B.Sc. COMPUTER TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2025 – 2026)

Enable | Enlighten | Enrich

KARPAGAM
ACADEMY OF HIGHER EDUCATION
(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)
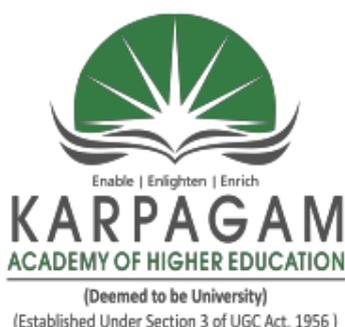
DEPARTMENT OF COMPUTER TECHNOLOGY
FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

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
(2025)

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

REGULATIONS – 2025 - 2026

The following regulations shall apply 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 2025-2026 onwards.

1 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

1.1 UG Programmes Offered
A candidate may undergo any one of the undergraduate programmes approved by 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.	BCA	Computer Applications
11.	B.Sc.	Biotechnology
12.	B.Sc.	Microbiology
13.	B.Sc.	Computer Science
14.	B.Sc.	Information Technology
15.	B.Sc.	Computer Technology
16.	B.Sc.	Computer Science (Cognitive Systems)

17.	B.Sc.	Computer Science (Artificial Intelligence and Data Science)
18.	B.Sc.	Computer Science (Cyber Security)

1.2 Admission Requirements (Eligibility)

A student 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 KAHE as equivalent thereto. (Annexure I)

1.3 Mode of Study
All Programmes are offered under Full-Time Regular mode.

2. DURATION OF THE PROGRAMMES

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

Programme(s) (Honors)	Min. No. of Semesters	Max. No. of Semesters
B.Sc., B.Com., BCA and BBA	8	15

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

Undergraduate degree programmes of either 3 or 4-year duration, with multiple entry and exit points and re-entry options, with appropriate certifications such as: UG certificate after completing 1 year (2 semesters) of study in the chosen fields of study, UG diploma after 2 years (4 semesters) of study, bachelor's degree after a 3-year (6 semesters) programme of study, 4-year bachelor's degree (honours) after eight semesters programme of study. If the student completes a rigorous research project in their major area(s) of study in the 4th year of a bachelor's degree (honours with research). The 4-year bachelor's degree programme is considered a preferred option since it would provide the opportunity to experience the full range of holistic and multidisciplinary education in addition to a focus on the chosen major and minors as per the choices of the student. Similarly, the student from other institutions can join Karpagam Academy of Higher Education in the 3rd, 5th or 7th semester with an appropriate UG Certificate or UG Diploma or Bachelor's Degree 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 minimum of 120 and up to a maximum of 125 credits for three years. Additional credits of 40 can also be earned on successful completion of fourth year. A range of 160 to 165 credits are offered as per the UGC Guidelines for the four-year UG Programme.

4. STRUCTURE OF THE PROGRAMME

Major Courses, Minor Courses, Multi-Disciplinary Courses (MDC), Skill Enhancement Courses (SEC), Ability Enhancement Courses (AEC), 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.

4.1 Major Courses

Major Courses consist of theory and practical components of department domains. The student has to earn a minimum of 60/80 Credits in Major Courses for 3/4 years programme respectively.

4.2 Minor Courses

Students have courses from Major disciplinary / interdisciplinary minors and skill-based courses. Students have to earn a minimum of 24/32 Credits in Minor Courses for 3/4 years programme respectively.

4.3 Multi Disciplinary 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 Multi-Disciplinary Courses and they have to earn a minimum of 09 Credits.

4.4 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. Students have to earn a minimum of 09 Credits in Skill Enhancement Courses.

4.5 Ability Enhancement Course (AEC)

There are four Ability Enhancement Courses offered during the first four semesters. Three credits are awarded for each course and students have to earn a minimum of 12 Credits in Ability Enhancement Courses. 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.

4.6 Value Added Courses (VAC)

The students shall study Value Added Courses in the first four semesters of their programme. 6 to 8 credits need to be earned under VAC. The assessment of the VAC is based on Internal Evaluation.

4.7 Internship
The students exiting the programme after first or second year must have completed an internship/apprenticeship of 02 or 04 credits respectively during the first year and second year summer term.

4.8 Minor Project Work

The project work shall start at the beginning of the 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 the Department concerned shall assign a project supervisor who in turn shall monitor the project work of the student(s). A project work shall be carried out by the students and they have to earn 06 to 08 credits.

If the candidate undertakes the 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. Three reviews shall be conducted as part of internal assessment. 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.

4.9 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. Three reviews shall be conducted as part of internal assessment. 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 who secure 7.5 CGPA, maintain an attendance of 80% in every semester and clear all the courses in their first appearance itself are referred to as advanced learners. When a student fails to maintain any of these conditions at any given time, the student will no longer retain advanced learner status.

These students can request for an on-demand examination for the courses from second semester onwards. These students on prior registration can appear for 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 shall 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. When the number of students enrolled for a particular course is less than 30, only self-learning mode is applicable and will be monitored by the mentor. Otherwise, a faculty will handle the course after regular working hours. The examination will be conducted along with the current semester courses.

Also, these advanced learners can register for online courses from NPTEL/SWAYAM/SWAYAM Plus portals on prior and proper approval from the department. The credits earned from those courses will be transferred to the mark statement of the students as in Clause 6.

6. TRANSFER OF CREDITS EARNED THROUGH ONLINE PLATFORM / INTERNATIONAL STUDIES

Students are encouraged to enroll in courses offered by NPTEL/Swayam/ Swayam Plus 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 & Grade Equivalence Committee consisting of the Dean of the Faculty (Chairman), Dean (R&D and Industrial Relations), Head of the Department (HoD), and a 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. If the student fails in NPTEL/Swayam/ Swayam Plus course, he/she can appear for the examination conducted by the University for the equivalent course in the curriculum.

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.

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 is in English.

9. SCHEME OF EXAMINATION

Evaluation: Evaluation of the course comprises two parts such as the Continuous Internal Assessment (CIA) and the End Semester Examination (ESE) until or otherwise the course is explicitly mentioned as only internal/only external.

The theory and practical courses shall carry a maximum of 100 marks, out of which 40 percent of marks are awarded for Continuous Internal Assessment (CIA) and 60 percent of marks for End Semester Examinations (ESE). When it is only an internal assessment course, 100 percent of marks are awarded for Continuous Internal Assessment.

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 15 working days) on the Notice Board to know their attendance status and satisfy 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. The 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 classroom 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 course offered to more than one programme 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). The Course Committee Meeting is conducted once in a semester. To indicate the common course, the Course Code should be suffixed with the letter "G".

14. ATTENDANCE 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 student has been satisfactory during the Programme.

b. A candidate who has secured attendance between 65.00% and 74.99% (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 the Department concerned and the Dean. The Head of the Department has to verify and certify the genuineness of the case before recommending it to the Dean concerned. However, the candidate has to execute an undertaking along with the parent and assure that this situation does not arise in the future. This permission is given only once during the entire period of study.

c. A candidate who has secured attendance between 55.00% and 64.99% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness with all the medical records, bills and discharge summary), will not be presented to that semester examination. However, that candidate will be permitted to go to the next semester wherein he / she has to compensate for the previous semester's lack of attendance. In such a case, the candidate will be permitted to write both semester examinations at the end of the next semester. This combination of lack of attendance can be done only between subsequent semesters. That is 1 & 2 or 2 & 3 or 3 & 4 or 4 & 5 or 5 & 6.

d. However, a Student who has secured less than 55% 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 the 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 the date after due verification. The same shall be submitted to the 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 and 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

For Environmental Studies and Universal Human Values:

S. No.	Category	Maximum Marks
1.	Assignment	15
2.	Attendance	5
3.	Test – I (2 ½ Units)	40
4.	Test – II (2 ½ Units)	40
Total		100

For Yoga for Youth Empowerment:

S. No.	Category	Maximum Marks
1.	Activity	15
2.	Attendance	5
3.	Test – I (2 ½ Units)	40
4.	Test – II (2 ½ Units)	40
	Total	100

For Community Engagement and Social Responsibility:

S. No.	Category	Maximum Marks
1.	Field Visit	15
2.	Attendance	5
3.	Test – I (1 ½ Units)	40
4.	Test – II (1 ½ Units)	40
	Total	100

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**

* *Viva- voce* is conducted during the model practical exam.

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

15.3 Pattern of Test Question Paper

Theory Courses:

Maximum Marks : 60*   **Duration: 2 ½ Hours**

Section	Marks
Part – A	Answer ALL the Questions (6 x 2 = 12 Marks)
Part - B	Answer ALL the Questions (3 x 6 = 18 Marks) ('either – or' type)
Part - C	Answer ALL the Questions (3 x 10 = 30 Marks) ('either – or' type)

* The 60 Marks will be converted to 12.5 Marks.

15.4 Attendance

Distribution of Marks for Attendance

S. No.	Attendance (%)	Maximum Marks
1	91 and above	5
2	81 - 90	4
3	75-80	3

16. ESE EXAMINATIONS

16.1 End Semester Examination (ESE): End Semester Examination will be conducted 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	Answer ALL the Questions (10 x 2 = 20 Marks)
Part - B	Answer ALL the Questions (5 x 6 = 30 Marks) ('either – or' type)
Part - C	Answer ALL the Questions (5 x 10 = 50 Marks) ('either – or' type)

 *The 100 Marks will be converted to 60 Marks.

Practical Courses: There shall be combined evaluation 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
Candidates taking the practical examination should submit a prescribed Bonafide Record Notebook 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)

The distribution of marks for the Continuous Internal Assessment (CIA) is given below:

Maximum Marks: 40

S. No.	Category	Maximum Marks
1.	Problem Selection	10
2.	Progress of the work (3 reviews X 5 marks)	15
3.	Presentation of the work (3 reviews X 5 marks)	15
	Total	**40**

The distribution of marks for the End Semester Examination is given below:

Maximum Marks: 60*

S. No.	Category	Maximum Marks
1.	Project Report	30
2.	Project Presentation	20
3.	Viva Voce	10
	Total	**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 resubmitted report shall be evaluated 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.

17.2 If a candidate fails to secure a pass in a particular course (either CIA or ESE or Both) as per clause 17.1, 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 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.

17.4 Candidate failed in internal assessment will be permitted to reappear to pass the internal assessment in the subsequent semesters by writing tests and by re-submitting Assignments/ Seminars.

The distribution of marks for this test shall be as given below.

S. No.	Category	Maximum Marks
1.	Assignment	5
2.	Attendance (Retained from the respective semester)	5
3.	Seminar	5
4.	Test*	25
	Total	40

* Tests shall be conducted in the ESE pattern for 100 marks and converted to 25 marks.

The examination should be completed within 6 weeks after reopening of the subsequent semester.

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. ONLINE EXAMINATIONS

The students who are going for Project / Internship / Coursework at National level are permitted to write their CIA test through Online Mode and ESE in Offline/Online mode. When they go for an International Project / Internship / Coursework, both the CIA and ESE shall be conducted through online mode.

19. 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.

20. AWARD OF LETTER GRADES

All the assessments of a course will be done on an 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+	61 - 70	7	GOOD
B	56 - 60	6	AVERAGE
C	50 - 55	5	PASS
RA	Below 50	-	REAPPEARANCE
AAA	-	-	ABSENT

21. 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.

$$\textbf{GPA} \text{ of a Semester} \quad \frac{\sum_i CiGPi}{\sum_i Ci} = \frac{\text{Sum of the product of the GP by the corresponding credits of the courses of that Semester}}{\text{Sum of the credits of the courses of that Semester}}$$

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

$$\textbf{CGPA} \text{ of the entire programme} = \frac{\text{Sum of the product of the GPs by the corresponding credits of the courses offered for the entire programme}}{\text{Sum of the credits of the courses of the entire programme}}$$

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

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**.

22. 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.

23.TRANSPARENCY AND GRIEVANCE COMMITTEE

Revaluation and Retotaling are allowed on representation (clause 22). Students 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.

24. ELIGIBILITY FOR THE AWARD OF THE DEGREE
A student shall be declared to be eligible for the conferment of the Degree if he / she

24.1 Successfully completed all the components prescribed by Curriculum and Credit Framework for Undergraduate Programme of UGC and earned the minimum required credits as specified in the curriculum corresponding to his / her programme within the stipulated period (vide clause 2.1).

24.1 No pending disciplinary enquiry/ action against him/her

24.2 The award of the degree must be approved by the Executive Council.

25.CLASSIFICATION OF THE DEGREE AWARDED
25.1 Candidates who qualify for the award of the Degree (vide clause 24) 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.**

25.2 Candidates who qualify for the award of the Degree (vide clause 24) 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**.

25.3 Candidates (not covered in clauses 25.1 and 25.2) who qualify for the award of the degree (vide Clause 24) shall be declared to have passed the examination in the **Second Class**.

26. 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.

27. 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. This is applicable only for the ESE component of the course which the student failed. Such students shall apply with prescribed fee to the Controller of Examinations within the stipulated time.

28. DISCIPLINE

28.1 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.

28.2 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.

29. KAHE ENTRANCE EXAMINATION

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

30. 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, University, or Board under the 10+2 pattern, with **Biology, Botany, 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, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.
3.	B. Sc.	Microbiology	Candidates who have passed Higher Secondary Education (XII) or any equivalent examination conducted by a State Government, University, or Board under the 10+2 pattern, with **Biology, 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, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.
5.	B. Sc.	Computer Technology	Candidates who have passed Higher Secondary Education (XII) or any equivalent examination conducted by a State Government, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.
6.	B.Sc.	Computer Science (Cognitive Systems)	Candidates who have passed Higher Secondary Education (XII) or any equivalent examination conducted by a State Government, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.

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, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.
8.	BCA	Computer Application	Candidates who have passed Higher Secondary Education (XII) or any equivalent examination conducted by a State Government, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.
9.	B. Com.	Commerce	Candidates who have passed Higher Secondary Education (XII) or any equivalent examination conducted by a State Government, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, with **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, University, or Board under the 10+2 pattern, or those who hold a 3-year diploma after 10th grade, with **Computer Science or Mathematics** as one of the subjects.
18.	B. Com	FinTech.	Candidates who have passed Higher Secondary Education (XII) or any equivalent examination conducted by a State Government, University, or Board under the 10+2 pattern, with **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,	

PROGRAMME 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 Information Technology.
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 Information Technology.
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 Information Technology.
6. **Research-related skills:** Demonstrate proficiency in data analysis, critical appraisal, and ethical research practices, contributing original insights to the advancements in Information Technology.
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 Information Technology.
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.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. Graduates will be able to design, develop, and implement efficient and robust software solutions to address complex real-world problems using appropriate programming languages, tools, and methodologies
2. Graduates will have a solid foundation in software engineering principles and be able to apply them to real-world projects

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

PEO I   :   To be a working Information Technology (IT) professional with core competencies that can be used on multi-disciplinary projects

PEO II   :   To understand the importance of relationship building within the IT industry

PEO III :   To understand the need for lifelong learning in the exploration and journey in IT

PEO IV :   To understand, evaluate and practice ethical behavior within the IT industry

PEO V   :   To be cognizant of security issues and their impacts on industry

MAPPING of PEOs and POs

POs	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	PSO1	PSO2
PEO I	X	X					X	X	X	X	X		X			X	
PEO II	X	X	X		X			X	X	X				X		X	X
PEO III	X	X	X				X						X		X	X	X
PEO IV				X	X	X			X			X		X			
PEO V	X	X	X				X	X		X			X			X	X

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT
DEPARTMENT OF COMPUTER TECHNOLOGY
UG PROGRAM (CBCS) – B.Sc. Computer Technology
(2025–2026 Batch and onwards)

Course Code	Name of the Course	Category	Objectives and Outcomes PO	PSO	L	T	P	Credit(s)	CIA 40	ESE 60	Total 100	Page. No
SEMESTER I												
25LTU101G / 25LHU101G/ 25LMU101G/ 25LSU101G/ 25LFU101G	Language: Tamil - I Language: Hindi - I, Language: Malayalam - I, Language: Sanskrit - I, Language: French - I	AEC 1	1,2,3	-	4	-	-	3	40	60	100	1
25ENU101G	English I	MDC 1	2,3,7,12	-	3	-	-	3	40	60	100	12
25ITU101G	Introduction to Programming in C	Major 1	1,3,4,5,6,8, 10,11,	1	5	-	-	3	40	60	100	14
25ITU102G	Fundamentals of Information Technology	Major 2	1,3,4,5,7,8, 10,11,13,1 5	1	4	-	-	3	40	60	100	16
25MAU101G	Numerical Methods	Minor 1	3,4	-	4	-	-	4	40	60	100	18
25ITU111G	Introduction to Programming in C – Practical	Major 3	1,3,4,5,6,8, 10,11	1	-	-	4	2	40	60	100	20
25ITU112G	Office Automation and Web Design - Practical	SEC 1	1,4,5,6,8,1 0,11	1	-	-	4	2	40	60	100	22
25VAC101G	Yoga for Youth Empowerment	VAC 1	4,5,6,8,10	-	2	-	-	2	100	-	100	26
Semester Total					**22**	**0**	**08**	**22**	**380**	**420**	**800**	
SEMESTER II												
25LTU201G / 25LHU201G/ 25LMU201G/ 25LSU201G/ 25LFU201G	Language: Tamil - II Language: Hindi - II, Language: Malayalam - II, Language: Sanskrit - II, Language: French - II	AEC 2	1,2,3	-	4	-	-	3	40	60	100	28
25ENU201G	English II	MDC 2	2,3,9	-	3	-	-	3	40	60	100	39
25ITU201G	Object Oriented Programming	Major 4	1,3,4,5,6,8, 11	1	5	-	-	3	40	60	100	41
25ITU202G	Relational Database Management Systems	Major 5	1,2,3,4, 5,6	1	4	-	-	3	40	60	100	44
25MAU201G	Discrete Structures	Minor 2	3,4,5	-	4	-	-	4	40	60	100	46
25ITU211G	Object Oriented Programming – Practical	Major 6	1,3,4,5,6,8, 11	1	-	-	4	2	40	60	100	48
25ITU212G	Relational Database Management Systems - Practical	SEC2	1,3,4,5,8,9, 11	1	-	-	4	2	40	60	100	50
25VAC201G	Environmental Studies	VAC 2	1,8,9,11,12 ,13,15	-	2	-	-	2	100	-	100	52
Semester Total					**22**	**0**	**08**	**22**	**380**	**420**	**800**	

Course Code	Name of the Course	Category	Objectives and Outcomes		Instruction Hours / Week			Credit(s)	Maximum Marks			Page. No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER III												
25LTU301G / 25LHU301G/ 25LMU301G/ 25LSU301G/ 25LFU301G	Language: Tamil – III, Language: Hindi - III, Language: Malayalam - III, Language: Sanskrit - III, Language: French - III	AEC 3	1,2,3	-	4	-	-	3	40	60	100	54
25ENU301G	English III	MDC 3	1,2,3,4	-	3	-	-	3	40	60	100	65
25CYU301G	Operating Systems	Major 7	1,3,4,5, 7,8,9, 11,13	1	4	-	-	3	40	60	100	67
25CYU302G	Computer Networks	Major 8	1,2,4,5, 8,9,11, 13,15	2	5	-	-	3	40	60	100	69
25MAU301G	Operation Research	Minor 3	3,4,5,6	-	4	-	-	4	40	60	100	71
25CYU311G	Computer Networks - Practical	Major 9	1,3,4,5, 8,9,11	2	-	-	4	2	40	60	100	73
25ITU311G	Programming in Python – Practical	SEC 3	1,3,4,5, 8,9,11, 15	1	-	-	4	2	40	60	100	75
25VAC301G	Community Engagement and Social Responsibility	VAC 3	1,2,3,4, 5,6,7, 8,10,15	2	2	-	-	2	100	-	100	77
25CTU391	Internship - I	Summer Internship	-	-	-	-	-	2	100	-	100	79
Semester Total					22	-	8	24	480	420	900	
SEMESTER IV												
25LTU401G / 25LHU401G/ 25LMU401G/ 25LSU401G/ 25LFU401G	Language: Tamil - IV Language: Hindi - IV, Language: Malayalam - IV, Language: Sanskrit - IV, Language: French - IV	AEC 4	1,2,3	-	4	-	-	3	40	60	100	80
25ENU401G	English IV	SEC 4	1,2,4	-	3	-	-	3	40	60	100	90
25ITU401G	Data Structure and Algorithms	Major 10	1,3,4,5, 8,9,11, 15	1	5	-	-	3	40	60	100	92
25CYU402G	Network Security	Major 11	1,3,4,5, 7,8,11, 15	1	4	-	-	3	40	60	100	94
25MAU401G	Probability and Statistics	Minor 4	3,4,5,6	-	4	-	-	4	40	60	100	96
25ITU411G	Data Structure and Algorithms - Practical	Major 12	1,3,4,5, 8,9,11	1	-	-	4	2	40	60	100	98
25CYU412G	Network Security - Practical	Major 13	1,3,4,5, 6,7,8,9, 15	1	-	-	4	2	40	60	100	100
25VAC401AG	Universal Human Values	VAC 4	3,4,5,7, 12	1	2	-	-	1	100	-	100	103
Semester Total					22	-	8	21	380	420	800	

Course Code	Name of the Course	Category	Objectives and Outcomes		Instruction Hours / Week			Credit(s)	Maximum Marks			Page. No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER V												
25CTU501	Software Testing	Major 14	1,3,4,5,6,7,8,9,13,15	1	5	-	-	3	40	60	100	106
25ITU502AG	Business Intelligence & Analytics	Major 15	1,2,3,4,5,6,7,8,10,11,12,13	2	5	-	-	3	40	60	100	108
25CAU502BG	Enterprise Infrastructure & Cloud Technology		1,2,3,4,5,9,10,11,12	2								110
25CYU503AG	Digital Identity and Access Management	Major 16	1,3,4,5,8,9,10,12	1	6	-	-	3	40	60	100	112
25ITU503B	Full Stack Web Development		1,2,3,4,6,9,11,13	1								114
25CMU501BG	Basics of Accounting	Minor 5	1,2,3,5,6,9,10,11,12	1	6	-	-	4	40	60	100	116
25CTU511	Software Testing - Practical	Major 17	1,3,4,5,6,7,8,9,13,15	1	-	-	4	2	40	60	100	118
25ITU512AG	Business Intelligence & Analytics - Practical	Major 18	1,2,3,4,5,6,7,8,10,11,12,13	2	-	-	4	2	40	60	100	120
25CAU512BG	Enterprise Infrastructure & Cloud Technology -Practical		1,2,3,4,5,9,10,11,12	2								122
25CTU591	Internship - II	Summer Internship	-	-	-	-	-	2	100	-	100	124
Semester Total					**22**	**-**	**8**	**19**	**340**	**360**	**700**	
SEMESTER VI												
25CTU601G	Generative AI	Major 19	1,3,4,5,8,9,13,15	1	6	-	-	3	40	60	100	125
25ITU602AG	Introduction to AI and Machine Learning	Major 20	1,3,4,5,8,9,13,15	1	5	-	-	3	40	60	100	127
25ITU602BG	Data Science		1,2,3,4,5,6,9,11,14	1								129
25ITU602CG	IT Project Management and Practices		1,2,3,4,5,6,10,11	1								131
25BAU601G	Entrepreneurship Development	Minor 6	1,3,4, 5,6,7,8,10,11,12	1	6	-	-	4	40	60	100	133
25CTU611G	Generative AI - Practical	Major 21	1,3,4,5,8,9,10	1	-	-	4	2	40	60	100	135
25CTU691	Project and Viva Voce	Major 22	-	-	-	-	9	6	40	60	100	137
25ECU601G	ECA/NCC/NSS/Sports /General Interest etc	-	-	-	-	-	-	-	100	-	100	138
Semester Total					**17**	**-**	**13**	**18**	**300**	**300**	**600**	
Grand Total					**127**	**-**	**53**	**126**	**2260**	**2340**	**4600**	

Course Code	Name of the Course	Category	Objectives and Outcomes PO	PSO	Instruction Hours / Week L	T	P	Credit(s)	Maximum Marks CIA	ESE	Total	Page. No
									40	60	100	
SEMESTER VII												
25CSU701G	Internet of Things	Major 23	1,2,6,7,8,9,10,11	1	6	-	-	4	40	60	100	139
25CSU702G	Advanced Java Programming	Major 24	1,3,4,5,6,8,10,11	1	6	-	-	4	40	60	100	141
25MAU701G	Statistical Computing	Minor 7	1,2,3,7,8,9,11,12,13		6	-	-	4	40	60	100	143
25CSU711G	Internet of Things – Practical	Major 25	1,3,4,5,8,9,11,15	1,2	-	-	6	4	40	60	100	145
25CSU712G	Advanced Java Programming – Practical	Major 26	1,3,4,5,6,8,10,11	1	-	-	6	4	40	60	100	147
Semester Total					**18**	**-**	**12**	**20**	**200**	**300**	**500**	
SEMESTER VIII A (HONOURS)												
25CSU801AG	MongoDB	Major 27	1,3,5,6,7,8,11,12,13,14	1	6	-	-	4	40	60	100	149
25CSU802AG	Data Visualization	Major 28	1,2,3,4,7,8,10,11,13	1,2	6	-	-	4	40	60	100	151
25BAU803AG	Advanced Organizational Behavior	Minor 8	1,3,4,5,6,7,9,10,11	1	6	-	-	4	40	60	100	153
25CSU811AG	MongoDB - Practical	Major 29	1,3,4,5,6,8,9,10,11,12	1	-	-	6	4	40	60	100	155
25CSU812AG	Data Visualization -Practical	Major 30	1,3,4,7,8,10,11,12,13,15	1	-	-	6	4	40	60	100	158
Semester Total					**18**	**-**	**12**	**20**	**200**	**300**	**500**	
Grand Total					**163**	**-**	**77**	**166**	**2660**	**2940**	**5600**	
SEMESTER VIII B (HONOURS WITH RESEARCH)												
25CMU801BG	Research Methodology and IPR	Minor 8	1,2,3,4,5,6,7,8,9,10,11,12	1	6	-	-	4	40	60	100	160
25ITU811BG	Data Analytics Tool – Practical	Major 27	-	-	-	-	6	4	40	60	100	162
25CTU891	Research Project	Project 1	-	-	-	-	18	12	100	200	300	164
Semester Total					**6**	**-**	**24**	**20**	**180**	**320**	**500**	
Grand Total					**151**	**-**	**89**	**166**	**240**	**2960**	**5600**	

