B.Sc. COMPUTER SCIENCE
(Cyber Security)

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.
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FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

UNDER – GRADUATE PROGRAMMES

(REGULAR PROGRAMME)

REGULATIONS
(2024)

CHOICE BASED CREDIT SYSTEM (CBCS)

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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

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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 have knowledge and skills in ethical hacking techniques and penetration testing methodologies, including network security, vulnerability assessment, and penetration testing. They will be proficient in identifying and mitigating security weaknesses in systems and networks.

PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

PEO I: Graduates will develop a strong foundation in cybersecurity principles, enabling them to identify, analyze, and mitigate security risks in computer systems and networks.

PEO II: Graduates will continuously learn and apply emerging cybersecurity technologies and techniques to solve dynamic and evolving security challenges.

PEO III: Graduates will uphold ethical standards in safeguarding digital assets, ensuring privacy, and promoting responsible use of cybersecurity practices.

PEO IV: Graduates will demonstrate leadership and teamwork skills in multidisciplinary environments, working effectively to develop secure, resilient systems and policies.

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

Course Code	Name of the course	Category	Outcomes		Instruction hours/week			Credits	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)	AEC 1	-	-	4	-	-	3	40	60	100	1
24ENU101	English I	MDC1	2,3,7,12	-	3	-	-	3	40	60	100	13
24CYU101	Programming in C	Major 1	1,4,5,6,8,10	1,2	5	-	-	4	40	60	100	15
24CYU102	Digital Principles and Computer Architecture	Major 2	1,4,5,6,8	1,2	3	-	-	2	40	60	100	17
24CYUA101	Numerical Methods	Minor 1	3,4	-	4	-	-	3	40	60	100	19
24CYU111	Programming in C – Practical	Major 3	1,4,5,8,10	1,2	-	-	4	2	40	60	100	21
24SEC111	Office Automation - Practical	SEC 1	1,2,4,5,6,7,8, 10,12	1,2	-	-	5	3	40	60	100	23
24VAC101	Yoga for Youth Empowerment	VAC1	1,12	1,2	2	-	-	2	100	-	100	27
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)	AEC 2	-	-	4	-	-	3	40	60	100	29
24ENU201	English II	MDC 2	2,3,9	-	3	-	-	3	40	60	100	41
24CYU201	Object Oriented Programming	Major 4	1,3,4,5,6,7	1,2	4	-	-	3	40	60	100	43
24CYU202	Data Structures	Major 5	3,4,5,7	1,2	**3**	-	-	3	40	60	100	45
24CYU203	Community Engagement and Social Responsibility	Major 6	1,2,3,4,5,6,7, 8,10,15	2	2	-	-	2	40	60	100	47

24CYUA201	Discrete Structures	Minor 2	3,4,5	-	4	-	-	4	40	60	100	49
24CYU211	Object Oriented Programming– Practical	Major 7	1,3,4,5,6	1,2	-	-	5	2	40	60	100	51
24SEC211	Web Programming – Practical	SEC 2	1,3,4,5,7,10	1,2	-	-	3	3	40	60	100	53
24VAC201	Environmental Studies	VAC 2	1,8,9,11,12,13,15	1,2	2	-	-	2	100	-	100	55
Semester Total					**22**	**0**	**08**	**25**	**420**	**480**	**900**	
Semester III												
24LSUT301/ 24LUH301/ 24LUM301/ 24LUS301/ 24LUF301	Language III (Tamil III / Hindi III / Malayalam III / Sanskrit III / French III)	AEC 3	-	-	4	-	-	3	40	60	100	57
24ENU301	English III	MDC 3	1,2,3,4	-	3	-	-	3	40	60	100	67
24CYU301	Operating Systems	Major 8	1,3,4,5,6,13	1,2	5	-	-	4	40	60	100	69
24CYU302	Computer Networks	Major 9	1,3,4,5,6,8	1,2	4	-	-	3	40	60	100	72
24CYUA301	Operations Research	Minor 3	3,4,5,6	-	4	-	-	3	40	60	100	74
24CYU311	Operating Systems – Practical	Major 10	1,3,4,5,6,8,9,10,11,15	1,2	-	-	4	2	40	60	100	76
24CYU312	Computer Networks – Practical	Major 11	1,3,5,8,9,11,12,13,14	1,2	-	-	4	2	40	60	100	78
24VAC301	Indian Knowledge System	VAC 3	9,11,12,13,14,15	2	2	-	-	1	100	-	100	80
24CYU391	Internship*	Summer Internship	-	-	-	-	-	2	100	-	100	83
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)	AEC 4	-	-	4	-	-	3	40	60	100	84
24ENU401	English IV	SEC 3	1,2,4	-	3	-	-	3	40	60	100	94
24CYU401	Cyber Security Essentials	Major 12	1,3,4,5,8,11,13	1,2	4	-	-	3	40	60	100	96
24CYU402	Network Security	Major 13	1,3,4,5,7,8,11,12	1,2	3	-	-	2	40	60	100	99
24CYU403	Cloud Computing and Security	Major 14	1,4,5,6,8,10,13	1,2	4	-	-	3	40	60	100	101

24CYUA401	Probability and Statistics	Minor 4	3,4,5,6	-	4	-	-	3	40	60	100	104
24CYU411	Cyber Security Essentials - Practical	Major 15	1,3,4,5,8,11, 13	1,2	-	-	3	2	40	60	100	106
24CYU412	Network Security - Practical	Major 16	1,3,4,5,6,7,8, 9,10,11,12	1,2	-	-	3	2	40	60	100	108
24VAC401	Universal Human Values	VAC 4	3,4,5,7,15	1	2	-	-	1	100	-	100	111
Semester Total					**24**	**-**	**6**	**22**	**420**	**480**	**900**	
Semester V												
24CYU501	Digital Identity and Access Management	Major 17	1,3,4,5,6,8,1 0	1,2	4	-	-	3	40	60	100	114
24CYU502A	Python Programming	Major 18	1,3,4,6,8,9,1 1	1,2	5	-	-	3	40	60	100	116
24CYU502B	.Net Programming		1,3,4,8,9,11	1,2								118
24CYU503A	Full Stack Development	Major 19	1,3,4,6,8,11	1,2	5	-	-	3	40	60	100	120
24CYU503B	Vulnerability Assessment and Penetration Testing		1,3,4,5,8	1,2								122
24CYUA501	Basics of Accounting	Minor 5	1,3,4,7,8,9,1 1	1,2	6	-	-	5	40	60	100	125
24CYU512A	Python Programming - Practical	Major 20	1,3,4,5,6,8,1 1	1,2	-	-	5	2	40	60	100	127
24CYU512B	.Net Programming - Practical		1,3,4,6,8,11	1,2								129
24CYU513A	Full Stack Development – Practical	Major 21	1,3,4,6,8,11	1,2	-	-	5	2	40	60	100	131
24CYU513B	Vulnerability Assessment and Penetration Testing - Practical		1,3,4,5,8	1,2								133
24CYU591	Internship*	Summer Internship	-	-	-	-	-	2	100	-	100	136
Semester Total					**20**	**-**	**10**	**20**	**340**	**360**	**700**	
Semester VI												
24CYU601	Major Elective	Major 22	-	-	5	-	-	3	40	60	100	137
24CYU602A	Cryptography	Major 23	1,3,4,5,6,8	1,2	5	-	-	3	40	60	100	147
24CYU602B	Generative AI		1,3,4,6,8	1,2	5	-	-	3				149
24CYUA601	Entrepreneurship	Minor 6	1,4,5,7,8,13	1,2	6	-	-	6	40	60	100	151
24CYU612A	Cryptography - Practical	Major 24	1,3,4,5,6,8	1,2	-	-	5	2	40	60	100	153
24CYU612B	Generative AI - Practical		1,2,3,4,5,6,8, 12,14,15	1,2	-	-	5	2				155

24CYU691	Project	Minor Project			-	-	9	6	40	60	100	157
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												
24CYU701	Internet of Things	Major 25	1,3,4,5,6,8	1,2	6	-	-	5	40	60	100	158
24CYU702	Advanced Java Programming	Major 26	1,3,4,6,7,8,9, 10,11	1,2	6	-		5	40	60	100	160
24CYUA701	Statistical Computing	Minor 7	1,3,4,5,6,8,1 0	1,2	6	-		5	40	60	100	162
24CYU711	Artificial Intelligence – Practical	Major 27	1,3,4,5,6,8,1 0,13	1,2	-	-	6	3	40	60	100	164
24CYU712	Advanced Java Programming – Practical	Major 28	1,2,4,5,6,8	1,2	-	-	6	3	40	60	100	166
Semester Total					**18**	-	**12**	**21**	**200**	**300**	**500**	
Semester VIII A (HONOURS)												
24CYU801	MongoDB	Major 29	1,4,5,6,8,10	1,2	6	-	-	5	40	60	100	168
24CYU802	Data Visualization	Major 30	1,3,4,5,6,7,8, 9,10	1,2	6	-	-	5	40	60	100	170
24CYUA801	Organizational Behaviour	Minor 8	1,2,3,4,5,7,8, 9,12,13,14	1,2	6	-	-	3	40	60	100	172
24CYU811	MongoDB - Practical	Major 31	1,4,5,6,8,10	1.2	-	-	6	3	40	60	100	174
24CYU812	Data Visualization - Practical	Major 32	1,2,3,4,5,6,7, 9,10,14	1,2	-	-	6	3	40	60	100	177
Semester Total					**18**	-	**12**	**19**	**200**	**300**	**500**	
Semester VIII B (HONOURS WITH RESEARCH)												
24CYU801B	Research Methodology and IPR	Major 29	1,3,4,5,6,8	1,2	6	-	-	4	40	60	100	179
24CYUA811	SPSS - Practical	Minor 8	1,3,4,5,6,8,9, 10	1,2	-	-	4	3	40	60	100	181
24CYU891	Research Project / Preparation of Research Project	Project	-	-	-	-	20	12	120	180	300	183
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	24CYU101	Programming in C
	24CYU102	Digital Principles and Computer Architecture
	24CYU111	Programming in C – Practical
II	24CYU201	Object Oriented Programming
	24CYU202	Data Structures
	24CYU203	Community Engagement and Social Responsibility
	24CYU211	Object Oriented Programming – Practical
III	24CYU301	Operating Systems
	24CYU302	Computer Networks
	24CYU311	Operating Systems - Practical
	24CYU312	Computer Networks - Practical
IV	24CYU401	Cyber Security Essentials
	24CYU402	Network Security
	24CYU403	Cloud Computing and Security
	24CYU411	Cyber Security Essentials - Practical
	24CYU412	Network Security - Practical
V	24CYU501	Digital Identity and Access Management
	24CYU502A	Python Programming
	24CYU502B	.Net Programming

	24CYU503A	Full Stack Development
	24CYU503B	Vulnerability Assessment and Penetration Testing
	24CYU512A	Python Programming - Practical
	24CYU512B	.Net Programming - Practical
	24CYU513A	Full Stack Development - Practical
	24CYU513B	Vulnerability Assessment and Penetration Testing-Practical
VI	24CYU601	Major Elective
	24CYU602A	Cryptography
	24CYU602B	Generative AI
	24CYU612A	Cryptography – Practical
	24CYU612B	Generative AI - Practical
	24CYU691	Project
VII	24CYU701	Internet of Things
	24CYU702	Advanced Java Programming
	24CYU711	Artificial Intelligence Practical
	24CYU712	Advanced Java Programming – Practical
VIII A	24CYU801	MongoDB
	24CYU802	Data Visualization
	24CYU811	MongoDB – Practical
	24CYU812	Data Visualization - Practical
VIII B	24CYU801	Research Methodology and IPR
	24CYU891	Research Project / Preparation of Research Project

Minor		
Semester	**Course Code**	**Name of the Course**
I	24CYUA101	Numerical Methods
II	24CYUA201	Discrete Structures
III	24CYUA301	Operations Research
IV	24CYUA401	Probability and Statistics
V	24CYUA501	Basics of Accounting
VI	24CYUA601	Entrepreneurship
VII	24CYUA701	Statistical Computing
VIII A	24CYUA801	Organizational Behaviour
VIII B	24CYUA811	SPSS - Practical

Major Elective		
Semester	**Course Code**	**Name of the Course**
VI	24CYU601A	Open Source Technology
VI	24CYU601B	Soft Computing
VI	24CYU601C	Deep Learning
VI	24CYU601D	J2EE
VI	24CYU601E	Mobile Computing

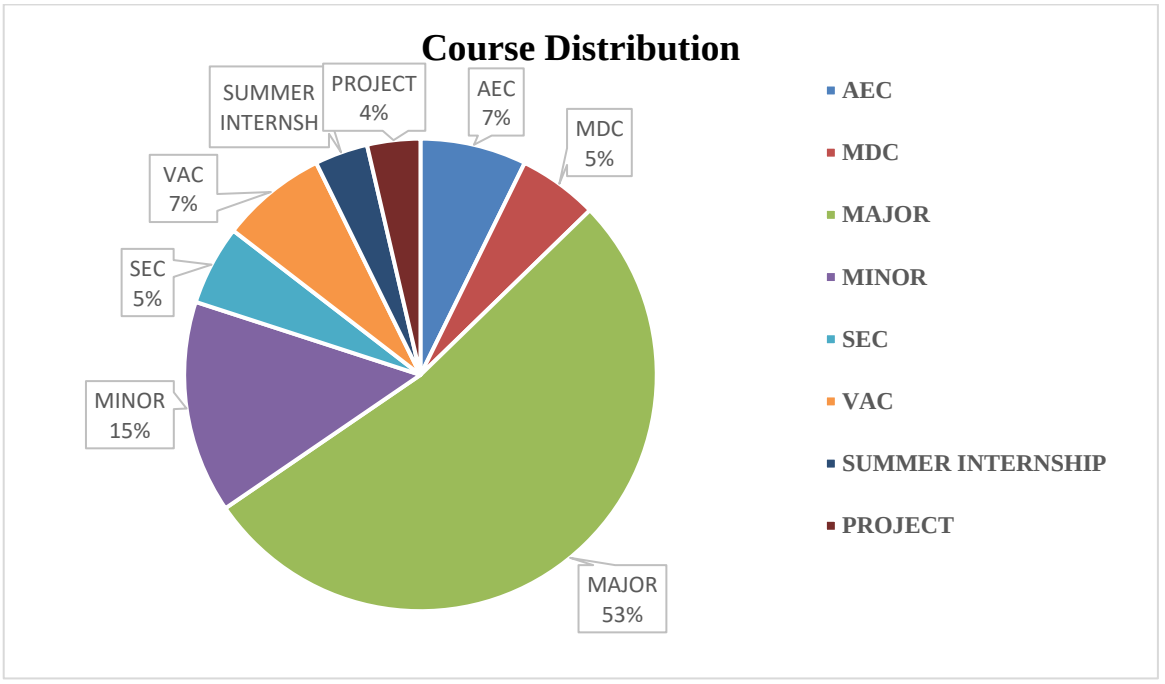
Skill Enhancement Courses (SEC)		
Semester	**Course Code**	**Name of the Course**
I	24SEC111	Office Automation – Practical
II	24SEC211	Web Programming – Practical
IV	24ENU401	English IV
Value Added Courses (VAC)		

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	24CYU391	Internship*
V	24CYU591	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
SUMMER INTERNSHIP	0	2	2
PROJECT	0	2	2
Total	37	18	55



Semester I

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

Karpagam Academy of Higher Education, Coimbatore – 21.

