI-Practical** **5H-2C**

Instruction Hours/week: L:0 T:0 P:5 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

- Generative AI concepts and familiarity with programming in Python

COURSE OBJECTIVES(CO):

- Gain a historical perspective of AI and its foundational concepts.
- Understand basic AI principles related to problem-solving, inference, perception, knowledge representation, and learning.
- Investigate AI applications in intelligent agents, expert systems, artificial neural networks, and other machine learning models.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	Understand
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	Apply
CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	Understand
CO4	Demonstrate proficiency developing applications in an 'AI language', expert system shell,or data mining tool.	Understand
CO5	Demonstrate proficiency in applying scientific method to models of machine	Understand

List of Programs

1. Use OpenAI’s GPT-2 model to write a short story based on a given prompt?
2. Apply artistic style transfer to your photos using the Neural-Style-Transfer tool in Python
3. Create a dataset of GAN-generated images using the DCGAN implementation in TensorFlow
4. Use the Magenta library to create a short piece of music
5. Interact with and analyze responses from a conversational AI model using the Rasa open-source framework
6. Use the Poetry tool from the Hugging Face Transformers library to write a poem
7. Enhance the quality of low-resolution images using the OpenCV and DAIN (Depth-Aware Video Frame Interpolation) tool
8. Compare AI-generated news articles with human-written ones using the GPT-2 model from Hugging Face

9. Create unique AI-generated artwork using the DeepArt or DeepDream algorithms available in Python libraries
10. Use TensorFlow Hub's Style Transfer model to create a new artwork from your existing photos

TOTAL: 60 HOURS

TEXT BOOKS:

1 Rich, E., Knight, K., & Nair, B. (Year). *Artificial intelligence*. Tata McGraw-Hill Education. ISBN 978-0-07-008770-5.

2 Kausik, S. (Year). *Artificial intelligence*. Cengage Learning. ISBN 978-81-31-1099-5

3 Padhy, N. P. (Year). *Artificial intelligence and intelligent systems*. Oxford University Press.

4 Russell, S., & Norvig, P. (Year). *Artificial intelligence: A modern approach*. Publisher. ISBN 0-13-103805-2

WEBSITES:

1 https://www.udemy.com/course/road-map-to-artificial-intelligence-and-machine-learning

2 https://ai.google/education/

3 https://www.iiitd.ac.in/iiit-delhi-pgdcsai/

4 https://www.marketingaiinstitute.com/blog/3-free-online-artificial-intelligence-courses-

taught-by-google-and-stanford-experts

5 https://www.mygreatlearning.com/ai/free-courses

6 https://www.classcentral.com/subject/ai

7 https://dlabs.ai/blog/top-10-free-machine-learning-and-artificial-intelligence-courses/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	2
CO1	3	1	2	2	1	1		2	-	-	-	1	-	-	-	-	2
CO3	3	-	2	-	-	-	-	-	-	-	-	1	-	-	-	-	2
CO4	3	1	-	2	-	-	-	2	-	-	-	-	-	1	-	-	2
CO5	3	-	2	2	-	-	-	2	-	-	-	-	-	-	1	-	2
Average	3	1	2	2	1	1	-	2	-	-	-	1	-	1	1	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU612B **Big Data Analytics - Practical** **5H-2C**

Instruction Hours/week: L:0 T:0 P:5 **Marks:** Internal**:40** External**:60** Total**:100**
End Semester Exam: 3 Hours

PREREQUISITE:

- Big data concepts and data analysis tools and programming languages like Python or R.

COURSE OBJECTIVES(CO):

- Provide an overview of big data analytics and teach how to design scalable systems for handling and analyzing large volumes of unstructured data.
- Learn fundamental techniques and tools for big data analytics, focusing on scalability and streaming capabilities.
- Develop skills to solve complex real-world problems and support decision-making through big data analytics.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Explain the motivation for big data systems and identify the main sources of Big Data in the real world.	Understand
CO2	Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.	Understand
CO3	Implement several Data Intensive tasks using the Map Reduce Paradigm	Understand
CO4	Apply the key issues in big data management and its associated applications in intelligent business and scientific computing.	Apply
CO5	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	Understand

List of Programs

1. Implement a quicksort using scala.
2. Implement an auction service using scala.
3. Write a scala function to perform any 10 arithmetic operations.
4. Write a program to find the factorial of a given number using recursion.
5. Write a program for string manipulations.
6. Write a program for alphabetic order arrangement of a set of names.
7. Write a program for student records using scala list.
8. Implement any 5 map methods for maintaining customer details.
9. Implement employee records using Files
10. Write a program to copy the files using command line arguments

TOTAL: 60 HOURS

TEXT BOOKS:

1. EMC Education Services. (2018). Data science and big data analytics: Discovering, analyzing, visualizing, and presenting data. Wiley.
2 Basens, B. (2017). Analytics in a big data world: The essential guide to data science and its applications. Wiley.
3 Jannach, D., & Zanker, M. (2017). Recommender systems: An introduction. Cambridge University Press.
4 Pries, K. H., & Dunnigan, R. (2016). Big data analytics: A practical guide for managers. CRC Press.
5 Loshin, D. (2016). Big data analytics: From strategic planning to enterprise integration with tools, techniques, NoSQL, and graph. Morgan Kaufmann/Elsevier.
6 Lin, J., & Dyer, C. (2015). Data-intensive text processing with MapReduce (Vol. 3, No. 1, pp. 1-177). Morgan & Claypool Publishers.