Other Courses to be Undergone by the Students											
I/II/III/IV/V	MOOC	-	-	-	-	-	-	4	-	-	-	-
Total (upto Semester VI) = 126+4=130 Credits											
Total (upto Semester VIII) = 170 Credits											
Minimum 126+4=130 Credits to earn the Degree (for III Years) **Minimum 170 Credits to earn the Degree (for IV Years)**											

Course Distribution Table(Honours)

Category	No of Courses		Total
	Theory	**Practical**	
AEC	4	0	4
MDC	3	0	3
MAJOR	18	12	30
MINOR	8	0	8
SEC	4	0	4
VAC	4	0	4
SUMMER INTERNSHIP	0	2	2
PROJECT	0	0	0
Total	41	14	55

Course Distribution

- AEC
- MDC
- MAJOR
- MINOR
- SEC
- VAC
- SUMMER INTERNSHIP
- PROJECT
- Total

0 5% 3% 22% 50% 10% 5% 0%
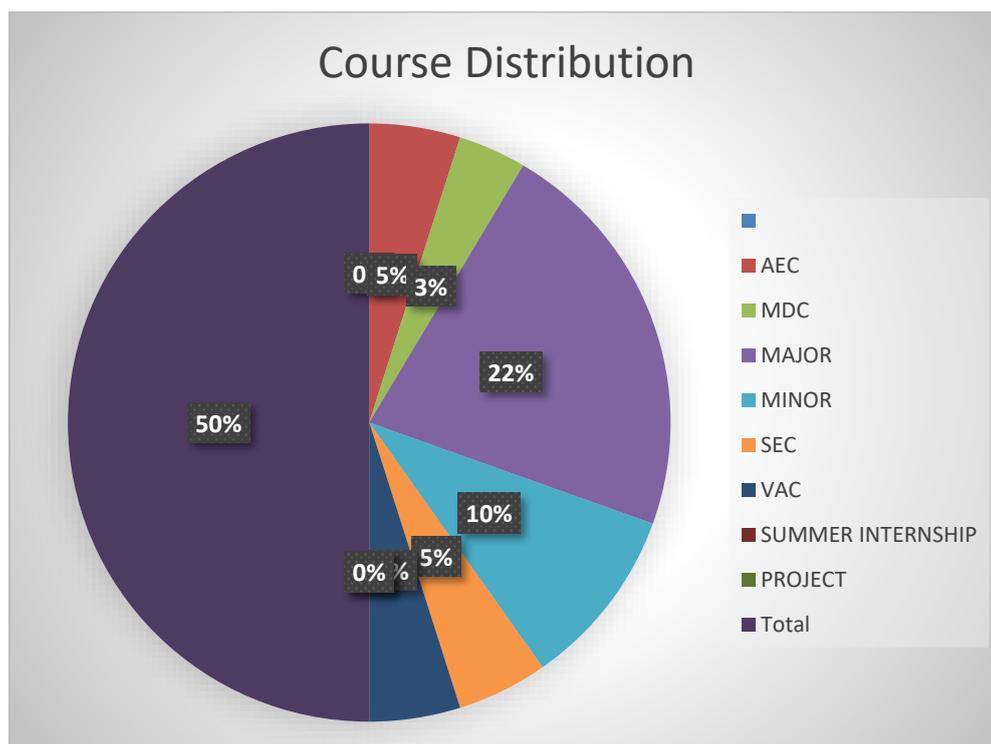
Course Distribution Table (Honours with Research)

Category	No of Courses		Total
	Theory	**Practical**	
AEC	4	0	4
MDC	3	0	3
MAJOR	15	12	27
MINOR	8	0	8
SEC	4	0	4
VAC	4	0	4
SUMMER INTERNSHIP	0	2	2
PROJECT	0	1	1
Total	38	15	53
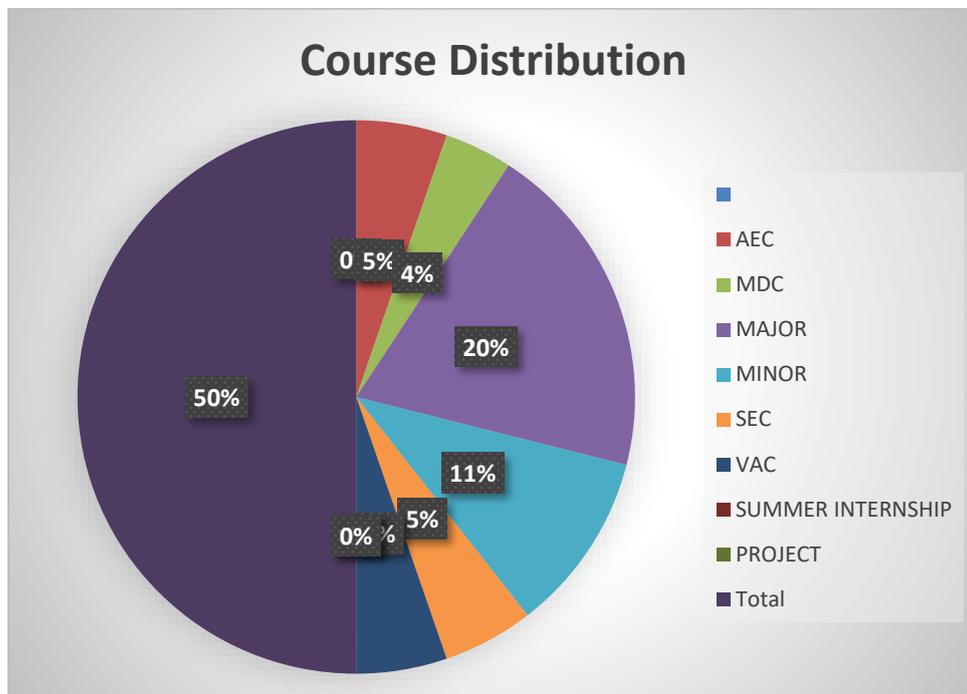
Semester I

25LTU101G | **Language: Tamil - I**

இலக்கிய இன்பம்

4H-3C

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

End Semester Exam: 3 Hours

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்; திறனாய்வு நோக்கை மேம்படுத்துதல்.
- இலக்கியங்களின் வழி மனித வாழ்வியலை உணர்த்துதல்.
- இன்புறுத்தல் மற்றும் அறிவுறுத்தல் நிலைகளில் இலக்கியங்களின் பங்களிப்பை உணர்த்துதல்.
- இளைய தலைமுறையினருக்கு அற உணர்வு மற்றும் வாழ்வியல் மதிப்புகளை அறிவுறுத்துதல்.

பாடத்திட்டப் பயன்விளைவு

- இந்தியக் குடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில் இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகத்தை அடைதல்.
- தொல்லியல், கல்வெட்டியல் மற்றும் ஓலைச்சுவடியியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- 'அறிவியல் தமிழ்' ; 'இணையத் தமிழ்' போன்ற தமிழின் வளர்ச்சித் துறைகள் சார்ந்த திறன் மேம்பாடு பெற்றிருத்தல்.
- வேலைவாய்ப்புக்குரிய வகையில் படைப்பாக்கத்திறன் முதலான மொழி ஆளுமை பெற்றிருத்தல் ;
- சமூக வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக உள்ள இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.

தாள்கள் வரிசையும் தேர்வுச் செயல் திட்டமும்
பகுதி-I தமிழ்
இளநிலைப்பட்ட அறிவியல் மற்றும் கலையியல் வகுப்புகள்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அகமதிப்பீடு/பருவ எழுத்துத் தேர்வு	மொத்தம்	மதிப்புப் புள்ளிகள்
ஒன்று	I	4	3	40 / 60	100	3

இலக்கிய நெறிகள்

அலகு – I   **10 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு -முச்சங்கங்கள் அறிமுகம் – சங்க இலக்கியத்தின் தோற்றுவாய் - பத்துப்பாட்டு அறிமுகம்

சங்க இலக்கியம் -முல்லைப்பாட்டு – "பால்போல" முதல் "குறுநீர்" வரை (1-58)

அற இலக்கியம - திருக்குறள் - பெரியாரைத் துணைக்கோடல் (அதிகாரம் 45), அறன் வலியுறுத்தல் (அதிகாரம் 4).

காப்பியம்	- சிலப்பதிகாரம் – அ) புகார்க்காண்டம் – மங்கல வாழ்த்துப்
	பாடல் - "நாகநீள் நகரொடு" முதல் "புகார் நகர் அது தன்னில்" வரை (21 - 22)
	மனையறம் படுத்த காதை – "வார் ஒலி கூந்தலை" முதல்
	"கண்ணகி தனக்கு என்" வரை (84 - 90)
ஆ) மதுரைக்காண்டம்	– கொலைக்களக் காதை – "இரு முதுகுரவர் ஏவலும்" முதல் "என் செய்தனை" வரை (67 - 70)
	"வினை விளை காலம்" முதல் "அச் சிலம்பு கொணர்க ஈங்கு" வரை (148-153)
	கட்டுரை காதை – "கடி பொழில்" முதல் "கட்டுரை கேள் நீ" வரை (138 - 170)
	வழக்குரை காதை – "அல்லவை செய்தார்க்கு" முதல் "
	உண்டளவே தோற்றான் உயிர்" வரை (82 - 93)
	இ) வஞ்சிக்காண்டம் – நடுகல் காதை - "மதுரை மூதூர்"
	முதல் "வடதிசை வணக்கிய மன்னவர் ஏறு" (218-234)
	வாழ்த்துக் காதை – "என்னே! இஃது என்னே!" முதல் "மீவிசும்பில் தோன்றுமால்" வரை (9)
இலக்கணம்	- அகத்திணைகள், புறத்திணைகள்

அலகு- 2   **08 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு-	எட்டுத்தொகை அறிமுகம்
சங்க இலக்கியம்	- நற்றிணை - "விளையாடு ஆயமொடு" - (172)
சங்க இலக்கியம்	- குறுந்தொகை - "நோமென் நெஞ்சே" – தலைவி கூற்று – (202) - "ஈதலும் துய்த்தலு" - தலைவன் கூற்று – (63)
அற இலக்கியம்	- நாலடியார் - கூடா நட்பு – "செறிப்பில்" முதல் "செய்யாது செய்து" வரை (1 முதல் 5 பாடல்கள்),
	சினம் இன்மை – "மதித்து இறப்பாரும்" முதல் "இளையான்" வரை (1 முதல் 5 பாடல்கள்), சுற்றம் தழால் – "வயாவும்" முதல் இன்னர் வரை" (1 முதல் 5 பாடல்கள்).
காப்பியம்	- மணிமேகலை - பாத்திரம் பெற்ற காதை - "போதிநீழல்" முதல் "நல்அறம்கண்டனை" வரை (73-98)
இலக்கணம்	- முதலெழுத்து - சார்பெழுத்து – விளக்கம்

அலகு– 3   **10 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு	- அற இலக்கியங்கள் அறிமுகம்
சங்க இலக்கியம்	- ஐங்குறுநூறு - வேட்கைப்பத்து – "வாழி ஆதன் வாழி அவினி" எனத் தொடங்கும் முதல் ஐந்து பாடல்கள்.
சங்க இலக்கியம்	- பதிற்றுப்பத்து – ஏழாம்பத்து - "எறிபிணம் இடறிய

	செம்மறுக்" (65)
அற இலக்கியம்	- நான்மணிக்கடிகை - எள்ளற்க என்றும் (1) - புகழ் செய்யும் (2)
	சிறந்தார்க்கு (3) - கொடுப்பின் (4) நல்லார்க்கும(5) - (தேர்ந்தெடுத்த ஐந்து பாடல்கள்)
காப்பியம்	- கம்பராமாயணம் – தேர்ந்தெடுக்கப்பட்ட பாடல்கள் (18) – மன்னவன் (1604), பின்னும் பகர்வாள் (1752), பஞ்சி ஒளிர் (2762), மயில் உடை (3151), ஆண்டு, ஆயிடை (3390), மற்று இனி (3812), கண்டனன் (5249), வேலையுள் (6037), மண்ணொடும் (6038), வாங்கிய ஆழி (6049), இங்கு உள (6051), கண்டனென் (6031), பைய பைய்ப் (6053), அந்நெறி (6058), குகனொடும் (6507), கூவி இன்று (7004), ஆள் ஐயா! (7271), கார்நின்ற (10043)
சிற்றிலக்கியம்	- கலிங்கத்துப்பரணி – போர்க்களக்காட்சிகள் –
	"தேவாசுரம் (472), உடலின்மேல் (475), நெடுங்குதிரை(476),விருந்தினரும் (477), தரைமகள் (483), பொருதடக்கை (484), வெயில்தாரை (488)".
இலக்கணம்	- சொல் – பெயர் - வினை, இடை, உரிச்சொல் – விளக்கமும் பயிற்சியும்.
இலக்கணம்	- மூவிடம் மற்றும் பெயர் விகுதிகள்.

அலகு– 4	**10 மணிநேரம்**
தமிழ் இலக்கிய வரலாறு	- காப்பியங்கள் - தோற்றமும் வளர்ச்சியும்
சங்க இலக்கியம்	- பரிபாடல் - வையை - (பாடல் – 6) "நிறைகடல் முகந்து உராய்" முதல் "சேறு ஆடுபுனலது செலவு" வரை (1-50 அடிகள்).
சங்க இலக்கியம்	- கலித்தொகை - "சுடர்தொடீஇக் கேளாய்" (51)
அற இலக்கியம்	- ஆசாரக்கோவை - 5 பாடல்கள் (நன்றியறிதல் (1),பிறப்பு (2), தக்கணை (3), வைகறை (4), எச்சிலார் (5)).
காப்பியம்	-தேம்பாவணி - நகர்வளம் 15 பாடல்கள் (மெய்வழி (97) முதல்– ஈரும் வாள் (106) வரை).
சிற்றிலக்கியம்	- தமிழ்விடு தூது – "சீர்கொண்ட" முதல் – "மஞ்சள்" வரை (1 முதல் 25 கண்ணிகள்)
இலக்கணம்	- தொடர் வகை – வினா விடை வகைகள்

அலகு – 5	**10 மணிநேரம்**
தமிழ் இலக்கிய வரலாறு	- சிற்றிலக்கியங்கள் தோற்றமும் வளர்ச்சியும்
சங்க இலக்கியம்	- அகநானூறு - "என்று புறம் தந்த எம்மும் உள்ளாள்" – பாலை - நற்றாய் கூற்று (35).
சங்க இலக்கியம்	- புறநானூறு – "புலவரை இறந்த புகழசால் தோன்றல்" – (21)
அற இலக்கியம்	- பழமொழி நானூறு - (5 பாடல்கள்)
	1. அவையறிதல் – கேட்பாரை நாடி (17),
	2. அறிவுடைமை - அறிவினால் (26),
	3. ஒழுக்கம் – விழுத் தொடையர் (34),
	4.இன்னா செய்யாமை - பூ உட்கும் (43),

	5. வெகுளாமை - இறப்பச் சிறியவர் (51)
காப்பியம்	- சீறாப்புராணம் - மானுக்குப் பிணை நின்ற படலம் -அரியினஞ் (2), குழை குழைத் (70), கொடியிடம் (12), நிறைவளஞ் (16), வல்லவ (17), என்னுயி (18), தனியெனென் (20), வலையிடத் (25), என வினவ (29), வேட்டுவனுரைப்ப (48) என்னும் (10 பாடல்கள்).
சிற்றிலக்கியம்	- முத்துக்குமாரசாமி பிள்ளைத்தமிழ் – காப்புப் பருவம் - பூமேவு கற்பகப் பொங்கரிற், (முதல் பாடல்), செங்கீரைப் பருவம் – இருக்கோல் இடும்பரிபுரக் கோல, (முதல் பாடல்), தாலப்பருவம்-பில்கும் பசுந்தேன் (முதல் பாடல்)
இலக்கணம்	- வேற்றுமை உருபுகள்.

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மொத்த மணிநேரம் - 48

</div>

TEXT BOOK T1 - கற்பகச் சோலை – தமிழ்ப்பாட நூல், இலக்கிய நெறிகள், தமிழ்த்துறை வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் – 21.

பார்வை நூல்கள்

R1 - தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன், கலையக வெளியீடு,நாமக்கல்.

R2 - வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, முனைவர் பாக்யமேரி, பூவேந்தன் பதிப்பகம், சீனிவாசா சாலை, மயிலாப்பூர், சென்னை.

இணையதளம்

W1-www.tvu.org.in

W2- www.maduraitamilproject.com

இதழ்கள்

J1- International Research Journal of Indian Literature, irjil.in

J2 - 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

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

4

Semester I

25LHU101G   **Language: Hindi - I**
                (PROSE, NON-DETAILED, NIBANDH, GRAMMAR)   **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):
- 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   **9 HOURS**

                a) Prose - Bharathiya Sangrah
                b) Non-Detailed - Naya Mehman
                c) Nibandh - Anushasan
                d) Grammar - Bhasha Aur Vyakaran

UNIT -II   **9 HOURS**

                a) Prose - Pahtha Pani Nirmal
                b) Non-Detailed - Eakankki ki Visheshatha
                c) Nibandh - Onam
                d) Grammar – Varna Vichar , Sangya

UNIT -III   **10 HOURS**

                a) Prose – Rashtriya Pitha Mahathma
                b) Non-Detailed – Maha Bharat ki Eak Sanjh
                c) Nibandh – Eakatha Ka Mahathva
                 d) Grammar – Sarvanam , Gender

UNIT-IV   **10 HOURS**

                a) Prose – Gapshap
                b) Non-Detailed – Yahang Sona Mana Hai
                c) Nibandh – Ganga Pradhushan Ki Samasya
                d) Grammar – Number , Karak , Visheshan

a) Prose – Nindha Ras
b) Non – Detailed Eakanki ki Katha Vasthu
c) Nibandh – Paropkar
d) Grammar - Kriya , Kriya Visheshan

TOTAL: 48 HOURS

TEXT BOOKS:

1. Prose :Nuthan Gathya Sangrah (lesson-1,5,6,8,9).
    Editor : Jayaprakash
    Publisher : Sumithra Prakasan,
    16|5.Hasting Road, Illahabad.211001.
2. Non-detailed: Naveen Ekhanki Sangrah
    Editor: Dr. Srimathi Malathi Tiwari Publisher:
    Sumithra Prakashan,
    204.Leela Apartment,
    Ashok Nagar, Illahabad-211001.
3. Nibandh : Subod Hindi Nibandh Editor :
    Dr. Braj Kishor Prasad Sing Publisher:
    Manoj Publication
    1583-84 Dariba Kala, Chandni Chouk,
    Delhi – 110006.
4. Grammar: Sugam Hindi Vyakaran
    Writer: Pro. Vamshidhar & Dharmapal
    00Publication: Shiksha Bharathi, Kashmir Gat, Delhi - 110006

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	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.8	2.4	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester I

25LMU101G   **Language: 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 required

COURSE OBJECTIVE(CO):
- Improves grammatical knowledge
- Will continue to read and learn about articles and think about them
- It is possible to read and understand short stories and understand the thoughts and life of the 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 No.	PART I MALAYALAM PAPER I	HOURS
I	Novel – Pathummayude Aadu - Vaikam Muhammed Basheer	10
II	Novel- - Pathummayude Aadu - Vaikam Muhammed Basheer	10
III	Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)	09
IV	Short Story - Ente Priyappeta Kadhakal – Akbar Kakkattil)	10
V	Composition &Translation(English to Malayalam)	09
	TOTAL	48

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

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

CO, PO, PSO Mapping

COs	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	-	-	-	-	-
AVG	-	3	3	-	-	-	3	-	-	-	-	2	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation

Semester I

25LSU101G	**Language: Sanskrit - I**
	(POETRY, GRAMMAR AND TRANSLATION) **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 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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25LFU101G   **Language: French - I**
(Leçon, Communication, Grammaire, Verbes, Lexique, Culture)   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 objectives of this course are:
- To enable the learner to communicate effectively and appropriately.
- To develop and integrate the use of the four language skills.
- To train students to acquire proficiency in French by reading different genres of literature and learning grammar.

COURSE OUTCOMES (COs):
At the end of this course, students will be able to

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

Unite – I   **9 HOURS**
    a) Leçon   – Bienvenue
    b) Communication   –Un cours de francais,Entrer en contact saluer,
    c) Verbes   - être ou avoir
    d) Lexique   –Les couleurs, l' alphabet
    e) Culture   – La France

Unité - 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

Unité - 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

Unité 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,

Unité 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

COs	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	-	-	-	-	-
AVG	-	3	3	-	-	-	3	-	-	-	-	2	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation

| | **Semester I** |

25ENU101G   **English I**

3H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:
Not required

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

COURSE OUTCOMES (COs):
At the end of this course, students will be able to

COs	Course Outcomes (COs):	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
RAMMAR:Types of Sentences

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: Articles

UNIT- IV   **7 HOURS**
LISTENING: Story Narrations
SPEAKING: Group Discussion
READING   : Reading Reports and profiles
WRITING   : Letter Writing
LITERATURE: Tyger by William Blake
GRAMMAR: Tenses

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: Subject Predicate, Framing
Questions and Question Tags

                                                                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

COs	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	-	-	-	-	-
AVG	-	3	3	-	-	-	3	-	-	-	-	2	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester I

25ITU101G	**Introduction to Programming in C**	

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 Required

Course Objectives (CO):
The Goal of this course is for students to:
- To provide the knowledge about computer fundamentals.
- To Learn to apply logic and critical thinking to solve C Programming problems
- To understand the use of Decision making, looping statements and arrays in C Programming
- To understand the concepts of User-Defined Functions, Structures and Unions in C Program
- To Implement the concept of Pointers and File Management for writing C Programs

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the fundamental knowledge of Computers.	Understand
CO2	Explain data types and variable declarations in C Programming	Understand
CO3	Develop C programs that implement decision-making and iteration to solve problems.	Create
CO4	Apply the features of User-Defined Functions, Structures and Union for developing robust C Programs	Apply
CO5	Analyze the concept of Pointers and File Management in C Programs	Analyze

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 and Branching: Introduction, Decision Making with IF Statement, Simple IF Statement, the IF-ELSE Statement, Nesting of IF-ELSE Statements, The ELSE IF Ladder, The Switch statement, The ? : Operator, The goto statement, The break Statement.
Decision Making and Looping: Introduction, The while Statement, The do while statement, The for statement, Jumps in LOOPS.

UNIT III Arrays   12 HOURS

One-dimensional Arrays, Declaration of One-dimensional Arrays, Initialization of One-dimensional Arrays, Example programs, Two-dimensional Arrays, Declaration of Two-dimensional Arrays, Initialization of Two-dimensional Arrays, Example programs-Matrix Multiplication, Transpose of a matrix.

Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs

UNIT IV Functions, Structures and Union   12   HOURS

User-defined Functions: Need for functions, Elements of User-defined Functions, Definition of Functions, Return Values and their Types, Function Calls, Function Declaration, Category of Functions, No Arguments and no Return Values, Arguments but no Return values, Arguments with Return Values, No Arguments but Returns a Value, Passing Arrays to Functions, Recursion, The Scope, Visibility and Lifetime of variables.

Structures and Union : Introduction, Defining a structure, declaring structure variables, accessing structure members, structure initialization, array of structures, Union

UNIT V Pointer and File Management   12 HOURS

Pointers: Introduction, Declaring Pointer Variables, Initialization of Pointer variables, accessing a Variable through its Pointer, Pointer Expressions, Pointer Increments and Scale Factor, **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. Stephen G. Kochan,2014.Programming in C, 4th Edition.

Reference Books:

1. Brian W. Kernighan and Dennis M. Ritchie, 2015.The C Programming Language, 2nd Edition.
2. Herbert Schildt, 2000.C: The Complete Reference, 4th Edition.

Websites :

1. Introduction to Programming in C-NPTEL
2. C for Everyone: Programming Fundamentals-Coursera
3. https://www.w3schools.com/c/

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	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	-	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	-	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3	-	2.4	3	2.25	1.25	-	1.3	-	2	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																

25ITU102G   **Fundamentals of Information Technology**

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 Goal of this course is for students to:
- To Deal with the basic concepts of computers.
- To Know about the computer input and output devices architecture.
- To Summarise storage memories of computer
- To Understand the basic computer software including the operating system and its concepts.
- To Explain basic of networks fundamentals

Course Outcomes (COs):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (COs):	Blooms Level
CO1	Explain the components of a computer and their functions.	Understand
CO2	Demonstrate the working of computer input and output devices	Understand
CO3	Explain the primary and secondary storage devices of computer	Understand
CO4	Utilize different types of software packages and its applications.	Apply
CO5	Apply the concept of networking and various types of networks LAN, WAN, MAN and Internet	Apply

Unit I: Introduction to Computers & Input Devices   9 HOURS
Introduction - History of Information Technology - Careers in Information Technology - Researching and Using the Web - Characteristics of computer - Evolution of Computer - Block Diagram Of a computer - Generations of Computer - Classification of Computers - Applications of Computer - Capabilities and limitations of computer. **Input Devices:** Keyboard - Terminals and its types. Pointing Devices - Scanners and its types - Voice Recognition Systems - Vision Input System - Touch Screen -

Unit II: Output Devices & Storage Fundamentals   9 HOURS
Output Devices: Monitors and its types. Printers: Impact Printers and its types. Non-Impact Printers and its types - Plotters - types of plotters - Sound cards - Speakers. **Primary Storage**: RAM ROM - PROM - EPROM - EEPROM. **Secondary Storage**: Magnetic Tapes - Magnetic Disks. Cartridge tape - hard disks - Floppy disks Optical Disks - Compact Disks - Zip Drive - Flash Drives.