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**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

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 b) Non-Detailed - Naya Mehman c) Nibandh - Anushasan d) Grammar - Bhasha Aur Vyakaran	**9 HOURS**
UNIT II	a) Prose - Pahtha Pani Nirmal b) Non-Detailed - Eakankki ki Visheshatha c) Nibandh - Onam d) Grammar – Varna Vichar , Sangya	**9 HOURS**
UNIT III	a) Prose – Rashtriya Pitha Mahathma b) Non-Detailed – Maha Bharat ki Eak Sanjh c) Nibandh – Eakatha Ka Mahathva d) Grammar – Sarvanam , Gender	**10 HOURS**
UNIT IV	a) Prose – Gapshap b) Non-Detailed – Yahang Sona Mana Hai c) Nibandh – Ganga Pradhushan Ki Samasya d) Grammar – Number , Karak , Visheshan	**10 HOURS**
UNIT V	a) Prose – Nindha Ras	**10 HOURS**

b) Non – Detailed Eakanki ki Katha Vasthu

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, 6|5.Hasting Road, Illahabad.211001.

ll. Non-detailed: Naveen Ekhanki Sangrah

Editor : Dr. Srimathi Malathi Tiwari

Publisher: Sumithra Prakashan,

204.Leela Apartment, Ashok Nagar, Illahabad-211001.

lll. 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** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

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

Unit I **10 HOURS**

Novel – Pathummayude Aadu - Vaikam Muhammed Basheer

Unit II **10 HOURS**

Novel - Pathummayude Aadu - Vaikam Muhammed Basheer

Unit III **9 HOURS**

Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil

Unit IV **10 HOURS**

Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil

Unit V **9 HOURS**

Composition & Translation (English to Malayalam)

TOTAL: 48 HOURS

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	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PO 13	PO 14	PO 15	PSO 1	PSO 2
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

24LUS101 LANGUAGE I: SANSKRIT I 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 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.Raghuvamasa (Canto – 1)R.S.Vadhyar and Sons Palghat, kerala

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

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 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

Unit – 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

Unit - 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

Unit - 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

Unit 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,

Unit 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

REFERENCE 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
4. Christian Beaulieu, Je **pratique, Exercises de grammaire A1**, Dider,Paris,2015
5. 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 Applicable

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

24CYU101 PROGRAMMING IN C 5H-4C

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To objective of this course is to provide the knowledge about C fundamentals.
- To learn the Concepts and techniques in the C Programming.
- To understand the concepts of Arrays and User-Defined Functions

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain 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.	Analyze
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. E. Balagurusamy, 2018. Programming in ANSI C, 7th Edition.
2. Brian W. Kernighan and Dennis M. Ritchie, 2015.The C Programming Language, 2nd Edition.

REFERENCE BOOKS:

1. Stephen G. Kochan,2014. Programming in C, 4th Edition.
2. E Balagurusamy, 2008.Computing Fundamentals & C Programming, Tata McGraw-Hill,Second Reprint.
3. Behrouz A. Forouzan and Richard F. Gilberg, 2000.Computer Science: A Structured Programming Approach Using C, 3rd Edition.
4. Herbert Schildt, 2000.C: The Complete Reference, 4th Edition.

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
6. https://www.javatpoint.com/c-programming-language-tutorial

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	-	3	-	-	-	-	-	-	-	-	3
CO2	3	-	-	3	3	-	-	3	-	-	-	-	-	-	-	2	-
CO3	3	-	-	3	3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	3	-	-	3	3	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	3	3	-	-	3	-	2	-	-	-	-	-	-	-
Average	3	-	-	3	3	2	-	3	-	2	-	-	-	-	-	2	3

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

Semester I

24CYU102 DIGITAL PRINCIPLES AND COMPUTER ARCHITECTURE 3H-2C

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To know the basic structure of number system methods.
- To understand the Logic circuits and Boolean algebra.
- To know the concepts of Memory and I/O Concepts.

COURSE OUTCOMES (Cos)

Upon completion of this course, the student 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. Albert Malvino, Donald P.Leach (1995), "Digital Principles and Applications", Third Edition, McGraw Hill Company [Unit I, II, III].
2. M.MORRIS MANO (1999), "Computer system Architecture ", 3rd Edition, Pearson Education Publications, [Unit IV, V].

REFERENCE BOOKS:

1. T.C.Bartee, 2003.Digital computer Fundamentals, Sixth Edition, Tata McGraw Hill.
2. John P.Hayes, 1998. Computer Architecture and Organization, Third Edition, Tata McGraw Hill Publishers Pvt Ltd.

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	-	-	-	-	-	-	-	-	-
CO4	3	-	-	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	3	2	1	-	3	-	-	-	-	-	-	-	-	-
Average	3	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	2

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

Semester I

24CYUA101 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 SOLUTIONS OF NUMERICAL ALGEBRAIC AND TRANSCENDENTAL EQUATIONS **10 HOURS**

Bisection method - Iteration method - False Position method - Newton's method.

UNIT II SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATION 10 HOURS

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 and Simpson 's Rule.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS 9 HOURS

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., Thilagavathi K. and 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.

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	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	-	**1**	**2.6**	-	-	-	-	-	-	-	-	-	-	-	-	-

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

Semester I

24CYU111 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 Applicable

COURSE OBJECTIVES (CO):

- To objective of this course is to provide the knowledge about structure of C Programming.
- To implement the Concepts and programming techniques in C.
- To develop the programs using User-Defined Functions, Structures and Unions

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain 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 command line 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. E. Balagurusamy, 2018. Programming in ANSI C, 7th Edition.
2. Brian W. Kernighan and Dennis M. Ritchie, 1988.The C Programming Language, 2nd Edition.

REFERENCE BOOKS:

1. Stephen G. Kochan, 2014.Programming in C, 4th Edition.
2. E Balagurusamy, 2008.Computing Fundamentals & C Programming, Tata McGraw-Hill, Second Reprint.

WEBSITES:

www.programmingsimplified.com
www.programiz.com / c-programming
www.cplusplus.com
www.learncpp.com
www.udemy.com
www.hackerrank.com
www. leetcode.com
www. codewars.com.com
www. codechef.com

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	-
CO2	-	-	-	2	2	-	-	3	-	-	-	-	-	-	-	-	2
CO3	3	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	-	-		2	-	-	3	-	-	-	-	-	-	-	-	-
CO5	3	-	-	2	2	-	-	3	-	1	-	-	-	-	-	-	-
Average	3	-	-	2	2	-	-	3	-	1	-	-	-	-	-	3	2

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

Semester I

24SEC111 OFFICE AUTOMATION - PRACTICAL 5H - 3C

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To Perform documentation.
- To Study concepts of Libre office, Spreadsheets, Presentation Tools.
- To Demonstrate the ability to apply application software in an office environment.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Summarize the dynamics of an office environment.	Understand
CO2	Explain the basics of computer systems and its components.	Understand
CO3	Illustrate to create a presentation using PowerPoint tool.	Understand
CO4	Apply the basic concepts of electronic spreadsheet software	Apply
CO5	Analysis 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. Vikas Gupta, "Comdex 14-1in-1 Computer course Kit", Dream Tech
2. Bittu Kumar, "Master in Ms-Office"

REFERENCE BOOKS:

1. Fundamentals of Computers - V.Rajaraman - Prentice- Hall of India
2. Microsoft Office 2007 Bible - John Walkenbach,Herb Tyson,Faithe Wempen,cary N.Prague,Michael R.groh,Peter G.Aitken, and Lisa a.Bucki -Wiley India pvt.ltd.
3. Introduction to Information Technology - Alexis Leon, Mathews Leon, and Leena Leon, Vijay Nicole Imprints Pvt. Ltd., 2013.

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
4. http://office.microsoft.com/en-us/training/CR010047968.aspx
5. http://spoken-tutorial.org

CO, PO, PSO Mapping

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

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**: - T**otal**:100**

End Semester Exam: -

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES(CO):

- To create awareness about Yoga and Physical Health
- To providing Value Education to improve the students character understanding Greatness of Life force and Mind
- To know about five aspects of life and to develop good Qualities and eliminating bad ones
- To Learn introspection practices like Analysis of Thoughts, Moralization of Desires, Neutralization of Anger and Eradication of Worries Diversity in Men (Why Men Differ).
- To understand about the yoga, life and practice Yogasanas.

COURSE OUTCOMES(COs):

Learners should 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 I YOGA AND PHYSICAL HEALTH 8 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 - AswaSanjalana Asana ThuvipathaasvaSarjalana asana AstangaNamaskara - Bhujangasana Atha Muktha Savasana AswaSanjalanaAsara Pada Hasthasana-Hastha UttanasanaPranamasana - Pranayama: Naddisudei-Clearance Practice-Benefits - Simplified Physical Exercise-Kayakalpa Practices - Meditation Practices.

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

UNIT II GREATNESS OF LIFE FORCE AND MIND 7 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 – SUBLIMATION **7 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- Spiritual purity. 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 **7 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 **7 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: 36 HOURS

REFERENCE BOOKS:

1. Kayakapam Thathuvagnani Vethathiri Maharishi
2. Light on yoga BKS.lyenger
3. ManavalakalaPart-1-Thathuvagnani Vethathiri Maharishi.
4. Manavalakala part-2-Thathuvagnani Vethathiri Maharishi
5. Mind ThathuvagnariVethathir Maharishi
6. Simplified Physical Exercises- ThathuvagnaniVethathiri Maharishi
7. Sound Health through yoga - Dr.Chandrasekaran
8. The world orcer of Holistic unity- ThathuvagnaniVethathiri Mahanshi
9. Thirukkural-Rev. Dr.G.U.pope
10. Yoga for modern age ThathuvagnaniVethathin Maharishi

CO, PO, PSO Mapping:

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

1 - Low, 2 - Medium, 3 - Strong, '-' – No Correlation

Semester II

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.சுரக்கும்திருவருட், 6.வதிவாய்விளைபயில், 7. உறைவான், 8.பச்சைப்பேர், 9.வித்தகம், 10.துணையாய், 11.கலந்தார்.
கவிதை - கவிஞர்தாமரை - தொலைந்துபோனேன்
சிறுகதை – அம்பை- 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

Semester II

24LUH201 **LANGUAGE II: HINDI 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 Applicable

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 b) Drama -Dhruva Swamini c) Novel - Nirmala , Thotharam d) Grammar – Kaal , Theen Prakar	**9 HOURS**
UNIT-II	a) Poetry – Sita , Ram b) Drama – Mandhakini , Koma c) Novel – Mansaram , Jiyaram d) Grammar – Upsarg, Prathyay	**9 HOURS**
UNIT-III	a) Poetry – Lakshman, Valmiki b) Drama – Ramaguptha , Chandhraguptha c) Novel – Sudha, Bhuvan Mohan Singh d) Grammar – Sabda Vyutpathi	**10 HOURS**
UNIT-IV	a) Poetry -Vishvaamithra, Thrijada b) Drama –Sikhar Swami,Shakraj c) Novel – Udhaybanulaal, Siyaram d) Grammar – Sambandh Chochak	**10 HOURS**
UNIT-V	a) Poetry – Bhagirath , Sagar b) Drama – Khingal , Mihirdev , Prohith c) Novel – bhalchandra Sinha,Kalyani, Rangili Bai d) Samuchchaybodhak, Vishmayathibodhak	**10 HOURS**

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 Applicable

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(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.

UNIT-I **10 HOURS**

Novel -Enmakaje

UNIT-II **10 HOURS**

Novel – Enmakaje

UNIT-III **10 HOURS**

Memmories – Neermaathalam Pootthakaalam

UNIT-IV **9 HOURS**

Memmories – Neermaathalam Pootthakaalam

UNIT-V **9 HOURS**

Translation(English to Malayalam)

TOTAL: 48 HOURS

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

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 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

Semester II

24LUF201 **LANGUAGE II: FRENCH 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 Applicable

COURSE OBJECTIVES (CO):

The objectives of this course are:

- 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	a) Leçon	- Les loisirs	**9 HOURS**
	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	a) Leçon	- La routine	**9 HOURS**
	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	a) Leçon	-Où faire ses courses	**10 HOURS**
	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	a) Leçon	- Decourvez et dégustez	**10 HOURS**
	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	a) Leçon	- Tout le monde s'amuse, Les ados au quotidien	**10 HOURS**
	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

REFERENCE 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
4. Christian Beaulieu, Je **pratique, Exercises de grammaire A1,** Dider,Paris,2015
5. 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

Semester II

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 Applicable

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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
Average	--	**2.5**	**2.5**	-	-	-	-	-	**2**	-	-	-	-	-	-	-	-

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

Semester II

24CYU201 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):

- 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

24CYU202 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 Applicable

COURSE OBJECTIVES (CO)

- To Understand the fundamental concepts of data structures
- To Learn linear data structures lists, stacks, and queues
- To Develop application using data structures and understanding the case studies.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Identify the 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 along with case studies.	Understand

UNIT I ARRAYS AND STACKS 7 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 LIST 7 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 **8 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.

Case study: Application of arrays in the real world -Linked list verses Arrays-Towers of Hanoi-Application of Queues-Comparison of sorting algorithms -Applications of Binary Tree-Warshall's Algorithm.

TOTAL: 36 HOURS

TEXT BOOKS:

1. R. S. Salaria, "Data structures & Algorithms Using C", 5th Edition, Khanna Book Publishing Co.Pvt. Ltd.,SRS Enterprises, New Delhi, 2022.
2. Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002

REFERENCE BOOKS:

1. Jean Paul Tremblay and Paul G. Sorensen, An Introduction to Data Structures with Applications, 2nd Edition, Tata McGraw Hill, New Delhi, 2017
2. Vijayalakshmi Pai G.A, Data Structures and Algorithms – Concepts, Techniques and Applications, 1st Edition, McGraw Hill Education, New Delhi, 2017.
3. Seymour Lipschutz, Data Structures McGraw Hill Publications, 2014, 1st Edition

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

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

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

Semester II

24CYU203 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

PREREQUISITE:

Not Applicable

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:

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

24CYUA201 DISCRETE STRUCTURES 4H-4C

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 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 12 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 12 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 12 HOURS

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

UNIT IV RECURRENCES 12 HOURS

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

UNIT V GRAPH THEORY **12 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: 60 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

Semester II

24CYU211 OBJECT ORIENTED 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand how C++ improves C with object-oriented feature.
- To learn how to perform Constructor/Destructor and File Manipulation.
- To learn how to Code using Inheritance, Interface, Package and Exception handling concepts in Java .