WEBSITES:

1 https://people.cs.ksu.edu/~schmidt/705a/Scala/scala_tutorial.pdf
2 https://www.tutorialspoint.com/scala/scala_tutorial.pdf
3 https://people.cs.ksu.edu/~schmidt/705a/Scala/Programming-in-Scala.pdf
4 https://www.cs.rice.edu/~javaplt/411/12-fall/Lectures/ScalaBasics.pdf

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	2	-	-	-	-	1	2	-
CO1	3	2	-	2	3	-	-	3	-	2	2	-	-	-	-	2	-
CO3	3	-	-	2	3	-	-	3	-	2	2	-	-	-	-	2	-
CO4	3	-	1	-	3	-	-	3	-	-	-	-	1	-	-	2	-
CO5	3	2	-	-	3	-	-	3	-	-	-	-	-	-	1	2	-
Average	3	2	1	2	3	-	-	3	-	2	2	-	1	-	1	2	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VI

24CSU691	**Project**	**9H-6C**
Instruction Hours/week: L:0 T: 0 P:9	**Marks:** Internal**:40** External**:60 T**otal**:100**	
	End Semester Exam:3 Hours	

Semester-VII

24CSU701 **Internet of Things** **6H-5C**

Instruction Hours/week: L:6 T: 0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Computer networks, programming, and sensors

COURSE OBJECTIVES(CO):

- The objective of this course is to provide the student with the fundamental knowledge and skills to understand smart objects and IoT Architecture.
- The student will learn various tools of IoT related Protocols.
- To build simple IoT systems using open hardware such as Arduino and Raspberry Pi.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the different real world IoT applications and its functions.	Understand
CO2	Apply of IoT Protocols in Security and Optimizing Networks.	Apply
CO3	Understand how to use Routing and Lossy Network Protocol and Service Protocols.	Understand
CO4	Understand how to manage structured and unstructured data in data analytics framework.	Understand
CO5	Apply the concepts of IoT in various smart systems.	Apply

UNIT I – FUNDAMENTALS OF IOT **15 HOURS**

Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT Models – Simplified IoT Architecture and Core IoT Functional Stack – Fog, Edge and Cloud in IoT – Functional Blocks of an IoT Ecosystem – Sensors, Actuators, and Smart Objects – Open Hardware Platforms for IoT

UNIT II – IOT PROTOCOLS - I **15 HOURS**

IoT Access Technologies: Physical and MAC Layers, Topology and Security of IEEE 802.15.4, 1901.2a, 802.11ah and LoRaWAN – Network Layer: Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo.

UNIT III – IOT PROTOCOLS – II **14 HOURS**

Routing over Low Power and Lossy Networks (RPL) – Application Transport Methods: Application Layer Not Present, Supervisory Control and Data Acquisition (SCADA) – Application Layer Protocols: CoAP and MQTT – Service discovery – mDNS.

UNIT IV- CLOUD, FOG, DATA ANALYTICS FRAMEWORK **14 HOURS**

Cloud and Fog Topologies – Cloud Services Model – Fog Computing – Structured versus Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL

Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Security in IoT – CISCO IoT System – IBM Watson IoT Platform.

UNIT V- IOT APPLICATIONS **14 HOURS**

Smart and Connected Cities: Street Layer, City Layer, Data Center Layer and Services Layer, Street Lighting, Smart Parking Architecture and Smart Traffic Control – Smart Transportation – Connected Cars.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., & Henry, J. (2017). *IoT fundamentals: Networking technologies, protocols, and use cases for Internet of Things*. Cisco Press.

2 Lea, P. (2018). *Internet of things for architects*. Packt.

3 Höller, J., Tsiatsis, V., Mulligan, C., Karnouskos, S., Savva, S., & Boyle, D. (2014). *From machine-to-machine to the Internet of Things: Introduction to a new age of intelligence*. Elsevier.

REFERENCE BOOKS:

1 Hersent, O., Boswarthick, D., & Elloumi, O. (2012). *The Internet of things: Key applications and protocols*. Wiley.

2 Uckelmann, D., Harrison, M., & Michahelles, F. (Eds.). (2011). *Architecting the Internet of Things*. Springer.

3 Bahga, A., & Madisetti, V. (2015). *Internet of things: A hands-on approach*. Universities Press.

WEBSITES

1. https://www.arduino.cc/
2. https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	1	-
CO1	-	-	-	3	3	-	-	2	-	-	-	-	-	-	-	1	-
CO3	1	-	-	3	3	-	-	2	-	-	-	-	-	-	-	1	-
CO4	-	-	1	3	3	1	-	-	-	-	-	-	-	-	-	1	-
CO5	-	-	-	3	3	1	-	-	-	-	-	-	-	-	-	1	-
Average	1	-	1	3	3	1	-	2	-	-	-	-	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VII

24CSU702 **Advanced Java Programming** **6H-5C**

Instruction Hours/week: L:6 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Object-oriented concepts

COURSE OBJECTIVES(CO):

- Utilize advanced features of the Java language to build and compile robust enterprise-grade applications.
- Design and develop GUI applications using Swings and Servlets.
- Provide a strong foundation in Java Beans, Struts, and JSON for manipulating and storing data effectively.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand how to write sophisticated Java Applications	Understand
CO2	Make use of the Java Language for writing well -organised , complex computer programs with both command -line and graphical user interfaces	Apply
CO3	Apply the database through Java programs, using Java Database Connectivity (JDBC)	Apply
CO4	Develop dynamic web pages, using Servlets	Apply
CO5	Understand use of Java Server Programming	Understand

UNIT I – SWING **14 HOURS**

Swing: Need for swing components, Difference between AWT and swing, Components hierarchy, Panes, Swing components: Jlabel, JTextField and JPasswordField, JTextAres, JButton, JCheckBox, JRadioButton, JComboBox, JList, JTree, JColorChooser, Dialogs.