Unit III: Number Systems and Boolean Algebra: 10 HOURS

Decimal–Binary – Octal–Hexadecimal-Converting Techniques in Number Systems-1's Complements - 2's Complements- Fundamentals concepts of Boolean Algebra – Logical Multiplication AND Gates, OR Gates, and Inverters – Evaluation of logical Expressions – Basic Law of Boolean Algebra – Simplification of expressions – De Morgan's theorems – Basic Duality of Boolean Algebra - Derivation of a Boolean Expression.

Unit IV Software 10 HOURS

Software and its needs - Types of S/W. **System Software**: Operating System - Utility Programs Programming Language: Machine Language - Assembly Language - High Level Language their advantages & disadvantages. **Application S/W** and its types: Word Processing - Spread Sheets Presentation - Graphics - DBMS s/w.

Unit V: Networks Fundamentals 10 HOURS

Local Area Network (LAN) - Applications of LAN - Wide Area Network (WAN) - Metropolitan Area Network (MAN) - Naming Computers Connected to Internet - Future of Internet Technology - WWW and Internet – Email.

Total: 48 HOURS

Text Books:
1. Roy - Shambhavi; Daniel, Clinton; and Agrawal, Manish, "Fundamentals of Information Technology" (2023).
2. Fundamentals of Information Technology, Alexis Leon And Mathews Leon, Vikas Publishing House Pvt. Ltd, 2009
3. V Raja Raman. Introduction to Information Technology, 3rd Edition, PHI Learning Private Limited, 2018

Reference Book:
1. Fundamentals of Computers and Information Technology, 2.N Doja,2005

Websites:
1. www.geeksforgeeks.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	-	2	-	1	-	2	3	-	3	2	-	2	-	3	3	-
CO2	3	-	1	1	-	-	2	1	-	2	1	-	-	-	2	3	-
CO3	2	-	-	2	-	-	-	-	-	2	3	-	-	-	-	3	-
CO4	3	-	-	-	2	-	-	2	-	2	-	-	1	-	-	3	-
CO5	2	-	1	2	-	-	3	-	-	3	-	-	-	-	2	3	-
AVG	2.6	-	1.3	1.6	1.5	-	2.3	2	-	2.4	2	-	1.5	-	2.3	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25MAU101G	**Numerical Methods**	**Semester I**

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 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.	Analyze
CO2	Implement numerical methods to solve systems of simultaneous linear algebraic equations.	Analyze
CO3	Summarize the principles of Gregory-Newton forward and backward and Lagrange's Interpolation formulas.	Analyze
CO4	Explain numerical differentiation and numerical integration formulas.	Analyze
CO5	Implement numerical methods to solve ordinary differential equations.	Analyze

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

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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	1	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester I

25ITU111G **Introduction to Programming in C – Practical**

4H - 2C

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

End Semester Exam:3 Hours

Prerequisite:
Not Required

Course Objectives (CO):
The Goal of this course is for students to:
- To provide the knowledge about computer fundamentals.
- To Learn to apply logic and critical thinking to solve C Programming problems
- To understand the use of conditional statements, looping statements and arrays in C Programming
- To understand the concepts of User-Defined Functions, Structures and Unions for writing C Programs
- To Implement the concept of Pointers and File Management for writing C Programs

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Apply basic concept of C Programming language.	Apply
CO2	Develop C Program to solve problems using Looping and decision making statements.	Apply
CO3	Develop C programs that implement arrays and String handling functions.	Apply
CO4	Apply the features of User-Defined Functions, Structures and Union for developing robust C Programs	Apply
CO5	Analyze the concept of Pointers and File Management for developing C Programs	Analyze

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 numbers from 1 to 50.
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 Stephen G. Kochan, 2014.Programming in C, 4th Edition.

Reference Books:

1. E Balagurusamy, 2008.Computing Fundamentals & C Programming, Tata McGraw-Hill, Second Reprint.

2.Behrouz A. Forouzan and Richard F. Gilberg, 2000.Computer Science: A Structured Programming Approach Using C, 3rd Edition.

3.Herbert Schildt, 2000.C: The Complete Reference, 4th Edition.

4.Brian W. Kernighan and Dennis 2. Ritchie, 1988.The C Programming Language, 2nd Edition.

WEBSITES
1 ww.programmingsimplified.com
2 ww.programiz.com / c-programming
3 ww.cplusplus.com
4 ww.learncpp.com
5 ww.udemy.com
6 ww.hackerrank.com
7 ww. leetcode.com
8 ww. codewars.com.com
9 ww. codechef.com
10 ww.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	3	-	1	-	-	1	-	-	-	2	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**	**-**	**2.4**	**3**	**2.25**	**1.25**	**-**	**1.3**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester I

25ITU112G	**Office Automation and Web Design - Practical**	

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:
>   Not Required

Course Objectives (CO):
The Goal of this course is for students to:
- To Learn to create, format, and manage professional documents using the features of word processing software
- To Develop skills in creating and managing complex spreadsheets for data analysis.
- To Create engaging and professional presentations using presentation software.
- To Understand how to integrate different office tools to streamline workflows and increase productivity.
- To Develop problem-solving abilities by troubleshooting common issues encountered in office automation tasks.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Apply the features of MS-Word software to create, edit, and manage professional documents.	Apply
CO2	Apply the various formulas in MS-Excel for creating accounting based spreadsheets	Apply
CO3	Create visually appealing presentations by effectively using various design formats of MS-Powerpoint	Create
CO4	Develop relational databases using the various options available in MS-Access Software	Create
CO5	Apply office automation software to streamline and automate the various business processes	Apply

I - 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 and create a table using table menu with,
    i.   With fractions, exponents, summation function
    ii.   With at least one „2*n" matrix
    iii. Basic mathematical and geometric operators.

    iv. Use proper text formatting, page color and page border.

    v. At least 5 columns and 10 rows.

    vi. Merge the first row into one cell.

    vii. Merge the second row into one cell, then split the second row into three cells.

    viii. Use proper table border and color.

    ix. Insert proper content into the table with proper text formatting.

II - List of Programs (MS Excel)

3. 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).

4. Do as directed
   i. Create a notepad file as per the following fields

   Slno   name th1   th2   th3   th4   th5   total   %   grade

   ii. Import this notepad file into excel sheet using data from text option.
   iii. Grade is calculated as,
      1. If %>=90, then grade A
      2. If %>=80 and <90, then grade B
      3. If %>=70 and <80, then grade C
      4. If %>=60 and <70, then grade D
      5. If %<60, then grade F

III - List of Programs (MS Power Point)

5. 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".

IV - List of Programs (MS Access)

6. Create a database "Student" with,
   1. 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.
   ii. Enter data in the table. The total must be calculated using update query.
   iii. Use query for sorting the table according to the descending/ascending order of the total marks.

V - List of Programs:

7. Create an HTML page using tags to accomplish the following:
   (i) A paragraph containing text "All that glitters is not gold". Bold face and italicize this text
   (ii) Create equation: $x = 1/3(y1\ 2 + z1\ 2$

(iii) Put a background image to a page and demonstrate all attributes of background image

(iv) Create unordered list of 5 fruits and ordered list of 3 flowers.

8. Create following table using HTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

Department	Sem1	SubjectA
		SubjectB
		SubjectC
	Sem2	SubjectE
		SubjectF
		SubjectG
	Sem3	SubjectH
		SubjectI
		SubjectJ

9. Create following web page using HTML and CSS with tabular layout.

10. To create a web page using Frames in HTML.

11. To create a web page using Horizontal Frames in HTML.

12. Change the tag **li** to have the following properties:
   - A display status of inline
   - A medium, double-lined, black border
   - No list style type

   Add the following properties to the style for **li**:
   - Margin of 5px
   - Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left

Total: 48 HOURS

Text Books:
1. Vikas Gupta, "Comdex 14-1in-1 Computer course Kit", Dream Tech
2. Bittu Kumar, "Master in Ms-Office"
3. HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill.
4. WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition.

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.
4. Principles of web design.,Joel sklar,sixth edition,2015
5. "Web Coding & Development All-in-One for Dummies",Paul McFedries ,2018 "Fundamentals of Web Development",Randy Connolly, Ricardo Hoar ,2017
6. Thomas A Powell, Fritz Schneider, "JavaScript: The Complete Reference", Third Edition, Tata McGraw Hill, 2013
7. HTML and CSS: Design and Build Websites", Jon Duckett,2014

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
6. http://www. freeCodeCamp Guides.com/
7. http://www. Codrops CSS Reference/

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	1	-	-	-	-	3	-
CO2	3	-	-	2	2	2	-	1	-	2	2	-	-	-	-	3	-
CO3	3	-	-	1	-	1	-	-	-	2	1	-	-	-	-	3	-
CO4	3	-	-	2	-	1	-	-	-	2	1	-	-	-	-	3	-
CO5	3	-	-	3	-	2	-	-	-	1	3	-	-	-	-	3	-
AVG	3	-	-	2	2	1.5	-	1	-	1.8	1.6	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

25

Semester I

25VAC101G   **Yoga for Youth Empowerment**

2H-2C

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

End Semester Exam: 3 Hours

PREREQUISITE:
 Not Required

COURSE OBJECTIVES(CO):
- Create awareness about Yoga and Physical Health.
- Providing value education to improve the student's character, understanding the greatness of life force and the Mind.
- Know about five aspects of life and develop good Qualities and eliminate bad ones.
- Learning introspection practices like analysis of thought, Moralization of Desires, Neutralization of Anger, and Eradication of Worries, Diversity in men (Why Men Differ)
- To understand yoga, life, and practice Yoga asanas

COURSE OUTCOMES(COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Understand the concepts of about Yoga and Physical Health	Understand
CO2	Study the concepts the 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   **5 HOURS**
Manavalakalai (SKY) Yoga: Manavalakalai (SKY) Yoga: Introduction - Education as a means for youth empowerment - greatness of education yoga for youth empowerment. Simplified physical exercises hand, leg, breathing, eye exercises, kapalabathi, makarasana part 1, Makarasana part 2, body massage, acupressure relaxation exercises and its benefits Yogasanas: Suryanamaskar 12 cycle pranayama, Asanas. [sitting and standing] meditation – Agna, explanation of initiation practice and its benefits

UNIT II GREATNESS OF LIFE FORCE AND MIND   **5 HOURS**
Kayakalpa, Aim of kayakalapa, philosophy, physical body, sexual vital fluid life force bio magnetism mind. Maintaining youth fullness, postponing old age, food transformation into seven minerals, the importance of sexual vital fluid measure and method of five aspects of life controlling undue passion. Kayakalpa Practice: Aswini Mudra, Ojas Breath, benefits of Kayakalpa, Sex and Spirituality, Development of mind in ten stages. Mental frequencies: Meditation-five essential qualities acquired through meditation, Types of meditation, Agna, Shanthi, Thuriya, and its Benefits .

UNIT III PERSONALITY DEVELOPMENT – SUBLIMATION   5 HOURS

Purpose and philosophy of life- Needs protection, Ethics, and wisdom. Introspection: importance of thought, maneuvering of the six Temperaments, Analysis of Thought and six roots for thought, moralization of Desires. Neutralization of Anger.

UNIT IV HUMAN RESOURCE DEVELOPMENT   4 HOURS

Eradication of worries: Reasons for worries, four types of worries, Practice for eradication of worries. Benefits of Blessings: effect of good vibration self blessing (Auto suggestion), Family blessing others, world blessing, Divine protect, Human Values: greatness of Friendship, Individual peace to World Peace

UNIT V LAW OF NATURE   5 HOURS

Unified force, cause and effect system, gentle Center, Purification of gentile center, Love and Compassion. Culture values: Types of Education Non violence and five fold moral culture, Truth, honesty, patience. Excuse, self control, obedience, consistent effort, No feeling jealousy, pleasant and polite, see good in everything.

YOGA PRACTICES: Thandasana Chakrasana (sideways) Vruchasana Thirikonasana Vakkarasana

TOTAL: 24 HOURS

TEXT BOOK:

    1. Yoga for Youth Empowerment-Value Education, ThathuvagnaniVethathiri Maharishi,WCSC,
Aliyar

REFERENCE BOOKS:
1.   Kayakapam Thathuvagnani Vethathiri Maharishi
2.   Light on yoga BKS.lyenger
3.   Manavalakala Part-1-Thathuvagnani Vethathiri Maharishi.
4.   Manavalakala part-2-Thathuvagnani Vethathiri Maharishi
5.   Mind ThathuvagnariVethathir Maharishi
6.   Simplified Physical Exercises- ThathuvagnaniVethathiri Maharishi
7.   Sound Health through yoga - Dr.Chandrasekaran
8.   The world order 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	3	-	-	-	-	-	2	-	-	-	1	-	-	-	-	1	2
CO2	3	-	3	3	-	-	1	-	-	-	1	-	-	-	-	1	1
CO3	3	-	-	-	-	2	-	-	-	3	2	-	-	-	-	-	2
CO4	3	-	-	2	2	-	-	-	-	-	3	-	-	-	-	1	2
CO5	3	-	3	3	2	1	-	-	1	-	3	-	-	2	3	2	-
AVG	**3**	**-**	**3**	**2.6**	**2**	**1.5**	**1.5**	**-**	**1**	**3**	**2**	**-**	**-**	**2**	**3**	**1.2**	**1.7**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25LTU201G   **Language: Tamil - II**
                              இலக்கிய இன்பம்   **4H-3C**

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

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்
- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்; திறனாய்வு நோக்கை மேம்படுத்துதல்.
- இலக்கியங்களின் வழி மனித வாழ்வியலை உணர்த்துதல்.
- இன்புறுத்தல் மற்றும் அறிவுறுத்தல் நிலைகளில் இலக்கியங்களின் பங்களிப்பை உணர்த்துதல்.
- இளைய தலைமுறையினருக்கு அற உணர்வு மற்றும் வாழ்வியல் மதிப்புகளை அறிவுறுத்துதல்.

பாடத்திட்டப் பயன்விளைவு
- இந்தியக் குடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில் இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகத்தை அடைதல்.
- தொல்லியல், கல்வெட்டியல் மற்றும் ஓலைச்சுவடியியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- 'அறிவியல் தமிழ்' ; 'இணையத் தமிழ்' போன்ற தமிழின் வளர்ச்சித் துறைகள் சார்ந்த திறன் மேம்பாடு பெற்றிருத்தல்.
- வேலைவாய்ப்புக்குரிய வகையில் படைப்பாக்கத்திறன் முதலான மொழி ஆளுமை பெற்றிருத்தல் ;
- சமூக வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக உள்ள இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.

தாள்கள் வரிசையும் தேர்வுச் செயல் திட்டமும்
பகுதி-I தமிழ்
இளநிலைப்பட்ட அறிவியல் மற்றும் கலையியல் வகுப்புகள்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அகமதிப்பீடு/பருவ எழுத்துத் தேர்வு	மொத்தம்	மதிப்புப் புள்ளிகள்
இரண்டு	II	4	3	40 / 60	100	3

இலக்கிய இன்பம்

அலகு – I   **11 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு - தமிழிலக்கிய வரிசையில் திருமுறைகள், பன்னிருதிருமுறைகள் அறிமுகம், திருமுறை ஆசிரியர்களின் இலக்கியப் பங்களிப்பு.

பக்தி இலக்கியம்   - சைவம் – பெரியபுராணம் - திருமூலநாயனார் புராணம் (தேர்ந்தெடுக்கப்பட்ட 15 பாடல்கள்)
- அந்தியிளம் பிறைக்கண்ணி (1) – மற்றவர்தாம் (2),காவிரிநீர்(9)–அந்நிலைமை(10), ந்தணர்தஞ் (11) – மற்றவன்றன் (12), இவன் உயிர் (13), பாய்த்தியபின் (14) – வெய்யசுடர் (16) –

அங்கவளும் (18) – பித்துற்ற (20) – இந்தநிலை (22) – ஆவடுதண்(25) – ஊனுடம்பில்(26) – முன்னிய (27)

கவிதை	- கண்ணன் என் சீடன் (1-150 வரிகள்) - மகாகவி பாரதியார்
கவிதை	- பெண்களின் உரிமைகள்(பெண்மை) - கவிமணி
கவிதை	- செருப்புடன் ஒரு பேட்டி- கவிஞர் மேத்தா
சிறுகதை	- கடவுளும் கந்தசாமிப் பிள்ளையும் – எழுத்தாளர் புதுமைப்பித்தன்
கட்டுரை	- ஆளுமைத்திறன் அறிவோம் (தன்னம்பிக்கை மாத இதழ்)
படைப்பிலக்கியப் பயிற்ச - கட்டுரைப் படைப்பாக்கத்திறன்	

அலகு – 2   **10 மணிநேரம்**

தமிழ் இலக்கிய வரலாற	- பன்னிரு ஆழ்வார்கள் வரலாறு
பக்தி இலக்கியம்	- நாச்சியார் திருமொழி (வாரணம் எனத் தொடங்கும் 11 பாடல்கள்) – ஆண்டாள்.
கவிதை	- மலையாளக்காற்று - கவிஞர் சிற்பி பாலசுப்பிரமணியம்.
கவிதை	- கம்ப்யூட்டர் கையில் நாம் - கவிஞர் ஈரோடு தமிழன்பன்
சிறுகதை	- நந்தவனத்தில் ஒரு ஆண்டி- எழுத்தாளர் ஜெயகாந்தன்
கட்டுரை	- அறிவியல் தமிழ் ஆக்கம் – இற்றை நிலை – டாக்டர். வா.செ. குழந்தைசாமி
படைப்பிலக்கியப் பயிற்சி - கவிதைப் படைப்பாக்கத்திறன்	

அலகு – 3   **10 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு	- தமிழ்ப் புதுக்கவிதையின் தோற்றமும் வளர்ச்சியும்
பக்தி இலக்கியம்	- திருவருட்பா - அஞ்சாதே நெஞ்சே (10 கண்ணிகள்) – இராமலிங்க அடிகளார்.
கவிதை	- கனவுகள் +கற்பனைகள் = காகிதங்கள் – கவிஞர் மீரா
கவிதை	- மின்மினிகளால் ஒரு கடிதம் - கவிஞர் அப்துல்ரகுமான்
கவிதை	- ஒட்டடை- கவிஞர் தாமரை
சிறுகதை	-நாற்காலி – எழுத்தாளர் கி. ராஜநாராயணன்
கட்டுரை	- உயர்தனிச் செம்மொழி - முனைவர் இரா. குணசீலன்
இலக்கணம்	- வல்லினம் மிகும், மிகா இடங்கள்
படைப்பிலக்கியப் பயிற்சி - சிறுகதைப் படைப்பாக்கத்திறன்	

அலகு- 4   **10 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு	- தமிழ்ச் சிறுகதையின் தோற்றமும் வளர்ச்சியும்.
கவிதை	- இயேசு காவியம் - கசப்புறு பாத்திரம் – "வானி லங்கு

நிலவு"முதல் "நேர மின்று நெருங்கியே" (1 முதல் 8 பாடல்கள்) - கவிஞர் கண்ணதாசன்.

கவிதை	- அதோ அந்த அவர்கள் - கவிஞர் வாலி.
கவிதை	- ஏழை இங்கொருவருமில்லை - கவிஞர் குலோத்துங்கன்.
சிறுகதை	- சுயநலம்- கவிஞர் விந்தன்.
கட்டுரை	- கங்கை வேடனும் காளத்தி வேடனும் - சொல்லின் செல்வர் ரா.பி. சேதுப்பிள்ளை.

ஆளுமைத்திறன் மேம்பாடு - பேச்சுக்கலை

அலகு -5   **07 மணிநேரம்**

தமிழ் இலக்கிய வரலாறு - தமிழ் உரைநடையின் தோற்றமும் வளர்ச்சியும்

கவிதை	- தவத்தின் மேன்மை - கவிஞர் குணங்குடி மஸ்தான் சாகிபு
கவிதை	- சின்னச் சின்ன பிரளயங்கள் - கவிஞர் வைரமுத்து
கவிதை	- சுயம் - கவிஞர் சல்மா
சிறுகதை	- மீன் - எழுத்தாளர் பிரபஞ்சன்
கட்டுரை	- வீரச்சுவை – நாவலர் ந.மு.வேங்கடசாமி நாட்டார்
மொழித்திறன் மேம்பாடு	- பிழையின்றி எழுதுதல் பயிற்சி. மரபுத்தமிழ்–திணைமரபு–உயர்திணை, ஃறிணை, அறிவியல் கலைச்சொற்கள்.

மொத்த மணிநேரம் - 48

TEXT BOOK

T1 - கற்பகச் சோலை – தமிழ்ப்பாட நூல், இலக்கிய இன்பம், தமிழ்த்துறை வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் – 21.

பார்வை நூல்கள்

 R1 - தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன், கலையக வெளியீடு,   நாமக்கல்.

 R2 - பெரியபுராணம் தொகுதி-1 பன்னிருதிருமுறை ஆய்வுமைய வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோவை-21

இணையதளம்

W1-www.tvu.org.in

W2- www.maduraitamilproject.com

இதழ்கள்

J1- International Research Journal of Indian Literature,irjil.in

J2 - International Tamil Research Journal, iorpress.in

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	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**2.4**	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

B. Sc. COMPUTER TECHNOLOGY

25LHU201G	**Language: Hindi - II**	
	(Modern Poetry, Drama, Novel, Grammar)	**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):
- 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   **9 HOURS**

a) Poetry – Nagarjun
b) Drama -Dhruva Swamini
c) Novel - Nirmala , Thotharam
d) Grammar – Kaal , Theen Prakar

UNIT-II   **9 HOURS**

a) Poetry – Sita , Ram
b) Drama – Mandhakini , Koma
c) Novel – Mansaram , Jiyaram
d) Grammar – Upsarg, Prathyay

UNIT-III   **10 HOURS**

a) Poetry – Lakshman, Valmiki
b) Drama – Ramaguptha , Chandhraguptha
c) Novel – Sudha, Bhuvan Mohan Singh
d) Grammar – Sabda Vyutpathi

UNIT-IV   **10 HOURS**

a) Poetry -Vishvaamithra, Thrijada
b) Drama –Sikhar Swami,Shakraj
c) Novel – Udhaybanulaal, Siyaram
d) Grammar – Sambandh Chochak

UNIT-V   **10 HOURS**

      a) Poetry – Bhagirath , Sagar
      b) Drama – Khingal , Mihirdev , Prohith
      c) Novel – bhalchandra Sinha,Kalyani, Rangili Bai
      d) Samuchchaybodhak, Vishmayathibodhak

                                                                    TOTAL: 48 HOURS

REFERENC 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

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	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**2.4**	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25LMU201G   **Language: Malayalam - II**

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:
Not required

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

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

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

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

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

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	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-
AVG	-	3	3	-	-	-	3	-	-	-	-	2	-	-	-	-	-

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

B. Sc. COMPUTER TECHNOLOGY

25LSU201G	**Language: Sanskrit - II**	
	(PROSE, GRAMMAR AND TRANSLATION**)**	**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 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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25LFU201G   **Language: French - II**
                    (Leçon, Communication, Grammaire, Verbes, Lexique, Culture)   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 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   **9 HOURS**

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

Unité - II   **9 HOURS**

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

Unité - III   **10 HOURS**

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

Unité -IV   **10 HOURS**

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

Unité - V   **10 HOURS**

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

TOTAL: 48 HOURS

Text Books:

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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
AVG	--	2.5	2.5	-	-	-	-	-	2	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25LFU201G   **English II**

3H-3C

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

End Semester Exam:3 Hours

Prerequisite:
          Not Required

COURSE OBJECTIVES (CO):
- To make the students to speak and write errors free English.

- To help the students develop their listening, speaking, reading and writing skills.

- Introducing literary works to the students to enhance their analytical and aesthetic skills.

Course Outcomes (COs):
     At the end of this course, students will be able to

COs	Course Outcomes (COs):	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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-
AVG	--	2.5	2.5	-	-	-	-	-	2	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																		

Semester II

25ITU201G   **Object Oriented 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 Required

Course Objectives (CO):
The Goal of this course is for students to:
- To Provide the fundamental knowledge and skills to become a proficient C++ programmer.
- To Understand all the features of Object-Oriented Programming for developing software based on the concepts of Object-Oriented Programming.
- To Introduce the concepts of Inheritance, Multithreading and Exception Handling using Java programs
- To Inculcate Java programming skills using AWT Packages and Applets

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the Object-Oriented Paradigm using C++ Programming	Understand
CO2	Solve real world problems using OOP techniques and use abstract classes	Apply
CO3	Explain the features of template and file handling in C++.	Understand
CO4	Apply Java Programming concepts of Inheritance, Multithreading and Exception Handling	Apply
CO5	Develop package and Applet based programs for creating web applications	Create

UNIT I Introduction to Object Oriented Programming   **12 HOURS**
Object Oriented Paradigm – Basic concepts of object oriented programming – Benefits of OOPS – Applications of OOPS – A simple C++ Program - Structure of C++ Program – **Tokens, Expressions and Control Structures:** Tokens - Keywords – Identifiers – Type Compatibility - Operators in C++: Scope Resolution Operator :: - Control Structures - Functions in C++: Introduction – Main function – Function Prototyping – Call by Reference – Return by Reference – Inline functions – Default Arguments – Function Overloading – Friend and Virtual functions – Math Library functions.