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 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. Antonio Mallia, Francesco Zoffoli,2019, C++ Fundamentals, Packt Publishing, Ltd.
2. Joel Murach, Mary Delamater, 2018, C++ Programming, Mike Murach& Associates Inc.

REFERENCE BOOKS:

1. Bjarne Stroustroup, 2014, Programming - Principles and Practice using C++, 2nd Edition, Addison-Wesley.
2. Stefan Bjornander, 2016, C++ Windows Programming, Published by Packt Publishing Ltd.
3. Richard L. Stegman, 2016, Focus on Object-oriented Programming with C++, 6th Edition, CreateSpace Independent Publishing Platform.
4. Harry, H. Chaudhary, 2014, Head First C++ Programming: The Definitive Beginner's Guide, First Create space Inc, O-D Publishing, LLC USA.
5. Debasish Jana, 2014, C++ And Object-Oriented Programming Paradigm, Published by PHI Learning Pvt. Ltd
6. Herbert Schildt,2021. Java: The Complete Reference,McGraw-Hill Education.
7. Kathy Sierra and Bert Bates,2020 (3rd Edition), Head First Java, O'Reilly Media.
8. Joshua Bloch,2018(3rd Edition). Effective Java, Addison-Wesley Professional.

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
9. www. codechef.com
10. www.topcoder.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	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	2	-	-	3	-	2	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	-	3	-	2	-	-	-	-	-	-	-	-	-	-	-
Average	2	-	1	3	2	2	-	-	-	-	-	-	-	-	-	3	2

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

Semester II

24SEC211 WEB PROGRAMMING - PRACTICAL 3H-3C

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To impart knowledge and essential skills necessary to use the internet and its various components.
- To use Google Apps for education effectively
- To develop the ability to logically plan and develop web pages.

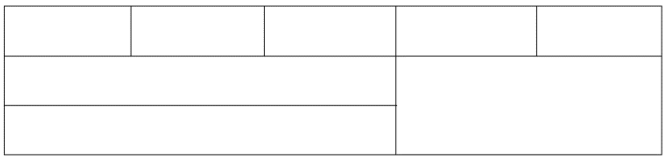
COURSE OUTCOMES (COs)

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

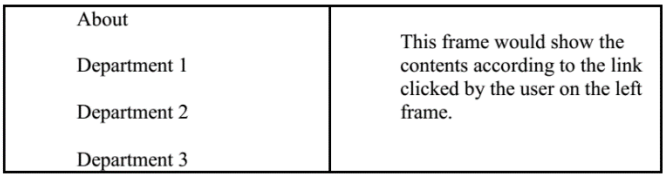
COs	Course Outcomes	Blooms Level
CO1	Demonstrate the fundamentals of Internet and the Web concepts	Understanding
CO2	Illustrate the various component of web concepts	Understanding
CO3	Examine the usage of internet concepts and analyze its components.	Analyzing
CO4	Apply and identify the online information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

List of Programs

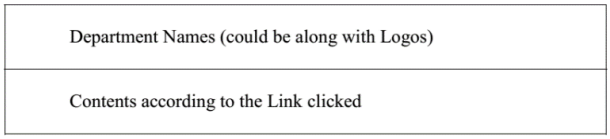
1. Create a web page using following formatting – Bold, Italics, Underline, Colors, Headings, Title, Font and Font Width, Background, Paragraph, Line Breaks, Horizontal Line, Blinking text as well as marquee text.
2. Create a web page using Ordered Lists, Unordered Lists, Inserting images, Internal and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



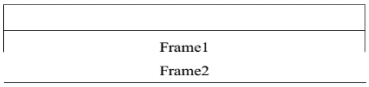
4. Create a web page using input type, select and Text Area in HTML.
5. Create a HTML Form containing Roll No, name of the student and Grades in a tabular form.
6. Create a web page using Frames in HTML.

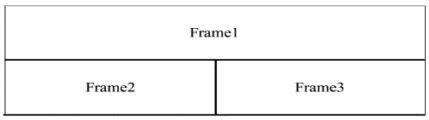


7. Create a web page using Horizontal Frames in HTML.



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. Principles of web design, Joel sklar, sixth edition, 2015.
2. "Web Coding & Development All-in-One For Dummies", Paul McFedries, 2018. "Fundamentals of Web Development", Randy Connolly, Ricardo Hoar, 2017.

REFERENCE BOOKS:

1. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.
2. "HTML and CSS: Design and Build Websites", Jon Duckett, 2014.

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

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

PREREQUISITE:

Student should know about fundamentals of environment.

COURSE OBJECTIVES (CO):

- To create awareness about structure and functions of various ecosystems.
- To develop an attitude of concern for the natural resources availability and its environment protection.
- To learn about the environment, resources available, biodiversity and its conservation.

COURSE OUTCOMES (COs):

On completion of the course, students are able to

COs	Course Outcomes	Blooms Level
CO1	Define the structure and functions of various ecosystems	Remember
CO2	Learn the ethical, cross-cultural, and historical context of natural resources and the methods for conservation	Understand
CO3	Predict current scenarios and find ways for the protection and betterment of habitat	Analyze
CO4	Analyze the interactions between social and environmental problems	Apply
CO5	Develop systems concepts and methodologies to analyze and understand interactions between social and Environmental processes	Create

UNIT I INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS: 5 HOURS

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 groundwater.

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: 4 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: 5 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

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

1-Low; 2-Medium; 3-Strong; '-' No correlation

Semester III

24LSUT301 LANGUAGE III: TAMIL III 4H-3C

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

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):

- 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 Applicable

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 I **10 HOURS**

Poetry – Chinthavishtayaya Seetha

UNIT II **10 HOURS**

Poetry – Chinthavishtayaya Seetha

UNIT III **10 HOURS**

Poetry – Mrugasikshakan-(Murgasikshakan,Kausalya,Varavu,Vittupoku Ekalavyan,Mazha) 6 poetries

UNIT IV **9 HOURS**

Poetry – Mrugasikshakan-(Kayal,Karkkadakam,Bhagavatham,Vazhivakkile naikutty,Edavelayil oru nimisham,Verumoru kathu) 6 poetries

UNIT V **9 HOURS**

Poetry - Aayisha **TOTAL: 48 HOURS**

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 SahithyaCharithram – T.M.Chummar (Kerala SahithyaAcademy,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

Semester III

24LUS301 LANGUAGE III: SANSKRIT 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 Applicable

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**

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	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

Semester III

24LUF301 **LANGUAGE III: FRENCH 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 Applicable

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

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

WEBSITES :

- http:// enseigner.tv5 monde.com/
- bonjourdumonde.com /exercises/contenu/le – francais-du- tourisme.html
- http://www.bonjurdefrance.com/
- 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 Applicable

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-ReadingCritically- Sequencing of Sentences-Reading Comprehension

UNIT- IV **7 HOURS**

WRITING: Descriptive and Narrative-Safety Instructions- Suggestions-Expansion ofAbbreviations-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

WEBSITES:

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

Semester III

24CYU301 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To remember the concepts and techniques of process management in Operating Systems.
- To understand the memory management and virtual management.
- To analyse the knowledge of operating system production and security.

COURSE OUTCOMES (COs):

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

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

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**

Storage Management: File-System Interface: File concept, Access Methods, Directory structure, File- system Mounting, File sharing, Protection and consistency semantics

File-System Implementation: File-System structure, File-System Implementations, Directory Implementation, Allocation Methods, Free-space Management, Efficiency and Performance, Recovery

Disk Management: Disk Structure, Disk Scheduling, Disk Management, Swap-Space Management, Disk Attachment, stable-storage Implementation

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, Operation System Concepts, 2nd Edition, Pearson Education.
2. Silberschatz / Galvin / Gagne, Operating System,6th Edition, WSE(WILEY Publication)
3. Andrew S. Tanenbaum, “Modern Operating Systems”, Prentice Hall,2000

REFERENCE BOOKS:

1. Silberschatz, Operation System Concepts windows XP update,2011
2. Garry Nutt, “Operating Systems–A Modern perspective”, Third Edition, Pearson Education
3. https://archive.nptel.ac.in/courses/106/105/106105214/
4. Bach,M.J., “Design of UNIX Operating System”, Prentice Hall
5. Charles Crowley, “Operating systems – A Design Oriented Approach”, Tata McGraw hill, 1997
6. Michel Palmer “Guide Operating Systems”, Vikas Thomson Learning Publishing, New Delhi
7. Milan Milon kovic, Operating System Concept sand design, II Edition, McGraw Hill 1992.
8. William Stallings, Operating System,4th Edition, Pearson Education.
9. H.M.Deitel, Operating systems,2nd Edition, Pearson Education
10. Nutt: Operating Systems,3/e Pearson Education2004
11. D.M.Dhamd here, “Operating Systems”,2nd Edition, 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

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

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

Semester III

24CYU302 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To know the basics of computer networks
- To understand the process of protocols, router, cellular networks
- To analyze the concepts of application layer and network security

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Explain the fundamentals concepts of computer network	Understand
CO2	Illustrate the DLL services and different protocol uses in computer networks	Understand
CO3	Summarize 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. Data Communications and Networking with TCP/IP protocols suite – Behrouz A.Forouzan, Fourth Edition TMH, 2006.
2. Computer Networks – Andrew S Tanenbaum, 4th Edition, Pearson Education 2003

REFERENCE BOOKS:

1. Data Communications and Networking-M.JAIN, BPB Publication, 2002
2. Data Communications and Networking-Jain Madhulika, BPB Publication, 2002
3. William Stalling,Computer networks – PHI
4. https://archive.nptel.ac.in/courses/106/105/106105080/
5. https://open.umn.edu/opentextbooks/textbooks/771
6. https://freecomputerbooks.com/networkComputerBooks.html
7. https://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html

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

COs	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	-	-	-	-	-	-	-	3	-
CO3	2	-	3	1	3	-	-	3	-	-	-	-	-	-	-	-	-
CO4	2	-	3	1	3	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	3	1	3	1	-	3	-	-	-	-	-	-	-	-	-
Average	2	-	3	1	3	1	-	3	-	-	-	-	-	-	-	3	2

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

Semester III

24CYUA301 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 Correlation

Semester III

24CYU311 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To learn Unix commands and shell programming.
- To implement Process Creation and Inter Process Communication.
- To implement Page Replacement Algorithms, File Organization and File Allocation Strategies.

COURSE OUTCOMES (COs):

Upon completion of this course, the student 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, Galvin Gagne, “Operating System Concepts”, 9th Edition, Wiley India Edition,2013
2. Deitel Deitel Choffnes, “Operating Systems”, 3rd Edition, Pearson Education, 2003.

REFERENCE BOOKS:

1. Stuart E. Madnick, John J.Donovan. “Operating Systems”, 3rd Edition, Tata McGraw Hill,2003.
2. "Modern Operating Systems" by Andrew S. Tanenbaum
3. "The Linux Programming Interface: A Linux and UNIX System Programming Handbook" by Michael Kerrisk

WEBSITES:

1. http://spoken-tutorial.org/
2. https://www.studocu.com/
3. https://infinite.education/view/ZCbZM02MLnA8KcU3ElWRaAre

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	3	2	-	-	2	-	-	-	-	-	-	-	1	-
CO2	1	-	2	3	2	-	-	2	-	-	-	-	-	-	-	-	3
CO3	-	-	2	3	2	-	-	2	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	2	-	-	2	-	-	1	-	-	-	-	-	-
CO5	-	-	-	3		1	-	-	1	1	1	-	-	-	1	-	-
Average	1	-	2	3	2	1	-	2	1	1	1	-	-	-	1	1	3

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

Semester III

24CYU312 **COMPUTER NETWORKS - 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 Applicable

COURSE OBJECTIVES (CO):

- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To acquire knowledge of Application layer and Presentation layer paradigms and protocols and to study Session layer design issues, Transport layer services, and protocols.
- To read the fundamentals and basics of Physical layer, and will apply them in real time applications.

COURSE OUTCOMES (COs):

Upon completion of this course, the student 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.) New Delhi: THM.

2 Alberto Leon-Garcia, Indra Widjaja (2017). Communication Network (2nd ed). Mc Graw Hill education.

REFERENCE BOOKS:

1 Tanenbaum, A. S. (2012). Computer Networks (5thed.).New Delhi: PHI.

2 Sathish Jain, Madhulika Jain, Vineeta Pillai, Kratika (2010). A Level Data Communication & Network Technologies. BPB publication.

3 Wayne Tomasi (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

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

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

Semester III

24VAC301 **INDIAN KNOWLEDGE SYSTEM** **2H-1C**

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

End Semester Exam: -

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To introduce students to foundational concepts in Indian Knowledge Systems (IKS), including philosophical schools, texts, and cultural practices.
- To explore the contributions of Indian mathematics, astronomy, and technology to global knowledge systems and their interdisciplinary connections.
- To analyze the ethical, philosophical, and practical implications of ancient Indian sciences and humanities in contemporary contexts.

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Identify and describe key components of Indian Knowledge Systems (IKS), including Vedic and non-Vedic philosophical schools, texts such as Puranas and Itihasa, and Niti Sastras.	Understand
CO2	Analyze and evaluate the contributions of Indian mathematics and astronomy to scientific knowledge, demonstrating an understanding of their historical development and modern relevance.	Analyze
CO3	Apply foundational linguistic and phonetic principles from Sanskrit texts like Panini's Astadhyayi to understand their computational and linguistic significance.	Apply
CO4	Demonstrate proficiency in calculating and applying geometric, trigonometric, and algebraic principles from ancient Indian mathematical texts.	Apply
CO5	Critically assess the cultural, philosophical, and ethical implications of Indian sciences and humanities, including their role in shaping societal norms and values.	Analyze

UNIT 1: INTRODUCTION TO IKS **5 HOURS**

Caturdaśa Vidyāsthānam, 64 Kalas, Shilpa Śāstra, Four Vedas, Vedāṅga, Indian Philosophical Systems, Vedic Schools of Philosophy (Sāṃkhya and Yoga, Nyaya and Vaiśeṣika, Pūrva-Mīmāṃsā and Vedānta), Non-Vedic schools of Philosophical Systems (Cārvāka, Buddhist, Jain), Puranas (Maha-puranas, Upa-Puranas and Sthala-Puranas), Itihasa (Ramayana, Mahabharata), Niti Sastras, Subhasitas

UNIT 2: FOUNDATION CONCEPT FOR SCIENCE & TECHNOLOGY **5 HOURS**

Linguistics & Phonetics in Sanskrit (panini's), Computational concepts in Astadhyayi Importance of Verbs, Role of Sanskrit in Natural Language Processing, Number System and Units of Measurement, concept of zero and its importance, Large numbers & their representation, Place Value of Numerals, Decimal System, Measurements for time, distance and

weight, Unique approaches to represent numbers (Bhūta Saṃkhya System, Kaṭapayādi System), Pingala and the Binary system, Knowledge Pyramid, Prameya – A Vaiśeṣikan approach to physical reality, constituents of the physical reality, Pramāṇa, Saṃśaya

UNIT 3: INDIAN MATHEMATICS & ASTRONOMY **5 HOURS**

Indian Mathematics, Great Mathematicians and their contributions, Arithmetic Operations, Geometry (Sulba Sutras, Aryabhatiya-bhasya), value of π, Trigonometry, Algebra, Chandah Sastra of Pingala,
Indian Astronomy, celestial coordinate system, Elements of the Indian Calendar Aryabhatiya and the Siddhantic Tradition Pancanga – The Indian Calendar System Astronomical Instruments (Yantras) Jantar Mantar or Raja Jai Singh Sawal.