UNIT II – JDBC **14 HOURS**

JDBC: Introduction, JDBC Drivers, JDBC Architecture, JDBC Classes and Interfaces, Making a Connection, Execute SQL Statement, SQL Statements - Simple Statement, Atomic Transaction, Pre-compiled Statement, SQL Statements to Call Stored Procedures. Retrieving Result - Getting Database Information, Scrollable and Updatable ResultSet, Scrollability Type, Concurrency Type, Examples. Result Set Metadata.

UNIT III - SERVLETS & JSP **14 HOURS**

Servlets: Server-side Java, Advantages Over Applets, Servlet Alternatives, Servlet Strengths, Servlet Architecture, Servlet Life Cycle, GenericServlet, HttpServlet, First Servlet, Passing

Parameters to Servlets, Retrieving Parameters, Server-Side Include, Cookies, Filters, Problems with Servlet.

UNIT IV - JSP **15 HOURS**

Introduction and Marketplace, JSP and HTTP, JSP Engines, JSP Syntax, Components, Beans, Session Tracking, Users Passing Control and Data between Pages, Sharing Session and Application Data.

UNIT V - NETWORK PROGRAMMING **15 HOURS**

Basic Networking: Java and the Net, Java Networking Classes and Interfaces, Getting Network Interfaces, Getting Interface Addresses, Getting Interface Properties, URL, Creating URL, Parsing URL, Web Page Retrieval, URL Connection, Http URL Connection, URL Encoder/URL Decoder, Proxy, Using Command Line Arguments, Using System Properties, Using Proxy Class, Proxy Selector**.**

TOTAL: 72 HOURS

TEXT BOOKS:

1. Roy, U. K. (2015). *Advanced Java programming*. Oxford University Press.
2. McFedries, P. (2018). *Web coding & development all-in-one for dummies*. Wiley.
3. Connolly, R., & Hoar, R. (2017). *Fundamentals of web development*. Pearson.

REFERENCE BOOKS:

1. Sklar, J. (2015). *Principles of web design* (6th ed.). Course Technology.
2. Duckett, J. (2014). *HTML and CSS: Design and build websites*. Wiley.

WEBSITES:

1. http://www. freeCodeCamp Guides.com/
2. http://www. Codrops CSS Reference/
3. https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide.
4. http://www.w3schools.com.
5. https://nptel.ac.in/courses/106105084/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	2	1	-	-	-	-	-	-	-	-	-	-	-	-	2
CO1	-	-	2	-	-	-	3	-	-	2	-	-	-	-	-	-	2
CO3	-	-	-	-	-	1	-	-	-	.2	-	-	-	-	-	-	2
CO4	-	-	-	-	-	-	3	1	-	-	-	-	-	-	-	-	2
CO5	-	-	-	-	-	-	3	-	1	-	1	-	-	-	-	-	2
Average	2	-	2	1	-	1	3	1	1	2	1	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VII

24CSUA701 **Statistical Computing** **6H-5C**

Instruction Hours/week: L:6 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- statistics and proficiency in a programming language

COURSE OBJECTIVES(CO):

- Develop statistical skills in sampling, hypothesis testing, and understanding statistical techniques as powerful tools in scientific computing.
- Enable students to gain knowledge about tests for randomness, including the run test, and understand the concepts of the sign test and Wilcoxon Signed Rank test.
- Learn the chi-square test for independence and grasp the concepts of quality, process, and product control using control chart techniques and sampling inspection plans.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the principles of census and sample surveys and to become competent for conducting sample surveys.	Understand
CO2	To Utilize information about the population on the basis of a random sample taken from that population and also to choose an appropriate test procedure under the test of significance	Apply
CO3	Compare the difference between parametric and non-parametric tests**.**	Understand
CO4	Develop and understand the difference between one way and two-way ANOVA.	Apply
CO5	To know about the basic of Statistical Quality Control and its tools	Understand

UNIT I **14 HOURS**

Sample Survey Basic Concept of Sample Survey - Census and Sample Survey - Population and Sample – Parameter and Statistic – Preparation of Questionnaire and Schedules – Principle steps in Sample Survey – Pilot survey – Sampling Distribution - Standard Error - Sampling and Non-sampling Errors – Advantages over Complete Enumeration – Limitations of Sampling.

UNIT II **14 HOURS**

Test of Significance Sampling Distribution - Standard Error – Test of Hypothesis: Simple Hypothesis, Null Hypothesis and Alternative Hypothesis – Test of Significance: Large Sample Test based on Mean, Differences of Means, Proportion and Difference of Proportions - Small Sample Test based on Mean, Difference of Means, Paired ‘t’ Test.

UNIT III **14 HOURS**

Analysis of Variance F-test – Analysis of Variance (ANOVA) – Test procedure for One way and Two way classifications – Simple Problems.

UNIT IV **15 HOURS**

Introduction of Non-parametric Test – Difference between Non-parametric and Parametric Test – Advantage and Limitations of Non-parametric Tests – Comparison of One and Two Populations Test for Randomness – Run Test – Test for Rank Correlation Coefficient – Sign Test. Comparison of Two Populations Median Test – Mann Whitney U Test.

UNIT V **15 HOURS**

Meaning and Concepts of Quality – Quality of Design – Standardization for Quality – Quality Movement – Quality Management – Quality of Conformance – Need for Statistical Quality Control Techniques in Industry – Causes of Quality Variations – Process Control and Product Control – Statistical basis for Control Charts – Uses of Shewart's Control Charts - R Charts - Charts for Defectives p and np Charts.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Gupta S. P., (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.

2 Gupta S. C., (1974), Statistical Quality Control, Khanna Publishing Co, New Delhi.

3 Mahajan M., (2009), Statistical Quality Control, Dhanpat Rai & Co. (P) Ltd., Educational & Technical Publishers, New Delhi.