UNIT II Classes and Objects   **12 HOURS**
Classes and Objects: C Structure revisited – Specifying a Class – Defining Member Function – C++ program with class – Nesting of member function - Private Member Function – Array within a Class – Memory allocation for object – Static data member – Static member function – Arrays of objects – object as a function argument – Friendly function – Returning objects – Pointers to member – Local classes.

Constructors and Destructors: Constructors – Parameterized Constructor – Multiple constructors in a Class – Constructor with default argument – Dynamic initialization of object – Copy Constructor – Dynamic Constructor – Destructors.

UNIT III Operator Overloading and Type Conversions   **12 HOURS**

Introduction – Defining Operator overloading – Overloading Unary operators – Overloading Binary operators – Rules for overloading operators – Typer Conversions, **Inheritance: Extending Classes -** Introduction – Defining Derived classes – Single Inheritance – Multilevel Inheritance – Multiple Inheritance – Hierarchical Inheritance – Hybrid Inheritance – Virtual Base class – Abstract classes

UNIT IV Java Basics   **12 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   **12 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 : 60 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	3	-	3	2	2	1	-	1	-	-	-	-	-	-	-	3	-
CO2	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO3	3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	2	3	2	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3	-	2.6	2.4	1.8	1.25	-	1.25	-	-	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25ITU202G   **Relational Database Management Systems**

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 goal of this course is for students to:
- To understand the basic concepts and the applications of database systems.
- To master the basics of SQL and construct queries using SQL.
- To understand the relational database design principles.
- To familiar with the basic issues of transaction processing and concurrency control.
- To familiar with database storage structures and access techniques.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic elements of a relational database management system.	Apply
CO2	Illustrate the data models for relevant problems.	Remember
CO3	Design entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data	Analysis
CO4	Demonstrate their understanding of key notions of query evaluation and optimization techniques.	Apply
CO5	Extend normalization for the development of application software 's.	Apply

UNIT - I INTRODUCTION AND DATABASE DESIGN MODEL   **10 HOURS**
Introduction: Database System Applications - View of Data - Database Architecture. Database Design and the E-R Model: Overview of the Design Process - The Entity-Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets - Entity Relationship Diagrams - Extended E-R Features.

UNIT - II INTRODUCTION TO SQL   **10 HOURS**
Overview of SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - DDL, DML, TCL and DCL statements - SELECT Operations Set Operations - Null Values - Aggregate Functions - Nested Sub Queries - Modification of the Database

UNIT - III RELATIONAL DATABASE DESIGN   9 HOURS

Features of Good Relational Designs - Functional Dependency - Atomic Domains and First Normal Form – Second Normal Form - Third Normal Form - Boyce-Codd Normal Form - Multivalued Dependency and Fourth Normal Form - Join Dependency and Fifth Normal Form.

UNIT - IV INTERMEDIATE AND PL/ SQL   10 HOURS

Intermediate SQL: Join Expressions - Views - Materialized Views - Transactions - Commit - Rollback – Integrity Constraints - Assertions - SQL Data Types and Schemas - Authorization. PL/SQL: Introduction to PL/SQL-Variable-Constants-Conditional Statements-Cursor-Implicit Cursors-PL/SQL Explicit Cursors - PL/SQL Procedures - PL/SQL Functions - PL/SQL Exception Handling PL/SQL Triggers.

UNIT - V TRANSACTIONS AND CONCURRENCY CONTROL   9 HOURS

Transactions: Transaction Concept - A Simple Transaction Model – Storage Structure - Transaction Atomicity and Durability - Transaction Isolation - Serializability. Concurrency Control: Lock Based Protocols - Timestamp Based Protocols - Validation Based Protocols.

Total: 48 HOURS

Text Books:
1. Silberschatz Abraham, Korth Henry F., and Sudarshan S, "Database System Concepts", 6 Edition, McGraw Hill Education, India, 2018.
2. Elmasri Ramez, Navathe Shamkant B, "Fundamentals of Database Systems", 7 Edition, Pearson Education, 2016.

Reference Books:
1. Ramakrishnan Raghu, Gehrke Johannes, "Database Management Systems", 3 Edition, McGraw Hill Education,2014
2. Database Systems using Oracle, Nilesh Shah, 2nd edition, PHI.
3. C.J.Date -An Introduction to Database Systems, Seventh Edition

Websites
1 http://www.digimat.in/nptel/courses/video/106105175/L01.html
2 https://www.tutorialspoint.com/oracle_sql/index.htm

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	-	-	-	-	-	-	1	3	-
CO2	2	3	-	3	-	-	-	-	-	-	-	-	2	-	1	3	-
CO3	3	-	1	-	3	-	-	1	3	-	-	-	-	-	-	3	-
CO4	2	-	2	1	1	-	-	2	1	-	-	-	-	-	-	3	-
CO5	1	2	-	2	2	-	-	-	-	-	-	-	1	-	3	3	-
AVG	2.23	2.5	1.5	2	2.25	3	-	1.66	2	-	-	-	1.5	-	1.66	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25MAU201G	**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 (COs):	Blooms Level
CO1	Interpret logical connectives and truth tables in well-formed formulas.	Analyze
CO2	Explain the basic concepts of set theory and operations on sets.	Analyze
CO3	Apply permutation and combination techniques to solve counting problems.	Analyze
CO4	Solve linear recurrence relations using the characteristic root method and generating functions.	Analyze
CO5	Define basic terminology and concepts in graph theory.	Analyze

UNIT I PREPOSITIONAL LOGIC   **10 HOURS**
Prepositions - Truth tables - Logical connectives - Well-formed Formulas - Demorgan's Law - Tautologies and contradictions - PDNF and PCNF – Equivalences - Inference theory - Rules of universal specification and generalization.

UNIT II SETS   **10 HOURS**
Introduction – Basic concepts of set theory – Operations on sets – Venn diagram - Relations - Properties of binary relations - Types of relation – Functions - Types of functions - Composition of functions - Inverse functions.

UNIT III COMBINATORICS   **9 HOURS**
Pigeonhole principle - Permutation and Combination - Principle of inclusion and exclusion - Mathematical induction.

UNIT IV RECURRENCES   9 HOURS

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

UNIT V GRAPH THEORY   10 HOURS

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

TOTAL: 48 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEBSITES:

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

CO, PO, PSO Mapping

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	-	-	1.3	2.4	1	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25ITU211G   **Object Oriented Programming - Practical**

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:
                    Not Required

Course Objectives (CO):
The Goal of this course is for students to:
- To provide the fundamental knowledge and skills to become a proficient C++ programmer.
- To understand all the features of Object-Oriented Programming for developing software based on the concepts of Object Oriented Programming.
- To develop C++ Programs using Templates and Streams.
- To introduce the concepts of Inheritance, Multithreading and Exception Handling using Java programs
- To inculcate Java programming skills using AWT Packages and Applets

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Analyze the methodology of Object-Oriented Paradigm using C++ Programming	Analyze
CO2	Implement the Concepts of Object-Oriented Programming using C++ Programs	Apply
CO3	Apply the features of template and file handling in C++ by developing C++ Progams.	Apply
CO4	Apply the features of Java Programming to implement the concepts of Inheritance, Multithreading and Exception Handling	Apply
CO5	Develop package and Java Applet based programs for creating web applications	Create

List of Programs
1. C++ Program using a program to get and print student data using Inheritance.

2. C++ program using class and object for binary tree traversal

3. C++ Program implementing Function Overloading and Constructor

4. C++ Program implementing String Class using

5. C++ Program implementing File Handling

6. C++ program to sort an array using pointers

7. C++ program for Implementation of Stack and Queue using Array

8. Simple Java applications - for understanding methods & Handling Strings in Java

9. Simple Package creation.

10. JAVA Program for Developing user-defined interfaces and implementation

11. Implementing Exception Handling Mechanism in Java

12. JAVA Program for Creation of thread in Java applications

Total : 48 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

Websites
1. www.programmingsimplified.com
2. www.programiz.com / cpp -programming
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.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	2	2	1	-	1	-	-	-	-	-	-	-	3	-
CO2	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO3	3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	2	3	2	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3		2.6	2.4	1.8	1.25	-	1.25	-	-	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25ITU212G   **Relational Database Management 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

Course Objectives
- The course describes the data, organizing the data in database, database administration.
- Familiar with database storage structures and access techniques   .
- Master the basics of SQL and construct queries using SQL.
- Students get practical knowledge on designing and creating relational database systems.
- Understand various advanced queries execution such as relational constraints, joins, set operations, aggregate functions, trigger, views and embedded SQL.

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

COs	Course Outcomes (COs):	Blooms Level
CO1	The students will be able to define program-data independence, data models for database systems, database schema and database instances.	Understanding
CO2	Demonstrate the basic elements of a relational database management system.	Applying
CO3	Identify the data models for relevant problems.	Remember
CO4	Demonstrate their understanding of key notions of query evaluation and optimization techniques.	Analyzing
CO5	Extend normalization for the development of application software's.	Applying

List of Programs

1. Basic SQL SELECT Statements – Creating and managing tables using DDL, DML, Integrity constraints.
2. DCL, TCL and DB Object (View, Sequence, Index, Synonym, Alias) commands
3. Single row Functions (character, mathematical and date functions) and Aggregate functions
4. Displaying Data from Multiple Tables using SQL operators, GROUPBY, HAVING and ORDERBY clause and also perform join operation.
5. Write a program to perform Basic PL/SQL programs
6. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
7. Write a PL/SQL block that handles exceptions.
8. Write SQL Triggers for insert, delete, and update operations in a database table.
9. Write the PL/SQL programs to Create the procedure for palindrome of given number
10. Write the PL/SQL programs to create the recursive function for factorial of given number

Total: 48 HOURS

Suggested Readings

1   Silberschatz Abraham, Korth Henry F., and Sudarshan S, "Database System Concepts", 6th Edition, McGraw Hill Education, India, 2018.
2   Elmasri Ramez, Navathe Shamkant B, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2016.
3   Ramakrishnan Raghu, Gehrke Johannes, "Database Management Systems", 3rd Edition, McGraw Hill Education,2014
4   Database Systems using Oracle, Nilesh Shah, 2nd edition, PHI.
5   C. J. Date - An Introduction to Database Systems, 7th Edition

Websites

1   http://www.digimat.in/nptel/courses/video/106105175/L01.html
2   https://www.tutorialspoint.com/oracle_sql/index.htm

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	1	-	1	-	-	-	-	-	-	-	3	-
CO2	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO3	3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	2	3	2	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3		2.6	2.4	1.8	1.25	-	1.25	-	-	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

25VAC201G   **Environmental Studies**

2H-2C

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

End Semester Exam:- 3 Hours

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 resource's availability and its environment protection.
- To learn about the environment, resources available, biodiversity and its conservation.
- To understand the current scenarios- to find ways for protection and betterment of or habitat.
- To understand the concepts to analyze the interactions between social and environmental problems.

COURSE OUTCOMES (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	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 – High, '-' – No Correlation																	

Semester III

25LTU301G   **Language: Tamil – III**
போட்டித் தேர்வு நோக்கில்
தமிழிலக்கியங்கள்   **4H-3C**

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

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்
- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்; திறனாய்வு நோக்கை மேம்படுத்துதல்.
- இலக்கியங்களின் வழி மனித வாழ்வியலை உணர்த்துதல்.
- இன்புறுத்தல் மற்றும் அறிவுறுத்தல் நிலைகளில் இலக்கியங்களின் பங்களிப்பை உணர்த்துதல்.
- இளைய தலைமுறையினருக்கு அற உணர்வு மற்றும் வாழ்வியல் மதிப்புகளை அறிவுறுத்துதல்.

பாடத்திட்டப் பயன்விளைவு
- இந்தியக் குடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில் இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகத்தை அடைதல்.
- தொல்லியல், கல்வெட்டியல் மற்றும் ஓலைச்சுவடியியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- 'அறிவியல் தமிழ்' ; 'இணையத் தமிழ்' போன்ற தமிழின் வளர்ச்சித் துறைகள் சார்ந்த திறன் மேம்பாடு பெற்றிருத்தல்.
- வேலைவாய்ப்புக்குரிய வகையில் படைப்பாக்கத்திறன் முதலான மொழி ஆளுமை பெற்றிருத்தல் ;
- சமூக வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக உள்ள இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.

தாள்கள் வரிசையும் தேர்வுச் செயல் திட்டமும்
பகுதி-I தமிழ்
இளநிலைப்பட்ட அறிவியல் மற்றும் கலையியல் வகுப்புகள்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வ மணிகள்	மதிப்பெண் அகமதிப்பீடு/பருவ எழுத்துத் தேர்வு	மொத்தம்	மதிப்புப் புள்ளிகள்
மூன்று	III	4	3	40 / 60	100	3

போட்டித் தேர்வு நோக்கில் தமிழிலக்கியங்கள்

அலகு – 1   **10 மணிநேரம்**
அற இலக்கியம்   –   **திருக்குறள்** - தெரிந்து தெளிதல் - கூடா நட்பு.
நாலடியார் - பெரியாரைப் பிழையாமை – (பாடல் 161 முதல் 165 வரை பொறுப்பர் என்றெண்ணி, பொன்னே கொடுத்தும்,அவமதிப்பும், விரிநிற நாகம், எம்மை அறிந்திலீர்)
பழமொழி நானூறு - (பாடல் 151 முதல் 155 வரை – (வேளாண்மை செய்து, ஒன்றால் சிறிதால், இனி யாரும் இல்லாதார், தற்றூக்கி, வீங்குதோள்)
இனியவை நாற்பது - (பாடல் 31 முதல் 35 வரை) – (அடைந்தார்

துயர்கூறா, கற்றறிந்தார் கூறும், ஊர்முனியா, எல்லிப் பொழுது,
ஒற்றினான் ஒற்றி)

சிறுபஞ்சமூலம் - பூவாது காய்க்கும் (20) – பூத்தாலும் காயா மரம்
உள (21).

ஏலாதி (1 முதல் 5 பாடல்கள் வரை -   சென்ற புகழ், கொலை
புரியான், தவம் எளிது, இடர் தீர்த்தல், தனக்கு என்னும்)

முதுரை – (11 முதல் 15 வரை) – (பண்டு முளைப்பது, மடல் பெரிது,
கவையாகி கொம்பாகி, கான மயிலாட, வேங்கை வரிப்புலி)
முதலான பாடல்களைத் திறனாய்தல்.

அலகு – 2	**08 மணிநேரம்**

காப்பியங்கள்   - ஐம்பெருங்காப்பியங்கள்
  - சிலப்பதிகார வழக்குரைகாதை
  - ஐஞ்சிறு காப்பியங்கள்
  - சூளாமணி அரசியற் சருக்கம்
  - பிற்கால இலக்கியங்கள்
  (பாரதசக்தி மகாகாவியம், இராவண காவியம்)

சிற்றிலக்கியங்கள் - குற்றாலக்குறவஞ்சி - பிள்ளைத்தமிழ் – பரணி – தூது – உலா
  முதலான இலக்கியங்களைத் திறனாய்தல்.

அலகு – 3	**10 மணிநேரம்**

தமிழின் தொன்மை - திராவிடமொழிகள் தொடர்பான செய்திகள்
தமிழ் வளர்த்த சான்றோர் – உ.வே.சாமிநாதர் – தெ.பொ.மீனாட்சி சுந்தரனார் – சி.
  இலக்குவனார்
  ஆகியோரின் தமிழ்ப்பணி – தேவநேயப்பாவாணர் – அகரமுதலி
  – பாவலரேறு பெருஞ்சித்திரனார் – ஜி.யு.போப் – வீரமாமுனிவர்
  ஆகியோரின் தமிழ்த்தொண்டு.

அலகு – 4	**10 மணிநேரம்**

தமிழ்வளர்த்த சான்றோர் - மகாகவி பாரதியார் – பாவேந்தர் பாரதிதாசன்
  -கவியரசுகண்ணதாசன்-பட்டுக்கோட்டை
  கல்யாணசுந்தரனார் – கவிஞர் முடியரசன் – நாமக்கல்
  கவிஞர் - சிலம்புச் செல்வர் ம.பொ.சிவஞானம் ஆகியோரின்
  தமிழ்ப்பணி – சாகித்ய அகாதெமி விருது பெற்ற
  இலக்கியங்கள்.

அலகு – 5	**10 மணிநேரம்**

கடிதப்பயிற்சி   1. நண்பனுக்குப் பாராட்டுக் கடிதம்
   2. தமிழ் மன்ற நிகழ்வை நாளிதழில் வெளியிட வேண்டி
  பதிப்பாசிரியருக்கு விண்ணப்பம்
   3.கருத்தரங்கப் பங்கேற்பிற்கான அனுமதி   வேண்டி
  விண்ணப்பம்
   4. வேலை வேண்டி விண்ணப்பம்

இலக்கணம்   - எழுத்து – குறில்,நெடில் வேறுபாடு – லகர,எகர, ழகர
  வேறுபாடு- னகர,ணகர வேறுபாடு - ரகர,றகர வேறுபாடு
  அறிதல்.பேச்சு வழக்குத் தொடரிலுள்ள பிழை திருத்தம் –
  (எ.கா.) நேத்து மழ பேஞ்சுது – நேற்று மழை பெய்தது.
  மொத்த மணிநேரம் – 48

TEXT BOOK T1 - கற்பகச் சோலை – தமிழ்ப்பாட நூல், இலக்கிய இன்பம், தமிழ்த்துறை வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் – 21.

பார்வை நூல்கள்

R1- தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன், கலையக வெளியீடு, நாமக்கல்.

R2 - வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, முனைவர் பாக்யமேரி, பூவேந்தன் பதிப்பகம், சீனிவாசா சாலை, மயிலாப்பூர், சென்னை.

இணையதளம்

W1-www.tvu.org.in

W2- www.maduraitamilproject.com

இதழ்கள்

J1- International Research Journal of Indian Literature, irjil.in

J2 - International Tamil Research Journal, iorpress.in

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	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2.4	2.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

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25LHU301G   **Language: Hindi - III**
(Story, History of Hindi Literature, Novel, Letter Writing)   **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):
* 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   **9 HOURS**

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

UNIT-II   **9 HOURS**

   a) Story – Puraskar
   b) Kaal Vibhajan , Char Prakar
   c) Ramesh Babu ,Devdeen
   d) Letter Writing – Leave Letter

UNIT-III   **10 HOURS**

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

UNIT-IV   **10 HOURS**

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

UNIT-V   **10 HOURS**

a) Story – kafan
b) Reethi Kaal,Adhunik Kaal
c) Dheen Dhayal,Manaki,
d) Letter Writing – Complaint Letter

                                                            TOTAL: 48 HOURS

TEXT 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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25LMU301G   **Language: Malayalam - III**

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:
- Not required

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

COURSE OUTCOME(COs):

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

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

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

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

CO, PO, PSO Mapping

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2.5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

2025-2026

Semester III

25LSU301G   **Language: Sanskrit - III**
(Drama and History of Sanskrit Literature)   **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 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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III
25LFU301G   **Language: French - III**
          (Histoire, histoire de la littérature frencais,roman, rédaction de lettres)   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 objectives of this course are
- 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 complémentsLes
                      verbes du premier groupe en -ger et -cer,
 d) Les verbes ouvrir et accueillir
 e) Lexique   - Les points cardinaux,Les prépositions de lieu (2)
 f) Culture   –Le français : une ouverture sur le monde

Unité – III   **10 HOURS**
a) Leçon   -
b) Communication   - permetter,defendre.
c) Grammaire   -La formation du pluriel (2) Les adjectifs de couler,   Les adjectifs
                             beau, nouveau, vieux
d) Lexique   - Les couleurs, Les formes,Les me
e) culture   – les grandes fleuves en Francais.

Unite – IV   **10 HOURS**
a) Leçon   – Félicitations !
b) Communication   - Décrire un objet
c) Grammaire   - Les pronoms relatifs qui et que,
.   L'imparfait, Les verbes connaître, écrire, mette   et vendre
d) Lexique   – Les mesures, L'informatique
                            DIRE, LIRE, ECRIRE , Les sons [E] / [O] / [Œ]
e) Culture   –Les lieux de la ville.

Unité - V   **10 HOURS**
a) Leçon   -En voyage !
 b) Communication -• Présenter ses vœux, Faire une réservation
 c) Grammaire - Les pronoms démonstratifs,La question avec Inversion,Les
                             adverbes de manière,
d) Lexique -Les voyages,L'aéroport et l'avion,Les fêtes
e) Culture –Noël

                                                       TOTAL: 48 HOURS
TEXT BOOKS:
1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison   1- Méthode de franca**is, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, S**aison** 1 – **Cahier d'activites** , Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, **Marie- Françoise Gliemenn,Les exercices de grammaire,Hachette FLE, Paris,200**5
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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2.5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25ENU301G   **English III**

3H-3C

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

End Semester Exam:3 Hours

Prerequisite:
Not Required

COURSE OBJECTIVES (CO):

- To enable students to recognize native 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 (COs):	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 of Abbreviations-Spellings Rules
Translation- Translating Short Sentences and Passages from English to Tamil

UNIT-V   **7 HOURS**
  VOCABULARY: Synonyms-Antonyms-Prefixes-Suffixes- Idioms- Different Types of English-Homonyms and Homophones (British and American)

                                             TOTAL: 36 HOURS

TEXT BOOKS

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

REFERENCE BOOKS:

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

WEB SITES:

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

CO, PO, PSO Mapping

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	2.5	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25CYU301G	**Operating Systems**	
		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 Goal of this course is for students to:
- To Understand the basic concepts and functions of operating systems.
- To Understand Processes, Threads and Deadlocks
- To Analyze Scheduling algorithms
- To Analyze memory management schemes.
- To Explain how protection domains, combined with an access matrix, authentication, uses of cryptography computing.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs)	Blooms Level
CO1	Explain about basic concepts of Operating System, its functions and services.	Understand
CO2	Explain CPU Scheduling, Synchronization, Deadlock Handling and Comparing CPU Scheduling Algorithms and Deadlock Detection Problems.	Understand
CO3	Summarize the role of paging, segmentation and virtual memory in operating systems.	Understand
CO4	Outline the concept of mass storage structure	Understand
CO5	Make use of security policies and mechanisms in operating systems	Analyze

Unit – I Introduction to Operating System   **7 HOURS**
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   **11 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   10 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 Storage Management   10 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 Protection and Security   10 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 : 48 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

Reference Books:

1. Garry Nutt, "Operating Systems–A Modern perspective",Third Edition, Pearson Education
2. Bach,2.J., "Design of UNIX Operating System", Prentice Hall
3. Charles Crowley, "Operating systems – A Design Oriented Approach", Tata McGraw hill, 1997
4. Michel Palmer "Guide Operating Systems", Vikas Thomson Learning Publishing, New Delhi
5. Milan Milon kovic, Operating System Concept sand design, II Edition, McGraw Hill 1992.
6. William Stallings, Operating System,4ᵗʰ Edition, Pearson Education.
7. H.2.Deitel, Operating systems,2ⁿᵈ Edition, Pearson Education
8. Nutt: Operating Systems,3/e Pearson Education2004
9. D.2.Dhamd here, "Operating Systems",2ⁿᵈ Edition, Tata McGraw-Hill

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	-	-	-	-	-	-	3	-
CO2	3	-	2	2	1	-	-	-	-	-	-	-	1	-	-	3	-
CO3	2	-	1	2	-	-	-	1	-	-	-	-	-	-	-	3	-
CO4	2	-	-	2	3	-	-	-	1	-	-	-	-	-	-	3	-
CO5	2	-	1	-	-	-	-	-	-	-	2	-	1	-	2	3	-
AVG	2.4	-	1.3	2	2	-	-	1	1	-	2	-	1	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25CYU302G   **Computer Networks**

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 Required

Course Objectives (CO):
The Goal of this course is for students to:

- To know the basics of computer networks
- To acquire the knowledge about the data link layer in the internet
- To understand the process of protocols, router, cellular networks
- To analyze the network layer with different techniques using routing algorithm
- 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 (COs):	Blooms Level
CO1	Explain the fundamentals concepts of computer network	Understand
CO2	Outline the DLL services and different protocol uses in computer networks	Understand
CO3	Summarize the uses of various protocols and Connection devices	Understand
CO4	Classify 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   **12 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   **12 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   **12 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   12 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 - APPLICATIONLAYER   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: 60 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
3. Data Communications and Networking-2.JAIN, BPB Publication, 2002
4. Data Communications and Networking-Jain Madhulika, BPB Publication, 2002

Reference Books:
 1.William Stalling,Computer networks – PHI

Websites
1. https://archive.nptel.ac.in/courses/106/105/106105080/
2. https://open.umn.edu/opentextbooks/textbooks/771
3. https://freecomputerbooks.com/networkComputerBooks.html
4. https://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html
5. https://www.javatpoint.com/computer-network-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	-	-	-	1	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2		-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	2	-	2	2	2	-	1.33	1.66	2	-	1.5	-	1	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

B.Sc. COMPUTER TECHNOLOGY

25MAU301G	**Operation Research**	

4H-4C

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

UNIT I LINEAR PROGRAMMING   12 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   **9 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   **9 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   **9 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

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO2	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO5	-	-	1	3	-	2	-	-	-	-	-	-	-	-	-	3	-
AVG	-	-	1	3	1	2	-	-	-	-	-	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

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 Required

Course Objectives (CO):
The Goal of this course is for students to:

- To know the basics of computer networks
- To acquire the knowledge about the data link layer in the internet
- To understand the process of protocols, router, cellular networks
- To analyze the network layer with different techniques using routing algorithm
- 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 (COs)	Blooms Level
CO1	Apply the fundamentals concepts of computer network and error detection algorithm	Apply
CO2	Apply DLL services and stop and wait protocols in computer networks	Understand
CO3	Experiment the uses of go back and Connection devices	Understand
CO4	Analyze the network layer and transport layer services	Analyze
CO5	Experiment the application of distance vector routing algorithm and Dijkstra algorithm in the computer network	Analyze

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

Reference Books
1. Wayne Tomasi (2007) Introduction to Data Communications and Networking (1st ed). Pearson
2. Alberto Leon-Garcia, Indra Widjaja (2017). Communication Network (2nd ed). Mc Graw Hill education.
3. Sathish Jain, Madhulika Jain, Vineeta Pillai, Kratika (2010). A Level Data Communication & Network Technologies. BPB publication.