UNIT 4: INDIAN SCIENCE & TECHNOLOGY **5 HOURS**

Indian S & T Heritage ,sixty-four art forms and occupational skills (64 Kalas) Metals and Metalworking technology (Copper, Gold, Zinc, Mercury, Lead and Silver), Iron & Steel, Dyes and Painting Technology), Town & Planning Architecture in India, Temple Architecture, Vastu Sastra,

UNIT 5: HUMANITIES & SOCIAL SCIENCES **4 HOURS**

Health, Wellness & Psychology, Ayurveda Sleep and Food, Role of water in wellbeing Yoga way of life Indian approach to Psychology, the Triguṇa System Body-Mind-Intellect-Consciousness Complex. Governance, Public Administration & Management reference to ramayana, Artha Sastra, Kauṭilyan State.

TOTAL: 24 HOURS

TEXT BOOKS:

1. Kapur K and Singh A. K (Eds) (2005). *Indian Knowledge Systems*, Vol. 1. Indian Institute of Advanced Study, Shimla.
2. Nair, Shantha N. (2008) *Echoes of Ancient Indian Wisdom.* Hindology Books, New Delhi

REFERENCE BOOKS:

1. Reshmi ramdhoni,(2018). *Ancient Indian Culture and Civilisation,* star publication
2. DK Chakkrabarty, Makkhan Lal,(2014) *History of Ancient India*, Aryan book International publication,
3. Dr. Girish Nath Jha, Dr. Umesh Kumar Singh and Diwakar Mishra,(2016). *Science and Technologyin Ancient Indian Texts,* DK Print World limited,
4. Swami BB Vishnu, (2015). *Vedic Science and History - Ancient Indian's Contribution to the ModernWorld*, Gosai publication.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P011	P012	P013	P014	P015	PSO1	PSO2
CO1	-	-	-	-	-	-	-	-	-	-	3	3	-	-	2	-	2
CO2	-	-	-	-	-	-	-	-	2	-	3	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	2	-	3	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	3	3	1	-	2	-	2
Average	-	-	-	-	-	-	-	-	2	-	3	3	1	-	2	-	2

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

Semester III

24CYU391	**INTERNSHIP**	**0H- 2C**
Instruction Hours/week: L:0 T:0 P: 0	**Marks:** Internal**:100** External**: - T**otal**:100**	
		End Semester Exam: -

Semester IV

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

Semester IV

24LUH401 **LANGUAGE IV: HINDI 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 Applicable

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

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-I **10 HOURS**

Screen Play - Perumthachan

UNIT- II **10 HOURS**

Screenplay - Perumthachan

UNIT-III **10 HOURS**

Drama - Saketham

UNIT- IV **9 HOURS**

Drama - Saketham

UNIT-V **9 HOURS**

Drama - Saaketham

TOTAL: 36 HOURS

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

Semester IV

24LUS401 LANGUAGE IV: SANSKRIT 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 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 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 LeelasukaSri 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**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

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

Semester IV

24LUF401 **LANGUAGE IV: FRENCH 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 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 méte

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

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

WEBSITES :

- http:// enseigner.tv5 monde.com/
- bonjourdumonde.com /exercises/contenu/le – francais-du- tourisme.html
- http://www.bonjurdefrance.com/
- 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** 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 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-PersonalityDevelopment-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-DictoComposition--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.

WEBSITES:

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

24CYU401 CYBER SECURITY ESSENTIALS 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):

- To learn about operations security, threat identification, and remediation.
- To understand encryption techniques for email privacy and authentication.
- To understand various Cyber Crimes and Cyber Security

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify security measures for browser-to-web server interactions.	Understand
CO2	Explain the principles of data security, privacy, and compliance standards.	Understand
CO3	Apply encryption techniques for email privacy and authentication.	Apply
CO4	Summarize digital signature schemes and their significance in data security.	Understand
CO5	Compare various Cyber Crimes and Cyber Security	Analyze

UNIT I INTRODUCTION 10 HOURS

Basics of digital security, protecting personal computers and devices, protecting devices from Virus and Malware, Identity, Authentication and Authorization, need for strong credentials, keeping credentials secure, protecting servers using physical and logical security, World Wide Web (www), the Internet and the HTTP protocol, security of browser to web server interaction

UNIT II CYBER ATTACKS 10 HOURS

Introduction to cyber-attacks, application security (design, development and testing), operations security, monitoring, identifying threats and remediating them, Principles of data security - Confidentiality, Integrity and Availability, Data Privacy, Data breaches, preventing attacks and breaches with security controls, Compliance standards, Computer Ethics. OWASPTop10: Types of Web attacks – SQL Injection, Cross site scripting, Brute Force, Buffer Overflow, Man in the middle attack, Denial of Service

UNIT III E-MAIL SECURITY 10 HOURS

Email Security: Security Services for email, Attacks possible through email, Establishing Keys privacy, authentication of the source, Message Integrity, Non-repudiation, Pretty Good Privacy,

S/MIME

IP Security: Over view of IP Sec, IPv4 and IPv6, Authentication header, Encapsulation Security Pay load (ESP), Internet Key Exchange

Transport Level Security: SSL / TLS Basic Protocol, computing the keys, client authentication, PKI as deployed by SSL, Attacks fixed in v3, Exportability, Encoding, Secure Electronic Transaction (SET)

UNIT IV HASH FUNCTIONS AND MAC **10 HOURS**

Hash Functions and MAC: Properties of hash functions, birthday attack, hash cash, Message Authentication code Algorithms, MAC protocols, HMAC, CMAC.

Digital Signature: Classification of signature schemes: RSA Signature, Digital Signature Standard, Overview of ELGamal and Schnorr schemes, One time signature schemes, Attacks on Digital Signatures, Blind Signatures

UNIT V CYBER CRIMES AND CYBER LAWS **8 HOURS**

Classification of Cyber-crimes, Common cyber crimes, Cyber crime targeting computers and mobiles, Cyber-crime against women and children , financial frauds, social engineering attacks, malware and ransomware attacks, zero day and zero click attacks, Cybercriminals modus - operandi, reporting of cyber-crimes, Remedial and mitigation measures, Legal perspective of cyber-crime, IT Act 2000 and its amendments, cybercrime and offences, Organisations dealing with Cybercrime and Cyber security in India, Case studies.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Sammons, John, and Michael Cross. The basics of cyber safety: computer and mobile device safety made easy. Elsevier, 2016.
2. CharlesP.Pfleeger,ShariLawrence,PfleegerJonathanMargulies;Security in Computing, Pearson Education Inc. 5th Edition, 2015

REFERENCE BOOKS:

1. Brooks, Charles J.Christopher Grow, Philip Craig, and Donald Short. Cyber security essentials. John Wiley & Sons, 2018
2. Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education, 2012

WEBSITES:

1. https://onlinecourses.nptel.ac.in/noc23_cs127/preview
2. https://aitskadapa.ac.in/e-books/CSE/COMPUTER%20NETWORKS/Principles%20of%20Computer%20Security%20CompTIA%20Security+%20and%20Beyond%20Lab%20Manual,%20Second%20Edition%20(%20PDFDrive%20).pdf
3. https://eopcw.com/assets/stores/Computer%20Security/lecturenote_1704978481security-in-computing-5-e.pdf

CO, PO, PSO Mapping

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

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

Semester IV

24CYU402 NETWORK SECURITY 3H-2C

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To familiarize students with various network protection tools such as firewalls, intrusion detection systems, and proxies.
- To provide knowledge of LAN attacks such as ARP cache poisoning and VLAN hopping.
- To introduce about firewalls and web security

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Summarize the principles of network protection and the role of firewalls.	Understand
CO2	Explain the principles and usage of secure communication protocols like SSH, SSL/TLS, and VPN.	Understand
CO3	Classify the concepts of Encrypting and Signing Emails	Understand
CO4	Analyze the Network based malware techniques	Analyze
CO5	Apply network Security in LAN attacks	Apply

UNIT I INTRODUCTION TO NETWORK SECURITY 6 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 6 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 6 HOURS

Encrypting and Signing Emails: PGP – GPG / open PGP, DKIM and SPF; Network packet creation and Manipulation using scapy and dpkt libraries; SDN Security

UNIT IV ATTACK TECHNIQUES 6 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 **6 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. William Stallings, Cryptography and Network Security: Principles and Practice, 8th Edition, Pearson edition, 2020.
2. Behrouz A.Forouzan, Cryptography & Network Security, McGraw-Hill, 3rd Edition2015.

REFERENCE BOOKS:

1. W.Stallings, Network Security Essentials: Applications and Standards, 6th Edition, Pearson Prentice Hall, 2016.
2. C.Kaufman, R.Perlmanand and M.Speciner, Network Security: Private Communication in a Public World, 2nd Edition, Prentice Hall PTR, 2002.
3. Vincent J. Nestleret.al, Principles of computer security Lab Manual,4th Edition, McGraw-Hill, 2014

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/Principles%20of%20Computer%20Security%20CompTIA%20Security+%20and%20Beyond%20Lab%20Manual,%20Second%20Edition%20(%20PDFDrive%20).pdf

CO, PO, PSO Mapping

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

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

Semester IV

24CYU403 CLOUD COMPUTING AND 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To Understand the limitations of traditional computing paradigms and recognize the emergence of cloud computing as a transformative technology.
- To Differentiate between various cloud delivery models (IaaS, PaaS, SaaS) and deployment models (public, private, community, hybrid).
- To Identify common security threats in cloud computing and discuss basic security terms, concepts, and mechanisms.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain the concept of computing paradigms and justify the suitability of cloud computing for various applications.	Understand
CO2	Classify the fundamentals of cloud security.	Understand
CO3	Summarize the basic security measures and access controls to mitigate common cloud security threats and evaluate the performance and scalability of cloud-based systems using relevant technologies and strategies.	Understand
CO4	Apply security standards and protocols to protect data and applications in the cloud environment.	Apply
CO5	Analyze the Cloud security strategies.	Analyze

UNIT I: INTRODUCTION TO CLOUD COMPUTING 8 HOURS

Traditional computing: Limitations, Overview of Computing Paradigms: Grid Computing, Cluster Computing, Distributed Computing, Utility Computing, Cloud Computing, NIST reference Model, Basic terminology and concepts, Cloud characteristics, benefits, and challenges.

Cloud delivery(service) models: Infrastructure-as-a-Service (IaaS), Platform-as-a-Service(PaaS), Software-as-a-Service (SaaS), XaaS (Anything-as-a-service).

Cloud deployment models: Public cloud, Community cloud, Private cloud, Hybrid cloud, Open Cloud Services.

UNIT II: FUNDAMENTAL CLOUD SECURITY 8 HOURS

Basic Terms and Concept sin Security, Threat Agents, Cloud Security Threats, Identity Management and Access Control, Cloud Security Working Groups, Element s of Cloud Security Model, Cloud Security Reference Model, Examining Cloud Security against Traditional Computing.

UNIT III: CLOUD MECHANISMS **8 HOURS**

Data Centre Technology, Virtualization Technology, Web Technology, Multitenant Technology, Scaling, Foundation of Cloud Scaling, Scaling Strategies in Cloud, Auto Scaling in Cloud Cloud Bursting, Types of Scaling, Capacity Planning, Capacity Planning at Different Service Levels, Load Balancer, Two Levels of Balancing, Goals of Load Balancing, Categories of Load Balancing, Exploring Dynamic Load Balancing.

UNIT IV: CLOUD MANAGEMENT **8 HOURS**

Cloud Audit and Compliance: Internal Policy Compliance, Regulatory External Compliance, Cloud Security Alliance. Cloud Computing and Business Continuity Planning Disaster Recovery.

UNIT V: CLOUDSECURITYSTRATEGIES **8 HOURS**

Standards for Security: SAMLO Auth, OpenID, SSL/TLS, Encrypting Data and Key Management, Creating a Cloud Security Strategy, The Future of Security in Cloud Computing.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Ronald L. Krutz, Russell Dean Vines. Cloud Security: A comprehensive Guide to Secure Cloud Computing, Wiley India 2010
2. Thomas Erl, EricBarceló Monroy. Cloud Computing: Concepts, Technology, Security, and Architecture, 2nd Edition.
3. “Cloud computing: Michael miller pearson publication,2009
4. “Cloud computing and practical Approach” Tata Mcgraw hill publication, Anthony. T. VELTE,2010

REFERENCE BOOKS:

1. "Cloud Computing: Concepts, Technology & Architecture" by Thomas Erl, Ricardo Puttini, and Zaigham Mahmood.
2. "Cloud Security and Privacy: An Enterprise Perspective on Risks and Compliance" by Tim Mather, Subra Kumaraswamy, and Shahed Latif.
3. "Cloud Computing: From Beginning to End" by Ray J. Rafaels.
4. "Managing Clouds: Organizational Considerations and Challenges" by Kyung-Soo Lim, Roshanak Roshandel, and George O. Rogers.
5. Cloud Security: A Comprehensive Guide to Secure Cloud Computing" by Ronald L. Krutz and Russell Dean Vines.

WEBSITES:

1. https://www.ibm.com/topics/cloud-security
2. https://www.javatpoint.com/what-is-cloud-security
3. https://onlinecourses.nptel.ac.in/noc21_cs14/preview
4. https://www.geeksforgeeks.org/cloud-computing-security/
5. https://www.cloudflare.com/learning/cloud/what-is-cloud-security/

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	-	-	-	-	-	-	-	-	-	-	1
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	2	-	-	-	-	2	-	-	-	-
CO5	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	-	-	2	1	2	-	2	-	1	-	-	2	-	-	3	1

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

Semester IV

24CYUA401 PROBABILITY AND STATISTICS 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:

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 HillEducation, 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-statistics-2014/
2. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE
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

Semester IV

24CYU411 CYBER SECURITY ESSENTIALS - 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand browser-to-web server interaction security.
- To learn about operations security, threat identification, and remediation.
- To understand encryption techniques for email privacy and authentication.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the security measures for browser-to-web server interactions.	Understand
CO2	Explain the principles of data security, privacy, and compliance standards.	Understand
CO3	Apply encryption techniques for email privacy and authentication.	Apply
CO4	Analyze digital signature schemes and their significance in data security.	Analyze
CO5	Classify the various Cyber Crimes and Cyber Security	Understand

List of Programs

1. Setting, configuring and managing three password policy in the computer (BIOS, Administrator and Standard User).
2. Security patch management and updates in Computer and Mobiles.
3. Installation and configuration of Computer Host Firewall.
4. To configure virtual networks using network simulator
5. To install and exploit security tools for protecting a network
6. To implement cryptographic algorithm for building a secure communication network
7. To exploit the vulnerabilities in a LAN environment and launch attacks
8. To analyze the network packet using Wireshark
9. To perform the web penetration testing using Burp suite
10. To perform vulnerability assessment of wireless devices
11. To exploit vulnerabilities in the systems
12. To perform the log analysis using Splunk

13. To find vulnerable apps in play store and perform static and dynamic analysis on it

1. LAN based insider attacks

Make use of Ettercap/arpspoof tool to perform ARP cache poisoning based attacks in a LAN environment:
1. Perform Denial of Service (DoS) attacks using ARP Cache poisoning attacks
2. Perform DNS Spoofing attack using ARP Cache poisoning attacks
3. Perform Password stealing (over plaintext) using ARP Cache poisoning attacks
4. Invoke 'sslstrip tool' for stealing password from any machine that is connected in a LAN by stripping the https connection.
For all the above attacks, observe the ARP cache table, CAM table, etc., before and after the attack. Run Wireshark and observe the traffic patterns before and after the attack.

2. Log analysis using ELK

Understand the architecture of ELK and installation process. Ingest Data from any source, use search option, analyze the logs, and then visualize. The details are there in the below link where you can use the free trial version
https://www.elastic.co/elastic-stack

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

TEXT BOOKS:

1. Sammons, John, and Michael Cross. The basics of cyber safety: computer and mobile device safety made easy. Elsevier, 2016.

REFERENCE BOOKS:

1. CharlesP. Pfleeger, Shari Lawrence, Pfleeger Jonathan Margulies; Security in Computing, Pearson Education Inc. 5th Edition, 2015
2. Brooks, Charles J.Christopher Grow, Philip Craig, and Donald Short. Cyber security essentials. John Wiley & Sons, 2018
3. Bryan Sullivan and Vincent Liu, Web Application Security, A Beginner's Guide, McGraw-Hill Education, 2012

CO, PO, PSO Mapping

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

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

Semester IV

24CYU412 NETWORK SECURITY - 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To familiarize students with various network protection tools such as firewalls, intrusion detection systems, and proxies.
- To provide knowledge of LAN attacks such as ARP cache poisoning and VLAN hopping.
- To introduce about firewalls and web security

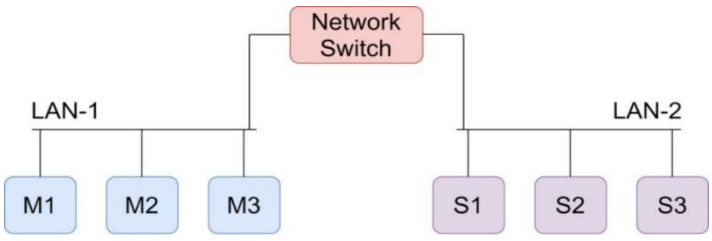
COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the principles of network protection and the role of firewalls.	Understand
CO2	Explain the principles and usage of secure communication protocols like SSH, SSL/TLS, and VPN.	Understand
CO3	Compare the concepts of Encrypting and Signing Emails	Understand
CO4	Apply the Network based malware techniques	Apply
CO5	Analyse network Security in LAN attacks	Analyze

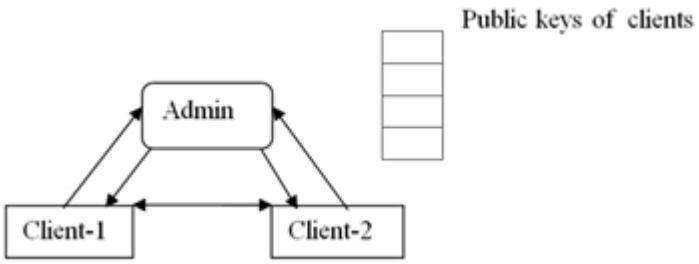
The experiments make use of Kali Linux distros and other open-source security tools.
Install Kali Linux on Virtual Machine and most of the open-source tools are available along with Kali Linux

1. **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

2. **Application of Cryptographic algorithms using Crypto tools** : 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/ TCP dump at the SPAN/Promiscuous port of the network switch and identify the communication between the communicating entities (Admin, Client-1, and Client-2).

3. **Network Security Lab: Network Packet analysis using Wireshark**.

(Mark your responses on the screenshot. A screenshot should be there for the command window, showing the sequence of actions and another one for Wireshark capture)

Do a regular HTTP GET and Response

1. What is the 48 bit ethernet address of your computer?
2. What is the 48-bit destination address in the ethernet frame? Which device has this ethernet address?
3. What is the content of frame type field? Which upper layer protocol does this correspond to?
4. How many bytes from the beginning does the GET appear in the ethernet frame?
5. In the HTTP OK, what is the value of the ethernet source address? Which machine does this belong to?
6. What is the destination address in the ethernet frame? Whose address is that?
7. What protocol does the ‘type’ correspond to?
8. How many bytes from the start does the ‘O’ in the OK of response message appear?
9. Write down the contents of your computer’s ARP cache. (use arp -a)
10. What are the hexadecimal values of the source and destination in the ethernet frame containing the ARP request message?
11. What is the type field indicating, in ethernet frame? For ARP?
12. How many bytes from the beginning does the ARP opcode field begin?
13. What is the value of ‘opcode’ field?
14. Does the ARP contain IP address of sender?
15. Find the ARP response corresponding to the request. How many bytes from the beginning does the ARP opcode field begin? What is its value?
16. What are the values of source and destination addresses in ARP response?

4. Wireless Security Lab :

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

TEXT BOOKS:

1. William Stallings, Cryptography and Network Security: Principles and Practice, 8th Edition, Pearson edition, 2020.

2. Behrouz A.Forouzan, Cryptography & Network Security, McGraw-Hill, 3rd Edition2015.

REFERENCE BOOKS:

1. W.Stallings, Network Security Essentials: Applications and Standards, 6th Edition, Pearson Prentice Hall, 2016.

2. C.Kaufman,R.PerlmanandM.Speciner,NetworkSecurity:PrivateCommunicationinaPublic World, 2nd Edition, Prentice Hall PTR, 2002.

3. VincentJ.Nestleret.al,PrinciplesofcomputersecurityLabManual,4thEdition,McGraw-Hill, 2014

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/Principles%20of%20Computer%20Security%20CompTIA%20Security+%20and%20Beyond%20Lab%20Manual,%20Second%20Edition%20(%20PDFDrive%20).pdf

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	-	-	-	-	-	-	-	-	-	-	1	-
CO2	3	-	-	-	-	1	-	-	-	3	-	-	-	-	-	-	3
CO3	-	-		2	3	-	2	-	-	3	-	-	-	-	-	-	-
CO4	-	-	2		3	-	-	-	2	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	3	-	-	3	3	-	-	-	-	-
Average	3	-	2.5	2	3	1	2	3	2	3	3	3	-	-	-	1	3

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

Semester IV

24VAC401 UNIVERSAL HUMAN VALUES 2H-1C

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

End Semester Exam: -

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To develop the holistic perspective based on self-exploration about themselves, family, society and nature/existence.
- To understand harmony in themselves, family, society and nature/existence.
- To strengthen the self-reflection.
- To develop the commitment and courage to act.

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Become more aware of themselves and their surroundings (family, society, nature).	Understand
CO2	Be more responsible in life.	Apply
CO3	Deal with problems with sustainable solutions, while keeping human relationship and human nature in mind.	Analyze
CO4	Develop consciousness of themselves through the control of mind.	Evaluate
CO5	Nuture human to live with mutual happiness and prosperity with rest of nature	Analyze

UNIT I INTRODUCTION 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 a process for self-exploration. Continuous Happiness and prosperity. A look at basic human Aspiration. Right understanding, Relationship and physical Facilities-the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and prosperity correctly- A critical appraisal of the current scenario. Method of fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II UNDERSTANDING HARMONY IN THE HUMAN BEING – HARMONY IN MYSELF 5 HOURS

Understanding human being as a co-existence of the sentiment 'I' and the material 'Body'. Understanding the needs of self ('I') and 'Body' – sukh and Suvidha. 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 helth; 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 HUMANHUMAN RELATIONSHIP 5 HOURS

Understanding values in human-human relationship; meaning of justice (nine universal values in relationship) and program for its fulfillment to ensure mutual happiness; Trust and respect as the foundational values of relation, 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 harmony in the family and society (society being an extension of family): Resolution, prosperity, fearlessness and coexistence 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 CO- EXISTENCE 4 HOURS

Understanding harmony in the nature, Interconnectedness and mutual fulfillment among the four orders of nature recyclability and self-regulation in nature. Understanding existence as co-existence of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V IMPLICATION OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS 5 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: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems, c) Ability to identify and develop appropriate technologies and management patters 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 a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations.

TOTAL: 24 HOURS

TEXT BOOKS:

1. Gaur,R.R, Sangal,R and Bagaria,G.P,(2010). A foundation course in Human Values and professional Ethics, Excel books, New Delhi.
2. Schumacher. E.F, Small is Beautiful: Economics as If People Mattered,Perennial Library.
3. Cecile Andrews, (2006). Slow is Beautiful, New Society Publishers.

REFERENCE BOOKS:

1. Joseph Cornelius Kumaruppa,(Digitized 30 Oct 2019). *The Economy of Permanence*.
2. Mahatma Gandhi, (1983). *The Story of My Experiments with Truth*.
3. Maulana Abul Kalam Azad, (2017). *India Wins Freedom*, Create Space Independent Publishing Platform.
4. Romain Rolland, (1952). *The Life of Vivekananda and the Universal Gospel*, Advaita ashrama.

WEB SITES:

1. http://www.arvindguptatoys.com/arvindgupta/gandhiexperiments.pdf
2. http://www.sanipanhwar.com/India%20Wins%20Freedom%20%20Maulana%20Abul%20Kalam%20Azad
3. https://estudantedavedanta.net/The-Life-Of-Vivekananda-And-The-Universal-Gospel.pdf

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO 9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	2	1	-	-	-	-	-	-	-	3	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
CO3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3	2	-
Average	**-**	**-**	**2**	**2**	**2**		**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2.5**	**-**

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

Semester V

24CYU501 DIGITAL IDENTITY AND ACCESS MANAGEMENT 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):

- To impart knowledge about Digital Identity.
- To Apply various access control techniques through user groups
- To Develop capacity to prepare various access control mechanism

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain about the Digital Identity.	Understand
CO2	Explain the importance privileged access	Understand
CO3	Apply various partitions	Apply
CO4	Analyze various access control techniques through user Authentication.	Analyze
CO5	Explain various access control mechanism.	Understand

UNIT I DIGITAL SECURITY & GOVERNANCE 9 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, CoBIT.

UNIT II IDENTITY AND ACCESS MANAGEMENT 9 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, and Provisioning Enforcement: Authentication, Authentication Implementation Approaches, Authorization, Logging and Monitoring Access Review and Certification: Benefits and Objectives, Access Review and Certification Processes Roles 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 Standard LDAP 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 **10 HOURS**

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. Ertem Osmanoglu. Identity and Access Management, Released November 2013
2. Reinhard E. Voglmaier, The ABCs of LDAP, Released November 2003
3. James F. Penrose. "Multi-Factor Authentication: Strategies and Implementation
4. Mark D. Osborn. Federated Identity Management: Concepts and Practices
5. Laura E. Peterson. Single Sign-On Solutions: Security, Implementation, and Best Practices
6. Mike Chapple, Access Control and Identity Management, 3rd Edition, Released October 2020

REFERENCE BOOKS:

1. Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short. Cybersecurity essentials. John Wiley & Sons, 2011
2. Thomas R. Peltier, Information Security Risk Analysis, CRC Press; 2001
3. Whitman, M. and Mattord, H., Principles of Information Security, Second Edition, Boston: Thomson Course Technology; 2008

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

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

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

Semester V

24CYU502A **PYTHON PROGRAMMING** **5H-3C**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To provide Basic knowledge of Python
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To provide knowledge about python packages and GUI programming.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain the Basic knowledge of Python	Understand
CO2	Develop a Python program using control statements	Apply
CO3	Make use lists, tuples, and dictionaries in Python programs	Apply
CO4	Apply file operations and database creation.	Apply
CO5	Interpret python packages and GUI programming	Understand

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 Défense – Get and Set Attribute Values with Properties – Name Mangling for Privacy – Method Types – Duck Typing – Special Methods –Composition.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Allen.B. Downey, Jeffrey Elkner, Chris Meyers.How to think like a computer scientist learning with Python / 1st Edition,2012
2. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978- 1111822705
3. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2016
4. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley, 2015
5. Jeeva Jose & P.SojanLal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Publishers, New Delhi, 2016
6. Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition-Second Release, 2014
7. Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

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

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

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

Semester V

24CYU502B .NET PROGRAMMING 5H-3C

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand .NET framework to develop web centric applications.
- To enable students to learn the basics of I/O and object-oriented programming.
- To learn about the ASP.NET controls and ADO.NET.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the basics of .NET framework and the object-oriented programming.	Understand
CO2	Explain the procedures, File I/O, Error handling and Message queues.	Understand
CO3	Summarize the components in VB.NET IDE, ADO.NET and also the window forms.	Understand
CO4	Apply the HTML server controls, Web controls, Validation controls and state management and tracing.	Apply
CO5	Categorize the various windows controls and forms.	Analyze

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. Evangelos Petroutsos, 2019. Mastering Visual Basic.NET, BPB Publications, New Delhi.
2. Ying Bai,2018. Practical Database Programming with Visual Basic.NET 2nd Edition, John Wiley & Sons Publication, Canada
3. Shirish Chavan. 2017. Visual Basic.NET, 1st Edition, Pearson Education, New Delhi.
4. Beginning Visual Basic 2016. Thearon Willis, Bryan Newsome, Wrox Publication, New Delhi,
5. VB.NET in Nutshell 2016. 2nd Edition. Steven Roman, Paul Lomax, Oreilly

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

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

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

Semester V

24CYU503A **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

PREREQUITES:

Not Applicable

COURSE OBJECTIVES (CO):

- To make the student understand the basic concepts of Full stack application development, aware of Characteristics of Full stack development, User-interface design, basics of development of Applications.
- To facilitate students to understand Angular JS.
- To inculcate working knowledge of backend with MONGODB

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain 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	Interpret the benefits of NoSQL	Understand
CO5	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**

Node.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. T1. Lauren Darcey and Shane Conder, (2011) "Android Wireless Application Development", PearsonEducation, 2nd ed.
2. Jerome DiMarzio, "*Beginning Android Programming with Android Studio*", 4th Edition
3. Android Programming: (2021)The Big Nerd Ranch Guide" (4th Edition) by Bill Phillips, Chris Stewart, and Kristin Marsicano.

REFERENCE BOOKS:

1. R1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. R2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. R3. Android Application Development All in one for Dummies by Barry Burd, Edition: I
4. Dawn Griffiths, David Griffiths, "*Head First Android Development: A Brain-Friendly Guide",* 2017.
5. Neil Smyth , "*Android Studio 3.0 Development Essentials: Android",* 8th Edition.
6. Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB. Copyright © 2015 BYAZAT MARDAN

WEBSITES:

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/
8. https://en.wikipedia.org/wiki/Mobile_app_development

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	-	-	-	-	1	-
CO2	-	-	1	-	-	3	-	-	-	-	-	-	-	-	-	-	2
CO3	-	-	-	3	-	3	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	1	3	-	3	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	3	-	3	-	-	2	-	-	-	-	-	-
Average	1	-	1	3	-	3	-	3	-	-	2	-	-	-	-	1	2

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

Semester V

24CYU503B VULNERABILITY ASSESSMENT AND PENETRATION 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To Understand various methodologies for vulnerability assessment, including foot printing, social engineering, and information gathering.
- To Learn about common system hacking techniques, including password cracking, keyloggers, and privilege escalation.
- To Develop skills in detecting and mitigating network attacks, such as sniffing, ARP poisoning, session hijacking, and DNS spoofing.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Analyze real-world attacks and vulnerabilities in Android apps and propose suitable mitigation strategies.	Analyze
CO2	Explain the network vulnerabilities using various scanning and enumeration techniques.	Understand
CO3	Classify the architecture of Android apps and their security implications.	Understand
CO4	Analyze the concepts to implement Android OS Security	Analyze
CO5	Apply the security challenges associated with hybrid mobile application development and propose appropriate security measures.	Apply

UNIT I INTRODUCTION TO VULNERABILITY ASSESSMENT **12 HOURS**

Introduction to vulnerability assessment, Foot printing & Social engineering Information gathering methodologies-Competitive Intelligence – DNS Enumerations - Social Engineering attacks. Scanning & Enumeration Port Scanning – Network Scanning – Vulnerability Scanning – NMAP scanning tool – OS Finger printing Enumeration. System Hacking Password cracking techniques- Key loggers- Escalating privileges.

UNIT II SNIFFERS & SQL INJECTION **12 HOURS**

Sniffers & SQL Injection Active and passive sniffing – ARP poisoning – Session Hijacking-DNS Spoofing- Conduct SQL Injection attack – Countermeasures. Introduction to Metasploit t: Metasploit framework, Metasploit Console, Payloads, Meterpreter, Introduction to Armitage, Installing and using Kali Linux Distribution, Introduction to penetration testing tools in Kali Linux. Case Studies of recent vulnerabilities and attacks.

UNIT III REVERSE ENGINEERING OF ANDROID APPS **12 HOURS**

Introduction to Reverse Engineering of Android Apps- Introduction to Android OS and App Development - Architecture, Types of Applications, Building an App, Understanding Activities, Activity Lifecycle, Managing State. Understanding various layouts and UI controls

UNIT IV INTRODUCTION TO ANDROID OS SECURITY **12 HOURS**

Introduction to Android OS Security, Static and Dynamic Analysis of Android Apps, Native Library Exploitation, OWASP Top ten mobile vulnerabilities, Security Assessment with Drozer, Burpsuite.

UNIT V ATTACKS AND VULNERABILITIES **12 HOURS**

Some of the attacks and Vulnerabilities in real world android apps: A case study. Hybrid Mobile Application Development and its security.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Kimberly Graves, CEH: Official Certified Ethical Hacker Review Guide, Wiley Publishing Inc.; 2007
2. Shakeel Ali and Tedi Heriyanto, Backtrack-4: Assuring security by penetration testing", PACKT Publishing; 2011.
3. Baloch, R.,Ethical Hacking and Penetration Testing Guide, CRC Press; 2015

REFERENCE BOOKS:

1. "Network Security Assessment: Know Your Network" by Chris McNab.
2. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto.
3. "Android Hacker's Handbook" by Joshua J. Drake, Zach Lanier, Collin Mulliner, Pau Oliva Fora, Stephen A. Ridley, Georg Wicherski.
4. "Android Security Internals: An In-Depth Guide to Android's Security Architecture" by Nikolay Elenkov.

WEBSITES:

1. https://www.veracode.com/security/vulnerability-assessment-and-penetration-testing
2. https://www.geeksforgeeks.org/differences-between-penetration-testing-and-vulnerability-assessments/
3. https://www.redscan.com/services/penetration-testing/vapt/
4. https://purplesec.us/learn/vulnerability-assessment-vs-penetration-testing/
5. https://www.tutorialspoint.com/penetration_testing/penetration_testing_vulnerability_assessment.html

CO, PO, PSO Mapping

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

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

Semester V

24CYUA501 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand basic concepts on Accounting
- To prepare financial statements
- To carry out depreciation on fixed assets

COURSE OUTCOMES (COs):

At the end of the course, student 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 non profit 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

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

REFERENCE 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 .
5. T.S.Grewal, S.C.Gupta and S.P.Jain, 2010, New Delhi Advanced Accountancy, Sultan Chand .
6. K.L.Narang and S.N.Maheswari ,2010, New Delhi Advanced Accountancy-Kalyani Publishers.

CO, PO, PSO Mapping

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

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

Semester V

24CYU512A PYTHON 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To develop simple programs using Python and packages.
- To develop python visualization techniques using packages.
- To Understand draw charts using different data sets.

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Explain the essentials of Python programming	Understand
CO2	Develop a basic program using python modules and packages	Apply
CO3	Construct a simple algorithm with and without using packages	Apply
CO4	Analyze an interpret algorithm and visualize the results with real time datasets	Analyze
CO5	Build a python program to manipulate stings	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. Allen Downey, Jeffrey Elkner, Chris Meyers.How to think like a computer scientist learning with Python / 1st Edition,2012.
2. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978- 1111822705.

3. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition , Pearson Education, 2016.

REFERENCE BOOKS:

1. Charles Dierbach, “Introduction to Computer Science using Python”, Wiley, 2015.
2. Jeeva Jose & P.SojanLal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Publishers, New Delhi, 2016.
3. Bill Lubanovic, “Introducing Python”, O’Reilly, First Edition-Second Release, 2014
4. Mark Lutz, “Learning Python”, O’Reilly, Fifth Edition, 2013.

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

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

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

Semester V

24CYU512B .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:

Not Applicable

COURSE OBJECTIVES (CO):

- To create windows forms using arrays and flow control statements.
- To learn the classes and namespaces in the .NET Framework class library.
- To assemble multiple forms, modules, and menus into working VB.NET solutions

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Develop Windows based applications using Visual Basic.Net	Apply
CO2	Make use of various tools in .net applications	Apply
CO3	Classify ADO.Net concept in VB.Net and ASP.Net applications	Understand
CO4	Develop server-side web applications using ASP.NET	Apply
CO5	Apply techniques to develop error-free software	Apply

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. Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007.

2. Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006.
3. Gray Cornell (2003),"Visual Basic 6 from ground up" TMH, New Delhi, 1st Edition,
4. VB.Net in Nutshell 2016. 2nd Edition. Steven Roman, Paul Lomax, Oreilly
5. Deitel and Deitel, T.R.Nieto (1998), "Visual Basic 6 – How to Program", Pearson Education. First Edition.

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

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

Semester V

24CYU513A 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To gain knowledge about Node JS and developing of applications.
- To help students to gain a better understanding of application development through React JS.
- To inculcate working knowledge of backend with MONGODB

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain 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	Show the React JS to test and run the applications.	Understand
CO5	Apply rapid prototyping techniques to design and develop sophisticated database connectivity through MONGO DB.	Apply

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 controllers. Note: 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.

REFERENCE 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

WEBSITES:

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

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

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

Semester V

24CYU513B VULNERABILITY ASSESSMENT AND PENETRATION 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To Understand various methodologies for vulnerability assessment, including foot printing, social engineering, and information gathering.
- To Learn about common system hacking techniques, including password cracking, keyloggers, and privilege escalation.
- To Develop skills in detecting and mitigating network attacks, such as sniffing, ARP poisoning, session hijacking, and DNS spoofing.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Analyze real-world attacks and vulnerabilities in Android apps and propose suitable mitigation strategies.	Analyze
CO2	Classify the network vulnerabilities using various scanning and enumeration techniques.	Understand
CO3	Explain the architecture of Android apps and their security implications.	Understand
CO4	Analyze the concepts to implement Android OS Security	Analyze
CO5	Apply the security challenges associated with hybrid mobile application development and propose appropriate security measures.	Apply

List of Programs

1. Network reconnaissance and Protection

1. Installing ‘iptable’ in Ubuntu VM to allow/block communication between VMs

a) Installing Email server and Web server in VMs. Usage of Firewall (iptable) in blocking/allowing a sub-network from accessing the servers

b) Configuring iptable to block Telnet inbound and outbound connections

2. Use ‘nmap’ tool to perform vertical and horizontal scanning for checking open and closed ports. Use nmap commands for performing the following experiments:

a) Use ping sweeping to determine which hosts are running.

b) Check for vulnerable services available using TCP connect scans.

c) Perform OS Fingerprinting to determine the OS of target machine.

d) Choose different options under each category according to your creativity.

2.Web Penetration testing using Burp Suite.

1. Configure burp suite in machine A and access the request and response going throw machine B. Both A and B machines should be pingable.

2. Intercept an https request through BurpSuite using import/export CA certificates.
3. Intercept a web application login credentials using BurpSuite and resend request using repeater.
4. Use intruder to brute force password list

3. Exploiting the vulnerabilities on a system

Use Metasploit (open-source exploit framework) to write and test your own exploit into any PC/Site with existing payloads using Virtual Machines in Ubuntu Host and Windows XP Virtual disk. These traces should be executed in OllyDbg step by step, and debug the protocols every single command, laidback with registers and flags, with buffer information. Also debug standalone DLL's like Message Box and wsprintf. Use IDA Pro (evaluate a limited version of the disassembler) to examine a protected and obfuscated sample executable. (.NET Reflector can be used to search through, the class hierarchies of .NET assemblies, even without any source code). Perform static and dynamic code auditing.

4. Mobile & Smart phone security Lab

Familiarize with android application .apk files. By performing static and dynamic analysis on the app. Find the vulnerable application and document the inferences

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: 60 HOURS

TEXT BOOKS:

1. Kimberly Graves, CEH: Official Certified Ethical Hacker Review Guide, Wiley Publishing Inc.; 2007
2. Shakeel Ali and Tedi Heriyanto, Backtrack-4: Assuring security by penetration testing", PACKT Publishing; 2011.
3. Baloch, R.,Ethical Hacking and Penetration Testing Guide, CRC Press; 2015

REFERENCE BOOKS:

1. "Network Security Assessment: Know Your Network" by Chris McNab.
2. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto.
3. "Android Hacker's Handbook" by Joshua J. Drake, Zach Lanier, Collin Mulliner, Pau Oliva Fora, Stephen A. Ridley, Georg Wicherski.
4. "Android Security Internals: An In-Depth Guide to Android's Security Architecture" by Nikolay Elenkov.

WEBSITES:

1. https://www.veracode.com/security/vulnerability-assessment-and-penetration-testing
2. https://www.geeksforgeeks.org/differences-between-penetration-testing-and-vulnerability-assessments/
3. https://www.redscan.com/services/penetration-testing/vapt/
4. https://purplesec.us/learn/vulnerability-assessment-vs-penetration-testing/
5. https://www.tutorialspoint.com/penetration_testing/penetration_testing_vulnerability_assessment.html

CO, PO, PSO Mapping

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

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

Semester V

24CYU591	**INTERNSHIP**	**0H - 2C**
Instruction Hours/week: L:0 T:0 P:0	**Marks:** Internal**:100** External**: -** Total**:100**	
	End Semester Exam: -	

Semester VI

24CYU601A **OPEN SOURCE TECHNOLOGY** **5H - 3C**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To introduce the various open-source software's like MySQL, PHP and TCL.
- To impart writing skill of PHP Programming to the student.
- To understand the concepts of SQL and construct queries using SQL.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain about the need and importance of open-source software	Understand
CO2	Develop PHP programs that use various PHP library functions.	Apply
CO3	Explain the basic Perl constructs and to outline Perl commands.	Understand
CO4	Classify the commands and flow control statements in TCL.	Understand
CO5	Construct database using Structured Query Language (SQL)	Apply

UNIT I Introduction **12 HOURS**

Introduction to open-source programming languages – History - Advantages and drawbacks of open-source programming - Difference between open-source software and free software - Threats and vulnerabilities in open-source languages.

UNIT II PHP **12 HOURS**

PHP Language Basics - PHP variables - operation and Expression - Control-Statements, Arrays - storing data in arrays - Extracting multiple values - Traversing, and sorting arrays - Functions - anonymous function – Strings - String Functions- file Handling and data storage.

UNIT III PERL **12 HOURS**

Pearl overview–pearl parsing rules–variables and data–statements and control structures – subroutines -, packages and modules – working with files– data manipulation.

UNIT IV TCL **12 HOURS**

Introduction to TCL-History and Features of TCL-Tokens, variables, commands, substitutions, operators, flow control statements.

UNIT V MYSQL **12 HOURS**

Introduction to MYSQL, The show Databases and Table, The USE Command, Create Database and Tables, Describe Table, Select, Insert, Update, and Delete statements-Some Administrative detail-Table Joins-Loading and Dumping a Database-My SQL and Web.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Kailash Vadera, Bhavyesh Gandhi, “Open Source Technology”, 1 Edition, Laxmi Publications Pvt Ltd 2012.
2. Perl: The Complete Reference, 2nd Edition, Martin C. Brown, TMH , 2009

REFERENCE BOOKS:

1. David Sklar, Adam Trachtenberg, 2019. PHP Cookbook: Solutions & Examples for PHP.
2. MySQL Bible, Steve Suchring, John Wiley 2002.
3. John Ousterhout, "TCL / TK programming", Pearson Education, 2002.

WEBSITES:

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview
3. https://www.tutorialspoint.com/oracle_sql/index.htm
4. www.w3schools.com/PHP/default.asp
5. https://www.javapoint.com/php-tutorial

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	-
CO2	3	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	1
CO3	3	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	-	-	3	-	-	-	-	-	-	-	-	-	-	3	-	-
Average	3	-	-	3	-	-	-	-	-	-	-	-	-	-	3	2	1

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

Semester VI

24CYU601B **SOFT 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:

Not Applicable

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)

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

COs	Course Outcomes	Blooms Level
CO1	Explain about the need and importance of Soft Computing	Understand
CO2	Analyze the various applications of Fuzzy sets.	Apply
CO3	Explain the basic of Artificial Neural Networks	Understand
CO4	Summarize the Genetic Algorithms.	Understand
CO5	Identify the concepts of Neuro Fuzzy Technology	Apply

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 Defuzzyfication 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, "Principles of soft computing",2nd Edition, Wiley India Pvt Limited, 2011.
2. Juh Shing Roger Jang, Cheun Tsai Sun, Eiji Mizutani, "Neuro fuzzy and soft computing", Prentice Hall, 1997.

REFERENCE BOOKS:

1. Juh Shing Roger Jang,Cheun Tsai Sun,Eiji Mizutani, "Neuro fuzzy and soft computing", Prentice Hall, 1997.
2. Ronald R.Yager, Lofti Zadeh, "An Introduction to fuzzy logic applications in intelligent Systems", Kluwer Academic, 1992.

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

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

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

Semester VI

24CYU601C **DEEP LEARNING** **5H - 3C**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand the fundamentals of neural networks
- To explore the ideas of Adaptive Resonance Theory.
- To discuss the concept of fuzzy logic systems.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the basic Concepts of Neural Networks.	Understand
CO2	Apply the concept of fuzziness involved in various systems.	Apply
CO3	Explain about fuzzy sets, Crisp sets, Fuzzy relations and Crisp relations.	Understand
CO4	To learn the concepts of Fuzzy Rule Based System and Defuzzification Methods.	Apply
CO5	Summarize 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, Training Algorithms: 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. Boris.ASkorohod, (2017), Diffuse Algorithms for Neural and Neuro-Fuzzy Networks, Pearson Education.
2. Flasiński, Mariusz. (2016). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.

REFERENCE BOOKS:

1. Boris.ASkorohod, (2017), Diffuse Algorithms for Neural and Neuro-Fuzzy Networks, Pearson Education.
2. Flasiński, Mariusz. (2016). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.
3. Rajasekharan and Rai (2016), Neural Networks, Fuzzy logic, Genetic algorithms: synthesis and applications by Rajasekharan and Rai – PHI Publication.
4. Dr.R.P.Das. (2016). Neural Networks and Fuzzy Logic. 1st Edition, Tata Mcgraw Hill, Delhi
5. James A. Freeman, David M. Skapura, (2016). Neural Networks – Algorithms, Applications and Programming Techniques, Pearson Education.
6. Simon Haykin. (2016).Neural Networks – A Comprehensive Foundation , Prentice Hall of India.

WEBSITES:

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	-	1	2	-	-	-	1	-	-	2	-	-	-	-	3	-
CO3	-	-	-	3	3	2	-	-	-	-	2	-	-	-	-	-	2
CO4	-	-	-	3	3	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	-
Average	2.5	-	1	2.75	3	2	-	3.5	-	-	2	-	-	-	-	3	2

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

Semester VI

24CYU601D	**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:

Not Applicable

COURSE OBJECTIVES (CO):

- To Understand the In-depth concepts of J2EE
- To Learn how to communication techniques in Java, including JDBC.
- To Use NetBeans IDE for creating J2EE Applications

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain the In-depth concepts of JEE	Understand
CO2	Classify the in-depth Life cycle of servlets and JSP.	Understand
CO3	Develop to communicate with databases using Java.	Apply
CO4	Build the NetBeans IDE for creating J2EE Applications.	Apply
CO5	Construct the 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. Jim Keogh. (2018). The Complete Reference J2EE 1st edtion New Delhi: Tata McGraw Hill.
2. Duane, K. Fields., & Mark, A. Kolb. (2017). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.

REFERENCE BOOKS:

1. Jim Keogh. (2018). The Complete Reference J2EE 1st edtion New Delhi: Tata McGraw Hill.
2. Duane, K. Fields., & Mark, A. Kolb. (2017). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.
3. Rod Johnson. (2017). J2EE Development without EJB 1st edition. New Delhi:Wiley Dream Tech.
4. Rod Johnson., & Rod Johnson, P.H. (2016). Expert One-On-One J2EE Design and Development. New Delhi: John Wiley & Sons.
5. Paul, J. Perrone., Venkata, S. R. Chaganti., Venkata S. R. Krishna., & Tom Schwenk. (2016). J2EE Developer's Handbook. New Delhi: Sams Publications.
6. Joseph, J. Bambara et al. (2016). J2EE Unleashed (1st ed.). New Delhi: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

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

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

Semester VI

24CYU601E **MOBILE 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To impart good knowledge of wireless communication to students.
- To understand the network layer and transport layer in mobile.
- To learn the database and service issues.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the concepts of Mobile Communication.	Understand
CO2	To analyze next generation Mobile Communication System.	Analyze
CO3	Utilize the network and transport layers of Mobile Communication	Apply
CO4	Analyze various protocols of all layers for mobile and ad hoc wireless communication networks.	Analyze
CO5	Explain the 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, “Mobile Communications”, Second Edition, Pearson Education, 2003. 2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.
2. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.

REFERENCE BOOKS:

1. Jochen Schiller, “Mobile Communications”, Second Edition, Pearson Education, 2003. 2. William Stallings, “Wireless Communications and Networks”, Pearson Education, 2002.
2. KavehPahlavan, PrasanthKrishnamoorthy, “Principles of Wireless Networks”, PHI/Pearson Education, 2003.
3. UweHansmann, LotharMerk, Martin S. Nicklons and Thomas Stober, “Principles of Mobile Computing”, Springer, 2003.
4. Raj Kamal, “Mobile Computing”,Oxford University Press, 2007
5. Asoke K. Talukdar, “Mobile Computing”, Tata McGraw-Hill Education,2010.

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	1	-	3	-	-	-	-	-	-	-	-	3	1	-	-	3	-
CO2	2	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	2
CO3	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	-	2	-	-	1	-	-	-	2	-	2	2	-	-	-	-
Average	1.5	-	2	2	1	1	-	-	-	2	-	2.5	2	-	-	3	2

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

Semester VI

24CYU602A **CRYPTOGRAPHY** **5H - 3C**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand basics of Cryptography and Network Security.
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data.
- To Implement various networking protocols.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify about Provide security of the data over the network	Understand
CO2	Explain the basic concepts of Cryptography and Network Security.	Understand
CO3	Apply the research in the emerging areas of cryptography and network security	Apply
CO4	Examine the various networking protocols.	Analyze
CO5	Identify any network from the threats in the world.	Apply

Unit I Basic Concepts of Cryptography **12 HOURS**

Attacks on Computers and Computer Security-Introduction, The need for security, Security approaches, Principles of security, Types of Security attacks, Security services, Security Mechanisms.

Cryptography: Concepts and Techniques-Introduction, plaintext and cipher text, substitution techniques, transposition techniques, encryption and decryption, symmetric and asymmetric key cryptography, stenography, key range and key size, possible types of attacks.

UNIT II Symmetric and Asymmetric Cryptography **12 HOURS**

Symmetric key Ciphers – Block Cipher principles & Algorithms (DES, AES, Blowfish), Differential and Linear Cryptanalysis, Block cipher modes of operation, Stream ciphers, RC4, Location and placement of encryption function, Key distribution. Asymmetric key Ciphers - Principles of public key cryptosystems, Public key Infrastructure, Algorithms (RSA, Diffie-Hellman, ECC), Key Distribution.

UNIT III Message Authentication Algorithms **12 HOURS**

Message Authentication Algorithms and Hash Functions - Authentication requirements, Authentication functions, Message authentication codes (MAC), Hash functions, Security of Hash functions and MAC, Message Digest5(MD5), Secure Hash Algorithm(SHA) – 512, Hash-based Message Authentication Code (HMAC), Cipher-based Message Authentication Code (CMAC), X.509 Authentication services.

UNIT IV Cryptographic Applications **12 HOURS**

Authentication Applications - Kerberos, X.509 Authentication Service, Public–Key Infrastructure, Biometric Authentication, Multi factor Authentication. Cryptographic Protocols-Types of protocols, Trust and computation, Validating Cryptographic protocols and attacks. Digital Signatures and Certificates - Digital Signatures, Digital Certificates, PKI and Certificate - Authorities

UNIT V Applications of Cryptography **12 HOURS**

User authentication- password, challenge-response and zero-knowledge protocols, server authentication; application secure online banking; digital cash, application keeping/storing secrets, block chain, application crypto currencies, implementation aspects: weakest key, key modularity, key management in cryptography, clear text cryptography. Quantum computing, quantum-resistant cryptography, implementation aspects: creating correct and secure programs, quality of code, side-channel attacks, implementation flaws, Quantum safe cryptography, Cloud security

TOTAL: 60 HOURS

TEXT BOOKS:

1. Boyd, Colin, Anish Mathuria, and Douglas Stebila. Introduction to Authentication and Key Establishment. Protocols for Authentication and Key Establishment. Springer, Berlin, Heidelberg; 2020
2. Boneh,Dan,andVictorShoup.Agraduatecourseinappliedcryptography.Draft0.5;2020

REFERENCE BOOKS:

1. J.Menezes, P.C.V. Oorschot and S.A.Vanstone, Hand book of Applied Cryptography, CRC Press, 1996.
2. Cryptography and N/W Security Priniciples and practice ,Willing stalling, pearson Education 2007
3. Abhijit Das and Veni Madhavan C. E., Public-key Cryptography, Theory and Practice, Pearson Education; 2009.

WEBSITES:

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171
3. https://www.programiz.com/c-programming
4. https://www.javatpoint.com
5. https://www.simplilearn.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	-	-	3	-	-	-	3	-	-	-	-	-	-	-	2	-
CO2	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	2
CO3	-	-	-	3	-	1	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
Average	1	-	3	3	2	1	-	3	-	-	-	-	-	-	-	2	2

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

Semester VI

24CYU602B **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To gain knowledge about Language Models and LLM Architecture
- To help students to gain a better understanding of Practical Applications of GPT.
- To Facilitate working knowledge of Use case Generative AI

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain the basics of Generative AI Models and Applications.	Understand
CO2	Apply basic principles of AI in solutions that require problem solving.	Apply
CO3	Summarize the various concepts of GPT for Artificial Intelligence.	Understand
CO4	To Develop 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. Kevin Knight and Elaine Rich, Nair B(2021)., "Artificial Intelligence (SIE)", Mc Graw.
2. Dan W. Patterson, "Introduction to AI and ES", Pearson Education.

REFERENCE BOOKS:

1. Ivan Brako,PROLOG: Programming for Artificial Intelligence,3rd edition Pearson,
2. Flasiński, Mariusz. (2018). Introduction to Artificial Intelligence. Tata Mcgraw Hill,Delhi.
3. Chandra .S.S.V. (2017). Artificial Intelligence and Machine Learning. Kindle Edition.
4. Elain Rich and Kevin Knight. (2021). Artificial Intelligence. McGraw Hill.

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

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

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

Semester VI

24CYUA601 **ENTREPRENEURSHIP** **6H - 6C**

Instruction Hours/week: L:6 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To explain concepts of Entrepreneurship and build an understanding about business situations in which entrepreneurs act.
- To understand the objectives of entrepreneurs
- To discuss the steps in venture development and new trends in entrepreneurship.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Categorize the foundation of Entrepreneurship Development and its theories.	Analyze
CO2	Explain to 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.	Apply
CO4	Apply the new trends in entrepreneurship& starting a venture and to explore marketing methods	Apply
CO5	Examine the Entrepreneurship Development and Government	Analyze

UNIT I INTRODUCTION TO ENTREPRENEURSHIP 14 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 14 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 14 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 **15 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 **15 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. Vasanth Desai " Dynamics of Entrepreneurial Development and Management Himalaya Publishing House,2009.
2. N.P.Srinivasan & G.P.Gupta," Entrepreneurial Development ", Sultanchand & Sons, 2020

REFERENCE BOOKS:

1. Paul Burns, Bloomsbury Academic,"Corporate Entrepreneurship And Innovation",2020.
2. UNNI,"Women Entrepreneurship In Indian Mid Class", Orient Blackswan Pvt. Ltd,2021.
3. S Anil Kumar , S C Poornima , M K Abraham , K Jayshree ,"Entrepreneurship Development", New Age Publishers; First edition ,2021, 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
5. https://onlinecourses.swayam2.ac.in/cec20_lb06/preview

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	-	-	-	-	-	-	2	2	-	-	-	-	-	-	-	3	-
CO3	-	-	-	3		-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	3	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-		3	-	-	-	-	-	-	-	2	-	-	-	-
Average	1	-	-	3	3	-	2	2	-	-	-	-	2	-	-	3	2

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

Semester VI

24CYU612A **CRYPTOGRAPHY - 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand basics of Cryptography and Network Security.
- To be able to secure a message over insecure channel by various means.
- To learn about how to maintain the Confidentiality, Integrity and Availability of a data.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain about Provide security of the data over the network	Understand
CO2	Classify the basic concepts of Cryptography and Network Security.	Understand
CO3	Apply the research in the emerging areas of cryptography and network security	Apply
CO4	Classify the various networking protocol techniques	Analyze
CO5	Identify the any network from the threats in the world.	Apply

List of programs

1. Represent a string (char pointer) with a value “Hello world”. The program should XOR each
character in this string with 0 and displays the result.*
2. Represent string (char pointer) with a value “Hello world” The program should AND or and
XOR each character in this string with 127and display the result.
3. Perform encryption and decryption using the following algorithms*
a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Implementation of Encryption and Decryption using DES*
5. Implementation of RSA Encryption Algorithm
6. Implementation of Hash Functions*
7. Implementation of Blowfish algorithm logic*
8. Implement the Diffie-Hellman Key Exchange mechanism
9. Implement RC4 logic using Java*
10. Encrypt the text “Hello world” using Blowfish.
11. Implement the SIGNATURE SCHEME –Digital Signature Standard*

TOTAL: 60 HOURS

TEXT BOOKS:

1. Boyd, Colin, Anish Mathuria, and Douglas Stebila. Introduction to Authentication and Key Establishment. Protocols for Authentication and Key Establishment. Springer, Berlin, Heidelberg; 2020
2. Boneh,Dan,andVictorShoup.Agraduatecourseinappliedcryptography.Draft0.5;2020
3. J.Menezes, P.C.V. Oorschot and S.A.Vanstone, Hand book of Applied Cryptography, CRC Press, 1996.
4. Cryptography and N/W Security Priniciples and practice ,Willing stalling, pearson Education 2007
5. Abhijit Das and Veni Madhavan C. E., Public-key Cryptography, Theory and Practice, Pearson Education; 2009.

WEBSITES:

1. http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html
2. https://nptel.ac.in/courses/106/105/106105171
3. https://www.programiz.com/c-programming
4. https://www.javatpoint.com
5. https://www.simplilearn.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	-	-	3	-	-	-	3	-	-	-	-	-	-	-	-	3
CO2	1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	3	-	1	-	3	-	-	-	-	-	-	-	2	-
CO4	-	-	3	3	2	-	-	3	-	-	-	-	-	-	-	-	-
CO5	-	-	3	3	2	1	-	-	-	-	-	-	-	-	-	-	-
Average	1	-	3	3	2	1	-	3	-	-	-	-	-	-	-	2	3

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

Semester VI

24CYU612B **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

PREREQUTIES:

Not Applicable

COURSE OBJECTIVES (CO):

- To gain a historical perspective of AI and its foundations.
- To investigate applications of AI techniques in intelligent agents, expert systems,artificial neural networks and other machine learning models.
- To experiment with a machine learning model for simulation and analysis.

COURSE OUTCOMES (COs)

At the end of this course, 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. Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07-008770-5,

   TMH,
2. Artificial Intelligence by SarojKausik ISBN:- 978-81-315-1099-5, Cengage Learning

REFERENCE BOOKS:

1. Artificial Intelligence and Intelligent Systems by Padhy, Oxforfd University Press,
2. Artificial Intelligence: A Modern Approach by Peter and Norvig ISBN-0-13-1038052

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/

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

Semester VI

24CYU691	**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

24CYU701 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To learn various tools of IoT related Protocols.
- To build simple IoT systems using open hardware such as Arduino and Raspberry Pi.
- To understand Data analytics concepts using IoT.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the different real world IoT applications and its functions.	Understand
CO2	Apply of IoT Protocols in Security and Optimizing Networks.	Apply
CO3	Explain the Routing and Lossy Network Protocol and Service Protocols.	Understand
CO4	Classify the 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 **14 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 **14 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 **15 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 **15 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. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton, Jerome Henry, "IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things", CISCO Press, 2017.
2. Perry Lea, "Internet of things for architects", Packt, 2018.

REFERENCE BOOKS:

1. Jan Ho¨ller, Vlasios Tsiatsis, Catherine Mulligan, Stamatis, Karnouskos, Stefan Savesand, David Boyle, "From Machine-to-Machine to the Internet of Things – Introduction to a New Age of Intelligence", Elsevier, 2014.
2. Olivier Hersent, David Boswarthick, Omar Elloumi , "The Internet of Things – Key Applications and Protocols", Wiley, 2012.
3. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), "Architecting the Internet of Things", Springer, 2011.
4. Arshdeep Bahga, Vijay Madisetti, "Internet of Things – A hands-on Approach", Universities Press, 2015.

WEBSITES:

1. https://www.arduino.cc/
2. https://www.ibm.com/smarterplanet/us/en/?ca=v_smarterplanet

CO, PO, PSO Mapping

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

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

Semester VII

24CYU702 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To build and compile robust enterprise grade applications
- To design and develop GUI applications using Swings and Servlets
- To provide foundations on Java Beans, Struts and JSON

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the sophisticated Java Applications	Understand
CO2	Apply the Java Language for writing well -organised, complex computer programs with both command -line and graphical user interfaces	Apply
CO3	Construct the Access database through Java programs, using Java Database Connectivity (JDBC)	Apply
CO4	Organize the dynamic web pages, using Servlets	Apply
CO5	Explain the 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. Advanced Java Programming, Uttam K. Roy, 2015, Oxford University Press
2. Web Coding & Development All-in-One for Dummies", Paul McFedries ,2018 "Fundamentals of Web Development", Randy Connolly, Ricardo Hoar ,2017.

REFERENCE BOOKS:

1. Principles of web design.,Joel sklar,sixth edition,2015.
2. HTML and CSS: Design and Build Websites", Jon Duckett, 2014.
3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.

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/

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

Semester VII

24CYUA701 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To develop the statistical skills in the areas of sampling and test of hypothesis.
- To understand statistical techniques as powerful tool in scientific computing.
- To enable the students to gain knowledge about test for randomness and run test.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Summarize the principles of census and sample surveys and to become competent for conducting sample surveys.	Understand
CO2	Explain 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	Understand
CO3	Compare the difference between parametric and non-parametric tests**.**	Analyze
CO4	Compare the difference between one way and two-way ANOVA.	Understand
CO5	Explain 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.

REFERENCE BOOKS:

1. Pillai R.S.N., and Bagavathi V., (2002). Statistics, S. Chand & Company Ltd, New Delhi
2. Gupta S. C and Kapoor V. K., (2007), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Montgomery D., (2011), Statistical Quality Control, Wiley India Pvt. Ltd, New Delhi.
4. 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/
3. http://onlinestatbook.com/2/introduction/inferential.html

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	-
CO2	3	-	3	-	-	2	-	-	-	1	-	-	-	-	-	-	2
CO3	-	-	3	2	-	-	-	1	-	-	-	-	-	-	-	-	-
CO4	3	-	3	2	-	-	-	1	-	-	-	-	-	-	-	-	-
CO5	3	-	3	2	1	2	-	-	-	-	-	-	-	-	-	-	-
Average	3	-	3	1	1	2	-	1	-	1	-	-	-	-	-	3	2

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

Semester VII

24CYU711 ARTIFICIAL INTELLIGENCE - 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To gain a historical perspective of AI and its foundations.
- To become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.
- To investigate applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.

COURSE OUTCOMES (COs)

At the end of this course, 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	Solve any kind of problem using depth first and best first search.	Apply

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. Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07-008770-5, TMH,2000
2. Artificial Intelligence by SarojKausik ISBN:- 978-81-315-1099-5, Cengage Learning

REFERENCE BOOKS:

1. Artificial Intelligence and Intelligent Systems by Padhy, Oxforfd University Press,
2. Artificial Intelligence: A Modern Approach by Peter and Norvig ISBN-0-13- 1038052

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

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

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

Semester VII

24CYU712 ADVANCED JAVA PROGRAMMING - 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To explore advanced topic of Java Programming for solving problems.
- To design and develop GUI Applications using Swing
- To enhance Knowledge to manipulate and store data

COURSE OUTCOMES (COs)

COs	Course Outcomes	Blooms Level
CO1	Classify the sophisticated Java Applications	Understand
CO2	Apply the Java Language for writing well -organised, complex computer programs with both command -line and graphical user interfaces	Apply
CO3	Construct the Access database through Java programs, using Java Database Connectivity (JDBC)	Apply
CO4	Organize the dynamic web pages, using Servlets	Apply
CO5	Explain the use of Java Server Programming	Understand

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. Advanced Java Programming, Uttam K. Roy, 2015, Oxford University Press
2. Web Coding & Development All-in-One for Dummies", Paul McFedries ,2018 "Fundamentals of Web Development", Randy Connolly, Ricardo Hoar ,2017.

REFERENCE BOOKS:

1. Principles of web design.,Joel sklar,sixth edition,2015.
2. HTML and CSS: Design and Build Websites", Jon Duckett, 2014.
3. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013.

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

COs	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	-
CO3	-	3	-	-	2	1	-	1	-	-	-	-	-	-	-	-	1
CO4	3	3	-	2	-	-	-		-	-	-	-	-	-	-	-	-
CO5	3	3	-	2	-	1	-	1	-	-	-	-	-	-	-	-	-
Average	3	3	-	2	2	1	-	1	-	-	-	-	-	-	-	3	1

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

Semester VIIIA

24CYU801 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To provide students the knowledge and skills to master the NoSQL database mongoDB
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB and replication and sharding in MongoDB

COURSE OUTCOMES (COs)

COs	Course Outcomes	Blooms Level
CO1	Explain the right skills and knowledge needed to develop Applications on MongoDB	Understand
CO2	Summarize the right skills and knowledge needed to run Applications on MongoDB	Understand
CO3	Develop the MongoDB programs from JavaScript shell.	Apply
CO4	Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Understand
CO5	Apply the query optimization in MongoDB and Understand replication and sharding in MongoDB	Apply

UNIT I GETTING STARTED **14 HOURS**

A database for the modern web – MongoDB through the JavaScript shell – Writing programs using MongoDB- MongoDB Document Model.

UNIT II APPLICATION DEVELOPMENT **14 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 **14 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 **15 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 **15 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

REFERENCE BOOKS:

1. Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O‟Reilly Media Inc.
2. David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
3. 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/
5. https://nptel.ac.in/courses/106106156/

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	2	-	-	-	-	1	-	-	-	-	-	-	-
CO2	3	-	-	3	2	-	-	-	-	1	-	-	-	-	-	3	-
CO3	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	2
CO4	3	-	-	3	2	-	-	1	-	1	-	-	-	-	-	-	-
CO5	3	-	-	3	2	1	-	1	-	-	-	-	-	-	-	-	-
Average	3	-	-	3	2	1	-	1	-	1	-	-	-	-	-	3	2

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

Semester VIIIA

24CYU802 **DATA VISUALIZATION** **6H - 5C**

Instruction Hours/week: L:6 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

- To impart the basic knowledge about the Data Visualization techniques.
- To understand the concept of Recent Trends in Data Visualization Techniques.
- To explore various data analysis tasks.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the 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	Explain the design issues, assessment of needs, critical design practices.	Understand

UNIT I **12 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 **12 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 **12 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 **12 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 **12 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
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

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

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

Semester VIIIA

24CYUA801 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To understand the basic concepts of organizational behaviour.
- To analyze the individual behaviour traits required for performing as an individual or group.
- To recognize the importance of organizational culture and organizational change.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Analyse organizational behaviour issues in the context of the organizational behaviour theories and concepts.	Analyze
CO2	Analyze the behaviour of the individuals and groups in organization and manage the stress.	Analyze
CO3	Build the team, power, politics and conflict arising between the members	Apply
CO4	Summarize the organizational change and culture affect the working relationship within organizations	Understand
CO5	Construct the communication skills to convey the thoughts and ideas of case analysis to the individuals and group.	Apply

UNIT I ORGANIZATION BEHAVIOUR: INTRODUCTION 14 HOURS

Organization Behaviour: 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 14 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 14 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 15 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 **15 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

TEXT BOOKS:

1. Fred Luthans. (2017). Organizational Behavior: An Evidence - Based Approach, 12thedition, Mcgraw Hill Education, NewDelhi.
2. Steven Mcshane and Mary Ann VonGlinow (2017), Organizational Behavior, 6th edition, McGraw Hill Education, NewDelhi

REFERENCE BOOKS:

1. Robbins, S. P., and Judge, T.A. (2016). Organizational Behaviour.(16thedition).New Delhi: Prentice Hall of India.
2. Laurie J. Mullins (2016), Management and Organisationalbehaviour, 10thedition, Pearson Education, NewDelhi
3. Robbins, S. P., and Judge, T.A. (2016). Essentials of Organizational Behavior.13 edition, Pearson Education

WEBSITES:

1. https://nptel.ac.in/courses/110/105/110105033/

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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	-	-	2	-	-	2	-	1	-	-	-	-	-	-	3	-
CO3	-	-	-	2	2	-	2	-	-	-	-	-	-	-	-	-	2
CO4	3	-	2	-	-	-	-	1	-	-	-	1	-	-	-	-	-
CO5	-	1	-	-	-	-	-	-	-	-	-	-	1	1	-	-	-
Average	3	1	2	2	2	-	2	1	1	-	-	1	1	1	-	3	2

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

Semester VIIIA

24CYU811 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To Write MongoDB programs from JavaScript shell.
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB and replication and sharing in MongoDB

COURSE OUTCOMES (COs)

COs	Course Outcomes	Blooms Level
CO1	Explain the right skills and knowledge needed to develop Applications on MongoDB	Understand
CO2	Summarize the right skills and knowledge needed to run Applications on MongoDB	Understand
CO3	Develop the MongoDB programs from JavaScript shell.	Apply
CO4	Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Understand
CO5	Apply the query optimization in MongoDB and Understand replication and sharding 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 Media Inc.
3. Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd.

REFERENCE BOOKS:

1. Mike Wilson. (2013). Building Node Applications with MongoDB and Backbone, O‟Reilly Media Inc.
2. David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
3. 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

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

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

Semester VIIIA

24CYU812 DATA VISUALIZATION - 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Classify the 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	Explain the design issues, assessment of needs, critical design practices.	Understand

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

REFERENCE BOOKS:

1. Wang Kaining, Infographic & Data Visualizations, sew Edition. 2013
2. 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

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

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

Semester VIIIB

24CYU801B 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:

Not Applicable

COURSE OBJECTIVES (CO):

- To impart knowledge and skills required for research methodology.
- To know the Problem formulation, analysis and solutions.
- To acquire knowledge on analysis of the datasets and find the results.
- To know the basic understanding of the Intellectual Rights.
- To explore the Patent drafting and filing patents

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explain the fundamental concepts of research methodology	Understand
CO2	Plan to find the research problem and review on it	Apply
CO3	Analyze the various research designs and techniques.	Analyze
CO4	Summarize the nature of intellectual property rights and apply it.	Understand
CO5	Apply the concepts of IPR and filing patents in R & D	Apply

UNIT I RESEARCH METHODOLOGY 14 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 14 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 14 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) 15 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) 15 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.

REFERENCE BOOKS:

1. RatanKhananabis and SuvasisSaha, (2015) "Research Methodology", Universities Press, Hyderabad.
2. Cooper Donald R, Schindler Pamela S and Sharma JK,(2012) "Business Research Methods", Tata McGrawHill Education, 11Edition.
3. Catherine J. Holland, (2007) "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press.
4. David Hunt, Long Nguyen, Matthew Rodgers, (2007) "Patent searching: tools & techniques", Wiley.

CO, PO, PSO Mapping

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

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

Semester VIIIB

24CYUA811 **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:

Not Applicable

COURSE OBJECTIVES (CO):

- To compute descriptive statistics
- To calculate parametric and non-parametric tests
- To apply statistical techniques on decision making

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Outline the descriptive statistics	Understand
CO2	Illustrate the parametric and non-parametric tests	Understand
CO3	Categorize the reliability and normality tests	Analyze
CO4	Apply the application of Bivariate and multivariate analysis	Apply
CO5	Apply the statistical techniques on decision making	Apply

List of Programs

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

REFERENCE BOOKS:

1. Keith Mccormick, Jesus Salcedo, Aaron Poh, SPSS Statistics for Dummies, 3rd Edition, Wiley, New Delhi.

2. Keith McCormick, Jesus Salcedo, Jon Peck, Andrew Wheeler, Jason Verlen (2017), SPSS Statistics for Data Analysis and Visualization, Wiley, New Delhi.

3. 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

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

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

Semester VIIIB

24CYU891 RESEARCH PROJECT/PREPARATION OF RESEARCH PROJECT 20H - 12C

Instruction Hours/week: L:0 T:0 P:20 **Marks:** Internal**:120** External**:180 T**otal**:300**

End Semester Exam: 3 Hours