4 Pillai R.S.N., and Bagavathi V., (2002). Statistics, S. Chand & Company Ltd, New Delhi

REFERENCE BOOKS:

1 Gupta S. C and Kapoor V. K., (2007), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.

2 Montgomery D., (2011), Statistical Quality Control, Wiley India Pvt. Ltd, New Delhi.

3 Leavenworth G., (2015), Statistical Quality Control, Mc - Graw Hill Education Pvt. Ltd., New Delhi.

WEBSITES:

1 http://www.ing.unipi.it/lanzetta/stat/Chapter20.pdf

2 https://www.statisticshowto.com/parametric-and-non-parametric-data/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	1
CO1	3	-	3	-	-	2	-	-	-	1	-	-	-	-	-	-	1
CO3	-	-	3	2	-	-	-	1	-	-	-	-	-	-	-	-	1
CO4	3	-	3	2	-	-	-	1	-	-	-	-	-	-	-	-	1
CO5	3	-	3	2	1	2	-	-	-	-	-	-	-	-	-	-	1
Average	3	-	3	2	1	2	-	1	-	1	-	-	-	-	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VII

24CSU711 Artificial Intelligence- Practical 6H-3C

Instruction Hours/week: L: 0 T: 0 P: 6 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hour

PREREQUISITE:

- Programming and fundamental concepts of artificial intelligence and machine learning.

COURSE OBJECTIVES(CO):

- Gain a historical perspective of AI and understand its foundational principles for problem-solving, inference, perception, knowledge representation, and learning.
- Investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks, and other machine learning models.
- Experience and experiment with AI development tools, including an AI language, expert system shells, data mining tools, and machine learning models for simulation and analysis.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	**Course Outcomes**	**Blooms Level**
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	Understand
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	Apply
CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	Understand
CO4	Demonstrate proficiency developing applications in an 'AI language', expert system shell,or data mining tool.	Understand
CO5	Demonstrate proficiency in applying scientific method to models of machine	Understand

List Of Programs

Write the following programs using PROLOG

1. Program to read address of a person using compound variable.
2. Program of fun to show concept of cut operator.
3. Program to count number of elements in a list.
4. Program to find member of a set.
5. Program to concatenate two sets.
6. Program to find permutation of a set.
7. Program to demonstrate family relationship.
8. Write a program to solve Nqueens problem
9. Solve any problem using depth first search.

10. Solve any problem using best first search.
11. Solve traveling salesman problem.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Rich, E., Knight, K., & Nair, S. (Year). *Artificial intelligence*. Tata McGraw-Hill Education.

2 Kausik, S. (Year). *Artificial intelligence*. Cengage Learning.

3 Padhy, N. P. (Year). *Artificial intelligence and intelligent systems*. Oxford University Press.

4 Russell, S., & Norvig, P. (Year). *Artificial intelligence: A modern approach*. Publisher.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO1	-	-	-	-	-	-	-	1	-	3	-	-	1	-	-	-	2
CO3	3	-	-	-	1	-	-	-	-	-	-	-	-	-	-	-	2
CO4	-	-	2	3	-	2	-	-	-	3	-	-	-	-	-	-	2
CO5	3	-	-	3	-	2	-	-	-	3	-	-	-	-	-	-	2
Average	3	-	2	2	1	2	-	1	-	2	-	-	1	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

.

Semester-VII

23CSU712 **Advanced Java Programming - Practical** **6H-3C**

Instruction Hours/week: L: 0 T: 0 P: 6 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Java programming skills and familiarity with object-oriented concepts.

COURSE OBJECTIVES(CO):

- Explore advanced topics in Java programming for problem-solving and building robust enterprise-grade applications using advanced features of the Java language.
- Provide a sound foundation in the concepts, practices, and precepts relevant to the industry and business.
- Design and develop GUI applications using Swing, and enhance knowledge to manipulate and store data effectively.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts related to Java Technology	Understanding
CO2	Understand and explore use of Java Server Programming	Understanding
CO3	Apply dynamic Web pages, using servlets and JSP	Applying
CO4	Build learn skill to develop real time applications	Applying
CO5	Apply to access to database through JAVA Programs, using Java Database Connectivity (JDBC)	Applying

List of Programs

1. Implementation of Multi-threading and Exception handling concepts
2. Write a program to read, write and copy a file using byte streams.
3. Write a program to read, write and copy a file using character streams.
4. Develop a program using AWT to display the personal detail of an employee.
5. Develop a banking system using Swing.
6. Write a program to handle Mouse and Key events.
7. Implement TCP/IP protocol for message communication.
8. Implement UDP protocol for message communication.
9. Using JDBC develop a student information system.
10. Implement client/server communication using servlets.
11. Develop a web page using JSP.
12. Implementation of RMI.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Roy, U. K. (2015). *Advanced Java programming*. Oxford University Press.

2 McFedries, P. (2018). *Web coding & development all-in-one for dummies*. Wiley.

3 Connolly, R., & Hoar, R. (2017). *Fundamentals of web development*. Pearson.

4 Duckett, J. (2014). *HTML and CSS: Design and build websites*. Wiley.

5 Powell, T. A., & Schneider, F. (2013). *JavaScript: The complete reference* (3rd ed.). Tata McGraw-Hill.

WEBSITES:

1 http://www. freeCodeCamp Guides.com/

2 http://www. Codrops CSS Reference/

3 https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide.

4 http://www.w3schools.com.