Web Sites
1. https://forgetcode.com/c/1203-crc-generation-in-computer-networks
2. https://gist.github.com/ankurdinge/1202643
3. https://www.geeksforgeeks.org/
4. https://www.thelearningpoint.net/computer-science/c-program
5. www.w3schools.com/tcpip/default.asp
6. 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	3	-	2	-	-	-	1	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2	-	-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	2	-	2	2	2	-	1.33	1.66	2	-	1.5	-	1	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25ITU311G   **Programming in Python - Practical**

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives
- To develop simple programs using Python and packages.
- To develop python programs to solve mathematical and statistical problems
- To develop python visualization techniques using packages.
- To develop python program datasets
- To Understand draw charts using different data sets.

Course Outcomes

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Understand the essentials of Python programming	Understand
CO2	Do basic programs using python modules and packages	Remember& understand
CO3	Create simple algorithms with and without using packages	Apply
CO4	Interpret algorithm and visualize the results with real time datasets	Analyze
CO5	Understand draw charts using different data sets.	Apply

List of Programs

1. Expressions, conditionals, loops, list, dictionary, and strings.
2. Functions: scope, parameter passing.
3. Data objects, pass arrays to functions, return values.
4. Functions using libraries: mathematical, and string functions.
5. File handling: open and close a file, read, write,
6. File processing: append to a file, standard input, output, and error streams, relative and absolute paths.
7. Using Python libraries: create and import Python libraries
8. Recursion: simple algorithms with recursion: factorial, Fibonacci numbers;
9. Recursion on arrays: binary search.
10. Pandas: Importing package and Arrays.
11. Data visualization Pyplot: line chart, pie chart, and bar chart.
12. NumPy: Structured array and Sorting array.
13. Matplotlib: draw different charts for a data set.

Total : 48 HOURS

Suggested Readings

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
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	3	-	2	-	-	-	1	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2	-	-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	2	-	2	2	2	-	1.33	1.66	2	-	1.5	-	1	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25VAC301G   **Community Engagement and Social Responsibility**

2H-2C

Instruction Hours/week: L:2 T:0 P:0   **Marks:** Internal:**100** External:**-** 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 (COs):	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   **5 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   **5 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   **4 HOURS**
Community Engaged Research and Ethics in Community Engaged Research Rural Distress, Rural Poverty, Impact of COVID-19 on Migrant Laborers, Mitigation of Disaster

UNIT IV: ICT Tools for Community Empowerment   **4 HOURS**

Role of ICT in Education, Health and Governance - Use of Mobile Applications for Public Services (e.g., Aarogya Setu, UMANG) - Basics of E-Governance, Online Grievance Portals, and RTI - Promoting Digital Literacy in Rural and Semi-Urban Communities - Case Studies on Tech for Social Good (e.g., telemedicine, digital banking)

UNIT V: Technology-Based Community Projects   **6 HOURS**

Identifying Social Problems that Can Be Addressed with Technology - Planning and Developing Simple Tech Solutions (e.g., survey apps, awareness websites) - Collaborating with Local NGOs or Institutions for Implementation - Monitoring Outcomes and Ensuring Sustainability - Field Project Presentation, Documentation and Reflection

                                                            TOTAL: 24 HOURS

TEXT BOOK:

1. Principles of Community Engagement, (2011).2nd Edition, NIH Publication No. 11-7782.
2. "ICT4D: Information and Communication Technology for Development" By Richard Heeks , Publisher: Routledge, ISBN: 9780415461981
3. "E-Governance: Concepts and Case Studies" By C.S.R. Prabhu, Publisher: PHI Learning, ISBN: 9788120323690
4. "Designing for Social Change: Strategies for Community-Based Graphic Design" By Andrew Shea Publisher: Princeton Architectural Press
5. "Social Innovation and Social Technology" By Alex Nicholls (Oxford University) – available as research papers & case studies

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	-	3	-	-	-	-	-	-
CO3	-	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	2
CO4	-	-	-	-	-	-	-	-	2	-	3	3	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	3	3	1	-	2	-	2
AVG	-	-	-	-	-	-	-	-	2	-	3	3	1	-	2	-	2
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

25CTU391   **Internship - I**

0H- 2C

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

25LTU401G   **Language: Tamil – IV**
தமிழக வரலாறும் பண்பாடும்   **4H-3C**

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

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்
- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்; திறனாய்வு நோக்கை மேம்படுத்துதல்.
- இலக்கியங்களின் வழி மனித வாழ்வியலை உணர்த்துதல்.
- இன்புறுத்தல் மற்றும் அறிவுறுத்தல் நிலைகளில் இலக்கியங்களின் பங்களிப்பை உணர்த்துதல்.
- இளைய தலைமுறையினருக்கு அற உணர்வு மற்றும் வாழ்வியல் மதிப்புகளை அறிவுறுத்துதல்.

பாடத்திட்டப் பயன்விளைவு
- இந்தியக் குடியுரிமைப்பணி முதலான போட்டித் தேர்வுகளில் இடம்பெறுகின்ற, 'தமிழ் இலக்கிய வரலாறு' குறித்த முழுமையான அறிமுகத்தை அடைதல்.
- தொல்லியல், கல்வெட்டியல் மற்றும் ஓலைச்சுவடியியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- 'அறிவியல் தமிழ்' ; 'இணையத் தமிழ்' போன்ற தமிழின் வளர்ச்சித் துறைகள் சார்ந்த திறன் மேம்பாடு பெற்றிருத்தல்.
- வேலைவாய்ப்புக்குரிய வகையில் படைப்பாக்கத்திறன் முதலான மொழி ஆளுமை பெற்றிருத்தல்;
- சமூக வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக உள்ள இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.

தாள்கள் வரிசையும் தேர்வுச் செயல் திட்டமும்
பகுதி-I தமிழ்
இளநிலைப்பட்ட அறிவியல் மற்றும் கலையியல் வகுப்புகள்

பருவம்	தாள்	கற்பிக்கும் நேரம்/வாரம்	தேர்வு மணிகள்	மதிப்பெண் அகமதிப்பீடு/பருவ எழுத்துத் தேர்வு	மொத்தம்	மதிப்புப் புள்ளிகள்
நான்கு	IV	4	3	40 / 60	100	3

தமிழக வரலாறும் பண்பாடும்

அலகு - 1   தமிழக வரலாறும் நாட்டுப்பிரிவுகளும்   10 மணிநேரம்

பழைய கற்காலம் – புதிய கற்காலம் – இரும்புக்காலம் – சங்க கால மூவேந்தர் நாடுகள் (சேர, சோழ, பாண்டியர்கள்) – பிற்கால நாட்டுப் பிரிவுகள் – பல்லவர் நாடு – நடு நாடு – தொண்டை நாடு – கொங்கு நாடு.

அலகு – 2   தமிழகத்தில் கலை இலக்கிய வளர்ச்சி   10 மணிநேரம்

காலந்தோறும் தமிழகத்தில் கட்டடக்கலை – கோயிற்கலை – கூத்துக்கலை – நாடகக்கலை – ஆடற்கலை - சிற்பக்கலை – ஓவியக்கலை வளர்ச்சி – தமிழ் வளர்ச்சிக்குப் பக்தி இலக்கியங்களின் பங்களிப்பு.

அலகு – 3   தமிழர்களின் வணிகம்   08 மணிநேரம்

சங்க கால வணிகம் – தமிழர்களின் அயல்நாட்டு வணிகத்தொடர்பு – கிரேக்கர்கள் – ரோமர்கள் – மௌரியர்களுடனான வணிகத்தொடர்பு – நாணயங்கள்.

அலகு – 4   தமிழகப் பண்பாட்டில் கொங்கு நாடு   10 மணிநேரம்

கொங்கு நாடும் அதன் வரலாறும் – அரசர்கள் – சிற்றரசர்கள் – கொங்கு நாட்டு எல்லைகள் – கொங்கு நாடும் பிற பகுதிகளும் - புலவர்கள் – இலக்கியங்கள் – பண்பாட்டுச் சிறப்பு.

அலகு – 5   தமிழகத் தொல்லியல் ஆய்வுக்களங்கள் 10 மணிநேரம்

அரிக்கமேடு – ஆதிச்சநல்லூர் – அழகன்குளம் – கீழடி – கொடுமணல் – கொற்கை – மயிலாடும்பாறை – கங்கை கொண்ட சோழபுரம் போன்ற ஆய்வுக்களங்களில் கிடைத்துள்ள தமிழக வரலாற்றுக் குறிப்புகள்.

                                         மொத்த மணிநேரம் – 48

 TEXT BOOK

 T1 - கற்பகச் சோலை – தமிழ்ப்பாட நூல், இலக்கிய இன்பம், தமிழ்த்துறை வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோயம்புத்தூர் – 21.
 பார்வை நூல்கள்
 R1 T2-தமிழக வரலாறு மக்களும் பண்பாடும் – கே.கே.பிள்ளை – உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி,சென்னை.
 R2 T3- தமிழக வரலாறும் பண்பாடும் – வே.தி.செல்வம் – மணிவாசகர் பதிப்பகம், பிராட்வே,சென்னை.

 இணையதளம்

 W1-www.tvu.org.in
 W2- www.maduraitamilproject.com

 இதழ்கள்

 J1- International Research Journal of Indian Literature, irjil.in
 J2 - International Tamil Research Journal, iorpress.in

 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	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25LHU401G   **Language: Hindi - IV**
(MODERN POETRY, ONE ACT, ESSAY, TRANSLATION)   **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):

- 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   **9 HOURS**

     a) Poetry – Lakshmanan ke Bare Me
     b) Bharath ka Bhagya
     c) Essay – Dhokha
     d) Translation – Lesson – 1 to 3

UNIT-II   **9 HOURS**

     a) Poetry – Soorpanakha Ki Visheshatha
     b) Bahu Ki Vida
     c) Essay – Jabaan
     d) Translation– Lesson – 4 to 6

UNIT-III   **10 HOURS**

     a) Poetry– Kavya Ke AdharPar
     b) Reed Ki Haddi
     c) Essay – Kya Janvar Bhee Sochthi Hai
     d) translation– Lesson – 7 to 9

UNIT-IV   **10 HOURS**

     a) Khanda Kavya Ke Adhar Par Panchavati
     b) Rajputhni Ka Badhala
     c) Essay – Shradha-Bhakthi
     d) Translation– Lesson – 10 to 12

a) Kavya Ke Adhar Par Prakruthik Varnan
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

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	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**2.6**	**2.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

25LHU401G   **Language: Malayalam - IV**

4H-3C

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

PREREQUISITE:
Not required
COURSE OBJECTIVE(CO):
- Knowledge of contemporary drama contents of Malayalam literature
- Learn Screen play and its techniques. The ability to read drama and express criticism about it and the ability to express social thoughts will improve
- There will also be litigation messages in Malayalam and news on speech techniques Able to write articles on their own and improve their creative skills.

COURSE OUTCOME(COs):
- Get a basic knowledge of drama
- Can read and critique Screenplay
- Create interest in art literature courses
- The hope of writing a Drama or a Screen Play
- The idea of creating new works and critique knowledge will improve.

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

TEXT BOOKS:
1.Perumthachan – M.T.VasudevanNair,DC Books

2.Saketham – C.N.SreekandanNair,DC Books
REFERENCE BOOKS:
1.MalayalaNatakaSahithyaCharithram. G Sankara Pillai (Kerala SahithyaAkademi, Trissur)
2. Malayala Nataka Sahithya Charithram, Vayala Vasudevan Pillai (Kerala Sahithya Akademi Thrissur).
3. Natakam- OruPatanam (C.J. SmarakaPrasanga Samithi, Koothattukulam)
   atakaroopacharcha, Kattumadam Narayanan (NBS, Kottayam)
4.Chalachithrasameeksha–Vijayakrishanan.
5. Cinemayude Paadangal-VisakalanavumVeekshanavum – Jose-K.Manual.

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	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

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2025-2026

Semester IV

25LSU401G　　　　**Language: Sanskrit - IV**
　　　　　　　　　　(Lyrics, Grammar and Translation)　　　**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 of the students. 'Go green', the motto of the syllabus emphasizes the urgent need to conserve nature without destruction of natural resources.

COURSE OUTCOMES(COs):

- **Critical Thinking**: Take informed actions after identifying the assumptions that frame students' thinking and actions.

- **Problem Solving**: Understand and solve problems of relevance to society to meet the specified needs using the knowledge, skills and attitudes acquired.

- **Effective Communication**: Speak, read, write and listen clearly in person and through electronic media in English and in one Indian language, and make meaning of the world by connecting people, ideas, books, media and technology.

- **Effective Citizenship**: Demonstrate empathetic social concern and equity centered national development.
- **Environment and Sustainability**: Understand the issues of environmental contexts and sustainable development.

UNIT I　　　　　　　　　　　　　　　　　　　　　　　**9 HOURS**
　　　Introduction to Sanskrit Lyrics and erotic literature.
UNIT II　　　　　　　　　　　　　　　　　　　　　　　**9 HOURS**
　　　Devotional Literature, Important works
UNIT III　　　　　　　　　　　　　　　　　　　　　　**10 HOURS**
　　　Krishnakarnamrita of Leelasuka (Second Section only)
UNIT IV　　　　　　　　　　　　　　　　　　　　　　**10 HOURS**
　　　Grammar – Past tense, Declension of personal pronouns
UNIT V　　　　　　　　　　　　　　　　　　　　　　　**10 HOURS**
　　　Simple sentences from Sanskrit Self Teacher

　　　　　　　　　　　　　　　　　　　　　TOTAL: 48 HOURS

TEXT BOOK:

Krishnakarnamrita of LeelasukaSri Ramakrishna Mud Mylapore, Chennai.

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	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

25LFU301G	**Language: French - IV** **(Comprehension,Tradusion, Reduction,Une act)**	**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 objectives of this course are:
- 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 readingFrench.	Understand
CO4	Prepare the learners to face situations with confidence and toseek employment in the modern globalized world.	Apply
CO5	Build the students' ability to listen and to speak French better.	Apply

Unite – I   **9 HOURS**
a) Leçon   –   On fait le ménage !
b) Communication   -   Protester et réagir
c) Grammaire   -   Le présent progressif, Les pronoms possessifs
                                          La phrase négative (3)
d) Lexique   –•   Le logement,La maison,Les pièces
e) Culture   –   Paris et ses symboles

Unite – II   **9 HOURS**
a) Leçon   –   À propos de logement
b) Communication   –   Exprimer l'intérêt et l'indifférence
c) Grammaire   –   Quelques adjectifs et pronoms indéfinis
                                         Les verbes lire, rompre et se plaindre
d) Lexique   –   Meubles et équipement,Les tâches ménagères
e) Culture   –   Les fêtes et les traditions en France

Unite – III   **10 HOURS**
a) Leçon   –   Tous en forme ! Accidents et catastrophes
b) Communication   –   Raconter au passé
c) Grammaire   –   Le passé composé et l'imparfait
                                         Le passé récent, L'expression de la durée,
d) Lexique   –   Le corps humain : l'extérieur,Le corps humain :
                                         l'intérieur Les maladies et les remèdes
e) Culture   –   La longue histoire de la Francophonie

Unite – IV   **10 HOURS**

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

Unite – V   **10 HOURS**

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

                                        TOTAL: 48 HOURS

TEXT BOOKS:
1. Cocton Marie –Noëlle , Duplex   Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison   1- Méthode de francais**, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, **Saison 1 – Cahier d'activites ,** Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, Marie-Françoise Gliemenn,Les **exercices de grammaire,Hachette FLE,** Paris,2005
4. Christian Beaulieu, **Je pratique**, **Exercices de grammaire A**1, Dider,Paris,2015
5. Nathalie BIE, philippe SANTINAN,Gra**mmaire pouradolescents-250exercises, 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

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

25ENU401G   **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 Required

Course Objectives (Co):
- To provide the students with an ability to build and enrich their communication skills.

- To help them think and write imaginatively and critically.

- To strengthen their professional skills.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

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

UNIT - I   8 HOURS
Concept of Communication- Barriers to Communication- Body Language- Personality Development-Etiquette and Manners-Soft Skills

UNIT - II   7 HOURS
Listening Comprehension-Reading Comprehension-Paragraph Writing-Precis Writing-Collocation

UNIT - III   7 HOURS
Writing-Writing Resume and Covering Letter- Types of Letter Writing-Letter Formats- E-mail Writing-Writing MoU- Dicto Composition--Term Paper-Book Reviews

UNIT - IV   7 HOURS
Speaking-Interview Skills-Preparing Welcome address and Vote of Thanks-Compering -

UNIT - V   7 HOURS
Punctuation Marks- Figures of Speech

TOTAL: 36 HOURS

TEXT BOOK:

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

REFERENCE BOOKS:

1. Martin's, St (2013). Oxford Handbook of Writing: Handbook of Writing. Cambridge University Press.

2. Wren & Martin, (2008). High School English Grammar & Composition, S.Chand & Company Ltd, Board of Editors,

3. Krashen, Stephen D (1982). Principles and Practice in Second Language Acquisition. New York:Pergamon Press.

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

CO, PO, PSO Mapping

COs	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	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	3	3	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

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Semester IV

25ITU401G   **Data Structure and Algorithms**

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 Required

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

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

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

UNIT 1 Introduction to Algorithms and Analysis   **10 HOURS**
        Introduction-Study of algorithms-Data structure introduction-How to create programs-How to analyse programs: time complexity, space complexity- Recursion. Data structure- types.

UNIT 2 Linear Data Structures   **12 HOURS**
        Array- 1D and 2D array - Stack - Applications of stack: Expression Evaluation – Conversion of Infix to postfix and prefix expression. Queue - Types of Queue: Circular Queue - Double Ended Queue (dequeue) - Applications – PriorityQueue using Arrays - List - Singly linked lists – Doubly linked lists - Circular linked lists.

UNIT 3 Non-linear Data Structures – Trees   **12 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 4 Non-linear Data Structures – Graphs   **12 HOURS**

Graph – basic definition and Terminology – Representation of Graph – Graph Traversal: Breadth First Search (BFS) - Depth First Search (DFS) - Minimum Spanning Tree: – Finding Shortest paths - Articulation Points - Bridges - and Biconnected Components - Strongly connected components – Eulerian Tour – Hamiltonian Tour.

UNIT 5 Sorting, Searching and Hashing Techniques   **14 HOURS**

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

Total: 60 HOURS

Text Books:
1. Charles Dierbach, Introduction to Computer Science using Python, Wiley First Edition (2015), ISBN-10: 81265560132015.
2. Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist   learning with Python / 1st Edition,2012.
3. Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage   Learning, ISBN: 978- 1111822705.

Reference Books:
1. Wesley J. Chun, "Core Python Applications Programming", 3rd Edition, Pearson   Education, 2016.
2. Jeeva Jose & P.SojanLal, "Introduction to Computing and Problem Solving with   PYTHON", Khanna Publishers, New Delhi, 2016.
3. Zed A.Shaw, Learn Python the Hard Way Paperback, Pearson Education, Third Edition edition (2017), ISBN-10: 9332582106.
4. Paul Barry, Head First Python, O' Reilly Publishers, First Edition, 2010,   ISBN:1449382673.

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

Book Link:
1. https://bedford-computing.co.uk/learning/wp-content/uploads/2015/10/Introduction-to-Computer-Science-Using-Python.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	-	-	-	-	-	-	-	3	-
CO2	3	-	-	2	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	2	-	3	2	3	-	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	2	1	2	-	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	2.6	-	2.33	1.75	2.2	-	-	2	1.5	-	1	-	-	-	1.5	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

25CYU402G	**Network Security**

4H-3C

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

End Semester   **Exam:**3 Hours

Prerequisite:
> Not Required

Course Objectives (CO):
The goal of this course is for students to:
- To provide Basic knowledge of security
- To Deal with principles of encryption algorithms, and conventional and public key cryptography.
- To Enable to know the levels of network security and security tools.
- To Understand Security operation
- To provide knowledge about Attacking Techniques.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic techniques on network security models	Understand
CO2	Illustrate public key cryptography and RSA	Understand
CO3	Apply on encryption function and network Packet Creations	Apply
CO4	Analyze the DNS and Malware Attacks	Analyze
CO5	Experiment the concept of Network sniffing and Password cracking	Apply

UNIT I Techniques for Network Protection   **8 HOURS**
Firewalls, packet filter and stateful firewalls - application aware firewalls - personal firewalls – IP tables - Proxies - NAT,

UNIT II Monitoring and Detection   **10 HOURS**
Intrusion Detection System-Snort - Signature and Anomaly based detection - Honeypots and Honeynets. Network Log management-syslog or SPLUNK;

UNIT III Secure Network Communication   **10 HOURS**
SCP - SSH - SSL3.0 - TLS1.2 - START TLS - IPSec - VPN and Secure HTTP; Attacks on SSL / TLS: SSL stripping - Drown and Poodle attack; 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   **10 HOURS**

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   **10 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: 48 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

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	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2	-	-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	2	-	2	2	2	-	1.33	1.66	2	-	1.5	-	1	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

		Semester IV
25MAU401G	**Probability and Statistics**	
		4H-4C

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

End Semester   Exam:3 Hours

PREREQUISITE:

Basic understanding of algebra, arithmetic, elementary statistics, and probability.

COURSE OBJECTIVES (CO):

- To understand the basic concepts in probability theory and the nature of uncertainty.
- To develop the ability to work with discrete and continuous probability distributions, understand their properties, and apply the Central Limit Theorem.
- To equip students with skills in univariate and bivariate analysis, including measures of central tendency, dispersion, correlation, regression, and the construction of index numbers.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Understand the counting principles, probability rules, and theorems to solve probability problems.	Analyze
CO2	Apply probability distributions such as Binomial, Poisson, Uniform and Normal to real-world scenarios.	Analyze
CO3	Solve measures of central tendency and dispersion to data sets.	Analyze
CO4	Utilize the correlation or regression methods to find the relationship between two variables.	Analyze
CO5	Understand the basic concept of index numbers and weighted index numbers.	Analyze

UNIT I BASICS OF PROBABILITY   **10 HOURS**
Introduction – Sample Space and Events, Equally Likely Events and Exhaustive Events, Dependent and Independent Events, Simple and Compound Events – Axioms of Probability – Addition and Multiplication Theorem – Combinations and Permutations – Conditional Probability – Bayes Formula.

UNIT II DISCRETE AND CONTINUOUS PROBABILITY DISTRIBUTIONS   **10 HOURS**
Random Variables (Discrete and Continuous) – Mathematical Expectation – Binomial Distribution – Poisson Distribution and its Properties. Uniform Distribution – Normal Distribution – Conditions and Properties – Standard Normal 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. 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 Edgeworth 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_JcleDbrVyP nE0PixKs2JE
3. https://nptel.ac.in/courses/110107114/
4. http://172.16.25.76/course/view.php?id=1642

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	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO3	-	-	-	3	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	3	-
CO5	-	-	1	3	-	2	-	-	-	-	-	-	-	-	-	3	-
AVG	-	-	1	3	1	2	-	-	-	-	-	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

25ITU411G   **Data Structure and Algorithms- Practical**

4H-2C

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

End Semester   Exam:3 Hours

Prerequisite:
          Not Required

Course Objectives
- To teach efficient storage mechanisms of data for an easy access.
- To design and implementation of various basic and advanced data structures.
- To introduce various techniques for representation of the data in the real world.
- To develop application using data structures.
- To teach the concept of protection and management of data.

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Implement linear data structures and use it to solve the given problem	Understanding
CO2	Make use of linear data structures concepts to solve the problems on non linear data structures	Applying
CO3	Implement the operations of trees	Applying
CO4	Implement searching, sorting and indexing operations	Analyzing
CO5	Apply appropriate graph algorithms for solving computing problems.	Applying

List of Programs

1. Develop a program to perform various stack operations using an array.
2. Implement a Program using Queue Data Structures.
3. Infix to postfix conversion using stack ADT
4. Construct a binary search Tree for a given number of elements.
5. Implementation of singly linked list and its operations
6. Write a program to perform Linear Search.
7. Sort the number of elements using insertion sort.
8. Arrange the given number of elements using selection sort method.
9. Write a program to perform Graph Traversals.
10. Implement the following operations in hash table using array
i. Store the element in hash table
ii. Search an element from the table
iii. Delete an element from the table

Total : 48 HOURS

Suggested Readings

1. Weiss M. A., "Data Structures and Algorithm Analysis in C", 2nd Edition, Pearson Education, 2016
2. Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest, Clifford Stein, "Introduction to Algorithms", 3rd Edition, Mcgraw Hill, 2009
3. Langsam Y.M., Augenstein J. and Tenenbaum A. M., "Data Structures using C and C++", 2nd Edition, Pearson Education, 1996.
4. Anany Levitin, "Introduction to the Design and Analysis of Algorithms", 3rd Edition, Pearson Education, 2012
5. Vijayalakshmi Pai G.A, "Data Structures and Algorithms – Concepts, Techniques and Applications", 1st Edition, McGraw Hill Education, New Delhi, 2017

Websites

1. http://www.digimat.in/nptel/courses/video/106105175/L01.html
2. https://www.tutorialspoint.com/oracle_sql/index.htm

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	-
CO2	3	-	-	2	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	2	-	3	2	3	-	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	2	1	2	-	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	2.6	-	2.33	1.75	2.2	-	-	2	1.5	-	1	-	-	-	1.5	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

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25CYU412G   **Network Security - Practical**

4H-2C

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

End SemesterExam:3 Hours

Prerequisite:
Not Required

Course Objectives (CO):
The goal of this course is for students to:
● To provide Basic knowledge of security
● To deal with principles of encryption algorithms, and conventional and public key cryptography.
● To enable to know the levels of network security and security tools.
● To Understand Security operation
● To provide knowledge about Attacking Techniques.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

| COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic knowledge on security models	Understand
CO2	Analyze and design classical encryption techniques and block ciphers.	Analyze
CO3	Design network application security schemes, such as PGP, S/MIME, IPSec, SSL, TLS,	Apply
CO4	Analyze the DNS and Malware Attacks	Analyze
CO5	Analyze Intruders and Intruder Detection mechanisms, Types of Malicious software,	Analyze

List of Experiments :
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
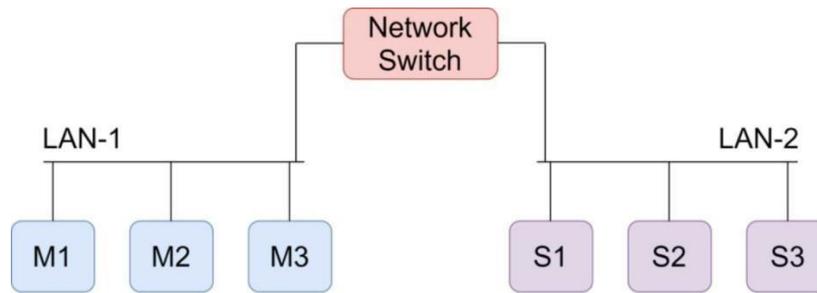
2. **Application of Cryptographic algorithms using Crypto tools** : Establish a Client-Client Secure communication protocol as shown in below Figure.

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/ TCPdump 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**.

Use Wireshark to solve the below scenarios:
1. You, as a SOC analyst noted that someone try to send information (PING) to unknown IP address and you are suspecting some malicious information might transferred in it. Analyse the log file and find the data.
a) Find the source and destination IP of that log.
b) Find the Data length (Bytes) and verify the checksum status on destination.

2. Now you have found that some kind of file is been downloaded by insider in unencrypted web traffic. Your task is to
a) Find the type of file.
b) Export that file from that web traffic, then analyse the file for any secret information.
c) Find the hostname in which the file is stored.

3. Based upon their activities, auditing team has started investigation against them and found that the insider passed some sensitive information via call to someone. The traffic is been captured. Analyse the traffic and find those conversations and extract the sensitive information in it.
 a) Find the call-ID when the status of the call is ringing.

4. On further investigation, you have a suspect on some wireless device communications. List out the Bluetooth devices communications from this traffic and find the details about native Bluetooth adapter.
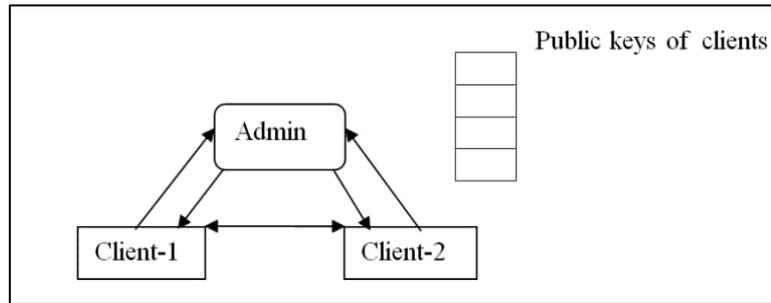
5. Analyse the captured WPA handshake from this traffic and report in detail about it to your administrator.

a) Geo locate all the endpoint of wireless devices.

b) Analyse the protocol level information transfer between wireless devices.

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.

Total: 48 HOURS

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

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	-	-	-	-	-	-	1	3	-
CO2	2	-	-	3	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	3	-	1	2	3	-	-	1	3	-	-	-	-	-	-	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	-	-	-	-	1	-	3	3	-
AVG	2.2	-	1.5	2	2.2	3	1	2.5	2	-	-	-	1	-	1.33	3	-

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

Semester IV

25VAC401AG   **Universal Human Values**

2H-1C

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

End Semester   Exam: 3 Hours

PREREQUISITE:
Not Required

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 (COs):	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	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	2	1	-	-	-	-	-	-	-	3	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	
CO3	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	3	-
CO4	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3	3	-
AVG	-	-	2	2	2		3	-	-	-	-	-	-	-	3	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

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	Semester V
25CTU501	**Software Testing**
	5H-3C

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

End Semester Exam:3 Hours

Prerequisite:
            Not Required

Course Objectives (CO):
- To learn about different type of applications and testing, along with the purpose ofautomation testing.
- To gain insight into the evolution of Selenium and get an overview of Selenium and its components and compare commonly usedautomation tool with Selenium automation tools.
- Explore the features and use of Selenium-WebDriver and learn data driven testing using TestNG.

COURSE OUTCOMES (COs):
Upon completion of this course, students will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Illustrate Selenium Architecture and its components.	Understand
CO2	Outline the concepts of basics of JAVA	Understand
CO3	Identify the WebDriver advanced features.	Apply
CO4	Make use of Data driven, Keyword driven and Hybrid test framework.	Apply
CO5	Experiment with Selenium IDE and buildthe Test cases using TestNG	Apply

UNIT I INTRODUCTION TO AUTOMATION   **12 HOURS**
Planning before Automation - Introduction to Selenium - Installing Selenium Components.

UNIT II   USING SELENIUM IDE   **12 HOURS**
Managing User Interface Controls - Basics of Java- Creating First Selenium Web Driver Script.

UNIT III   SELENIUM METHODS   **12 HOURS**
Common Selenium Web Driver Methods - Verification Point in Selenium - Exploring the Featuresof Web Driver.

UNIT IV   HANDLING POP-UP DIALOGS AND MULTIPLE WINDOWS   **12 HOURS**
Working with Dynamic UI Objects- Data driven testing using TestNG - Selenium Functions,Common Questions and Tips.

UNIT V REPORTING IN SELENIUM   **12 HOURS**
Batch Execution- Automation Frameworks - Understanding Selenium Grid.

                                                                        TOTAL: 60 HOURS

TEXT BOOKS:
1. Rex Allen Jones II. (2016). Selenium Web Driver for Functional Automation Testing, Test4 Success, LLC
2. Adithya Garg, Ashish Mishra. (2015). A Practitioner's Guide to Test Automation UsingSelenium", Tata McGraw Hill Education.

REFERENCE BOOKS:

1. Navneesh Garg, (2014). Test Automation Using Selenium WebDriver with Java", Adact InGroup Pvt Ltd..
2. Satya Avasarala, (2014). Selenium Web Driver - PRACTICAL Guide, Packt Publishing.
3. David Burns. (2010). Selenium 1.0 Testing Tools, Packt Publishing.

WEBSITES:

1. https://www.seleniumhq.org/docs/
2. https://www.javatpoint.com/selenium-tutorial
3. https://www.softwaretestingmaterial.com/selenium-tutorial/

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	-	-	-	-	1	1
CO2	-	-	3	-	-	3	-	-	2	-	1	-	-	-	-	-	2
CO3	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	1	-
CO4	-	-	-	3	-	-	-	3	-	-	-	-	-	-	-	1	2
CO5	-	-	3	3	-	3	-	3	-	-	-	-	-	-	-	-	-
Average	1	-	3	3	-	3	-	3	2	-	1	-	-	-	-	1	1.6

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

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

End Semester   Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To become familiar with the ethics and basics of Business Intelligence and Decision Support Systems
- To define mathematical models, data mining and data preparation
- To describe classification problems and clustering methods
- To study marketing models, Logistic and production models and Data envelopment analysis.
- To be able to grasp the objectives of knowledge management and artificial intelligence and expert systems.

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain intelligence architectures, representation of the decision-making process, evolution of information systems	Understand
CO2	Interpret development of a model, representation of input data , data mining process, analysis methodologies, data validation, data transformation,	Understand
CO3	Evaluate classification models, Bayesian methods, Clustering methods, Partition methods, Hierarchical methods	Evaluate
CO4	Apply sales force management, relationship marketing, logistical planning optimization models, efficient frontier, and efficiency measurements. The CCR framework	Apply
CO5	demonstrate extensive knowledge of Knowledge Management Activities, Artificial Intelligence vs. Natural Intelligence, Organizational Learning and Transformation, and the fundamentals of expert system construction.	Apply

UNIT I INTRODUCTION   **12 HOURS**

Business intelligence: Effective and timely decisions, Data, information and knowledge, The role of mathematical models, Business intelligence architectures, Ethics and business intelligence

Decision support systems: Definition of system, Representation of the decision-making process, Evolution of information systems, Definition of decision support system, Development of a decision support system

UNIT II MATHEMATICAL MODELS   12 HOURS

Mathematical models for decision making: Structure of mathematical models, Development of a model, Classes of models **Data mining:** Definition of data mining, Representation of input data , Data mining process, Analysis methodologies **Data preparation**: Data validation, Data transformation, Data reduction

UNIT III CLASSIFICATION AND CLUSTERING   12 HOURS

Classification: Classification problems, Evaluation of classification models, Bayesian methods, Logistic regression, Neural networks, Support vector machines **Clustering:** Clustering methods, Partition methods, Hierarchical methods, Evaluation of clustering models

UNIT IV BUSINESS INTELLIGENCE APPLICATIONS   12 HOURS

Marketing models: Relational marketing, Sales force management, **Logistic and production models**: Supply chain   optimization, Optimization models for logistics planning, Revenue management systems. **Data development analysis**: Efficiency measures, Efficient frontier, The CCR model, Identification of good operating practices

UNIT V KNOWLEDGE MANAGEMENT   12 HOURS

Introduction to Knowledge Management, Organizational Learning and Transformation, Knowledge Management Activities, Approaches to Knowledge Management, Information Technology (IT) In Knowledge Management, Knowledge Management Systems Implementation, Roles of People in Knowledge Management **Artificial Intelligence and Expert Systems:** Concepts and Definitions of Artificial Intelligence, Artificial Intelligence Versus Natural Intelligence, Basic Concepts of Expert Systems, Applications of Expert Systems, Structure of Expert Systems, Knowledge Engineering, Development of Expert Systems

Total : 60 HOURS

Text Books:
1. "Business Intelligence: Data Mining and Optimization for Decision Making" by Carlo Vercellis Wiley First Edition 2009
2. "Decision support and Business Intelligence Systems by Efraim Turban", by Ramesh Sharda, Dursun Delen Pearson Publication Ninth Edition 2011

Reference Books:
1. Fundamental of Business Intelligence Grossmann W, by Rinderle-Ma Springer First Edition 2015

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	2	-	-	-	2	2	3	-	-	3	-	2
CO2	-	-	-	3	2	-	3	-	-	3	2	3	3	-	-	-	2
CO3	-	3	-	2	2	3	-	-	-	2	3	2	-	3	-	-	2
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	1	-	2
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	-	2
AVG	3	3	2.6	2.33	1.6	2	2.5	2.5	-	2.4	2.4	2.66	3	3	2	-	2
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																		

25CAU502BG   **Enterprise Infrastructure & Cloud Technologies**

5H-5C

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

End Semester Exam:3Hours

Course Objectives (CO)

- To Understand and Apply Core Networking and Server Infrastructure Concepts
- To Administer and Maintain Windows Server Environments
- To Manage Active Directory and Secure Enterprise Environments
- To Operate and Troubleshoot Linux Servers and Virtualization Platforms
- To Implement Cloud Solutions, Backup Strategies, and Infrastructure Monitoring

Course Outcomes

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Understand and differentiate between various networking devices, server hardware, storage types, and operating systems used in enterprise environments	Apply
CO2	Install, configure, and manage Windows Server infrastructure including storage, performance, patching, high availability, and automation using PowerShell.	Apply
CO3	Configure and secure Active Directory services, manage domain environments, and implement authentication, auditing, and backup policies.	Apply
CO4	Administer Linux server environments, manage system processes and services, implement virtualization using tools like VMware and Hyper-V.	Analyze
CO5	Describe cloud computing models and services, work with key cloud platforms (AWS, Azure), and utilize tools for backup, monitoring, and troubleshooting of IT infrastructure.	Analyze

UNIT I   **12 HOURS**

Networking and Server Infrastructure: Introduction to Networking Devices and LAN/WAN - IPv4 and IPv6. Routers and Switches Overview. Datacenter Overview and Server Form Factors - Server Management Portals (IPMI/iLO/iDrac) and Events - Introduction to Storage: NAS, DAS, SAN - RAID Levels and Comparisons (Fibre Channel, iSCSI, FCoE) - Operating Systems Overview (Server & Client) - Domain vs. Workgroup - File Systems: FAT, NTFS, ReFS, EXT3, EXT4 - Installing and Managing OS (Windows Server, Linux) - Firewall Fundamentals (Hardware/Software).

UNIT II   **12 HOURS**

Windows Server Administration: Windows Server Core Installation, Upgrades, Patch Management & Migrations - Storage Spaces, iSNS, DCB, and MPIO - Data Deduplication and Disk Management - High Availability, Fail-over Clustering, iSCSI, NLB - Deployment Images using MDT and WSUS - PowerShell DSC and Monitoring Tools - Performance Monitoring and Event Logs

UNIT III   12 HOURS

Active Directory & Security: AD DS, DNS Server Role, Zones, and Transfers - AD DS Replication and Sites - Group Policy Management and Templates - Securing Domain Controllers and Accounts - Audit Authentication and Managed Service Accounts - Certificate Services (CAs, Templates, Revocation, Recovery) - AD FS, AD RMS, and Smart Cards - Backup & Restore of Active Directory

UNIT IV   12 HOURS

Linux Server Administration and Virtualization: RHEL / Cent OS Overview, Boot Process and GRUB2 - Filesystem Hierarchy, Shell Environment, Text Editors - User and Group Management, File Permissions, ACLs - RPM, YUM, Dependency Management, Patching , System Logging, Snapshots, Backup/Restore. Virtualization: Hypervisors, Hyper-V, VMware vSphere/vCenter - Configuring VMs, Networking, Storage, HA/DRS - vMotion, Templates, Resource Pools, dvSwitches

UNIT V   12 HOURS

Cloud, Backup and Monitoring: Cloud Computing Fundamentals, Deployment Models - SaaS, PaaS, IaaS and Key Providers (AWS, Azure, GCP) - Cloud Security, Navigation, and Resource Management- AWS EC2, S3, VPC, IAM; Azure VM, Storage, Networking. Backup Technologies: Disk, Tape, VM Backups, Restoration, Deduplication, Troubleshooting. Infra Monitoring Tools Overview : Nagios.

Total: 60 HOURS

Suggested Readings

1   Mustafa Toroman , "Hands-On Cloud Administration in Azure" , Packt, 2020.
2   Sara Perrott, "Windows Server 2019 & PowerShell All-in-One For Dummies", Wiley, 2021.
3   Sander van Vugt, "Red Hat RHCSA 8 Cert Guide: EX200", Pearson IT Certification, 2021.
4   Nick Marshall, "Mastering VMware vSphere 7", Wiley, 2021.

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	1	-	-	-	1	2	1	2	-	-	-	-	2
CO2	3	3	3	2	2	-	-	-	2	3	2	2	-	-	-	-	2
CO3	3	3	3	3	2	-	-	-	2	3	2	3	-	-	-	-	2
CO4	3	3	3	3	2	-	-	-	2	3	2	3	-	-	-	-	2
CO5	3	3	3	3	3	-	-	-	2	3	3	3	-	-	-	-	2
AVG	3	3	2.8	2.6	2	-	-	-	1.8	2.8	2	2.6	-	-	-	-	2
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester V

25CYU503AG   **Digital Identity and Access Management**

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To Understand the importance of Identity and Access Management in an organization
- To understand Identity Governance and Administration
- To apply various access control techniques through user groups.
- To develop capacity to prepare various access control mechanism.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs)	Blooms Level
CO1	Explain the role of DIAM with emerging information Technology, compliance and regulations and industry standards for Identity management.	Understand
CO2	Outline techniques of Identity and authentication with risks assessment	Understand
CO3	Build capability to compare various access control techniques.	Apply
CO4	Gain knowledge on access control systems.	Understand
CO5	Apply various access control techniques	Apply

UNIT I: DIGITAL SECURITY & GOVERNANCE   **14 HOURS**

Access control & identity management, Identification, Authentication and Authorization, Classification of Information, Separation of Duties, need for strong credentials. Access Controls: Models, Authentication Factors, Network Access Control

Security Governance: Managing Information Security, Organization and responsibilities, Information Security Governance, Security Incident Management, Application Security, Data and information Analyze, Role of databases and database management systems, Knowledge management systems and data warehouses, Secure Coding Practices, ISO 27001 - Domains, Introduction to SOX, HIPAA, CoBlT.

UNIT II: IDENTITY AND ACCESS MANAGEMENT   **15 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   15 HOURS

The LDAP Protocol, LDAP Basics: Objects in LDAP - Object Classes - Attributes - and Schema - Server Configuration -First Steps with LDAP -Updating a Directory with a Batch 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 between LDAP and Non-LDAP Systems -Partitioning -Replication -Data Distribution between LDAP and Non-LDAP Systems

UNIT IV: SECURED ACCESS PARADIGMS: EXPLORING MULTI-FACTOR AUTHENTICATION, SSO, AND FEDERATED SYSTEMS   14 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   14 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: 72 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. Cyber security essentials. John Wiley & Sons, 201
2. Thomas R. Peltier, Information Security Risk Analysis, CRC Press;2001
3. Whitman,2. and Mattord, H., Principles of Information Security, Second Edition, Boston: Thomson Course Technology; 2008

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	1	2	-	-	3	2	2	3	2	-	-	-	3	-
CO2	-	-	1	3	2	-	-	2	-	1	2	3	-	-	3	3	-
CO3	2	-	3	-	-	-	-	1	3	2	3	2	-	-	-	3	-
CO4	2	-	2	-	-	-	-	-	2	3	-	-	-	-	3	3	-
CO5	-	-	3	2	2	-	-	2	3	-	3	3	-	-	-	3	-
AVG	2	-	2.4	2	2	-	-	2	2.5	2	2.75	2.5	-	-	3	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25ITU503B   **Full Stack Web Development**

                                                                      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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To understand how front end and back-end techniques necessary to build web applications.
- To learn how to make websites interactive,
- To create data driven web applications.
- To Get familiar with the latest web development technologies
- To Learn all about SQL and NoSQL databases

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain front-end technologies including JavaScript, jQuery library, and other JavaScript-based plugins.	Understand
CO2	Outline the various stacks available for web application development	Understand
CO3	Use Node.js for application development and Develop React applications	Apply
CO4	Apply objects displayed by browsers, as well as client browser properties.	Apply
CO5	Demonstrate web servers, database tools, integrated development environments (IDEs), and other technologies currently used in the web industry	Apply

Unit I Introduction CSS   **15 HOURS**

Applying CSS to HTML. Selectors - Properties and Values - CSS Colors and Backgrounds - CSS Box Model - CSS Margins - Padding - and Borders - CSS Text and -Font Properties - CSS General Topics

Unit II JavaScript   **15 HOURS**

Introduction to JavaScript-Applying JavaScript (internal and external)-Understanding -JS Syntax-Introduction to Document and Window Object-Variables and Operators-Data Types.

Unit III JavaScript   **14 HOURS**

Num Type Conversion-Math and String Manipulation-Objects and Arrays-Date and Time-Conditional Statements-Switch Case-Looping in JS-Functions

Unit IV – ReactJS   **14 HOURS**

Introduction-Templating using JSX-Components - State and Props-Lifecycle of Components-Rendering List and Portals-Error Handling-Routers-Redux and Redux Saga-Immutable.js-Service Side Rendering-Unit Testing-Webpack

Unit V – NodeJS   **14 HOURS**

Node JS Overview-Node JS - Basics and Setup-Node JS Console-Node JS Command Utilities-Node JS Modules-Node JS Concepts-Node JS Events-Node JS with Express JS-Node JS Database Access

Total : 72 HOURS

Text Books:
1. Jon Duckett (2020) - HTML & CSS: Design and Build Websites + JavaScript & Query: Interactive Front-End Web Development

2. Greg Lim, (2020), Beginning Node.js, Express & MongoDB Development Paperback.

Reference Books:

1. Ethan Brown (2019), Web Development with Node and Express: Leveraging the JavaScript Stack

2. Anthony Accomazzo, Ari Lerner, and Nate Murray, (2018) Fullstack React: The Complete Guide to ReactJS and Friends,

Websites
1. https://www.w3schools.com/css/
2. https://www.w3schools.com/js/default.asp
3. https://www.w3schools.com/nodejs
4. https://nareshit.in/full-stack-web-development-course/
5. https://catalogue.rrc.ca/Programs/WPG/Parttime/FUSTP-CT/CoursesandDescriptions

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	-	-	-	2	-	2	-	-	-	-	3	-
CO2	3	1	3	-	-	1	-	-	2	-	1	-	-	2	-	3	-
CO3	2	2	1	1	-	-	-	-	2	-	-	-	1	-	-	3	-
CO4	2	1	1	2	3	-	-	-	3	-	-	-	2	-	-	3	-
CO5	2	-	-	3	3	3	-	-	3	-	2	-	3	2	-	3	-
AVG	2.4	1.75	1.66	2	2.66	2	-	-	2.4	-	1.66	-	2	2	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester V

25CMU501BG   **Basics of Accounting**

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To understand basic concepts on accounting
- To prepare various subsidiary books
- To prepare financial statements
- To carry out depreciation on fixed assets
- To prepare accounts for nonprofit organizations

Course Outcomes (COs):
Upon completion of this course, the student will be able to:

COs	Course Outcomes (COs):	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
Note: Distribution of Marks between problems and theory shall be 75% and 25%.

Text Books:
1. N.Vinayakam, P.L.Maniam and K.L.Nagarajan , (2012)Principles of Accountancy New Delhi .S.Chand & Company Ltd
2. S. P. Jain & K. L. Narang, 2010, Advanced Accountancy, Sultan Chand & Sons. New Delhi
3. T.S.Grewal,(2011)Introduction to Accountancy, New Delhi S.Chand & Company Ltd.

Reference Books:
1. R.L.Gupta, V.K.Gupta and 2.C.Shukla,2010, New Delhi Financial Accounting,Sultan Chand
2. T.S.Grewal, S.C.Gupta and S.P.Jain, 2010, New Delhi Advanced Accountancy, Sultan Chand .
3. 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	-	-	3	-	2	1	-	-	2	1	2	3	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	3	-
CO3	3	-	3	-	3	2	-	-	3	2	2	3	-	-	-	3	-
CO4	3	-	-	-	3	2	-	-	2	-	-	3	-	-	-	3	-
CO5	3	3	-	-	3	3	-	-	3	2	2	2	-	-	-	3	-
AVG	3	3	3	-	2.75	2	-	-	2.6	1.5	2	2.75	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25CTU511   **Software Testing – practical**

4H-2C

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

End Semester   Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:
- To learn about different type of applications and testing, along with the purpose of automation testing.
- To gain insight into the evolution of Selenium and get an overview of Selenium and its components and compare commonly usedautomation tool with Selenium automation tools.
- Explore the features and use of Selenium-WebDriver and learn data driven testing using TestNG.

Course Outcomes (COs):

Upon completion of this course, students will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Illustrate Selenium Architecture and its components.	Understand
CO2	Outline the concepts of basics of JAVA	Understand
CO3	Identify the WebDriver advanced features.	Apply
CO4	Make use of Data driven, Keyword driven and Hybrid test framework.	Apply
CO5	Experiment with Selenium IDE and buildthe Test cases using TestNG	Apply

List of Programs
1. Write a test case based on controls.
2. Test data in a flat file.
3. Manual test case to verify student grade
4. Write and test a program to select the number of students who have scored more than 60 inany one subject (or all Subjects)
5. Write and test a program to login a specific web page.
6. Write and test a program to get the number of list items in a list / combo box.
7. Test a HTML file.
8. Test a program in MS Excel for Data Driven Wizard.ss
9. Test the addition of two values in C++ Program.

TOTAL: 48 HOURS

TEXT BOOKS:
1. Rex Allen Jones II. (2016). Selenium Web Driver for Functional Automation Testing, Test4 Success, LLC
2. Adithya Garg, Ashish Mishra. (2015). A Practitioner's Guide to Test Automation Using Selenium", Tata McGraw Hill Education.
3. Navneesh Garg, (2014). Test Automation Using Selenium WebDriver with Java", Adact InGroup Pvt Ltd.

REFERENCE BOOKS:

1. Satya Avasarala, (2014). Selenium Web Driver - PRACTICAL Guide, Packt Publishing.
2. David Burns. (2010). Selenium 1.0 Testing Tools, Packt Publishing.

WEBSITES:

1. https://www.seleniumhq.org/docs/
2. https://www.javatpoint.com/selenium-tutorial
3. https://www.softwaretestingmaterial.com/selenium-tutorial/

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

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

25ITU512AG   **Business Intelligence & Analytics – 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:
  Import the legacy data from different sources and load in the target system

Course Objectives (CO):
The goal of this course is for students to:
  - To become familiar with the ethics and basics of Business Intelligence and Decision Support Systems
  - To define mathematical models, data mining and data preparation
  - To describe classification problems and clustering methods
  - To study marketing models, Logistic and production models and Data envelopment analysis.
  - To be able to grasp the objectives of knowledge management and artificial intelligence and expert systems.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Demonstrate proficiency in BI tools like Excel, Tableau and Collect, Analyse and visualize data using tools	Understand
CO2	Create effective business reports, data visualization and communicative insights	Create
CO3	Apply data mining techniques and build models	Apply
CO4	Build BI projects, including planning, execution and delivery	Apply
CO5	Demonstrate extensive knowledge of Knowledge Management Activities, Artificial Intelligence vs. Natural Intelligence, Organizational Learning and Transformation, and the fundamentals of expert system construction.	Apply

List of Programs:
  1. Perform the Extraction Transformation and Loading (ETL) process to construct the database in the Sqlserver.
  2. Create the Data staging area for the selected database.
  3. Import the data warehouse data in Microsoft Excel and create the Pivot table and Pivot Chart.
  4. Execute the MDX queries to extract the data from the data warehouse
  5. Apply the what – if Analysis for data visualization. Design and generate necessary reports based on the data warehouse data
  6. Perform the data classification using classification algorithm.
  7. Perform the data clustering using clustering algorithm.
  8. Perform the Linear regression on the given data warehouse data.
  9. Perform the logistic regression on the given data warehouse data.

Total : 48 HOURS

Text Books:
1. "Business Intelligence: Data Mining and Optimization for Decision Making" by Carlo Vercellis Wiley First Edition 2009
2. "Decision support and Business Intelligence Systems by Efraim Turban", by Ramesh Sharda, Dursun Delen Pearson Publication Ninth Edition 2011

Reference Books:
1. Fundamental of Business Intelligence Grossmann W, by Rinderle-Ma Springer First Edition 2015

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	2	-	-	-	2	2	3	-	-	3	3	-
CO2	-	-	-	3	2	-	3	-	-	3	2	3	3	-	-	3	-
CO3	-	3	-	2	2	3	-	-	-	2	3	2	-	3	-	3	-
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	1	3	-
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	3	-
AVG	3	3	2.6	2.33	1.6	2	2.5	2.5	-	2.4	2.4	2.66	3	3	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester V

25CAU512BG	**Enterprise Infrastructure and Cloud Technologies - Practical**

5H-2C

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

End Semester Exam:3 Hours

Course Objectives (CO)
- To Install, Configure, and Administer Windows Server Environments.
- To Automate Server Administration Using PowerShell.
- To Manage Linux Server Operations and Services
- To Deploy and Maintain Virtual Machines on Hypervisors.
- To Implement and Manage Cloud Infrastructure and Services

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Install and configure Windows Server (Core/GUI) and Linux systems with user accounts, ACLs, and network settings	Apply
CO2	Implement Active Directory, group policies, and enforce security controls across domain environments.	Apply
CO3	Develop PowerShell scripts for task automation	Create
CO4	Configure and manage virtualization platforms like VMware and Hyper-V, including VM creation and snapshots.	Apply
CO5	Monitor Linux services and manage system updates using tools like YUM, top, systemctl.	Apply

LIST OF PROGRAMS

Windows Server
1. **Windows Server Installation & Configuration**
o Install Windows Server (Core & GUI).
o Patching
2. **Install & Configure Active Directory Domain Services (AD DS)**
o Promote server to DC, join clients to the domain.
o Enforce password policy, restrict drives, desktop configuration.
3. **Implement Failover Cluster and Network Load Balancing (NLB)**
o Build a high-availability cluster for file share service.
o Cluster Troubleshooting – High Availability, Fail-Over
4. **PowerShell Scripting for Automation Tasks**
o Write scripts for backup, log rotation, monitoring, Patching, Checking stale records

Linux Server

5. **Install Linux (RHEL/CentOS) and Set Up Users & ACLs**
   o Partitioning, user creation, chmod, setfacl, etc.
   o Patching
   o Configuring Network interfaces – NMTUI/NMCLI
   o Server Troubleshooting – Boot, Package, Services, Discover services

6. **Service Monitoring and Patch Management using YUM**
   o Enable repo, install updates, monitor with top, systemctl.

7. **Create and Manage VMs in VMware / Hyper-V**
   o Install hypervisor, create VM, snapshot, clone, Delete

Cloud Computing

8. **Launch and Access EC2 Instances on AWS**
   o Key pair creation, EC2 instance launch, inbound rules, remote access.

9. **Configure S3 Bucket and Lifecycle Policies**
   o Create bucket, enable versioning, lifecycle rule to archive/delete.

10. **Create and Manage VPC with Subnets and Security Groups (AWS)**
    o Design private/public subnets, attach IGW, and route tables.

11. **Azure VM Deployment and Storage Blob Configuration**
    o Create VM, configure VNet, attach a blob container for backup.

12. **IAM Role and Policy Creation in AWS**
    o Create custom IAM roles and attach to EC2 instance for access control.

13. **Configure Cloud Backup using AWS/Azure Services**
    Snapshot of EC2 instance / Azure VM backup vault.

Total : 60 HOURS

Suggested Readings

1   Mustafa Toroman , "Hands-On Cloud Administration in Azure" , Packt, 2020.
2   Sara Perrott, "Windows Server 2019 & PowerShell All-in-One For Dummies", Wiley, 2021.
3   Sander van Vugt, "Red Hat RHCSA 8 Cert Guide: EX200", Pearson IT Certification, 2021.
4   Nick Marshall, "Mastering VMware vSphere 7", Wiley, 2021.

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	-	-	-	-	-	-	3	-
CO2	3	-	-	2	1	-	-	-	2	-	-	-	-	-	-	3	-
CO3	3	-	2	1	-	1	-	-	-	-	-	-	-	1	-	3	-
CO4	3	-	3	1	2	3	-	-	-	-	1	-	-	-	1	3	-
CO5	2	1	1	-	2	3	-	-	-	-	-	-	-	-	-	3	-
AVG	2.8	1	2	1.5	1.75	2.33	-	-	1.5	-	1	-	-	1	1	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester V

25CTU591   **Internship - II**

0H- 2C

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

End Semester Exam: 3 Hours

Semester VI

25CTU601G   **Generative AI**

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- Understand the basic concepts of Generative AI models and applications, including language models and LLM architecture.
- Gain knowledge about GPT (Generative Pre-trained Transformer) and its practical applications.
- Develop a working knowledge of use cases for Generative AI.

COURSE OUTCOMES(COs):
Upon completion of this course the students will be able to:

COs	Course Outcomes (COs):	Blooms Level
CO1	Understand the basics of Generative AI Models and Applications.	Understand
CO2	Apply basic principles of AI in solutions that require problem solving.	Apply
CO3	Understand the various concepts of GPT for Artificial Intelligence.	Understand
CO4	Experiment with Future application and emerging Trends	Apply
CO5	Utilize the Use case of Generative AI	Apply

UNIT I: INTRODUCTION TO GENERATIVE AI   14 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   15 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)
                                                                    14 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   14 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 **15 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: 72 HOURS

TEXT BOOKS:

1. Kevin Knight and Elaine Rich, Nair B(2021)., "Artificial Intelligence
2. (SIE)", Mc Graw .
3. Dan W. Patterson, "Introduction to AI and ES", Pearson Education,
4. Ivan Brako,PROLOG: Programming for Artificial Intelligence,3rd edition Pearson,

REFERENCE BOOKS:

1. Flasiński, Mariusz. (2018). Introduction to Artificial Intelligence. Tata Mcgraw Hill, Delhi.
2. Chandra .S.S.V. (2017). Artificial Intelligence and Machine Learning. Kindle Edition.
3. 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, SO 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	-	-	-	-	-	-	-	-	2
CO4	-	-	1	2	-	1	-	3	-	-	-	-	-	-	-	-	2
CO5	-	-	-	2	-	-	-	3	-	-	-	-	-	-	-	-	2
Average	2	-	1	2	-	1	-	3	-	-	-	-	-	-	-	-	2

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

25ITU602AG   **Introduction to AI and Machine 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 Required
Course Objectives (CO):
The goal of this course is for students to:
   • To study the concepts of artificial intelligence
   • To learn the methods of solving problems using artificial intelligence
   • To introduce the concepts of knowledge reasoning and planning
   • To understand the basics of supervised and unsupervised machine learning
   • To learn the concepts of machine learning applications

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Evaluate Artificial Intelligence (AI) methods and describe their foundations	Analysis
CO2	Apply the characteristics of artificial intelligence that makes it useful to solve real-world problems	Apply
CO3	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation and learning	Apply
CO4	Apply supervised and unsupervised learning models for appropriate AI applications	Apply
CO5	Identify the theory of machine learning models for relevant AI applications	Analyze

UNIT I INTELLIGENT AGENTS   **12 HOURS**
Introduction to AI -Intelligent Agents: Agents and Environments – Concept of Rationality- nature of Environments – Structure of Agents- Problem Solving Agents – Search algorithms.

UNIT II PROBLEM SOLVING AND HEURISTIC SEARCH   **12 HOURS**
Informed search Strategies – Heuristic functions – Local Search and Optimization Problems- Local Search in Continuous Spaces- Game Theory - Optimal Decisions in Games.

UNIT III KNOWLEDGE REASONING AND PLANNING   **12 HOURS**
Constraint Satisfaction Problem: Backtracking search in CSP- Local search in CSP- Knowledge based agents- Propositional logic- Agents based on Propositional Logic.

UNIT IV SUPERVISED LEARNING AND UNSUPERVISED LEARNING   **12 HOURS**
 Forms of Learning- Supervised Learning – Linear Regression and Classification: Univariate Linear

Regression - Linear classification with Logistic Regression- Ensemble Learning: Random Forest - Unsupervised Learning and Transfer Learning - multitask learning.

UNIT V   APPLICATIONS   **12 HOURS**

Reinforcement Learning: Passive and Active Reinforcement Learning - Natural Language Processing: Language Models – Grammar - Computer vision: Image Formation-Classifying Im – Detecting Objects – Robotics: Robotic Perception – Humans and Robots.

Total: 60 HOURS

Text Books:
1. Stuart Russell and Peter Norvig., "Artificial Intelligence ─ A Modern Approach", Fourth Edition, Pearson, 2020.
2. Ric, E., Knight, K and Shankar, B. 2009. Artificial Intelligence, 3rd edition, Tata McGraw Hill.

Reference Books:
1. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar Foundations of Machine Learning, MIT Press, 2012.

Websites :

1. https://ai.google/education
2. https://machinelearningmastery.com/
3. https://www.tensorflow.org/
4. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
5. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

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	-	-	-	3	-	-	3	-
CO2	3	-	3	3	-	-	-	-	1	-	-	-	-	-	2	3	-
CO3	2	-	-	2	2	-	-	2	-	-	-	-	2	-	-	3	-
CO4	1	-	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO5	1	-	2	2	2	-	-	-	-	-	-	-	2	-	3	3	-
AVG	2	-	2.5	2.5	2.25	-	-	2	1.5	-	-	-	2.33	-	2.5	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25ITU602BG   **Data Science**

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 Required
Course Objectives (CO):

- To gain a proficient knowledge in the statistical analysis of data and the use of computation tools for data analysis.
- To evaluate massive amounts of data from many sources in order to make use of them and draw conclusions for decision-making assistance or business process optimization.
- To get real-world, practical knowledge through classroom and applied research experiences using Data science tools.
- To demonstrate proficiency with statistical analysis of data.

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain statistical analysis of data and the use of computation tools for data analysis.	Understand
CO2	Create algorithms of moderate complexity, and can implement them in at least two languages appropriate for data science work.	Apply
CO3	Analyze, classify, and evaluate massive amounts of data from many sources in order to make use of them and draw conclusions for decision-making assistance or business process optimization.	Analye
CO4	Able demonstrate proficiency with statistical analysis of data.	Apply
CO5	Apply data science concepts and methods to solve problems in real-world contexts and will communicate these solutions effectively	Apply

UNIT I Data Science Technology Stack: **12 HOURS**
Rapid Information Factory Ecosystem - Data Science Storage Tools - Data Lake - Data Vault - Data Warehouse Bus Matrix - Data Science Processing Tools -Spark - Mesos -Akka - Cassandra - Kafka - Elastic Search - R -Scala - Python - MQTT - TheFuture
Layered Framework: Definition of Data Science Framework - Cross- Industry Standard Process for Data Mining (CRISP-DM) - Homogeneous Ontology for Recursive Uniform Schema - The Top Layers of a Layered Framework - Layered Framework for High-Level Data Science and Engineering - Business Layer - Utility Layer.

UNIT II Three Management Layers: **12 HOURS**

Operational Management Layer - Processing-Stream Definition and Management - Audit - Balance - and Control Layer - Balance - Control - Yoke Solution - Cause-and-Effect - Analysis System - Functional Layer - Data Science Process

UNIT III Retrieve Superstep :   **12 HOURS**

Data Lakes - Data Swamps - Training the TrainerModel - Understanding the Business Dynamics of the Data Lake - Actionable Business Knowledge from Data Lakes - Engineering a Practical Retrieve Superstep, Connecting to Other Data Sources, **Assess Superstep:** Assess Superstep, Errors, Analysis of Data,Practical Actions, Engineering a Practical Assess Superstep,

UNIT IV Process Superstep :   **12 HOURS**

Data Vault, Time-Person-Object-Location-EventData Vault, Data Science Process, Data Science, **Transform Superstep :** Transform Superstep, Building a Data Warehouse, Transforming with Data Science, Hypothesis Testing, Overfitting and Underfitting, Precision-Recall, Cross-Validation Test.

UNIT V Transform Superstep: **12 HOURS**

Univariate Analysis - Bivariate Analysis - Multivariate Analysis - Linear Regression - Logistic Regression - Clustering Techniques - ANOVA - Principal Component Analysis(PCA) - Decision Trees - Support Vector Machines - Networks - Clusters - and Grids - Data Mining - Pattern Recognition - Machine Learning - Bagging Data -Random Forests - Computer Vision (CV) - Natural Language Processing (NLP) - Neural Networks - TensorFlow.

Organize and Report Supersteps : Organize Superstep - Report Superstep - Graphics - Pictures - Showing the Difference

                                                                      Total : 60 HOURS

Text Books:
1. Practical Data ScienceAndreas François by Vermeulen APress 2018
2. Principles of Data Science by Sinan Ozdemir PACKT 2016
3. Data Science from Scratch Joel Grus O'Reilly 2015

Reference Books:
1. Data Science from Scratch first Principle in python Joel Grus Shroff Publishers 2017
2. Experimental Design in Data science with Least Resources N C Das Shroff Publishers 2018

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	-	-	-	-	-	-	3	-
CO2	3	2	2	2	1	-	-	-	2	-	-	-	-	-	-	3	-
CO3	3	-	2	1	-	1	-	-	-	-	-	-	-	1	-	3	-
CO4	3	-	3	1	2	3	-	-	-	-	1	-	-	-	-	3	-
CO5	2	1	1	-	2	3	-	-	-	-	-	-	-	-	-	3	-
AVG	2.8	1.5	2	1.5	1.75	2.33	-	-	1.5	-	1	-	-	1	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25ITU602CG   **IT Project Management and Practices**

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To acquaint students with the concepts and methods available for software development in industrial environments
- To understand the fundamental principles of software project management.
- To have a good knowledge of responsibilities of project manager.
- To be familiar with the different methods and techniques used for project management.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Apply project management concepts and techniques to an IT project.	Apply
CO2	Identify issues that could lead to IT project success or failure	Analyze
CO3	Explain project management in terms of the software development process.	Apply
CO4	Describe the responsibilities of IT project managers.	Understand
CO5	Apply project management concepts through working in a group as team leader	Apply
CO6	Be an active team member on an IT project.	Apply

UNIT 1 INTRODUCTION   12 HOURS
Defining of Software Development Process - Process - Tailoring the Process – Improving the process discipline - Need for implementing discipline. Software Production Process - Identify the Software Model - Software Process Models : Waterfall Model - Prototyping Model - RAD Model - Incremental Model - Spiral Model - Component Assembly Model - Software Life Cycle.

UNIT 2 SOFTWARE DEVELOPMENT   12 HOURS
Software Development Team - Three Vital Aspects of Software Project Management - The Team - Meaning of Leadership - Communicating in Harmony - Personality traits - Project Organizations. Project Planning: Top-Down and Bottom-Up Planning - Types of Activity - Project Duration: Schedule Monitoring Tools - Gantt Chart - PERT Chart - Critical Path.

UNIT 3 PROJECT REVIEW   12 HOURS
Tracking Meetings - Recovery plans - Schedule Work & Escalation Meetings. - Project Engineering: Product Requirements - Understanding the Customer Problem to solve - Initial Investigation - Strategies for determining information requirements - Information gathering Tools - Product Objectives.

UNIT 4 PROBLEM SOLVING   12 HOURS.

Product Specifications - Defining the Final Product - Data Flow Diagram - Data Dictionary - Structured English - Decision Trees - Decision Tables - Feasibility Study. Software Testing : Test Plan - Development Testing : Verification and Validation - General Testing Methods : White Box and Black Box Testing - Unit Testing – System Integration Testing - Validation Testing - System testing.

UNIT 5 SOFTWARE QUALITY   12 HOURS

Software Quality - Quality Measures - FURPS - Software Quality Assurance – Software Reviews - Format Technical Review (FTR) Formal Approaches to SQA – Software Reliability - Introduction to SQA - The Software Quality Assurance Plan – Formal approaches to SQA - Clean room Methodology.

Total : 60 HOURS

Text Books:

1. Roger S. Pressman - "Software Engineering – A Practitioner's Approach", Seventh Edition,
2. Mc Graw-Hill International Edition, 2010.
3. Ian Sommerville, "Software Engineering", 9th Edition, Pearson Education Asia, 2011.

Reference Books:

1. Rajib Mall, "Fundamentals of Software Engineering", Third Edition, PHI Learning
2. PrivateLimited, 2009.
3. Pankaj Jalote, "Software Engineering, A Precise Approach", Wiley India, 2010.
4. Kelkar S.A., "Software Engineering", Prentice Hall of India Pvt Ltd, 2007.
5. Stephen R.Schach, "Software Engineering", Tata McGraw-Hill Publishing Company Limited,2007.

Website:

1. http://nptel.ac.in/.

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	3	3	1	2	-	-	2	2	-	-	-	-	3	-
CO2	2	3	2	-	-	1	3	-	-	3	2	-	-	-	-	3	-
CO3	-	-	3	-	2	2	-	-	-	-	3	-	-	-	-	3	-
CO4	3	-	-	2	1	-	-	-	-	-	-	-	-	-	-	3	-
CO5	2	-	3	3	3	3	-	-	-	-	3	-	-	-	-	3	-
AVG	2.5	2.5	2.5	2.66	2.25	1.75	2.5	-	-	2.5	2.5	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VI

25BAU601G   **Entrepreneurship Development**

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):
The goal of this course is for students to:

- To explain concepts of Entrepreneurship and build an understanding about business situations in which entrepreneurs act.

- To qualify students to analyse the various aspects, scope and challenges under an entrepreneurial venture
- To understand the objectives of entrepreneurs
- To discuss the steps in venture development and new trends in entrepreneurship.
- To Correctly collect and analyze Entrepreneurship Development and Government Role

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Categorize the foundation of Entrepreneurship Development and its theories.	Analyze
CO2	Learners will explore entrepreneurial skills and management function of a company with special reference to SME sector	Understand
CO3	Identify the type of entrepreneur and the steps involved in an entrepreneurial venture.	Remember
CO4	Apply the new trends in entrepreneurship& starting a venture and to explore marketing methods	Apply
CO5	Examine the Entrepreneurship Development and Government	Apply

UNIT I Introduction to Entrepreneurship   **15 HOURS**
Introduction - Entrepreneur - meaning- importance-Qualities, nature, types, traits, culture, similarities and economic and differences between Entrepreneur and Intrapreneur. Entrepreneurship development-its importance- Role of Entrepreneurship -Entrepreneurial environment

UNIT II Evolution of Entrepreneurs   **15 HOURS**
Entrepreneurial promotion. Training and developing motivation : factors - mobility of Entrepreneurs - Entrepreneurial change - occupational mobility-factors in mobility - Role of consultancy organizations in promoting Entrepreneurs-Forms of business for Entrepreneurs.

UNIT III Corporate Entrepreneurship   **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 favorable for Corporate entrepreneurship, benefits of Corporate entrepreneurship.

UNIT IV Family and Non Family Entrepreneur & Women Entrepreneurs   **14 HOURS**

Managing, growing and ending the new venture - Family and Non Family Entrepreneur & Women entrepreneurs: Role of Professionals - Professionalism vs family entrepreneurs - Role of Woman entrepreneur - Factors influencing women entrepreneur - Challenges for women entrepreneurs - Growth and development of women entrepreneurs in India

UNIT V   Entrepreneurship Development and Government Role   **14 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:
3. Vasanth Desai " Dynamics of Entrepreneurial Development and Management Himalaya Publishing House,2009.
4. 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 , 2 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	3	-	3	2	1	2	-	-	-	2	2	3	-	-	-	3	-
CO2	-	-	-	3	2	-	3	-	-	3	2	3	-	-	-	3	-
CO3	-	-	-	2	2	3	-	-	-	2	3	2	-	-	-	3	-
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	-	3	-
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	3	-
AVG	3	-	2.6	2.33	1.6	2	2.5	2.5	-	2.4	2.4	2.66	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VI

25CTU611G   **Generative AI - Practical**

4H-2C

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

End Semester Exam: 3 Hours

Prerequisite:

Not Required**.**

Course Objectives (CO):

The goal of this course is for students to:

- 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):

COs	Course Outcomes (COs)	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 othermachine 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.

<div align="right">

TOTAL: **48 HOURS**

</div>

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-artifici al-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	-	-	-	-	-	-	-	-	-	-	-	-	-	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

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

Semester VI

25CTU691   **Project and Viva Voce**

9H-6C

Instruction Hours/week: L: 0 T:0 P: 9   **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

Semester VI

25ECU601G   **ECA / NCC / NSS / Sports / General Interest etc.,**

0H-0C

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

End Semester Exam:-

Semester VII

25CSU701G   **Internet of Things**

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To study the fundamentals about IoT
- To study about IoT Access technologies
- To study the design methodology and different IoT hardware platforms.
- To study the basics of IoT Data Analytics and supporting services.
- To study about various IoT case studies and industrial applications.

Course Outcomes (COs):
Upon completion of this course, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain Use of Devices, Gateways and Data Management in IoT	Understand
CO2	Apply of Design IoT applications in different domain and be able to analyze their performance	Apply
CO3	Implement basic IoT applications on embedded platform.	Understand
CO4	Explain Data analytics concepts using IoT	Understand
CO5	The student will be reinforcing the concepts of IoT to design an IoT based smart system using open hardware platforms and open cloud offerings.	Apply

UNIT – I Fundamentals of IoT   **14 HOURS**
 Evolution of Internet of Things - Enabling Technologies - M2M Communication - IoT World Forum (IoTWF) standardized architecture - Simplified IoT Architecture - Core IoT Functional Stack - Fog - Edge and Cloud in IoT - Functional blocks of an IoT ecosystem - Sensors - Actuators - Smart Objects and Connecting Smart Objects.

UNIT - II IoT Protocols   **14 HOURS**
IoT Access Technologies: Physical and MAC layers - topology and Security of IEEE 802.15.4 - 802.11ah and Lora WAN - Network Layer: IP versions - Constrained Nodes and Constrained Networks -6LoWPAN - Application Transport Methods: SCADA - Application Layer Protocols: CoAP and MQTT.

UNIT - III Design and Development 14 HOURS

Design Methodology - Embedded computing logic - Microcontroller - System on Chips - IoT system building blocks IoT Platform overview: Overview of IoT supported Hardware platforms such as: Raspberry pi - Arduino Board details

UNIT IV Data Analytics and Supporting Services 15 HOURS

Data Analytics: Introduction - Structured Versus Unstructured Data - Data in Motion versus Data at Rest - IoT Data Analytics Challenges - Data Acquiring - Organizing in IoT/M2M - Supporting Services: Computing Using a Cloud Platform for IoT/M2M Applications/Services - Everything as a service and Cloud Service Models.

UNIT V Case Studies/Industrial Applications 15 HOURS

IoT applications in home - infrastructures - buildings - security - Industries - Home appliances - other IoT electronic equipments - Industry 4.0 concepts.

Total: 72 HOURS

TEXT BOOK:

1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press,
2. Vijay Madisetti and ArshdeepBahga, "Internet of Things: (A Hands-on Approach)", Universities Press (INDIA) Private Limited 2014, 1st Edition.
3. Internet of Things: Architecture, Design Principles and Applications, Rajkamal, McGraw Hill HigherEducation

Text Books:

1. Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World", Pearson Education 2015.
2. Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", Apress Publications 2013, 1st Edition.

Reference Books:

1. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice", Wiley 2014.
2. CunoPfister, "Getting Started with the Internet of Things", O"Reilly Media 2011.

Websites:

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.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	2	-	-	-	1	2	2	3	2	2	2	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-	3	-
CO5	2	2	-	-	-	3	2	3	2	3	3	2	-	-	-	3	-
AVG	2.66	2	-	-	-	2	2	2.5	2.5	2.5	2.5	2.4	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Karpagam Academy of Higher Education (Deemed to be University), Coimbatore - 641 021.

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Semester VII

25CSU702G   **Advanced Java Programming**

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 Required
Course Objectives (CO):
The goal of this course is for students to:
- To be able to put into use the advanced features of the Java language to build and compile robust enterprise grade applications
- To provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business
- To design and develop GUI applications using Swings and Servlets
- To enhance knowledge to manipulate and store data
- To provide foundations on Java Beans, Struts and JSON

Course Outcomes (COs):
Upon completion of this course, the student will be able to

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

UNIT I SWING AND GUI COMPONENTS   **14 HOURS**

Applets- Architecture, Basics, skeleton, simple applets, Requesting and Repainting HTML applet tag, passing parameters to applets- Graphics- Font,-Colorclasses Swing-JApplet, JFrame, JComponent Differences between Component and Container,Icons, JLabel, JTextField, JButton, JCheckBox, JRadioButton,JComboBox

UNIT II REMOTE METHOD INVOCATION   **14 HOURS**

RMI- Overview – RMI Architecture - Developing Application with RMI Declaring and implementing remote interfaces –Stub and Skelton –registering Remote objects – writing RMI server –client- EJB Introduction Entity bean –session bean –EJB Transaction.

UNIT III JAVA SERVER PAGES   15 HOURS

JSP Introduction to JSP - JSP life cycle - Attributes in JSP - JSP elements - Directives - Declarations - Expressions - Script let - Action Elements - using session Object and CookiesWorking with Java Mail - usage of use Bean Tag.

UNIT IV JAVA DATABASE CONNECTIVITY   15 HOURS

Presentation to JDBC CONNECTION settings – The Concept of JDBC – JDBC Driver Types – JDBC Packages – A Brief Overview of the JDBC Process – Database Connection – Associating the JDBC/ODBC Bridge with the Database – Statement Objects – Result Set.

UNIT V SERVLETS   14 HOURS

Background, The Life Cycle of a Servlet & the JSDK-A Simple Servlet – The Servlet API – Role Play-Servlet Concept – The javax. servlet Package – Reading Servlet Parameters, The javax.servlet.http Package – Handling HTTP Request and Responses – Using Cookies – Session Tracking.

Total : 72 HOURS

Text Books:

1. Naughton and H.Schildt, (2007), "Java 2-The complete reference", Fifth Edition McGraw Hill.
2. K. SOMASUNDARAM, "Advanced Programming in Java 2: Updated to J2SE6 with Swing, Servlet and RMI: 1
3. Jim Keogh, (2002), "The Complete Reference J2EE", Tata McGraw Hill Edition, New Delhi.
4. Marty Hall, Larry Brown, (2004), "Core Servlets and Java Server Pages", 2nd Edition, Pearson Education.

Reference Books:

1. J2EE 1.4 Bible, J.McGovern, RAdatia, Y.Fain, Wiley-dreamtech India Pvt.Ltd, NewDelhi,2003.
2. Inside Servlets, D. R.Callaway, Addison Wesley, Boston,1999.
3. Java Beans from the Ground Up,JosephO‟Neil, Tata McGraw Hill, NewDelhi.
4. Enterprise JavaBeans, TomValesky,Addison Wesley,1998.
5. Core Java Vol II Advanced Features, Cay S Horstmann& Gary Cornell, Addison Wesley.

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	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3	-	2.4	3	2.25	1.25	-	1.33	-	2	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation

Semester VII

25MAU701G   **Statistical Computing**

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- 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.
- To make the students to understand the concept of sign test and Wilcoxon Signed rank test.
- To learn chi-square test for independence as well as to understand the concept of quality, process and product control using control chart techniques and sampling inspection plan.

Course Outcomes (Cos):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (Cos):	Blooms Level
CO1	To understand the principles of census and sample surveys and to become competent for conducting sample surveys.	Understand
CO2	To find information about the population on the basis of a random sample taken from that population and also to choose an appropriate test procedure under the test of significance	Apply
CO3	To know the difference between parametric and non-parametric tests**.**	Apply
CO4	To learn and understand the difference between one way and two-way ANOVA.	Apply
CO5	To know about the basic of Statistical Quality Control and its tools	Understand, Apply, Analyze

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.

<div style="text-align:right">Total : 72 HOURS</div>

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 2., (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	2	-	-	-	-	1	1	-	-	3	2	-	-	3	-
CO2	3	3	2	-	-	-	2	-	1	-	2	-	2	-	-	3	-
CO3	-	3	-	-	-	-	2	1	1	-	2	3	-	-	-	3	-
CO4	3	-	2	-	-	-	-	1	-	-	2	-	-	-	-	3	-
CO5	3	3	2	-	-	-	2	1	1	-	2	3	2	-	-	3	-
AVG	3	3	2	-	-	-	2	1	1	-	2	3	2	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																		

Semester VII

25CSU711G   **Internet of Things – Practical**

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):
The goal of this course is for students to:

- To understand the concepts of Internet of Things and the application of IoT.
- To Determine the Market perspective of IoT.
- To Understand the vision of IoT from a global context

Course Outcomes (Cos):

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

Cos	Course Outcomes (Cos):	Blooms Level
CO1	Demonstrate the sensors and actuators for an IoT application	Understanding
CO2	Apply basic principles and protocols for a specific IoT application	Apply
CO3	Demonstrate and utilize the cloud platform and APIs for IoT application	Understanding
CO4	To Experiment with embedded boards for creating IoT prototypes	Apply
CO5	Ability to Design a solution for a given IoT application	Analyze

List of Programs

1. Led Control Using Arduino Board
2. Potentiometer And Ir Sensor Interfacing With Arduino
3. Controlling Two Actuators Using Arduino
4. Creation of Things Speak Account
5. Actuator Controlling Through Cloud
6. Dht11sensor Data To Cloud
7. Iot Based Air Pollution Control System
8. Tds Sensor Interfacing With Arduino
9. Actuator Controllingby Mobile Using Arduino

Total: 72 HOURS

Text Books:
1. IoT Fundamentals: Networking Technologies, Protocols and Use Cases for Internet of Things, David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Rob Barton and Jerome Henry, Cisco Press,
2. Vijay Madisetti and ArshdeepBahga, "*Internet of Things: (A Hands-on Approach)*", UniversitiesPress (INDIA) Private Limited 2014, 1st Edition.
3. Internet of Things: Architecture, Design Principles And Applications, Rajkamal, McGraw Hill HigherEducation

REFERENCE BOOKS:
1. Michael Miller, "The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and SmartCities Are Changing the World", Pearson Education 2015.
2. Francis da Costa, "Rethinking the Internet of Things: A Scalable Approach to ConnectingEverything", Apress Publications 2013, 1st Edition.
3. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory andPractice", Wiley 2014.
4. CunoPfister, "Getting Started with the Internet of Things", O"Reilly Media 2011.

Websites:
1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.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	-	-	-	-	-	-	-	3	-
CO2	3	-	-	2	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	2	-	3	2	3	-	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	2	1	2	-	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	2.4	-	2.33	1.75	2.2	-	-	2	1.5	-	1	-	-	-	1.5	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VII

25CSU712G   **Advanced Java Programming – Practical**

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:
> Not Required

Course Objective:
The goal of this course is for students to:
- To explore advanced topic of Java Programming for solving problems.
- To be able to put into use the advanced features of Java language to build and compile robust enterprise grade applications.
- To provide a sound foundation to the students on the concepts, precepts and practices, in a field that is of immense concern to the industry and business.
- To design and develop GUI Applications using Swing
- To enhance Knowledge to manipulate and store data

Course Outcomes (Cos):
> Upon completion of this course, the student will be able to:

Cos	Course Outcomes (Cos):	Blooms Level
CO1	Understand the concepts related to Java Technology	Understand
CO2	Explore and Understand use of Java Server Programming	Understand
CO3	Create dynamic Web pages, using servlets and JSP	Apply
CO4	Students learn skill to develop real time applications	Apply
CO5	Students learn to access to database through JAVA Programs, using Java Database Connectivity (JDBC)	Apply

List of Programs
1. HTML to Servlet Communications
2. Servlet to HTML Communication
3. Applet to Servlet Communication
4. Servlet to Applet Communication
5. Designing online applications with JSP
6. Creating JSP program using JavaBeans
7. Working with Enterprise JavaBeans
8. Performing Java Database Connectivity and storing the students Marks.
9. Creating Web services with RMI.
10. Creating and Sending Email with Java
11. Building web applications for any Departmental Store.
12. Finding Compound Interest and Simple Interest using Session Management1

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	-	1	-	-	1	-	-	-	2	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3	-	2.4	3	2.25	1.25	-	1.33	-	2	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

	Semester VIII – A

25CSU801AG   **MongoDB**

                                                                                  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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To provide students the knowledge and skills to master the NoSQL database mongoDB.
- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- 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):
          Upon completion of this course, the student will be able to:

Cos	Course Outcomes (Cos)	Blooms Level
CO1	To provide students the right skills and knowledge needed to develop Applications on mongoDB	Understand
CO2	To provide students the right skills and knowledge needed to run Applications on mongoDB	Understand
CO3	Writing MongoDB programs from JavaScript shell.	Apply
CO4	Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Apply
CO5	Perform 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   **15 HOURS**
Document-oriented data – Principles of schema design – Designing an e-commerce data model – Nuts and bolts on databases, collections, and documents. Queries and aggregation – E-commerce queries – MongoDB's query language – Data Types in MongoDB -Aggregating orders – Aggregation in detail.

UNIT III – UPDATES, ATOMIC OPERATIONS, AND DELETES   15 HOURS

A brief tour of document updates – E-commerce updates – Atomic document processing – MongoDB updates and deletes. Indexing and query optimization: Indexing theory – Indexing in practice.

UNIT IV – REPLICATION   14 HOURS

Overview – Replica sets – Master-slave replication – Drivers and replication. Shading: Overview – A sample shard cluster – Querying and indexing a shard cluster – Choosing a shard key.

UNIT V – DEPLOYMENT AND ADMINISTRATION   14 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	-	-	-	1	3	1	3	1	-	3	3	-	-	-	3	-
CO2	3	-	1	-	2	1	-	2	1	-	-	3	-	2	-	3	-
CO3	-	-	-	-	-	2	-	-	3	-	-	3	-	-	-	3	-
CO4	2	-	3	-	2	3	1	-	1	-	-	2	3	2	-	3	-
CO5	3	-	1	-	-	1	2	-	3	-	2	3	3	-	-	3	-
AVG	2.75	-	1.66	-	1.66	2	1.33	2.5	1.8	-	2.5	2.8	3	2	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VIII – A

25CSU802AG   **Data Visualization**

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 Required

Course Objective
The goal of this course is for students to:
- 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
- To use Tableau's visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset.
- To use data visualizations, dashboards, and Tableau Stories to support relevant communication for diverse audiences.

Course Outcomes (Cos):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (Cos):	Blooms Level
CO1	Explore various data visualization techniques in order to provide new insight.	Remember
CO2	Apply appropriate data visualization techniques to provide trends/insights for the given dataset.	Understand
CO3	Apply visualization tools / techniques for various data analysis tasks.	Apply
CO4	Given the application context for given data set, Design the information Dashboard for access information based on user criteria.	Analyze
CO5	Evaluate the design issues, assessment of needs, critical design practices.	Evaluate

UNIT I R FUNDAMENTALS   **14 HOURS**
Introduction to R: Usage of R – Working with R – Packages. Creating a dataset: Understanding datasets – Data structures – Data input – Annotating datasets.

UNIT II DATA MANAGEMENT   **15 HOURS**
Basic data management: Creating New Variables-Recoding Variables-Renaming Variables Variables – Missing values – Date values – Type conversions – Sorting data – Merging datasets – Subsetting datasets –SQL statements to manipulate dataframes. Advanced Data Management: Numerical and Character Functions – Control flow – Reshaping Data-Aggregating Data.

UNIT III GRAPHS AND STATISTICS 14 HOURS

Basic Graphs: Bar plots ─ Pie charts ─ Histograms – Box plots-Dot plots. Basic statistics: Descriptive statistics – Frequency and contingency tables – Correlations-T-tests

UNIT IV LINEAR REGRESSION 14 HOURS

Regression: Many faces – OLS regression – Regression diagnostics – Unusual observations – Corrective measures ─ Selecting the best regression model- Generalized Linear Models- Logistics Regression – Poisson Regression.

UNIT V INTERMEDIATE AND ADVANCED GRAPHICS 15 HOURS

Intermediate Graphs: Scatter Plots-Line charts-Correlograms- Mosaic Plots-Advanced Graphics: Four graphics systems –ggplot2 Package-Plot Type-Grouping -Faceting-Modifying the Appearance-Saving graphs.

Total: 72 HOURS

Text Books:
1. Robert I.Kabacoff, "R in Action: Data analysis and graphics with R", Dreamtech Press, Third Edition, 2019.
2. Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", WROX
3. Ritchie S. King, Visual story telling with D3" Pearson

Reference Books:
1. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.
2. Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014
3. 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	3	2	-	-	3	3	-	-	2	2	-	-	2	3	3
CO2	2	3	-	2	-	-	3	3	-	3	3	-	2	-	2	3	3
CO3	-	-	-	-	-	-	2	-	-	3	3	-	-	-	-	3	3
CO4	3	2	3	2	-	-	3	-	-	2	3	-	2	-	-	3	3
CO5	3	-	2	3	-	-	2	-	-	3	2	2	-	-	-	3	3
AVG	2.75	2.33	2.66	2.25	-	-	2.6	3	-	2.75	2.6	2	2	-	2	3	3
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

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Semester VIII – A

25BAU803AG	**Advanced Organizational Behavior**	

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 Required

Course Objectives (CO):
The goal of this course is for students to:
- To understand the basic concepts of organizational behavior.
- To analyze the individual behavior traits required for performing as an individual or group.
- To obtain the perceiving skills to judge the situation and communicate the thoughts and ideas.
- To understand how to perform in group and team and how to manage the power, politics and conflict.
- To recognize the importance of organizational culture and organizational change.

Course Outcomes (Cos):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (Cos):	Blooms Level
CO1	Analyse organizational behavior issues in the context of the organizational behavior theories and concepts.	Analyze
CO2	Assess the behavior of the individuals and groups in organization and manage the stress.	Apply
CO3	Manage team, power, politics and conflict arising between the members	Analyze
CO4	Understand how organizational change and culture affect the working relationship within organizations	Understand
CO5	Understand and exhibit the communication skills to convey the thoughts and ideas of case analysis to the individuals and group.	Understand

UNIT I: Organization Behavior: Introduction   **14 HOURS**
Organization Behavior: Meaning and definition – Fundamental concepts of OB – Contributing disciplines to the OB field – OB Model – Significance of OB in the organization success – Challenges and Opportunities for OB.

UNIT II : Behavior 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	-	1	2	3	-	3	-	2	-	-	-	-	-	3
CO2	-	-	-	2	2	3	-	-	2	3	3	-	2	-	-	-	3
CO3	3	-	-	-	2	-	-	-	2	3	3	-	3	-	-	-	3
CO4	3	-	3	2	1	-	3	-	-	2	-	-	3	-	-	-	3
CO5	3	-	2	3	-	2	2	-	-	3	-	-	-	-	-	-	3
AVG	3	-	2.66	2.33	1.5	2.33	2.66	-	2.33	1.75	2.33	-	2.33	-	-	-	3
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

25CSU811AG   **MongoDB – Practical**

6H-4C

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

End Semester   Exam:3 Hours

Prerequisite:
Not Required

Course Objectives (CO):
The goal of this course is for students to:
- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- 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
- To Know the fundamentals of MongoDB configuration and backup methods, monitoring, and operational strategies.

Course Outcomes (Cos):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (Cos):	Blooms Level
CO1	To provide students the right skills and knowledge needed to develop Applications on mongoDB	Understand
CO2	To provide students the right skills and knowledge needed to run Applications on mongoDB	Understand
CO3	Writing MongoDB programs from JavaScript shell.	Apply
CO4	Explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Apply
CO5	Perform query optimization in MongoDB and replication and sharing in MongoDB	Apply

List of Programs

Structure of 'restaurants' collection :
{ "address": { "building": "1007", "coord": [-73.856077, 40.848447], "street": "Morris Park Ave", "zipcode": "10462" }, "borough": "Bronx", "cuisine": "Bakery", "grades": [{ "date": { "$date": 1393804800000 }, "grade": "A", "score": 2 }, { "date": { "$date": 1378857600000 }, "grade": "A", "score": 6 }, { "date": { "$date": 1358985600000 }, "grade": "A", "score": 10 }, { "date": { "$date": 1322006400000 }, "grade": "A", "score": 9 }, { "date": { "$date": 1299715200000 }, "grade": "B", "score": 14 }, "name": "Morris Park Bake Shop", "restaurant_id": "30075445" }

1. Write a MongoDB query
   a. to display all the documents in the collection restaurants.
   b. to display the fields restaurant_id, name, borough and cuisine for all the documents in the collection restaurant.
   c. to display the fields restaurant_id, name, borough and cuisine, but exclude the field _id for all the documents in the collection restaurant
   d. to display the fields restaurant_id, name, borough and zip code, but exclude the field _id for all the documents in the collection restaurant.
   e. to display all the restaurant which is in the borough Bronx
   f. to display the first 5 restaurant which is in the borough Bronx.
   g. to display the next 5 restaurants after skipping first 5 which are in the borough Bronx.
   h. to find the restaurants who achieved a score more than 90.
   i. to find the restaurants that achieved a score, more than 80 but less than 100.
2. Write a MongoDB query
   a. to find the restaurants which locate in latitude value less than -95.754168.
   b. to find the restaurants that do not prepare any cuisine of 'American' and their grade score more than 70 and latitude less than -65.754168.
   c. to find the restaurants which do not prepare any cuisine of 'American' and achieved a score more than 70 and not located in the longitude less than – 65.754168. Note : Do this query without using $and operator. Go to the editor
   d. to find the restaurants which do not prepare any cuisine of 'American ' and achieved a grade point 'A' not belongs to the borough Brooklyn. The document must be displayed according to the cuisine in descending order.
3. Write a MongoDB query
   a. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Wil' as first three letters for its name. Go to the editor
   b. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'ces' as last three letters for its name.
   c. to find the restaurant Id, name, borough and cuisine for those restaurants which contain 'Reg' as three letters somewhere in its name.
4. Write a MongoDB query
   a. to find the restaurants which belong to the borough Bronx and prepared either American or Chinese dish.
   b. to find the restaurant Id, name, borough and cuisine for those restaurants which belong to the borough Staten Island or Queens or Bronxor Brooklyn.
   c. to find the restaurant Id, name, borough and cuisine for those restaurants which are not belonging to the borough Staten Island or Queens or Bronxor Brooklyn.
   d. to find the restaurant Id, name, borough and cuisine for those restaurants which achieved a score which is not more than 10.
   e. to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'.
   f. to find the restaurant Id, name, and grades for those restaurants which achieved a grade of "A" and scored 11 on an ISODate "2014-08- 11T00:00:00Z" among many of survey dates
   g. to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08-11T00:00:00Z".

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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 contain 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	-	-	-	1	3	-	3	1	2	3	3	-	-	-	3	-
CO2	3	-	1	2	2	1	-	2	1	-	-	3	-	2	-	3	-
CO3	-	-	-	-	-	2	-	-	3	-	-	3	-	-	-	3	-
CO4	2	-	3	1	2	3	-	-	1	-	-	2	-	2	-	3	-
CO5	3	-	1	-	-	1	-	-	3	2	2	3	-	-	-	3	-
AVG	2.75	-	1.66	1.5	1.66	2	-	2.5	1.8	2	2.5	2.8	-	2	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VIII – A

25CSU812AG   **Data Visualization – Practical**

6H-4C

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

End Semester   **Exam:**3 Hours

Prerequisite:

Not Required

Course Objectives (CO):
The goal of this course is for students to:
● 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
● To use Tableau's visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset.
● To use data visualizations, dashboards, and Tableau Stories to support relevant communication for diverse audiences.

Course Outcomes (Cos):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (Cos):	Blooms Level
CO1	Design effective data visualizations in order to provide new insights into a research question or communicate information to the viewer	Apply
CO2	Find and select appropriate data that can be used in order to create a visualization that answers a particular research question.	Apply
CO3	Properly document and organize data and visualizations in order to prepare them for reuse.	Understand
CO4	Given the application context for given data set, Design the information Dashboard for access information based on user criteria.	Apply
CO5	Evaluate the design issues, assessment of needs, critical design practices.	Apply

List of Programs
1. Exploring Data Visualization tools

2. Data Mapping

3. Drawing Graphs

4. Creating Scatter Plot Maps

5. Construct new data set by incorporating various data structures for importing the data set

6. Implement the data management operations like sort, merge, subset and aggregate

7. Drawing Charts

8. Visualize the statistics results using descriptive statistics method

9. Predict the result of new data using the regression methods

10. Experiment the different functions in ggplot2 to visualize the results

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	-	3	2	-	-	3	3	-	-	2	2	-	-	2	3	-
CO2	2	-	-	2	-	-	3	3	-	3	3	-	2	-	2	3	-
CO3	-	-	-	-	-	-	2	-	-	3	3	-	-	-	-	3	-
CO4	3	-	3	2	-	-	3	-	-	2	3	-	2	-	-	3	-
CO5	3	-	2	3	-	-	2	-	-	3	2	2	-	-	-	3	-
AVG	2.75	-	2.66	2.25	-	-	2.6	3	-	2.75	2.6	2	2	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VIII – B

25CMU801BG   **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 Required

Course Objectives (CO):

The goal of this course is for students to:

- 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):

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

Cos	Course Outcomes (Cos)	Blooms Level
CO1	Understand the fundamental concepts of research methodology	Understand
CO2	Ability to find the research problem and review on it	Apply
CO3	Understand the various research designs and techniques.	Analyze
CO4	Ability to understand the nature of intellectual property rights and its apply it	Apply
CO5	Ability to understand about IPR and filing patents in R & D	Apply

UNIT – I: RESEARCH METHODOLOGY   **14 HOURS**

Objectives and motivation of research – Types of research – Research approaches – Significanceof 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.
5. The Institute of Company Secretaries of India, Statutory body under an Act of parliament,"ProfessionalProgramme Intellectual Property Rights, Law and practice", September 2013.

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	3	2	1	2	3	2	3	3	2	-	-	-	-	3
CO2	2	3	3	2	1	2	2	2	2	2	2	3	-	-	-	-	3
CO3	3	3	2	3	2	1	1	3	3	2	2	3	-	-	-	-	3
CO4	2	2	3	2	1	2	3	3	2	3	3	2	-	-	-	-	3
CO5	3	3	3	2	3	2	3	2	2	3	2	3	-	-	-	-	3
AVG	2.6	2.8	2.6	2.4	1.8	1.6	2.2	2.6	2.2	2.6	2.4	2.6	-	-	-	-	3
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VIII – B

25ITU811BG   **Data Analytics Tool- Practical**

6H-4C

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

End Semester   **Exam:**3 Hours

Prerequisite:
          Not Required

Course Objectives (CO):
The goal of this course is for students to:
- To compute descriptive statistics
- To calculate parametric and non-parametric tests
- To carryout reliability and normality tests
- To comprehend the application of Bivariate and multivariate analysis
- To compute bivariate and multivariate analysis
- To apply statistical techniques on decision making

Course Outcomes (Cos):
Upon completion of this course, the student will be able to

Cos	Course Outcomes (Cos):	Blooms Level
CO1	Utilize Hadoop related tools such as Hbase, Cassandra, Pig, and Hive for big data analytics	Apply
CO2	Apply map reduce and NoSql concepts	Apply
CO3	Apply SQL operations for Spark based data set.	Apply
CO4	Evaluate the streaming process in real time analytics.	Analyze
CO5	Implement K-means algorithm	Apply

List of Programs:

1. Installation of Hadoop Framework, it's components and study the HADOOP ecosystem.
2. Write a program to implement word count program using MapReduce
3. Experiment on Hadoop Map-Reduce / PySpark: -Implementing simple algorithms in Map-Reduce: Matrix multiplication.
4. Install and configure MongoDB/ Cassandra/ Hbase/ Hypertable to execute NoSQL Commands.
5. Implementing DGIM algorithm using any Programming Language/ Implement Bloom Filter using any programming language
6. Implement and Perform Streaming Data Analysis using flume for data capture, PYSpark / HIVE for data analysis of twitter data, chat data, weblog analysis etc.
7. Implement any one Clustering algorithm (K-Means/CURE) using Map-Reduce.
8. Implement Page Rank Algorithm using Map-Reduce.

Total: 72 HOURS

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	3	2	1	2	3	2	3	3	2	-	-	-	3	-
CO2	3	3	3	2	1	1	2	2	2	2	2	3	-	-	-	3	-
CO3	3	3	2	3	2	1	1	3	3	2	2	3	-	-	-	3	-
CO4	2	2	3	2	1	1	3	3	2	3	3	2	-	-	-	3	-
CO5	3	3	3	2	3	1	3	2	2	3	2	3	-	-	-	3	-
AVG	2.8	2.8	2.6	2.4	1.8	1	2.2	2.6	2.2	2.8	2.4	2.6	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester VIII - B

25CTU891   **Research Project/Preparation of Research Project**

18H-12C

Instruction Hours/week: L:0 T:0 P:18   **Marks:** Internal:**100** External:**200** Total:**300**

End Semester Exam:3 Hours