5 https://nptel.ac.in/courses/106105084/

6 https://freevideolectures.com/blog/webdesign-online-courses-and-video-lectures/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-	2
CO1	3	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	2
CO3	-	3	-	-	2	1	-	1	-	-	-	-	-	-	-	-	2
CO4	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	2
CO5	3	3	-	2	-	1	-	1	-	-	-	-	-	-	-	-	2
Average	3	3	-	2	2	1	-	1	-	-	-	-	-	-	-	-	2

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VIII - A

24CSU801 **MongoDB** **6H-5C**

Instruction Hours/week: L:6 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Database concepts and Proficiency in a Programming language

COURSE OBJECTIVES(CO):

- Provide students with the knowledge and skills to master the NoSQL database MongoDB.
- Write MongoDB programs using the JavaScript shell and understand MongoDB's architecture, including defining objects, loading data, querying data, and performance tuning.
- Define, compare, and use MongoDB in relation to other RDBMS systems, and perform query optimization, replication, and sharding in MongoDB

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand needed to develop Applications on mongoDB	Understand
CO2	Explain to run Applications on mongoDB	Understand
CO3	Apply MongoDB programs from JavaScript shell.	Apply
CO4	Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Understand
CO5	Understand replication and sharding in MongoDB	Understand

UNIT I - GETTING STARTED **15 HOURS**

A database for the modern web – MongoDB through the JavaScript shell – Writing programs using MongoDB- MongoDB Document Model.

UNIT II - APPLICATION DEVELOPMENT **15 HOURS**

Document-oriented data – Principles of schema design – Designing an e-commerce data model – Nuts and bolts on databases, collections, and documents. Queries and aggregation – E-commerce queries – MongoDB’s query language – Data Types in MongoDB -Aggregating orders – Aggregation in detail.

UNIT III - UPDATES, ATOMIC OPERATIONS, AND DELETES **15 HOURS**

A brief tour of document updates – E-commerce updates – Atomic document processing – MongoDB updates and deletes. Indexing and query optimization: Indexing theory – Indexing in practice.

UNIT IV – REPLICATION **14 HOURS**

Overview – Replica sets – Master-slave replication – Drivers and replication. Shading: Overview – A sample shard cluster – Querying and indexing a shard cluster – Choosing a shard key.

UNIT V - DEPLOYMENT AND ADMINISTRATION **13 HOURS**

Deployment – Monitoring and diagnostics – Maintenance – Performance troubleshooting

TOTAL: 72 HOURS

TEXT BOOKS:

1 Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.

2 Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O‟Reilly Media Inc.

3 Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd

4 Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O‟Reilly Media Inc.

REFERENCE BOOKS:

1 David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485

2 Shakuntala Gupta Edward. 2016. Practical Mongo DB , 2nd edition, Apress Publications, 2016, ISBN 1484206487

WEBSITES:

1 http://www.mongodb.org/about/production-deployments/

2 http://docs.mongodb.org/ecosystem/drivers/

3 http://www.mongodb.org/about/applications/

4 http://www.mongodb.org/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	3	2	-	-	-	-	1	-	-	-	-	-	1	-
CO1	3	-	-	3	2	-	-	-	-	1	-	-	-	-	-	1	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	1	-
CO4	3	-	-	3	2	-	-	1	-	1	-	-	-	-	-	1	-
CO5	3	-	-	3	2	1	-	1	-	-	-	-	-	-	-	1	-
Average	3	-	-	3	2	1	-	1	-	1	-	-	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VIII - A

24CSU802 **Data Visualization** **6H-5C**

Instruction Hours/week: L:6 T:0 P: 0 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Data Analysis

COURSE OBJECTIVES(CO):

- Impart basic knowledge about data visualization techniques and recent trends in the field.
- Understand the working of various data analysis tasks and how they relate to data visualization.
- Learn about data sets in visualization and the fundamentals of design issues in visual perception.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand various data visualization techniques in order to provide new insight.	Understand
CO2	Apply appropriate data visualization techniques to provide trends/insights for the given dataset.	Apply
CO3	Apply visualization tools / techniques for various data analysis tasks.	Apply
CO4	Analyze the application context for given data set, Design the information Dashboard for access information based on user criteria.	Analyze
CO5	Evaluate the design issues, assessment of needs, critical design practices.	Evaluate

UNIT I **15 HOURS**

Introduction to Data Visualization: Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar) Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics). Making use of HTML5 CANVAS, Integrating SVG.

UNIT II **15 HOURS**

Basics of Data Visualization – Tables: Reading Data from Standard text files (.txt, .csv, XML), Displaying JSON content Outputting Basic Table Data (Building a table, Using Semantic Table, Configuring the columns), Assuring Maximum readability (Styling your table, Increasing readability, Adding dynamic Highlighting), Including computations, Using data tables library, relating data table to a chart.

UNIT III **14 HOURS**

Visualizing data Programmatically: Creating HTML5 CANVAS Charts (HTML5 Canvas basics, Linear interpolations, A Simple Column Chart, Animations), Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations).

UNIT IV **14 HOURS**

Introduction to D3.js: Getting setup with D3, Making selections, changing selection's attribute, Loading and filtering External data : Building a graphic that uses all of the population distribution data, Data formats you can use with D3, Creating a server to upload your data, D3's function for loading data, Dealing with Asynchronous requests, Loading and formatting Large Data Sets.

UNIT V **14 HOURS**

Advanced Data Visualization: Making charts interactive and Animated: Data joins, updates and exits, interactive buttons, Updating charts, Adding transactions, using keys Adding a Play Button: wrapping the update phase in a function, Adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", WROX

2 Ritchie S. King, Visual story telling with D3" Pearson

3 Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.

REFERENCE BOOKS:

1 Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014

2 Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013.

WEBSITES:

1. https://www.tableau.com/learn/articles/data-visualization
2. https://www.ibm.com/in-en/topics/data-visualization

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2		2	-	-	-	-	3	-	-	-	-	-	1	-
CO1	3	-	2	2	2	-	-	-	-	3	-	-	-	-	-	1	-
CO3	-	-	-	2	-	-	-	3	-	-	-	-	-	-	-	1	-
CO4	3	-	2	2	2	-	1	-	-	3	-	-	-	-	-	1	
CO5	3	-	2	2	2	1	-	-	1	-	-	-	-	-	-	1	-
Average	3	-	2	2	2	1	1	3	1	3	-	-	-	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VIII - A

24CSUA801 **Organizational Behaviour** **6H-3C**

Instruction Hours/week: L:6 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Management Principles

COURSE OBJECTIVES(CO):

- Understand the basic concepts of organizational behavior and individual behavior traits for effective performance.
- Develop perceiving skills for assessing situations and communicating ideas effectively.
- Learn how to perform in teams, manage power, politics, and conflict, and recognize the importance of organizational culture and change.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Analyse organizational behavior issues in the context of the organizational behavior theories and concepts.	Analyze
CO2	Apply the behavior of the individuals and groups in organization and manage the stress.	Apply
CO3	Analyse manage team, power, politics and conflict arising between the members	Analyze
CO4	Understand how organizational change and culture affect the working relationship within organizations	Understand
CO5	Understand and exhibit the communication skills to convey the thoughts and ideas of case analysis to the individuals and group.	Understand

UNIT I: ORGANIZATION BEHAVIOUR : INTRODUCTION **15 HOURS**

Organization Behavior: Meaning and definition - Fundamental concepts of OB - Contributing disciplines to the OB field – OB Model - Significance of OB in the organization success - Challenges and Opportunities for OB.

UNIT II : BEHAVIOUR AND PERSONALITY **15 HOURS**

Attitudes – Sources - Types - Functions of Attitudes. Values – Importance - Types of Values. Personality – Determinants of personality- Theories of Personality - psycho-analytical, social learning, job-fit, and trait theories.

UNIT III: PERCEPTION **15 HOURS**

Perception – factors influencing perception - Person Perception – Attribution Theory – Frequently Used Shortcuts in Judging Others- Perceptual Process- Perceptual Selectivity - Organization Errors of perception – Linkage between perception and Decision making.

UNIT IV: GROUP AND STRESS MANAGEMENT **14 HOURS**

Foundation of Group Behavior - Types of Groups - Stages of Group Development - Group Norms - Group Cohesiveness – Stress – Causes of stress – Effects of Occupational Stress- Coping Strategies for Stress.

UNIT V: ORGANIZATION CULTURE AND CHANGE **13 HOURS**

Organizational culture- Characteristics of Culture- Types of Culture – Creating and Maintaining an Organizational Culture. Organizational change – Meaning - Forces for Change - Factors in Organizational Change - Resistance to change- Overcoming resistance to change.

TOTAL: 72 HOURS

WEBSITE

1 https://nptel.ac.in/courses/110/105/110105033/

.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	2	-	-	-	-	-	-	-	-	-	-	1	-
CO1	3	-	-	2	-	-	2	-	1	-	-	-	-	-	-	1	-
CO3	-	-	-	2	2	-	2	-	-	-	-	-	-	-	-	1	-
CO4	3	-	2	-	-	-	-	1	-	-	-	1	-	-	-	1	-
CO5	-	1		-	-	-	-	-	-	-	-		1	1	-	1	-
Average	3	1	2	2	2	-	2	1	1	-	-	1	1	1	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

24CSU811 **MongoDB - Practical** **6H-3C**

Instruction Hours/week: L: 0 T:0 P:6 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Database concepts and Proficiency in a Programming language

Course Objectives(CO):

- Write MongoDB programs using the JavaScript shell and understand MongoDB's architecture, including defining objects, loading data, querying data, and performance tuning.
- Define, compare, and use MongoDB in relation to other RDBMS systems, and perform query optimization, replication, and sharing in MongoDB.
- Learn the fundamentals of MongoDB configuration, backup methods, monitoring, and operational strategies.

Course Outcomes(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Develop Applications on Mongo DB	Understand
CO2	Understand to run Applications on Mongo DB	Understand
CO3	Apply MongoDB programs from JavaScript shell.	Apply
CO4	Understand the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Understand
CO5	Apply the query optimization in MongoDB and replication and sharing in MongoDB	Apply

List of Programs

Structure of 'restaurants' collection :

{ "address": { "building": "1007", "coord": [-73.856077, 40.848447], "street": "Morris Park Ave", "zipcode": "10462" }, "borough": "Bronx", "cuisine": "Bakery", "grades": [{ "date": { "$date": 1393804800000 }, "grade": "A", "score": 2 }, { "date": { "$date": 1378857600000 }, "grade": "A", "score": 6 }, { "date": { "$date": 1358985600000 }, "grade": "A", "score": 10 }, { "date": { "$date": 1322006400000 }, "grade": "A", "score": 9 }, { "date": { "$date": 1299715200000 }, "grade": "B", "score": 14 }, "name": "Morris Park Bake Shop", "restaurant_id": "30075445" }

1. Write a MongoDB query
    a. to display all the documents in the collection restaurants.
    b. to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
    c. to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant

d. to display the fields restaurant_id, name, borough and zip code, but exclude the field _id for all the documents in the collection restaurant.
e. to display all the restaurant which is in the borough Bronx
f. to display the first 5 restaurant which is in the borough Bronx.
g. to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.
h. to find the restaurants who achieved a score more than 90.
i. to find the restaurants that achieved a score, more than 80 but less than 100.

2. Write a MongoDB query
   a. to find the restaurants which locate in latitude value less than -95.754168.
   b. to find the restaurants that do not prepare any cuisine of 'American' and their grade score more than 70 and latitude less than -65.754168.
   c. to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and not located in the longitude less than - 65.754168. Note : Do this query without using $and operator. Go to the editor
   d. to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.
3. Write a MongoDB query
   a. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name. Go to the editor
   b. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.
   c. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.
4. Write a MongoDB query
   a. to find the restaurants which belong to the borough Bronx and prepared either American or Chinese dish.
   b. to find the restaurant Id, name, borough and cuisine for those restaurants which belong to the borough Staten Island or Queens or Bronxor Brooklyn.
   c. to find the restaurant Id, name, borough and cuisine for those restaurants which are not belonging to the borough Staten Island or Queens or Bronxor Brooklyn.
   d. to find the restaurant Id, name, borough and cuisine for those restaurants which achieved a score which is not more than 10.
   e. to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'.
   f. to find the restaurant Id, name, and grades for those restaurants which achieved a grade of "A" and scored 11 on an ISODate "2014-08- 11T00:00:00Z" among many of survey dates
   g. to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08-11T00:00:00Z".
5. Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52

6. Write a MongoDB query
    a. to arrange the name of the restaurants in descending along with all the columns.
    b. to arranged the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.
7. Write a MongoDB query to know whether all the addresses contains the street or not.
8. Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double.
9. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7.
10. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.

2 Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O"Reilly

3 Media Inc.

4 Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd

5 Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O"Reilly Media Inc.

6 David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485

7 Shakuntala Gupta Edward. 2016. Practical Mongo DB , 2nd edition, Apress Publications, 2016, ISBN 1484206487

WEBSITES:

1 http://www.mongodb.org/about/production-deployments/
2 http://docs.mongodb.org/ecosystem/drivers/
3 http://www.mongodb.org/about/applications

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	3	3	-	-	-	-	2	-	-	-	-	-	-	1
CO1	-	-	-	3	3	-	-	-	-	2	-	-	-	-	-	-	1
CO3	-	-	-	3	3	-	-	-	-	2	-	-	-	-	-	-	1
CO4	3	-	-	3	3	-	-	1	-	-	-	-	-	-	-	-	1
CO5	3	-	-	3	3	1	-	1	-	-	-	-	-	-	-	-	1
Average	3	-	-	3	3	1	-	1	-	3	-	-	-	-	-	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VIII - A

24CSU812	**Data Visualization - Practical**	**6H-3C**
Instruction Hours/week: L:0 T:0 P: 6	**Marks:** Internal**:40** External**:60 T**otal**:100**	
	End Semester Exam:3 Hours	

PREREQUISITE:

- Data Analysis

COURSE OBJECTIVES(CO):

- Interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- Explore the relationship between continuous variables using scatter plots and line plots, and present data using various techniques such as charts, diagrams, and maps.
- Utilize Tableau's visualization tools to conduct data analysis, explore unfamiliar datasets, and create data visualizations, dashboards, and Tableau Stories to support communication with diverse audiences.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	**Course Outcomes**	**Blooms Level**
CO1	Develop the design effective data visualizations in order to provide new insights into a research question or communicate information to the viewer	Apply
CO2	Apply and select appropriate data that can be used in order to create a visualization that answers a particular research question.	Apply
CO3	Understand the document and organize data and visualizations in order to prepare them for reuse.	Understand
CO4	Apply the application context for given data set, Design the information Dashboard for access information based on user criteria.	Apply
CO5	Build the design issues, assessment of needs, critical design practices.	Apply

List of Programs

1. Loading and Distinguishing Dependent and Independent parameters
2. Exploring Data Visualization tools
3. Drawing Charts
4. Drawing Graphs
5. Data mapping
6. Creating Scatter Plot maps
7. Using BNF Notations
8. Working with REGEX
9. Visualize Network Data
10. Understanding Data Visualization frameworks

TOTAL: 72 HOURS

TEXT BOOKS:

1 E. Tufte, The Visual Display of Quantitative Information, Graphics Press. 2nd Edition, 2001

2 Alexandru C Telea, Data Visualization: Principles And Practice, 2nd Edition, 2014

3 Wang Kaining, Infographic & Data Visualizations, sew Edition. 2013

4 Andy Krik, Data Visualisation : A Handbook for Data Driven Design, 1st Edition, 2016

WEBSITES:

1 https://www.tableau.com/learn/articles/data-visualization

2 https://www.ibm.com/in-en/topics/data-visualization

3 https://www.geeksforgeeks.org/data-visualization-with-python/

4 https://www.freecodecamp.org/news/d3js-tutorial-data-visualization-for-beginners/

5 https://www.dataversity.net/demystifying-advanced-data-visualization/

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	1	2	-	3	-	-	-	-	2	-	-	-	-	3	1	-
CO1	3	-	2	-	3	1	-	-	-	2	-	-	-	-	3	1	-
CO3	-	-	-	-	3	-	-	-	-	2	-	-	-	-	-	1	-
CO4	3	-	-	2	3	-	1	-	-	2	-	-	-	-	3	1	-
CO5	3	-	2	2	3	-	-	-	1	-	-	-	-	1	3	1	-
Average	3	1	2	2	3	1	1	-	1	2	-	-	-	1	3	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VIII - B

24CSU801B **Research Methodology and IPR** **6H-4C**

Instruction Hours/week: L:6 T:0 P: 0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Research concepts and intellectual property principles

COURSE OBJECTIVES(CO):

- Impart knowledge and skills required for research methodology, including problem formulation, analysis, and solutions.
- Acquire the ability to analyze datasets and interpret results effectively.
- Understand the basics of intellectual property rights, including patent drafting and filing.

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental concepts of research methodology	Understand
CO2	Indentify the research problem and review on it	Apply
CO3	Understand the various research designs and techniques.	Understand
CO4	Understand the nature of intellectual property rights and its apply it	Understand
CO5	Understand about IPR and filing patents in R & D	Understand

UNIT – I: RESEARCH METHODOLOGY **15 HOURS**

Objectives and motivation of research - Types of research - Research approaches – Significance of research -Research methods verses methodology - Research and scientific method –

Importance of research methodology - Research process - Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations- Criteria of good research. Defining the research problem: Definition of research problem - Problem formulation - Necessity of defining the problem - Technique involved in defining a problem.

UNIT—II: LITERATURE SURVEY AND DATA COLLECTION **15 HOURS**

Importance of literature survey - Sources of information - Assessment of quality of journals and articles -Information through interne. Effective literature studies approaches, analysis, plagiarism, and research ethics. Data - Preparing, Exploring, examining and displaying.

UNIT—III: RESEARCH DESIGN AND ANALYSIS **15 HOURS**

Meaning of research design - Need of research design - Different research designs - Basic principles of experimental design - Developing a research plan - Design of experimental set-up - Use of standards and codes. Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT-IV: INTELLECTUAL PROPERTY RIGHTS (IPR) 14 HOURS

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT-V: PATENT RIGHTS (PR) 13 HOURS

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs. Licenses, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL: 72 HOURS

TEXT BOOKS:

1 Peter S. Menell ,Mark A. Lemley, Robert P. Merges, (2021) "Intellectual Property in the New Technological"Vol. I Perspectives.

2 Laura R. Ford, (2021), "The Intellectual Property of Nations: Sociological and Historical Perspectives on aModern Legal Institution Paperback.

3 R. Ganesan, (2011) "Research Methodology for Engineers", MJP Publishers, Chennai, 2011.

4 RatanKhananabis and SuvasisSaha, (2015) "Research Methodology", Universities Press, Hyderabad.

REFERENCE BOOKS:

1 Cooper Donald R, Schindler Pamela S and Sharma JK,(2012) "Business Research Methods", Tata McGrawHill Education, 11Edition.

2 Catherine J. Holland, (2007) "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press.

3 David Hunt, Long Nguyen, Matthew Rodgers, (2007) "Patent searching: tools & techniques",

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	-	-	-	3	-	-	-	-	-	-	-	-	-	1	-
CO1	-	-	2	3	1	3	-	2	-	-	-	-	-	-	-	1	-
CO3	-	-	2	3	-	3	-		-	-	-	-	-	-	-	1	-
CO4	-	-	2	3	-	3	-	2	-	-	-	-	1	-	-	1	-
CO5	-	-		3	-	3	-	2	-	-	-	-	-	-	-	1	-
Average	1	-	2	3	1	3	-	2	-	-	-	-	1	-	-	1	-

1 - Low, 2 - Medium, 3 - High, '-' - No Correlatio

Semester-VIII - B

24CSUA801 **SPSS - Practical** **4H-3C**

Instruction Hours/week: L:0 T: 0 P: 4 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

PREREQUISITE:

- Statistics Knowledge

COURSE OBJECTIVES(CO):

- To calculate parametric and non-parametric tests
- To carryout reliability and normality tests
- To comprehend the application of Bivariate and multivariate analysis

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the descriptive statistics	Understand
CO2	Understand the calculate parametric and non-parametric tests	Understand
CO3	Analyze the carryout reliability and normality tests	Analyze
CO4	Analyze the application of Bivariate and multivariate analysis	Analyze
CO5	Demonstrate bivariate and multivariate analysis	Understand
CO6	Apply statistical techniques on decision making	Apply

EXERCISES

1. Simple Frequency
2. Descriptive Statistics
3. Test of Reliability
4. Test of Normality
5. Independent ‘t’ Test
6. Analysis of Variance (ANOVA)
7. Paired ‘t’ Test
8. Chi-square
9. Mann Whitney U Test
10. Kruskal Wallis H Test
11. Wilcoxon Test
12. Correlation
13. Regression
14. Factor Analysis
15. Garrett Ranking

TOTAL: 48 HOURS

TEXT BOOKS:

1 Darren George, Paul Mallery (2016), IBM SPSS Statistics 23 Step by Step, Routledge, New Delhi.

2 Asthana and Braj Bhushan (2017), Statistics for Social Sciences (With SPSS Applications), Prentice Hall of India, New Delhi

3 Keith Mccormick, Jesus Salcedo, Aaron Poh, SPSS Statistics for Dummies, 3rd Edition, Wiley, New Delhi.

4 Keith McCormick, Jesus Salcedo, Jon Peck, Andrew Wheeler, Jason Verlen (2017), SPSS Statistics for Data Analysis and Visualization, Wiley, New Delhi.

5 Brian C. Cronk (2016), How to Use SPSS®: A Step-By-Step Guide to Analysis and Interpretation, 9th Edition, Routledge, New Delhi

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	-	-	-	-	2	-	-	-	-	3	-	1
CO1	-	-	2	2	-	-	-	2	-	-	-	-	-	-	-	-	1
CO3	-	-	-	-	3	1	-	-	1	-	-	-	-	-	-	-	1
CO4	3	-	-	-	3	-	--	2	-	-	-	-	-	-	3	-	1
CO5	-	-	2	2	--	-	-	--	-	2	-	-	-	-	-	-	1
Average	3	-	2	2	**3**	1	-	2	1	2	-	-	-	-	3	-	1

1 - Low, 2 - Medium, 3 - High, '-' - No Correlation

Semester-VIII - B

24CSU891	**Research Project/Preparation of Research Project**	**20H-12C**

Instruction Hours/week: L:0 T:0 P:20 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours