

B.Sc. COMPUTER SCIENCE (Cyber Security)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2025 – 2026)



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

Tamil Nadu, India.

Phone No. 0422-2980011 – 15 Fax No: 0422-2980022-23

E mail ID: info@kahedu.edu.in

Web: www.kahedu.edu.in



KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)
(Established Under Section 3 of UGC Act, 1956)

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

(REGULAR PROGRAMME)

REGULATIONS (2025)

CHOICE BASED CREDIT SYSTEM (CBCS)

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PROGRAM OUTCOMES (POs):

By the end of the programme, our graduates will

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

PROGRAM SPECIFIC OUTCOMES (PSOs).

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

PSO 2: Graduates will be skilled in designing, developing, and deploying cognitive systems. They will apply their expertise in areas such as virtualization and cloud computing, client relationship management, infrastructure management, IT infrastructure library, and robotic process automation to design and develop advanced systems.

PROGRAMME EDUCATIONAL OUTCOMES (PEOs)

PEO I: Graduates will develop a deep understanding of cognitive systems, artificial intelligence, and machine learning to design and implement intelligent solutions for complex problems.

PEO II: Graduates will continuously adapt to technological advancements in cognitive computing and foster innovation in the development of AI-driven applications.

PEO III: Graduates will apply ethical considerations in the development and deployment of cognitive systems, ensuring responsible use of AI technologies in society.

PEO IV: Graduates will effectively collaborate with professionals from various disciplines, leveraging cognitive technologies to solve interdisciplinary challenges.

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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.	<i>Viva – voce</i> [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.	<i>Viva – voce</i> [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.

$$\text{GPA of a Semester} = \frac{\sum_i C_i G P_i}{\sum_i C_i}$$

Sum of the product of the GP by the

Sum of the credits of the courses of
that Semester

$$\text{i.e. GPA of a Semester} = \frac{\sum_i C_i G P_i}{\sum_i C_i}$$

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

$$\text{CGPA of the entire programme} = \frac{\sum_i C_i G P_i}{\sum_i C_i}$$

Sum of the credits of the courses of
the entire programme

$$\text{i.e. CGPA of the entire programme} = \frac{\sum_n \sum_i C_{ni} G P_{ni}}{\sum_n \sum_i C_{ni}}$$

where,

- C_i is the credit fixed for the course 'i' in any semester
- G_{Pi} 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,	

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

Course Code	Name of the course	Category	Objectives and Outcomes		Instruction hours/week			Credit(s)	Maximum Marks			Page No
			PO	PSO	L	T	P		CIA	ESE	Total	
SEMESTER I												
25LTU101G/ 25LHU101G/ 25LMU101G/ 25LSU101G/ 25LFU101G	Language: Tamil - I / Hindi - I/ Malayalam - I/ Sanskrit - I/ French - I	AEC1	1,2,3	-	4	-	-	3	40	60	100	1
25ENU101G	English I	MDC1	2,3,7,12	-	3	-	-	3	40	60	100	15
25CSU101G	Programming in C	Major1	1,4,5,6, 8,10,	1	4	-	-	3	40	60	100	17
25CSU102G	Digital Principles and Computer Architecture	Major2	1,4,5,6,8	1,2	4	-	-	3	40	60	100	20
25MAU101G	Numerical Methods	Minor1	1,4,5,6,8	-	4	-	-	4	40	60	100	23
25CSU111G	Programming in C– Practical	Major3	1,4,5,8,10	2	-	-	4	2	40	60	100	25
25CSU112G	Digital Productivity - Practical	SEC1	1,3,4,5,9, 11,	1, 2	-	-	5	2	40	60	100	27
25VAC101G	Yoga for Youth Empowerment	VAC1	1,12	1	2	-	-	2	100	-	100	31
Semester Total					21	0	09	22	380	420	800	
SEMESTER II												
25LTU201G/ 25LHU201G/ 25LMU201G/ 25LSU201G/ 25LFU201G	Language: Tamil - II/ Hindi - II/ Malayalam - II/ Sanskrit - II/ French - II	AEC2	1,2,3	-	4	-	-	3	40	60	100	33
25ENU201G	English II	MDC2	2,3,9	-	3	-	-	3	40	60	100	46
25CSU201G	Java Programming	Major 4	1,3,4, 5, 9,11,12	1, 2	4	-	-	3	40	60	100	48
25CSU202G	Data Structures	Major 5	1,3,4,8, 9,11	1	4	-	-	3	40	60	100	51
25MAU201G	Discrete Structures	Minor 2	1,3,4,5	-	4	-	-	4	40	60	100	53
25CSU211G	Java Programming with Data Structures –Practical	Major 6	1,3,4,5, 11	1,2	-	-	5	2	40	60	100	55
25CSU212G	Data Analysis –Practical	SEC2	1,3,4,5, 11	1, 2	-	-	4	2	40	60	100	57
25VAC201G	Environmental Studies	VAC2	1,3,4,5,8,9, 12,13	1	2	-	-	2	100	-	100	60
Semester Total					21	0	09	22	380	420	800	

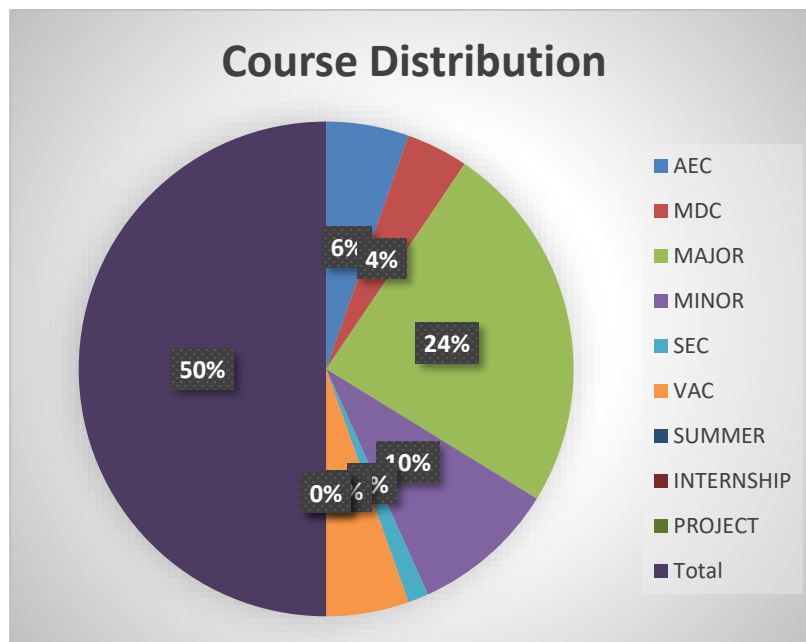
SEMESTER III												
25LTU301G/ 25LHU301G/ 25LMU301G/ 25LSU301G/ 25LFU301G	Language: Tamil - III / Hindi - III/ Malayalam - III/ Sanskrit - III/ French - III	AEC3	1,2,3	-	4	-	-	3	40	60	100	63
25ENU301G	English III	MDC3	1,2,3,4	-	3	-	-	3	40	60	100	76
25CYU301G	Operating Systems	Major 7	1,3,4,5,6, 13	1	5	-	-	3	40	60	100	78
25CYU302G	Computer Networks	Major 8	1,3,4,5,6, 8	2	4	-	-	3	40	60	100	81
25MAU301G	Operations Research	Minor 3	1,3,4,5,8, 10,11	-	4	-	-	4	40	60	100	83
25CYU311G	Computer Networks - Practical	Major 9	1,3,5,8,9, 10,11	2	-	-	4	2	40	60	100	86
25ITU311G	Programming in Python –Practical	SEC 3	1,3,4,5,9, 11,	1	-	-	4	2	40	60	100	88
25VAC301G	Community Engagement and Social Responsibility	VAC 3	1,2,3,4,5, 6,7,8,10, 15	1,2	2	-	-	2	100	-	100	90
25CYU391	Internship - I	Summer Internship	-	-	-	-	-	2	100	-	100	92
Semester Total					22	0	8	24	480	420	900	
SEMESTER IV												
25LTU401G/ 25LHU401G/ 25LMU401G/ 25LSU401G/ 25LFU401G	Language: Tamil - IV / Hindi - IV/ Malayalam - IV/ Sanskrit - IV/ French - IV	AEC4	1,2,3	-	4	-	-	3	40	60	100	93
25ENU401G	English IV	SEC4	1,2,4	-	3	-	-	3	40	60	100	105
25CYU401	Cyber Security Essentials	Major 10	1,2,3,4,5, 6,9,11,12	1	5	-	-	3	40	60	100	107
25CYU402G	Network Security	Major 11	1,3,4,7,8, 11,12	2	4	-	-	3	40	60	100	110
25MAU401G	Probability and Statistics	Minor 4	1,3,4,5,8, 9,10,11, 12, 13	-	4	-	-	4	40	60	100	112
25CYU411	Cyber Security - Practical	Major 12	1,3,4,5,6, 8,9,10,11 ,12	1	-	-	4	2	40	60	100	115
25CYU412G	Network Security - Practical	Major 13	1,3,4,5,6, 7,8,9,10, 11,12	2	-	-	4	2	40	60	100	117
25VAC401AG	Universal Human Values	VAC 4	6,7,8,9,12	-	2	-	-	1	100	-	100	121
Semester Total					22	0	8	21	380	420	800	

SEMESTER V												
25CYU501	Vulnerability Assessment and Penetration Testing	Major 14	1,3,4,6,7,8,9,11	2	5	-	-	3	40	60	100	124
25CSU502AG	Full Stack Development	Major 15	1,3,4,6,8,11	2	5	-	-	3	40	60	100	126
25CYU502B	.NET Programming		1,2,3,4,5,6,7,8,9,10,11,12	2								128
25CYU503AG	Digital Identity and Access Management	Major 16	1,3,4,5,11,12	1,2	4	-	-	3	40	60	100	130
25CYU503B	Relational Database Management System		1,3,4,5,11,12	1								133
25CSU503CG	Software Testing		1,3,4,5,9,11,12	1,2								135
25CMU501BG	Basics of Accounting	Minor 5	1,3,4,7,8,9,11	-	6	-	-	4	40	60	100	137
25CYU511	Vulnerability Assessment and Penetration Testing –Practical	Major 17	1,3,4,5,6,8,11	1,2	-	-	5	2	40	60	100	139
25CSU512AG	Full Stack Development-Practical	Major 18	1,3,4,6,8,11	2	-	-	5	2	40	60	100	142
25CYU512B	.NET Programming - Practical		1,2,3,4,5,6,7,8,9,10,11,12	2								144
25CYU591	Internship - II	Summer Internship	-	-	-	-	-	2	100	-	100	146
Semester Total					20	0	10	19	340	360	700	
SEMESTER VI												
25CTU601G	Generative AI	Major 19	1,4,8,10,14,15	1	6	-	-	3	40	60	100	147
25CSU602AG	Ethical Hacking	Major 20	1,3,4,5,9,11	1,2	4	-	-	3	40	60	100	149
25CYU602B	Big Data Analytics		1,3,4,5,9,11	1,2								151
25CSU602CG	Blockchain Technology		1,3,4,5,9,11	1,2								153
25CSU602DG	Digital Marketing		1,3,4,5,9,11	1,2								155
25BAU601G	Entrepreneurship Development	Minor 6	1,4,5,7,8,13	1	6	-	-	4	40	60	100	157
25CTU611G	Generative AI - Practical	Major 21	1,2,3,4,5,8,10,11,13,15	2	-	-	5	2	40	60	100	159
25CYU691	Project and Viva Voce	Major 22	-	-	-	-	9	6	40	60	100	161
25ECU601G	ECA / NCC / NSS / Sports / General interest etc		-	-	-	-	-	-	100	-	100	162
Semester Total					16	-	14	18	300	300	600	

Grand Total								122	0	58	126	2260	2340	4600	
SEMESTER VII															
25CSU701G	Internet of Things	Major23	1,3,4,5,6,8	1	6	-	-	5	40	60	100	163			
25CSU702G	Advanced Java Programming	Major 24	1,3,4,6,7,8,9,10,11	2	6	-		5	40	60	100	165			
25MAU701G	Statistical Computing	Minor 7	1,3,4,5,6,8,10	1	6	-		4	40	60	100	167			
25CSU711G	Internet of Things – Practical	Major 25	1,3,4,5,6,8,10,13	2	-	-	6	3	40	60	100	169			
25CSU712G	Advanced Java Programming – Practical	Major 26	1,2,4,5,6,8	2	-	-	6	3	40	60	100	171			
Semester Total								18	0	12	20	200	300	500	
SEMESTER VIII A (HONOURS)															
25CSU801AG	MongoDB	Major 27	1,4,5,6,8,10	1	6	-	-	5	40	60	100	173			
25CSU802AG	Data Visualization	Major 28	1,3,4,5,6,7,8,9,10	1	6	-	-	5	40	60	100	175			
25BAU803AG	Advanced Organizational Behaviour	Minor 8	1,2,3,4,5,7,8,9,12,13,14	1	6	-	-	4	40	60	100	177			
25CSU811AG	MongoDB-Practical	Major 29	1,4,5,6,8,10	1	-	-	6	3	40	60	100	179			
25CSU812AG	Data Visualization-Practical	Major 30	1,2,3,4,5,6,7,9,10,14,15	1	-	-	6	3	40	60	100	182			
Semester Total								18	0	12	20	200	300	500	
SEMESTER VIII B (HONOURS WITH RESEARCH)															
25CMU801BG	Research Methodology and IPR	Minor 8	1,3,4,5,6,8,13	1	6	-	-	4	40	60	100	184			
25CSU811BG	Advanced Data Analytics Tools-Practical	Major 27	1,3,4,5,6,8,9,10,15	1	-	-	6	4	40	60	100	186			
25CYU891	Research Project	Project	-	-	-	-	18	12	120	180	300	188			
Semester Total								6	-	24	20	200	300	500	
Grand Total								146	0	94	166	2660	2940	5600	
Other Courses have 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)															

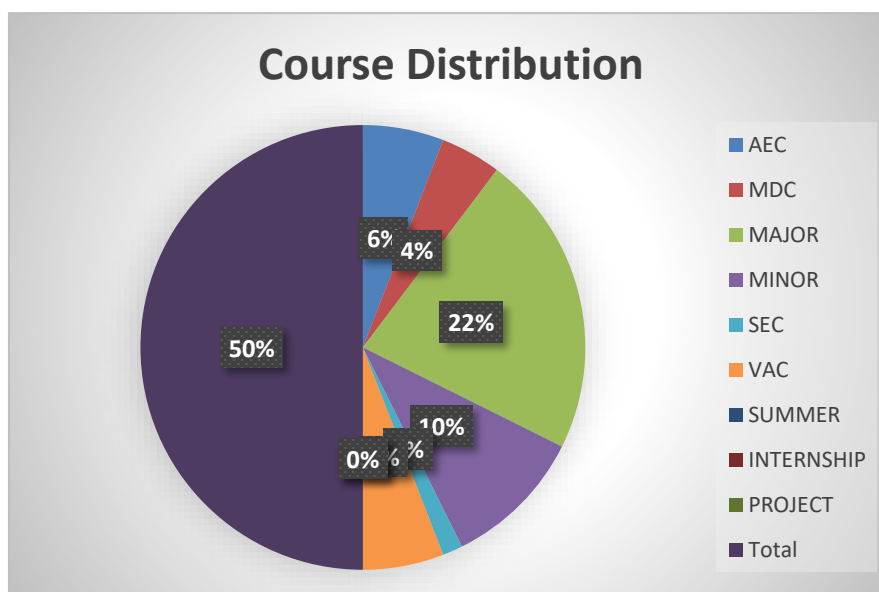
Course Distribution Table Honours

	No of Courses		Total
	Theory	Practical	
AEC	4	0	4
MDC	3	0	3
MAJOR	18	12	30
MINOR	7	1	8
SEC	1	3	4
VAC	4	0	4
SUMMER INTERNSHIP	0	2	2
PROJECT	0	0	0
Total	37	18	55



Course Distribution Table Honours with Research

	No of Courses		Total
	Theory	Practical	
AEC	4	0	4
MDC	3	0	3
MAJOR	15	12	27
MINOR	7	1	8
SEC	1	3	4
VAC	4	0	4
SUMMER INTERNSHIP	0	2	2
PROJECT	0	1	1
Total	34	19	53



25LTU101G

Language: Tamil - I

முதல் பருவம்

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 குடியரிமைப்பணி 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

- தமிழ் இலக்கிய வரலாறு** - முச்சங்கங்கள் அறிமுகம் - சங்க இலக்கியத்தின் தோற்றுவாய் - பத்துப்பாட்டு அறிமுகம்
- சங்க இலக்கியம்** - முல்லைப்பாட்டு - “பால்போல” முதல் “குறுநீர்” வரை (1-58)
- அற இலக்கியம்** - 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 னெஞ்சே” - தலைவி கூற்று - (202) - “ஈதலுந் 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

- ஐங்குறுநாறு - 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) - நல்லார்க்கும் (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 பையப் (6053), அந்நெறி (6058), குகனொடும் (6507), கூவி இன்று (7004), ஆள் ஐயா! (7271), கார்நின்ற (10043)

சிற்பிலக்கியம்

- 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 - “சுடர்தொடிக் 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 – “ஈன்று புறம் தந்த எம்மும் உள்ளாள்” – பாலை - நற்றாய் கூற்று (35).
சங்க இலக்கியம்	- புறநானூறு – “புலவரை இறந்த புகழ்சால் 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.

மொத்த மணிநேரம் - 48 மணிநேரம்

TEXT BOOK

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

பார்வை நூல்கள்

1. R1 - தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன், கலையக வெளியீடு,நாமக்கல்.
2. R2 - வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, முனைவர் பாக்கியமேரி, பூவேந்தன் பதிப்பகம், சீனிவாசா சாலை, மயிலாப்பூர், சென்னை.

இணையதளம்

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

இதழ்கள்

1. J1- International Research Journal of Indian Literature, irjil.in
2. 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

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

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

UNIT V

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

10 HOURS**TOTAL: 48 HOURS****REFERENCE BOOKS::****I. Prose** : Nuthan Gathya Sangrah (lesson-1,5,6,8,9).

Editor : Jayaprakash

Publisher : Sumithra Prakasan,
16|5.Hasting Road,
Illahabad.211001.**II. Non-detailed** : Naveen Ekhanki Sangrah

Editor : Dr. Srimathi Malathi Tiwari

Publisher : Sumithra Prakashan,
204.Leela Apartment,
Ashok Nagar, Illahabad-211001.**III. Nibandh** : Subod Hindi Nibandh

Editor : Dr. Braj Kishor Prasad Sing

Publisher : Manoj Publication
1583-84 Dariba Kala, Chandni Chouk,
Delhi – 110006.**IV. Grammar** : Sugam Hindi Vyakaran

Writer: Pro. Vamshidhar & Dharmapal

Publication: Shiksha Bharathi, Kashmir Gat, Delhi – 110006

CO, PO, PSO Mapping

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

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

		Semester- I
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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	1.2	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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“ ending nouns

(Masculine)

TOTAL: 48 HOURS**TEXT BOOKS:**

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

CO, PO, PSO Mapping

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

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

		Semester- I
25LFU101G	Language: French - I	4H-3C
(Leçon, Communication, Grammaire, Verbes, Lexique, Culture)		
Instruction Hours/week: L:4 T:0 P:0		Marks: Internal:40 External:60 Total:100
End Semester Exam: 3 Hours		

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNITE I**9 HOURS**

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

UNITE II**9 HOURS**

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

UNITE III**10 HOURS**

- a) Leçon - Salut ! Je m'appelle Agnès
- b) Communication - Se présenter et présenter quelqu'un Demander et dire la date
- c) Grammaire - Les pronoms personnels sujets ,Les verbes être et avoir ,
Les articles définis et indéfinis
- d) Verbes - Les verbes aller et venir
- e) Lexique - Les mois de l'année, Les nombres de 0 à 69 » La famille (1)
- f) Culture - La France physique et politique

UNITE IV**10 HOURS**

- a) Leçon - Qui est-ce ? Dans mon sac, j ' ai
- b) Communication - Demander et répondre poliment ,Demander des informations
Personnelles
- c) Grammaire - La formation du féminin, La formation du pluriel ,
Le adjectifs possessifs
- d)Verbes - Les verbes ir et re
- e)Lexique - Les professions ,Quel ques objets ,La fiche d'identité
- f)Culture - Les symbols de la France,

UNITE V**10 HOURS**

- a) Leçon - Il est comment ? Allô ?
- b)Communication - Décrire l'aspect physique et le caractère Parler au téléphone
- c)Grammaire - La formation du féminin , La phrase interrogative
Qu'est-ce que... ? La phrase négative
- d)Verbes - Le verbe Faire
- e) Lexique - L'aspect physique , Le caractère, Les
prépositions de lieu , Les nombres à partir de 70
- f) Culture - Les frontiers de la france,les villes connues en france.

TOTAL: 48 HOURS**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, Duplex, 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 exercices**, CLE International , Paris , 2005

WEBSITES :

1. <http://enseigner.tv5monde.com/>
2. [bonjourdumonde.com/exercices/contenu/le – francais-du- tourisme.html](http://bonjourdumonde.com/exercices/contenu/le-francais-du-tourisme.html)
3. <http://www.bonjurdefrance.com/>
4. <https://www.lepointdufle.net/>

CO, PO, PSO Mapping

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

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

25ENU101G

English I

Semester I

3H-3C

Instruction Hours/week: L:3 T:0 P:0

Marks: Internal:40 External:60 Total:100

End Semester Exam: 3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Use English grammar to create error-free sentences.	Apply
CO2	Build and maintain social relationships through effective communication.	Remember
CO3	Construct business letters, proposals and E-Mail communication	Remember
CO4	Plan and deliver group discussions and presentations.	Understand
CO5	Classify communication skills in business environment	Understand

UNIT I**8 HOURS**

LISTENING: Listening –Types of Listening
 SPEAKING: Basics of Pronunciation
 READING: Reading – Types of Reading
 COMPOSITION WRITING: Jumbled Sentences
 LITERATURE: Poem- Mending Wall- Robert Frost
 GRAMMAR: Parts of Speech

UNIT II**7 HOURS**

LISTENING: Principles of Listening Skills
 SPEAKING: Self-Introduction
 READING: Reading Techniques
 COMPOSITION WRITING: Paragraph Writing
 LITERATURE: Prose- On Running After One's Hat- G. K. Chesterton
 GRAMMAR: Types of Sentences

UNIT III**7 HOURS**

LISTENING: Barriers of Listening
 SPEAKING: Telephone Conversations
 READING: Reading Comprehension Passages
 COMPOSITION WRITING: Precis Writing
 LITERATURE: Short Story - The Bet - Anton Chekov
 GRAMMAR: Articles

UNIT IV**7 HOURS**

LISTENING: Story Narrations
 SPEAKING: Group Discussion
 READING: Reading Reports and profiles
 COMPOSITION WRITING: Letter Writing
 LITERATURE: One-act play- The Death Trap - H.H. Munro
 GRAMMAR: Tenses

UNIT V**7 HOURS**

LISTENING: Listening Strategies
 SPEAKING: Interview Skills
 READING: Tips for MOC- Anchoring
 COMPOSITION WRITING: Circular Writing and Summary Writing
 LITERATURE: Short story- The Snake Song by R K Narayan
 GRAMMAR: Subject Predicate, Framing Questions and Question Tags

TOTAL: 36 HOURS**TEXT BOOK :**

1. Board of Editors, (2024), *Acrostic I*, 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 (2012), *Sound Business*, 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://www.poemhunter.com/>
2. <https://hearthandfield.com/on-running-after-ones-hat-gk-chesterton-1915/>
3. <https://www.eastoftheweb.com/short-stories/UBooks/Bet.shtml>
4. <https://masthanappa.blogspot.com/2018/09/the-death-trap-h-h-munro-saki.html>
5. <https://shorturl.at/ud8rp>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(CO'S):

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

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

UNIT I Overview of C**10 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**10 HOURS**

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

UNIT III Arrays and User-Defined Functions**10 HOURS**

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

UNIT IV Pointers, Structures and Unions**9 HOURS**

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

UNIT V File Management**9 HOURS**

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

TOTAL: 48 HOURS**TEXT BOOKS:**

1. E. Balaguruswamy,(2019) “*Programming in ANSI C*”, 8th Edition, McGraw Hill Education
2. Stephen G. Kochan, (2014), “*Programming in C*”, 4th Edition, Pearson Education.

REFERENCE BOOKS:

1. Yash Avant P. Kanetkar, (2019) “*Let Us C*”, 16th Edition, BPB Publications
2. Kernighan B.W and Dennis M. Ritchie, (2015), “*The C Programming Language*”, 2nd Edition, Pearson Education India
3. Pradip Dey, Manas Ghosh, (2018), “*Programming in C*”, 2nd Edition, Oxford University Press.

WEBSITES:

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

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Number Systems and Boolean Algebra

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I NUMBER SYSTEM AND BINARY CODES**10 HOURS**

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

UNIT II DIGITAL LOGIC AND COMBINATIONAL SEQUENTIAL CIRCUITS 10 HOURS

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

UNIT III INPUT– COMBINATIONAL CIRCUITS**10 HOURS**

Multiplexers - Demultiplexers – 1-of-16 Decoders – BCD-Decimal Decoders - Encoders – Flip-flops: RS Flip-flops- Edge-triggered RS Flip-flops - Edge-triggered D Flip-flops - Edge-triggered JK Flip-flops.

UNIT IV CPU AND DMA**9 HOURS**

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

UNIT V MEMORY ORGANIZATION AND MULTIPROCESSORS**9 HOURS**

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

TOTAL: 48 HOURS**TEXT BOOKS:**

1. Donald P Leach, Albert Paul Malvino, GoutamSaha, (2015), “*Digital Principles and Applications*”, 8th edition , McGraw-Hill Education.
2. M. Morris Mano and Rajib Mall, (2017), “*Computer System Architecture*” The latest edition is the 3rd edition.

REFERENCE BOOKS:

1. K. Meena (2013), “*Principles of digital Electronics*”, PHI Learning.
2. M. Morris Mano, (2016), “*Digital Logic and Computer Design*”, Pearson Education.

WEBSITES:

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

CO, PO, PSO Mapping

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

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

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

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

UNIT II**10 HOURS****SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATION**

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

UNIT III INTERPOLATION**10 HOURS**

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

UNIT IV NUMERICAL DIFFERENTIATION AND INTEGRATION 9 HOURS

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

**UNIT V: 9 HOURS
NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS**

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

TOTAL: 48 HOURS**TEXT BOOKS:**

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

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

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

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

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

List of Programs

1. Write a C program to find the sum, average, standard deviation for a given set of numbers.
2. Write a C program to generate n prime, perfect, Armstrong numbers.
3. Write a C program to generate Fibonacci series.
4. Write a C program to print magic square of order n where $n > 3$ and 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. Balagurusamy, E. (2019). *Programming in ANSI C* (8th ed.). McGraw-Hill Education.
2. Stephen G. Kochan, (2014), “*Programming in C*”, 4th Edition, Pearson Education.

WEBSITES:

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

CO, PO, PSO Mapping

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

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

25CSU112G

Digital Productivity - Practical

Semester-I

5H - 2C

Instruction Hours/week: L: 0 T: 0 P:5

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam: 3 Hours

PREREQUISITE:

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

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

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

List of Programs**MS-Word**

1. Create a news-paper document with at least 200 words,
 - i. Use margins as, top:1.5, bottom:2, left:2, right:1 inch.
 - ii. Use heading "Gandhi Jayanti", font size: 16, font color: red, font face: Arial Black.
 - iii. With first letter "dropped" (use drop cap option) of the first paragraph containing a picture at the right side
 - iv. Use three columns from the second paragraph onwards till the half of the page.
 - v. Then use heading "Computer basics"
 - vi. Create paragraph using two columns till the end of the page.
2. Create a Mathematical question paper using, at least five equations
 - i. With fractions, exponents, summation function
 - ii. With at least one „m*n“ matrix
 - iii. Basic mathematical and geometric operators.
 - iv. Use proper text formatting, page color and page border.
3. Create a flowchart using,
 - i. Proper shapes like ellipse, arrows, rectangle, and parallelogram.
 - ii. Use grouping to group all the parts of the flowchart into one single object.

4. Create a table using table menu with,
 - i. At least 5 columns and 10 rows.
 - ii. Merge the first row into one cell.
 - iii. Merge the second row into one cell, then split the second row into three cells.
 - iv. Use proper table border and color.
 - v. Insert proper content into the table with proper text formatting.

MS-Excel

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

- 2 Grade is calculated as,
 - i. If $\% \geq 90$, then grade A
 - ii. If $\% \geq 80$ and < 90 , then grade B
 - iii. If $\% \geq 70$ and < 80 , then grade C
 - iv. If $\% \geq 60$ and < 70 , then grade D
 - v. If $\% < 60$, then grade F

- 3 Create a sales table using the following data,

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

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

MS-Power Point

1. Create a power-point presentation with minimum 10 slides
 - i. Use word art to write the heading for each slide.
 - ii. Insert at least one clip-art, one picture
 - iii. Insert at least one audio and one video
 - iv. Hide at least two slides

MS-Access

- 1 Create a database “Student” with,
 - i. At least one table named “mark sheet” with field name “student name, roll number, mark1, mark2, mark3, mark4, total”
 - ii. The data types are, student name: text, roll number: number, mark1 to mark4: number, total: number. Roll number must be the primary key.
 - iii. Enter data in the table. The total must be calculated using update query.

- iv. Use query for sorting the table according to the descending/ascending order of the total marks.

Google Suite

1. Create an email account in Gmail. Using the account created compose a mail to invite other college students for your college fest, enclose the invitation as attachment and send the mail to at least 50 recipients. Use CC and BCC options accordingly
2. Open your inbox in the Gmail account created, check the mail received from your peer from other college inviting you for his college fest, and download the invitation. Reply to the mail with a thank you note for the invite and forward the mail to other friends.
3. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.
4. Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.
5. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.
6. Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Vikas Gupta (2008), “*Comdex 14-1in-1 Computer course Kit*”, Dream Tech Bittu Kumar, “Master in Ms-Office”
2. Joan Lambert and Curtis Frye, (2022) “*Microsoft Office Step by Step (Office 2021 and Microsoft 365)*”. Microsoft Press.
3. Balaji Iyer. (2021) “*Google Workspace User Guide: The Ultimate Guide to Google Workspace Applications*” Packt Publishing.

REFERENCES:

1. V. Rajaraman, (2014), *Fundamentals of Computers*, Prentice-Hall of India.
2. J. Holler, (2024), *The Microsoft Office 365 Bible: The Most Updated and Complete Guide to Excel, Word, PowerPoint, Outlook, OneNote, OneDrive, Teams, Access, and Publisher from Beginners to Advanced*.
3. Alexis Leon, Mathews Leon, Leena Leon, (2013), *Introduction to Information Technology*, Vijay Nicole Imprints Pvt. Ltd.

WEBSITES:

1. <https://wiki.openoffice.org/wiki/Documentation>
2. <https://bosslinux.in/sites/default/files/BOSS4.0-Usermanual.pdf>
3. <http://windows.microsoft.com/en-in/windows/windows-basics-all-topics>
4. <http://office.microsoft.com/en-us/training/CR010047968.aspx>
5. <http://spoken-tutorial.org>
6. <https://wiki.openoffice.org/wiki/Documentation>.
7. <https://bosslinux.in/sites/default/files/BOSS4.0-usermanual.pdf>.
8. <http://windows.microsoft.com/en.in/windows/windows-basics-all-topics>.

CO, PO, PSO Mapping

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

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

25VAC101G

Yoga for Youth Empowerment

Semester-I

2H-2C

Instruction Hours / week: L: 2 T: 0 P: 0

Marks: Internal: 100 External: - Total: 100

End Semester Exam: - 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 to develop good Qualities and eliminating 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 about the yoga, life and practice Yoga asanas

COURSE OUTCOMES(COs):

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

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

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

Manavalakalai (SKY) Yoga: 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 kayakalpa, 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 BOOKS:**

1. *Yoga for Youth Empowerment-Value Education*, Thathuvagnani Vethathiri 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 Thathuvagnani Vethathir Maharishi
6. Simplified Physical Exercises- Thathuvagnani Vethathiri Maharishi
7. Sound Health through yoga - Dr.Chandrasekaran
8. The world orcer of Holistic unity- Thathuvagnani Vethathiri Maharishi
9. Thirukkural- Rev. Dr.G.U.pope
10. Yoga for modern age - Thathuvagnani Vethathiri Maharishi

CO, PO, PSO Mapping

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

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 குடியரிமைப்பணி 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

அலகு - 1**11 மணிநேரம்****தமிழ் இலக்கிய வரலாறு**

- தமிழிலக்கிய வரிசையில் திருமுறைகள்,
பன்னிரு திருமுறைகள் அறிமுகம்,
திருமுறை ஆசிரியர்களின் இலக்கியப் பங்களிப்பு.

பக்தி இலக்கியம்

- சைவம் - பெரியபுராணம் - திருமூலநாயனார் புராணம் -
(தேர்ந்தெடுக்கப்பட்ட 15 பாடல்கள்) - அந்தியிளம்
பிறைக்கண்ணி (1) - மற்றவர்தாம் (2), காவிநீர் (9) -
அந்நிலைமை (10), அந்தணர்தஞ் (11) - மற்றவன்றன் (12),
இவன் உயிர் (13), பாய்த்தியபின் (14) - வெய்யசுடர் (16) -
அங்கவளம் (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 பயிற்சி

- கட்டுரைப் படைப்பாக்கத்திறன்

அலகு - 2**10 மணிநேரம்****தமிழ் இலக்கிய வரலாறு**

- 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, அஃறிணை, அறிவியல் கலைச்சொற்கள்.

மொத்த மணிநேரம் – 48 மணிநேரம்

TEXT BOOK

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

பார்வை நூல்கள்

1. R1 - தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன், கலையக வெளியீடு, நாமக்கல்.
2. R2 - பெரியபுராணம் தொகுதி-1 பன்னிருதிருமுறை ஆய்வுமைய வெளியீடு, கற்பகம் உயர்கல்விக்கழகம், கோவை-21

இணையதளம்

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

இதழ்கள்

1. J1- International Research Journal of Indian Literature,irjil.in
2. 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

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	a) Poetry – Nagarjun b) Drama -Dhruva Swamini c) Novel - Nirmala , Thotharam d) Grammar – Kaal , Theen Prakar	9 HOURS
UNIT II	a) Poetry – Sita , Ram b) Drama – Mandhakini , Koma c) Novel – Mansaram , Jiyaram d) Grammar – Upsarg, Prathyay	9 HOURS
UNIT III	a) Poetry – Lakshman, Valmiki b) Drama – Ramaguptha , Chandhraguptha c) Novel – Sudha, Bhuvan Mohan Singh d) Grammar – Sabda Vyutpathi	10 HOURS
UNIT IV	a) Poetry -Vishvaamithra, Thrijada b) Drama –Sikhar Swami,Shakraj c) Novel – Udhaybanulaal, Siyaram d) Grammar – Sambandh Chochak	10 HOURS

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

10 HOURS

TOTAL: 48 HOURS

REFERENCE BOOKS:

1. Modern Poetry : *Bhoomija*

- Writer** : Nagarjun
- Editors** : Somdev & Shobhakanth
- Publisher** : Radha Krishna Publication
New Delhi – 110051

2. Drama : *Dhruva Swamini*

- **Writer** : Jayshankar Prasad
- **Publisher** : Sakshi Publication
S-16, Naveen Shahdara, Delhi – 110032

3. Novel : *Nirmala*

- **Writer** : Premchand
- **Publisher** : Prabhath Prakashan
4/19, Asaf Ali Road, New Delhi – 110002

4. Grammar : *Sugam Hindi Vyakaran*

- **Writers** : Prof. Vamsidhar & Dharmapal
- **Publisher** : Siksha Bharathi
Madharsa Road, New Delhi – 110006

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not required

COURSE OBJECTIVE(CO):

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

COURSE OUTCOME(COs):

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	-	1.2	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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 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 Prose, Important prose works in Sanskrit

UNIT II

9 HOURS

Balaramayana – Balakanda

UNIT III

10 HOURS

Balaramayana – Ayodhyakanda

UNIT IV**10 HOURS**

Balaramayana – Aranyakanda

UNIT V**10 HOURS**

Athmanepada Declension of ending nouns (feminine)

Passages from Sanskrit Self Teacher (Simple sentences)

TOTAL: 48 HOURS**TEXT BOOK:**

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

CO, PO, PSO Mapping

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

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

25LFU201G

Language: French – II

4H-3C

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

Instruction Hours/week: L:4 T:0 P:0

Marks: Internal:40 External:60 Total:100

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNITÉ I**9 HOURS**

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

UNITÉ II**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 dessinées.

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 verbes irréguliers
- e) Lexique - Les aliments, Les quantités, Les commerces et les commerçants
- f) Culture - Les plats français

UNITÉ IV

10 HOURS

- a) Leçon - Décourvez 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 démonstratifs, La formation du féminin Le pronom indéfini on, passé composé.
- d) Verbes - les du premier groupe en -yer, Les verbes voir et sortir
- e) Lexique - Les sorties Situer dans le temps, La famille, (2) Les vêtements et les accessoires
- f) Culture - Le pays des gourmands

TOTAL: 48 HOURS

REFERENCE BOOKS:

1. Cocton Marie –Noëlle, Duplex Dorothée, Heu Elodie, Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de français**, Didier, Paris, 2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie, Ripaud Deldphin, **Saison 1 – Cahier d'activités**, Dider, Paris, 2015
3. Anne Akyüz, Bernadette Bazelle- Shahmael, Joëlle Bonenfant, 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 exercices, CLE International, Paris, 2005

WEBSITES :

1. <http://enseigner.tv5monde.com/>
2. [bonjourdumonde.com /exercices/contenu/le – francais-du- tourisme.html](http://bonjourdumonde.com/exercices/contenu/le-francais-du-tourisme.html)
3. <http://www.bonjurdefrance.com/>
4. <https://www.lepointdufle.net/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I**8 HOURS**

LISTENING: Listening to Different Accents and Intonation

SPEAKING : Preparing for Small Talks

READING : Syllabification

COMPOSITION WRITING: Developing a story with pictures

LITERATURE: Refuge Mother and Child by Chinua Achebe (Poetry)

GRAMMAR: Subject verb agreement

UNIT II**7 HOURS**

LISTENING: Listening in Different Contexts

SPEAKING: Oral Presentation

READING: Reading Passages

COMPOSITION WRITING: Hints Development

LITERATURE: Prose: My Childhood- Dr. A.P.J. Abdul Kalam

GRAMMAR: Phrases and Clauses

UNIT III**7 HOURS**

LISTENING: Listening to Buisness stories/Tedtalks

SPEAKING: Public speaking and secrets of good delivery

READING: Note Making

COMPOSITION WRITING: Rearranging Paragraphs

LITERATURE: Poem: A Gift of India - Sarojini Naidu
 GRAMMAR: Voice

UNIT IV

7 HOURS

LISTENING: Listening to instructions and announcements
 SPEAKING: Debating
 READING: Close Reading
 COMPOSITION WRITING: Writing Agenda, Memos, Minutes and Notices
 LITERATURE: Play: Dance Like a Man - Mahesh Dattani
 GRAMMAR: Degrees of Comparison

UNIT V

7 HOURS

LISTENING: Listening to Product Description- Labelling and Gap Filling Exercises
 SPEAKING: Developing Argument and Closing Argument
 READING: Reading Comprehension/ Summary Writing
 COMPOSITION WRITING : Dialogue Writing
 LITERATURE: Short- story: The Bear Hunt- Leo Tolstoy
 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://allpoetry.com/>
2. <https://ncert.nic.in/textbook/pdf/iebe106.pdf>
3. <https://poets.org/poem/gift-india>
4. <https://shorturl.at/4sgld>
5. <https://sportingclassicsdaily.com/leo-tolstoy/>

CO, PO, PSO Mapping

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

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

25CSU201G

Java Programming

Semester-II

4H - 3C

Instruction Hours/week: L:4 T:0 P: 0

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

PREREQUISITE:

- Not Applicable

COURSE OBJECTIVES (CO):

The goal of this course is for students to:

- Introduce the fundamentals of Object-Oriented Programming (OOP) and the evolution of Java, enabling students to understand and apply key OOP concepts and Java programming structure effectively.
- Develop the ability to write Java programs using core features such as data types, control structures, arrays, classes, objects, interfaces, packages, multithreading, and exception handling.
- Equip students with practical skills in applet development and file I/O operations, including stream handling and file management techniques for real-world application development.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Explore the principles of Object-Oriented Programming and including its features, structure, and role in internet applications.	Understand
CO2	Apply Java programming constructs such as variables, data types, control structures, classes, and objects to develop simple to intermediate-level applications.	Understand
CO3	Implement and manipulate arrays, strings, interfaces, and packages, and develop multithreaded Java programs for concurrent execution.	Apply
CO4	Handle runtime errors using exception handling mechanisms and create interactive web-based applications using Java Applets.	Apply
CO5	Perform file input/output operations in Java using byte streams, character streams, and random access files for data storage and retrieval.	Understand

UNIT I FUNDAMENTALS OF OBJECT-ORIENTED PROGRAMMING 8 HOURS

Object-Oriented Paradigm – Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming –Application of Object-Oriented Programming. Java Evolution: History – Features – How Java differs from C and C++ – Java and Internet – Java and www – Web Browsers. Overview of Java: simple Java program – Structure – Java Tokens – Statements – Java Virtual Machine.

UNIT II DATATYPES, BRANCHING, LOOPING & CLASSES AND OBJECTS

10 HOURS

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching:if, if...else, nested if, switch, ? : Operator - Decision Making and Looping: while, do, for – Jumps in Loops - Labeled Loops – Classes, Objects and Methods.

UNIT III ARRAYS AND INTERFACES

10 HOURS

Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming – Creating Threads – Extending the Thread Class – Stopping and Blocking a Thread – Life Cycle of a Thread – Using Thread Methods.

UNIT IV ERROR HANDLING

10 HOURS

Managing Errors and Exceptions: Types of Errors – Exceptions – Syntax of Exception Handling Code – Multiple Catch Statements – Using Finally Statement – Throwing Our Own Exceptions – Using Exceptions for Debugging – Applet Programming -How Applets differ from Applications – Applet Life Cycle – Designing a Web Page – Adding Applet to HTML File – Running the Applet.

UNIT V MANAGING INPUT / OUTPUT FILES IN JAVA

10 HOURS

Concepts of Streams- Stream Classes – Byte Stream classes – Character stream classes – Using streams – I/O Classes – File Class – I/O exceptions – Creation of files – Reading/Writing characters, Byte-Handling Primitive data Types – Random Access Files.

TOTAL: 48 HOURS

TEXT BOOKS:

1. E. Balagurusamy, (2023) *Programming with Java – A Primer - 7th Edition*, TMH.
2. Herbert Schildt (2018), *Java: The Complete Reference*, McGraw Hill Education, Oracle Press 10th Edition

REFERENCE BOOKS:

1. John R. Hubbard, (2004), *Programming with Java*, 2nd Edition, TMH.
2. Cay Horstmann, (2020), *BIG Java*, 3rd Edition, Wiley Publication.

WEBSITES:

1. www.spokentutorial.org
2. www.nptel.ac.in
3. <https://www.w3schools.com/java/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not Required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I Arrays and Stacks**10 HOURS**

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

UNIT II Queues and Linked Lists**10 HOURS**

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

UNIT III Trees**10 HOURS**

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

UNIT IV Graphs**9 HOURS**

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

UNIT V Sorting, Searching and Hashing**9 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: 48 HOURS**TEXT BOOKS:**

- 1 Salaria, R. S. (2022). *Data structures & algorithms using C* (5th ed.). Khanna Book Publishing Co. Pvt. Ltd. SRS Enterprises.
- 2 Seymour Lipschutz, (2014), *Data Structures* McGraw Hill Publications, 1st Edition

REFERENCE BOOKS:

- 1 Tremblay, J. P., & Sorensen, P. G. (2017). *An introduction to data structures with applications* (2nd ed.). Tata McGraw-Hill
- 2 Pai, V. G. A. (2017). *Data structures and algorithms: Concepts, techniques, and applications* (1st ed.). McGraw-Hill Education.
- 3 Lipschutz, S. (2014). *Data structures* (1st ed.). McGraw-Hill Education.

WEBSITES:

- 1 <https://www.cs.usfca.edu/~galles/visualization/Algorithms.html>
- 2 <https://www.doccity.com/en/data-structures-and-algorithm-explanation-and-types/8851110/>

CO, PO, PSO Mapping

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

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

25MAU201G

Discrete Structures

Semester-II

4H – 4C

Instruction Hours/week: L:4 T:0 P:0

Marks: Internal:40 External:60 Total:100

End Semester Exam: 3 Hours

PREREQUISITE:

- Understanding of basic algebra and calculus.

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Interpret logical connectives and truth tables in well-formed formulas.	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 PROPOSITIONAL LOGIC**10 HOURS**

Propositions - 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=POsg0THUGzQ>
2. <https://www.youtube.com/watch?v=XDSO-IVDFxQ>
3. https://www.youtube.com/results?search_query=Basic+terminology+and+properties+of+trees

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not required

COURSE OBJECTIVES (CO):

The main objectives of this course are to:

- The main objective of JAVA Programming Lab is to provide the students a strong foundation on programming concepts and its applications through hands-on training.
- Practice the Basic concepts, Branching and Looping Statements and Strings in C programming.
- Implement and gain knowledge in Arrays, functions, Structures, Pointers and File handling.

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the basic concepts of Java Programming with emphasis on ethics and principles of professional coding.	Understand
CO2	Demonstrate the creation of objects, classes and methods and the concepts of constructor, methods overloading, Arrays, branching and looping.	Understand
CO3	Create data files and Design a page using AWT controls and Mouse Events in Java programming Implement the concepts of code reusability and debugging.	Apply
CO4	Develop applications using Strings, Interfaces and Packages and applets.	Apply
CO5	Construct Java programs using Multithreaded Programming and Exception Handling.	Apply

List of Programs

1. Write a Java Applications to extract a portion of a character string and print the extracted string.
2. Write a Java Program to implement the concept of multiple inheritance using Interfaces.
3. Write a Java Program to create an Exception called payout-of-bounds and throw the exception.
4. Write a Java Program to implement the concept of multithreading with the use of any three multiplication tables and assign three different priorities to them.
5. Write a Java Program to display message in the applet windows.

6. Write a Java Program to create a frame with four text fields name, street, city and pin code with suitable tables. Also add a button called my details. When the button is clicked its corresponding values are to be appeared in the text fields.
7. Write a Java Program to demonstrate the Multiple Selection List-box.
8. Write a Java program to search for a key element in a binary search tree.
9. Write a Java program for the implementation of BFS for a given graph.
10. Write a Java program for the implementation of DFS for a given graph.

TOTAL: 60 HOURS

TEXT BOOKS:

1. E. Balagurusamy (2023), *Programming with Java – A Primer*, 7th Edition, TMH.
2. Herbert Schildt (2018), *Java: The Complete Reference*, McGraw Hill Education, Oracle Press 10th Edition.

REFERENCE BOOKS:

1. John R. Hubbard, (2004), *Programming with Java*, 2nd Edition, TMH.
2. Cay Horstmann, (2020), *BIG Java*, 3rd Edition, Wiley Publication.

WEBSITES:

1. www.spokentutorial.org
2. www.nptel.ac.in
3. <https://www.w3schools.com/java/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

Familiarity with Data Visualization.

COURSE OBJECTIVES (CO):

- Perform data cleaning, transformation, and analysis using Advanced Excel.
- Design dynamic and interactive dashboards using Power BI and Tableau.
- Use real-time data to build visual insights for decision making.
- Apply Business Intelligence concepts to solve real-world problems.
- Demonstrate the ability to communicate findings effectively using visual storytelling.

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Apply advanced Excel features	Understand
CO2	Develop interactive dashboards and reports using Power BI with real-time data connections.	Understand
CO3	Use Tableau to build interactive visualizations and storyboards from raw datasets.	Analyze
CO4	Evaluate and compare insights from Excel, Power BI, and Tableau to solve business problems.	Analyze
CO5	Demonstrate data storytelling and decision-making using visual representations tailored for business users.	Apply

List of Programs**Advanced Excel**

1. Create a worksheet to calculate the Result and Grade of students using IF, AND, and OR functions based on marks in five subjects.
2. Apply **Conditional Formatting** to highlight:
 - a. Marks above 90 in green
 - b. Marks below 50 in red
 - c. Top 3 scores in bold blue
3. Create a **PivotTable** to summarize exam data:
 - a. Show average, maximum, and minimum marks for each subject
4. Design a mini dashboard and chart to show student performance including:
 - a. Number of passed/failed students
 - b. Average scores
 - c. Conditional formatting to show top performers
5. Record a **Macro** to automatically format a result sheet (font style, borders, background color).

Power BI / Tableau.

6. Import a dataset with missing values into Power BI / Tableau. Identify the missing/null values in columns. Replace null values:
 - a. With zero (for numerical data)
 - b. With “Not Available” (for categorical/text data)
7. Import a dataset that contains duplicate records.
 - a. Identify duplicate rows based on key columns (e.g., ID, Name).
 - b. Remove the duplicate entries using the Power Query Editor (Power BI) or Data Interpreter (Tableau).
8. Use a column like "Full Name" and split it into “First Name” and “Last Name”. Combine “City” and “State” columns into a new column called “Location”. Use appropriate transformation tools (Split Column in Power BI or Split function in Tableau).
9. Check data types assigned to each column after import. Change incorrect types:
 - a. Convert text-based dates to Date format.
 - b. Change numerical text (e.g., “1000”) to Number.
10. Convert inconsistent case (e.g., "Coimbatore", "coimbatore", "COIMBATORE") to proper case format.
 - a. Trim unnecessary white spaces in text fields.
 - b. Replace common spelling errors (e.g., “Tamilnadu” vs “Tamil Nadu”).
11. Identify and filter out records with extreme or invalid values (e.g., Age = 0 or > 100). Use filters to only keep records within valid ranges. Create a visualization before and after outlier removal to compare.
12. Load the cleaned data into Power BI/Tableau.
 - a. Create basic charts like bar graphs, pie charts, or tables to summarize:
 - b. Total Records
 - c. Clean vs Dirty Data
 - d. Count of Nulls before & after

TOTAL: 48 HOURS

TEXT BOOKS:

1. Michael Alexander, Richard Kusleika, and John Walkenbach , “*Excel 2021 Bible*”.
2. Bluttman, K. (2021). “*Excel Formulas and Functions for Dummies*”. For Dummies.
3. Milligan, J. N. (2020). “*Learning Tableau 2020: Create effective data visualizations, build interactive visual analytics, and transform your organization*” (3rd ed.). Packt Publishing.
4. Arnold, J. (2022). “*Learning Microsoft Power BI*” O’Reilly Media.

REFERENCES:

1. Célia Talma Gonçalves, Maria José Angélico Gonçalves and Maria Inês Campante,(2023) “*Developing Integrated Performance Dashboards Visualisations Using Power BI as a Platform*”, Information.
2. Mr.Bharat Mane, Dr.Chandrani Singh, Dr.Sunil Khilari (2022) “*Business Intelligence Tool- Power BI for Performance Management*”, SSRN.

WEBSITES:

1. <https://www.excel-easy.com/>
2. <https://learn.microsoft.com/en-us/power-bi/>
3. <https://www.tutorialspoint.com/tableau/index.htm>

CO, PO, PSO Mapping

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

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

25VAC201G

Environmental Studies

Semester-II

2H-2C

Instruction Hours/week: L:2 T:0 P: 0

Marks: Internal: 100 External: - Total: 100

End Semester Exam:- - Hours

PREREQUISITE:

- Students should know about the fundamentals of the environment.

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the structure and functions of various ecosystems.	Understand
CO2	Familiarize yourself, the ethical and historical context of natural resources, and the methods for conservation.	Remember
CO3	Analyze the interactions between social and environmental problems.	Analyze
CO4	Predict current scenarios and find ways the protect and betterment of the habitat.	Apply
CO5	Develop systems to analyze the interactions between social and Environmental processes.	Create

UNIT I INTRODUCTION - ENVIRONMENT & ECOSYSTEMS**5 HOURS**

Environment Definition, Scope and Importance; Ecosystem, Structure, classification, and functions of the ecosystem. Energy flow, Food chains and food webs, Ecological succession. Forest ecosystem, Grassland Ecosystem, Desert ecosystem, Aquatic ecosystems.

UNIT II NATURAL RESOURCES - RENEWABLE AND NON-RENEWABLE RESOURCES**5 HOURS**

Natural resources - Renewable and non-renewable resources. Land resources, Land degradation, and 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, and 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, and man-wildlife conflicts.

UNIT IV ENVIRONMENTAL POLLUTION**5 HOURS**

ENVIRONMENTAL POLLUTION: Causes, effects and control measures of Air pollution, Water pollution, Soil pollution, and Noise pollution. Nuclear hazards and human health risks.

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT

4 HOURS

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

TOTAL: 24 HOURS

TEXT BOOKS:

1. Anonymous. (2004). *A Text book for Environmental Studies, University Grants Commission and Bharat Vidyaapeeth 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.
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REFERENCE BOOKS:

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5. Verma, P.S., and Agarwal V.K(2016). *Environmental Biology (Principles of Ecology)*. S. Chand and Company Ltd, New Delhi.

CO, PO, PSO Mapping

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

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

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 குடியரிமைப்பணி 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
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, தற்றுாக்கி, 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)
- மூதுரை** - (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 – கவியரசு
கண்ணதாசன் - 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
- எழுத்து – குறில், நெடில் வேறுபாடு – லகர, ளகர, 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 மணிநேரம்

TEXT BOOK

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

பார்வை நூல்கள்

1. R1- தமிழ் இலக்கிய வரலாறு, முனைவர் கா.கோ. வேங்கடராமன், கலையக
வெளியீடு, நாமக்கல்.
2. R2 - வகைமை நோக்கில் தமிழ் இலக்கிய வரலாறு, முனைவர் பாக்யமேரி,
பூவேந்தன் பதிப்பகம், சீனிவாசா சாலை, மயிலாப்பூர், சென்னை.

இணையதளம்

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

இதழ்கள்

1. J1- International Research Journal of Indian Literature, irjil.in
2. 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	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

B. Sc Computer Science(Cyber Security)

2025-2026

Semester III

25LHU301G

Language: Hindi – III

4H-3C

(Story, History Of Hindi Literature, Novel, Letter Writing)

Instruction Hours/week: L:4 T:0 P:0

Marks: Internal:40 External:60 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	a) Story – Bade Ghar Ki Beti b) Hindi Bhasha Ka Vikas c) Novel – Ramnath,Jalpa d) Letter Writing –Personal Letter	9 HOURS
UNIT II	a) Story – Puraskar b) Kaal Vibhajan , Char Prakar c) Ramesh Babu ,Devdeen d) Letter Writing – Leave Letter	9 HOURS
UNIT III	a) Story – Usne Kaha Tha b) Literature – Adhikaal c) Indhubhooshan, Rathna,Johra d) Letter Writing – Letter for the Publisher	10 HOURS
UNIT IV	a) Story – Paanchminte b) Poorva Madhya Kaal c) Manibhooshan,Dhayanath,Rameshwari d) Letter Writing – Application for job	10 HOURS
UNIT V	a) Story – kafan b) Reethi Kaal,Adhunik Kaal c) Dheen Dhayal,Manaki, d) Letter Writing – Complaint Letter	10 HOURS
		TOTAL: 48 HOURS

REFERENCE BOOKS:

1.Story : Kahani Manjari

Publisher : D.B.Hindi Prachar Sabha
T.Nagar , Chennai – 600017

2.History of Hindi

Literature : Hindi Sahithya ka Saral Ithihas

Writer : Rajnath Sharma.A

Publisher : Vinoth Pusthak Mandir

Agra – 02

3.Novel : Gaban

Writer : Premchandh

Publisher : Rajkamal Prakashan

New Delhi – 110002

4.Letter Writing : Sumitha Hindi Nibandh Aur Pathra Lekhan

Writer : Sri Sharan

Publisher : Kalda Publication

Mukhar Ji Nagar, Delhi - 09

CO, PO, PSO Mapping

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

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

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 Sahithya Charithram – T.M.Chummar (Kerala Sahithya Academy,Trichur)

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2

CO1	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	0.6	1	0.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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

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

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

PREREQUISITE:

- Not required

COURSE OBJECTIVES (CO):

- To enable students to recognize native 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**

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

UNITÉ II**9 HOURS**

- Leçon - On vend ou on garde ?

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

UNITÉ III

10 HOURS

- a) Leçon
- b) Communication- permettre, défendre.
- c) Grammaire -La formation du pluriel (2) Les adjectifs de couleur,
Les adjectifs beau, nouveau, vieux
- d) Lexique - Les couleurs, Les formes, Les mesures
- e) culture – les grandes fleuves en France.

UNITÉ 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, mettre et vendre
- d) Lexique – Les mesures, L'informatique DIRE, LIRE, ECRIRE ,
Les sons [E] / [O] / [Œ]
- e) Culture –Les lieux de la ville.

UNITÉ V

10 HOURS

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

TOTAL: 48 HOURS

REFERENCE BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de français**, Didier, Paris, 2015.
2. Cocton Marie – Noëlle, Duplex, Heu Elodie, Kasazian Emilie ,Ripaud Delphine, **Saison 1 – Cahier d'activités** , Dider ,Paris , 2015
3. Anne Akyüz, Bernadette Bazelle- Shahmael, Joëlle Bonenfant, **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 exercices, CLE International, Paris, 2005

WEBSITES :

1. <http://enseigner.tv5monde.com/>
2. [bonjourdumonde.com /exercices/contenu/le – francais-du- tourisme.html](http://bonjourdumonde.com/exercices/contenu/le-francais-du-tourisme.html)
3. <http://www.bonjurdefrance.com/>
4. <https://www.lepointdufle.net/>

CO, PO, PSO Mapping

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

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

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 improve the ability to comprehend and interpret spoken information accurately.
- To cultivate effective communication for various professional and personal scenarios.
- To develop student entrepreneurs by training them as English language instructors and promoting communicative English in schools and colleges.

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.	Remember
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.	Apply
CO4	Follow leadership, work ethics and management principles.	Understand
CO5	Express values and skills gained through effective communication to other disciplines.	Understand

UNIT I**8 HOURS**

LISTENING: Listening Comprehension-Listening for Specific Information- Interpreting Charts and Diagrams

UNIT II**7 HOURS**

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

UNIT III**7 HOURS**

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

UNIT IV**7 HOURS**

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

Abbreviations-Spellings Rules Translation- Translating Short Sentences and Passages from English to Tamil

UNIT V

7 HOURS

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

TOTAL: 36 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEBSITES:

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

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Knowledge in computer language.

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

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

UNIT I INTRODUCTION**12 HOURS**

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

UNIT II PROCESS MANAGEMENT**12 HOURS**

Process Management: Processes: Process concept, Process scheduling, Co-operating processes, Operations on processes, Inter process communication, Communication in client-server systems.

Threads: Introduction to Threads, Single and Multi-threaded processes and its benefits, User and Kernel threads, Multithreading models, Threading issues.

CPU Scheduling :Basic concepts, Scheduling criteria, Scheduling Algorithms, Multiple Processor Scheduling, Real-time Scheduling, Algorithm Evaluation, Process Scheduling Models.

Process Synchronization : Mutual Exclusion, Critical –section problem, Synchronization hardware, Semaphores, Classic problems of synchronization, Critical Regions, Monitors, OS Synchronization, Atomic Transactions

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

UNIT III MEMORY MANAGEMENT**12 HOURS**

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

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

UNIT IV FILE ORGANIZATION

12 HOURS

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

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

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

UNIT V PRODUCTION AND SECURITY

12 HOURS

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

TOTAL: 60 HOURS

TEXT BOOKS:

1. Khurana, R. (2023). *Operating System* (2nd ed.). Vikas Publishing.
2. Silberschatz, A., Galvin, P. B., & Gagne, G. (2023). *Operating System Concepts* (9th ed.). Techno Series
3. Silberschatz, A., Peterson, J. L., & Galvin, P. B. (2020). *Operating system concepts* (10th ed.). John Wiley & Sons.

REFERENCE BOOKS:

1. Deitel, H. M., Deitel, P. J., & Choffnes, D. R. (2023). *Operating System* (3rd ed.). Pearson Education.
2. Bhatt, P. C. P. (2023). *An Introduction to Operating Systems: Concepts and Practice (GNU/Linux and Windows)* (5th ed.). PHI Learning

WEBSITES:

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

CO,PO,PSO Mapping

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

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

PREREQUISITE:

- Basic understanding of Networking Concept.

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

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

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

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

UNIT II DATA LINK LAYER**8 HOURS**

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

UNIT III MULTIPLE ACCESS PROTOCOLS**8 HOURS**

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

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

Network layer and Transport layer: Logical addressing – IPv4 addressing, IPv4 address Classes, Subnet Mask, Public & Private IP Address and IPV6 addressing, Address mapping-ICMP, IGMP. Connectionless and Connection-Oriented Services: Transport layer services, UDP and TCP. Congestion Control, Quality of Service. Introduction to Routing and Switching concepts.

UNIT V APPLICATION LAYER

12 HOURS

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

TOTAL: 48 HOURS

TEXT BOOKS:

1. Kizza, J. M. (2024). *Computer Network Security and Cyber Ethics* (4th ed.). .
2. Kurose, J., & Ross, K. (2023). *Computer Networking: A Top-Down Approach* (8th ed.).
3. Odom, W. (2023). *Computer Networking First-Step*.
4. Tanenbaum, A. S., Feamster, N., & Wetherall, D. J. (2021). *Computer Networks* (6th ed.). Pearson Education

REFERENCE BOOKS:

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

WEBSITES:

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

CO,PO,PSO Mapping

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

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

B. Sc Computer Science(Cyber Security)

2025-2026

25MAU301G

Operations Research

Semester-III

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	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

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

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

PREREQUISITE:

- Basic understanding of Networks Concept.

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

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

List of Programs

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

TOTAL: 48 HOURS

TEXT BOOKS::

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

WEBSITES:

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

CO,PO,PSO Mapping

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

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

PREREQUISITE:

- Not Applicable.

COURSE OBJECTIVES (CO):

- 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 (COs):

Upon completion of this course, students will be able to

COs	Course Outcomes	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. Sojan Lal, "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

1 - Low, 2 - Medium, 3 - High, ‘-’ – No Correlation

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: - Hours

PRE-REQUISITE:

- Not required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I INTRODUCTION AND PRINCIPLES**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**5 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 DIGITAL LITERACY AND EMPOWERMENT INITIATIVES**5 HOURS**

Digital Literacy and Empowerment Initiatives –Community Training: Basic computer and internet use - Social media usage and safety: WhatsApp, Facebook, Telegram - Cyber safety and digital payments - Designing digital surveys and feedback mechanisms (Google Forms) – Data collection, analysis, and problem identification. Accessing e-governance portals (Aadhaar, DigiLocker, etc.).

UNIT V ICT FOR PROMOTING SELF-HELP GROUPS (SHGS)**4 HOURS**

ICT for Promoting Self-Help Groups (SHGs) – Digital promotion tools: simple websites, social media marketing- Online branding using simple websites and social media page – Selling products through WhatsApp Business, Amazon etc. - Digital finance and payments: UPI, BHIM, Paytm, PhonePe,- Record-keeping using spreadsheets and mobile apps.

TOTAL: 24 HOURS**TEXT BOOK:**

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

WEBSITES:

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

CO, PO, PSO Mapping

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

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

தமிழக வரலாறும் பண்பாடும்

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 குடியரிமைப்பணி 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

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

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

அலகு – 3 தமிழர்களின் வணிகம்

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

அலகு – 4 தமிழகப் பண்பாட்டில் கொங்கு நாடு

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

அலகு – 5 தமிழகத் தொல்லியல் ஆய்வுக்களங்கள்

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

TEXT BOOK

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

பார்வை நூல்கள்

1. R1- தமிழக வரலாறு மக்களும் பண்பாடும் – கே.கே.பிள்ளை – உலகத் தமிழாராய்ச்சி நிறுவனம், தரமணி, சென்னை.
2. R2 - தமிழக வரலாறும் பண்பாடும் – வே.தி.செல்வம் – மணிவாசகர் பதிப்பகம், பிராட்வே, சென்னை.

இணையதளம்

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

இதழ்கள்

1. J1- International Research Journal of Indian Literature, irjil.in
2. 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	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	2.6	2.6	2.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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

- UNIT V**
- Kavya Ke Adhar Par Prakruthik Varnan
 - Bheem Aur Raakshas
 - Essay – Adhunik Nari
 - Translation – Lesson –13 to 15

10 HOURS

TOTAL: 48 HOURS

REFERENCE BOOKS::

- Poetry : Panchavati
 Writer : Mythili Sharan Guptha
 Publisher : Bharathiya Sahithya Sangrah
 Kanpur – 208002, Uttar Pradesh
- One Act Play : Adarsh Akanki
 Publisher : D.B.Hindi Prachar Sabha
 T. Nagar, Chennai – 600017, Tamil Nadu
- Essay : Nibandh Nishchay
 Editor : Dr.Sharadh Ranjan
 Publisher : Hindi Sahithya Sammelan Prayag
 12.Sammelan Marg, Illahabadh
- Translation : Anuvadh Abhyas – III
 Publisher : D.B.Hindi Prachar Sabha
 T.Nagar, Chennai – 600017, Tamil Nadu

CO, PO, PSO Mapping

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

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

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)
Nataroopacharcha, Kattumadam Narayanan (NBS, Kottayam)
4. Chalachithrasameeksha–Vijaykrishanan.
5. Cinemayude Paadangal-VisakalanavumVeekshanavum – Jose-K.Manual.

CO, PO, PSO Mapping

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Average	0.6	1.8	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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

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:

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

CO, PO, PSO Mapping

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

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

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

TOTAL: 48 HOURS**REFERENCE BOOKS:**

1. Cocton Marie –Noëlle , Duplex Dorothee, Heu Elodie , Kasazian Emilie, Ripaud Delphine,
Saison 1- Méthode de français, Didier, paris.2015.
2. Cocton Marie – Noëlle, Duplex, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, **Saison 1**
– **Cahier d'activités** , Dider ,Paris , 2015
3. Anne Akyüz, Bernadette Bazelle- Shahmael, Joëlle Bonenfant, 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 exercices, CLE**
International , Paris , 2005

WEBSITES:

1. <http://enseigner.tv5monde.com/>
2. [bonjourdumonde.com /exercices/contenu/le – francais-du- tourisme.html](http://bonjourdumonde.com/exercices/contenu/le-francais-du-tourisme.html)
3. <http://www.bonjurdefrance.com/>
4. <https://www.lepointdufle.net/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I**8 HOURS**

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

UNIT II**7 HOURS**

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

UNIT III**7 HOURS**

Writing-Writing Resume and Covering Letter- Types of Letter Writing-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

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

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

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs)

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

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

UNIT I INTRODUCTION**12 HOURS**

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

UNIT II CYBER ATTACKS**12 HOURS**

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

UNIT III E-MAIL SECURITY**12 HOURS**

Email Security: Security Services for email, Attacks possible through email, Establishing Keys privacy, authentication of the source, Message Integrity, Non-repudiation, Pretty Good Privacy, S/MIMEIP Security: Over view of IP Sec, IPv4 and IPv6, Authentication header, Encapsulation Security Pay load (ESP), Internet Key ExchangeTransport Level Security: SSL / TLS Basic Protocol, computing the keys, client authentication, PKI as deployed by SSL, Attacks fixed in v3, Exportability, Encoding, Secure Electronic Transaction (SET)

UNIT IV HASH FUNCTIONS AND MAC**12 HOURS**

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

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

UNIT V CYBER CRIMES AND CYBER LAWS**12 HOURS**

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

TOTAL: 60 HOURS**TEXT BOOKS:**

1. Sammons, John, and Michael Cross. The basics of cyber safety: computer and mobile device safety made easy. Elsevier, 2016.
2. Charles P.Pfleeger, Shari Lawrence ,Pfleeger Jonathan Margulies; Security in Computing, Pearson Education Inc. 5th Edition, 2015

REFERENCE BOOKS:

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

WEBSITES:

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

CO, PO, PSO Mapping

Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	2	-
CO2	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	2
CO3	-	-	3	2	1	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	2	-	-	-	-	-	-	1	-	1	-	-	-	-
CO5	2	-	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Average	2	-	3	2	1	-	-	3	-	-	1	-	1	-	-	2	2

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

PREREQUISITE:

- Computer networks and cybersecurity fundamentals.

COURSE OBJECTIVES(CO):

- Familiarize students with network protection tools, including firewalls, intrusion detection systems, and proxies.
- Introduce secure communication protocols, techniques, and LAN attack methods such as ARP cache poisoning and VLAN hopping.
- Provide knowledge about web security, IP security, and firewalls.

COURSE OUTCOMES(COs):

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

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

UNIT I INTRODUCTION TO NETWORK SECURITY**7 HOURS****TECHNIQUES FOR NETWORK PROTECTION, MONITORING AND DETECTION:**

Firewalls, packet filter and stateful firewalls, application aware firewalls, personal firewalls – IP tables, Proxies, NAT, Intrusion Detection System-Snort, Signature and Anomaly based detection, Honeybots and Honeynets. Network Log management-syslog or SPLUNK.

UNIT II SECURE NETWORK COMMUNICATION**7 HOURS**

Secure Network Communication: SCP, SSH, SSL3.0, TLS1.2, START TLS, IPSec, VPN and Secure HTTP; Attacks on SSL / TLS: SSL stripping, Drown and Poodle attack.

**UNIT III ENCRYPTING AND SIGNING EMAILS
HOURS****7**

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**7 HOURS**

Attack Techniques: Network reconnaissance – Nmap and vulnerability audits – open VAS; DNS based attacks, Phishing – DNS Twist ; Network based malware attacks: Remote access Trojan – Poison Ivy and Domain name generation algorithm – based Botnets

UNIT V LAN ATTACKS**8 HOURS**

LAN attacks: ARP Cache poisoning- Ettercap / arpspoof, MAC flooding, Port Stealing, DHCP attacks, VLAN hopping; Network Sniffing – Wire shark and Password Cracking-John the Ripper

TOTAL: 36 HOURS**TEXT BOOKS:**

1. Stallings, W. (2020). *Cryptography and network security: Principles and practice* (8th ed.). Pearson Education.
2. Forouzan, B. A. (2015). *Cryptography and network security* (3rd ed.). McGraw-Hill Education.
3. Stallings, W. (2016). *Network security essentials: Applications and standards* (6th ed.). Pearson.

REFERENCE BOOKS:

1. Vacca, J. R. (2023). *Computer and information security handbook* (4th ed.). Morgan Kaufmann.
2. William Stallings (2020), *Cryptography and Network Security: Principles and Practice*, 8th Edition, Pearson edition.

WEBSITES:

1. <https://dl.hiva-network.com/Library/security/Cryptography-and-network-security-principles-and-practice.pdf>
2. <https://daxinimehul321.wordpress.com/wp-content/uploads/2014/11/cryptography-and-network-security-forouzan-copy.pdf>
3. <https://aitskadapa.ac.in/ebooks/CSE/COMPUTER%20NETWORKS/PrinciplesEdition.pdf>

CO,PO,PSO Mapping

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

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

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.
- To equip students with skills in univariate and bivariate analysis, including measures of central tendency, dispersion, correlation, regression, and the construction of index numbers.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the counting principles, probability rules, and theorems to solve probability problems.	Analyze
CO2	Apply probability distributions such as Binomial, Poisson, Uniform, Normal, and Exponential 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 Edge worth and Fisher’s Ideal Index Numbers - Simple problems.

TOTAL: 48 HOURS**TEXT BOOKS:**

1. Ross, S.M. (2021). *A First Course in Probability*, 10th Edition, Pearson, New Delhi.
2. Pillai, R.S.N. and Bagavathi, V. (2019). *Statistics Theory and Practice*, S. Chand & Company Ltd, New Delhi.
3. Evans James, R. (2017). *Business Analytics*, 2nd Edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Dinesh Kumar, U. (2021). *Business Analytics: The Science of Data - Driven Decision Making* (2nd ed.), Wiley, New Delhi.
2. Hogg, R.V., McKean, J.W., & Craig, A.T. (2019). *Introduction to Mathematical Statistics* (8th ed.). Pearson Education Asia.
3. Miller, I., and Miller, M. (2006). *John E. Freund’s Mathematical Statistics with Applications* (7th ed.). Pearson Prentice Hall.
4. Srivastava, T. N., & Rego, S. (2016). *Statistics for Management* (3rd ed.). McGraw Hill Education (India) Private Limited.

WEBSITES:

1. <https://ocw.mit.edu/courses/18-05-introduction-to-probability-and-statistics-spring-2022/pages/classes-reading-and-in-class-materials/>
2. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE
3. <https://nptel.ac.in/courses/110107114/>

CO, PO, PSO Mapping

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

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

25CYU411

Cyber Security - Practical

Semester-IV

4H-2C

Instruction Hours/week: L:0 T:0 P: 4

Marks: Internal:40 External:60 Total:100

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs)

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

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

List of Programs

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

1. LAN based insider attacks

Make use of Ettercap/arp spoof tool to perform ARP cache poisoning based attacks in a LAN environment:

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

2. Log analysis using ELK

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

Tools Recommendation:

1. Firewall UTM Box – Fortigate 40F
2. Open Source SIEM – ELK
3. Kali Linux OS included with Burpsuite Community Version, OWASP ZAP, Metasploit, OpenVAS

TOTAL: 48 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PO1 3	PO1 4	PO1 5	PSO 1	PSO 2
CO1	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	2	-
CO2	2	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	3
CO3	-	-	3	2	1	-	-	3	-	-	-	-	-	-	-	-	-
CO4	-	-	3	2	-	-	-	-	-	-	1	-	1	-	-	-	-
CO5	2	-	3	-	-	-	-	3	-	-	-	-	-	-	-	-	-
Average	2	-	3	2	1	-	-	3	-	-	1	-	1	-	-	2	3

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

25CYU412G

Network Security - Practical

Semester-IV

4H-2C

Instruction Hours/week: L:0 T:0 P: 4

Marks: Internal:40 External:60 Total:100

End Semester Exam: 3 Hours

PREREQUISITE:

- Network security concepts and hands-on experience with networking tools.

COURSE OBJECTIVES(CO):

- Configure and manage a simple LAN with Linux and Windows machines, set up VLANs using Kali Linux, and generate RSA keys.
- Capture, analyze traffic for encryption, export and analyze web traffic files, and investigate Bluetooth communications and WPA handshake.
- Perform vulnerability assessments, penetration testing on Wi-Fi networks, and use automated attack tools like NetStumbler, Kismet, CowPatty, and Aircnort.

COURSE OUTCOMES(COs):

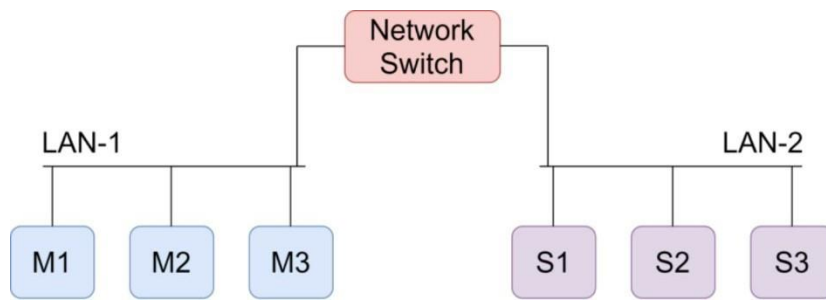
Upon completion of this course the students will be able to:

COs	Course Outcomes	Blooms Level
CO1	Understand the basics of LAN with Linux and windows machines and configure separate VLAN using Kali Linux and open-source tools.	Understand
CO2	Analyze the RSA public and private key for client	Analyze
CO3	Analyse the traffic between hosts to ensure proper encryption, Export files from web traffic and analyze for secret information.	Analyze
CO4	Apply the Bluetooth device communications and analyze WPA handshake for wireless security	Apply
CO5	Apply the Vulnerability Assessment (VA) and Penetration Testing (PT) on local Wi-Fi networks, automated attacks with tools like NetStumbler, Kismet, CowPatty, and Aircnort.	Apply

List of Programs:

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

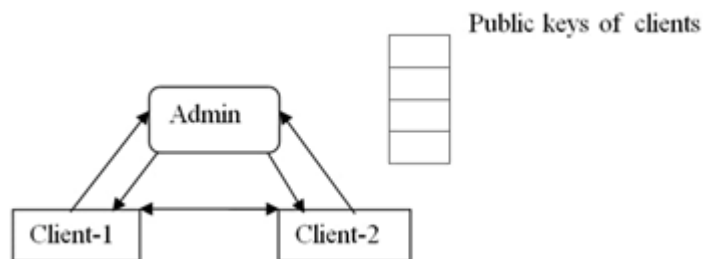
1. LAN based Network Security: Set up a simple LAN as shown in below figure. M1-3 and S1-3 are machine which have Linux and Windows running.



- i) Configure LAN-1 and LAN-2 as separate VLANs in the network switch (use inter VLAN ACL).
- ii) 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.
- iii) 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:

- i) 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.
- ii) 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.
- iii) 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.
- iv) 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.
- v) 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.

IV. Wireless Security Lab:

Perform a VA/PT on your local Wi-Fi network and try automated attacks with NetStumbler and Kismet to gather information wireless network and try attacks like CowPatty and Airsnort. Further execute aircrackng to simulate attacks 802.11 WEP and WPA-PSK keys for auditing wireless networks and performing airodump, aircrack, airmon, airbase, aireplay and airtun using Kali 2.0 (Sana) Linux. Attempt a Wi-Fi sniffing to gather location data which can be used to identify device parameters of wireless communication devices.

Tools Recommendation:

Firewall UTM Box – Fortigate 40F

Open Source SIEM – ELK (<https://www.elastic.co/elastic-stack>)

Kali Linux OS included with Burpsuite Community Version, OWASP ZAP, Metasploit,

OpenVAS

TOTAL: 48 HOURS

CO, PO, PSO Mapping

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

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

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I INTRODUCTION**5 HOURS**

Purpose and motivation for the course, recapitulation from universal human values I. Self-exploration-what is it? – its content and process; ‘Natural Acceptance’ and Experiential Validation- as a process for self-exploration. Continuous Happiness and prosperity. A look at basic human Aspiration. Right understanding, Relationship and physical Facilities-the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and prosperity correctly- A critical appraisal of the current scenario. Method of fulfill the above human aspirations: understanding and living in harmony at various levels.

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

Understanding human being as a co-existence of the sentiment ‘I’ and the material ‘Body’. Understanding the needs of self (‘I’) and ‘Body’ – sukh and Savidha. 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,(2023). 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. Gaston Masnata, M. (2024). Slow: Embracing the Joy of a Slower, Simpler Life. Hardie Grant Books.

REFERENCE BOOKS:

1. Joseph Cornelius Kumarappa,(Digitized 30 Oct 2019). *The Economy of Permanence*.
2. O'Dea, S. (2024). Slow Living: Cultivating a Life of Purpose in a Hustle-Driven World. Dexterity Books.
3. Maulana Abul Kalam Azad, (2017). *India Wins Freedom*, Create Space Independent Publishing Platform.
4. Zahariades, D. (2024). *The Art of Going SLOW: How to Simplify Your Life, Calm Your Mind, and Focus on What Truly Matters to You!*. Independently published.

WEB SITES:

1. <http://www.arvindguptatoys.com/arvindgupta/gandhiexperiments.pdf>
2. <https://estudentedavedanta.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
C01	-	-	2	1	-	-	-	-	-	-	-	3	-	-	-	-	-
C02	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
C03	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-
C04	-	-	-	-	-	-	3	-	-	-	-	-	-	-	-	-	-
C05	-	-	-	3	-	-	-	-	-	-	-	-	-	-	3	2	-
Average	-	-	2	2	2		3	-	-	-	-	-	-	-	3	2.5	-

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:

- Programming concepts and logic.

COURSE OBJECTIVES (CO):

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

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

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

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

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

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

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

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

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

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

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

UNIT V ATTACKS AND VULNERABILITIES**12 HOURS**

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

TOTAL: 60 HOURS**TEXT BOOKS:**

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

REFERENCE BOOKS:

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

WEBSITES

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

CO, PO, PSO Mapping

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

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

25CSU502AG

FULL STACK DEVELOPMENT

Semester-V

5H-3C

Instruction Hours /week: L: 5 T: 0 P: 0

Marks: Internal : 40 External : 60 Total: 100

End Semester Exam: 3 Hours

PREREQUISITE:

- Web development (HTML, CSS, JavaScript) and programming fundamentals.

COURSE OBJECTIVES (CO):

- Understand the basic concepts of Full Stack application development, including user-interface design and application development fundamentals.
- Gain knowledge about Node.js, AngularJS, and ReactJS for front-end and back-end development.
- Acquire working knowledge of backend development with MongoDB..

COURSE OUTCOMES (COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts of Full Stack Development	Understand
CO2	Develop applications with Node JS.	Apply
CO3	Identify various concepts of developing applications using Node JS	Apply
CO4	Develop React JS to test and run the applications.	Apply
CO5	Utilize rapid prototyping techniques to design and develop sophisticated database connectivity through MONGO DB.	Apply

UNIT I INTRODUCTION TO FULL STACK DEVELOPMENT**12 HOURS**

Introduction: History of Full Stack Development – Features- - The Python Full Stack-Advantages of Full Stack-Applications of Full Stack - Technologies included in Full Stack Development: Frontend-Backend – Database- Examples Stacks in Development: The MEAN Stack - The MERN Stack AND The Python Full Stack.

UNIT – II ANGULAR JS**12 HOURS**

What is AngularJS? Why AngularJS? Features of AngularJS, AngularJS architecture, Setting up the Environment, Model-View-Controller explained, My first AngularJS app All about Angular expressions, How to use expressions, Number and String Expressions, Object Binding and Expressions, Working with Arrays, Forgiving Behaviour, Angular expressions v/s Javascript expressions

UNIT III NODE JS**12 HOURS**

Node.js basics - Local and Export Modules - Node Package Manager - Node.js web server - Node.js File system - Node Inspector - Node.js Event Emitter - Frameworks for Node.js - Express.js Web App - Serving static Resource - Node.js Data Access

UNIT – IV REACT JS**12 HOURS**

Introduction to React Router and Single Page Applications React Forms, Flow Architecture and Introduction to Redux More Redux and Client-Server Communication.

UNIT – V: MONGO DB**12 HOURS**

Introduction-History and features of MONGODB -Differences between SQL,MYSQL and NOSQL- Benefits of NoSQL- MongoDB Installation-Collections in MongoDB- Documents In mongoDb- Inserting data into database- Filter queries in MongoDB Database - Schema Validation-Indexing- Aggregation-Embedded Document.

TOTAL: 60 HOURS**TEXT BOOKS:**

1. D. K. Sasidharan, S. N. Kumar, (2017), *Full Stack Development with JHipster*, Packt Publishing.
2. J. DiMarzio, (n.d.), *Beginning Android Programming with Android Studio (4th Edition)*.
3. B. Phillips, C. Stewart, K. Marsicano, (2021), *Android Programming: The Big Nerd Ranch Guide (4th Edition)*, Big Nerd Ranch Guides.

REFERENCE BOOKS:

1. Meier, R. (2010.). *Professional Android 2 application development*. Wiley India Pvt Ltd
2. Murphy, M. L. (2011). *Beginning Android*. Wiley India Pvt Ltd.
3. Burd, B.(2015.). *Android application development all-in-one for dummies* (1st ed.). For Dummies.

WEB REFERENCES:

1. <https://developer.android.com/guide>
2. https://en.wikipedia.org/wiki/Android_10
3. Develop App for Free
4. <https://flutter.dev/>
5. <http://ai2.appinventor.mit.edu>
6. https://en.wikipedia.org/wiki/Android_version_history
7. <https://aws.amazon.com/mobile/mobile-application-development/> (Unit 1)

CO, PO, PSO Mapping

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

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

Instruction Hours /week: L: 5 T: 0 P: 0

Marks: Internal: 40 External : 60 Total: 100

End Semester Exam: 3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs)

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

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

UNIT I INTRODUCTION TO .NET FRAMEWORK

12 HOURS

Introduction to .NET: .NET framework features & architecture, CLR, common Type system, MSIL, Assemblies and class libraries. Introduction to visual studio, Project basics, types of projects in .NET, IDE of VB .NET – Menu bar, Tool bar, Solution Explorer, Toolbox, Properties Window, Form Designer, Output Window, Object browser. The environment: Editor tab, format tab, general tab, docking tab. Visual development & event driven programming – Methods and events.

UNIT II VB .NET LANGUAGE

12 HOURS

The VB .NET Language: The VB .NET Language – Variables- declaring variables, Data type of variables, forcing variables declarations, scope & lifetime of a variable, constants, arrays, types of arrays, control array, Structure programming – Modularity – Information hiding – abstraction – events – subroutines and functions – message box – input box. Control flow statement: conditional statement, loop statement.

UNIT III BASIC WINDOWS CONTROLS

12 HOURS

Textbox Control- List Box, Checked List Box-Scrollbar and Track Bar Controls-More Windows Control-The common Dialog Controls-The Rich Text Box Control - Handling Strings, characters

and Dates. The Tree View and List View Controls: Examining the Advanced Controls-The Tree View Control-The List View Control.

UNIT IV WORKING WITH FORMS

12 HOURS

Working with Forms: Loading, showing and hiding forms, controlling One form within another. Using MDI form. Working with Menus: creating menu, inserting, deleting, assigning short cut keys, pop up menu. Windows Form Control (with Properties, Methods and events). Built-in Dialog Box: Open File Dialog, Save File Dialog, Font Dialog, Color Dialog, Print Dialog, Printing.

UNIT V DATABASE PROGRAMMING WITH ADO .NET

12 HOURS

Database programming with ADO .NET: overview of ADO, from ADO-to-ADO .NET, accessing data using server explorer. Creating connection, command, data adapter and data set with OLEDB and SQLDB. Display data on data bound controls, display data on a data grid. Generate reports using Crystal Report Viewer.

TOTAL: 60 HOURS

TEXT BOOKS:

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

WEBSITES:

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.vbtutot.com
4. <https://freevideolectures.com/course/3002/dot-net-tutorial>
5. <https://www.nptelvideos.com/video.php?id=1760&c=21>

CO,PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO11	PSO 12
CO1	2	-	-	-	-	-	-	-	-	-	3	-	-	-	-	-	-
CO2	-	-	3	-	-	-	-	-	-	-	3	-	-	-	-	2	-
CO3	-	-	3	-	-	-	-	-	2	-	3	-	-	-	-	-	3
CO4	-	-	3	-	-	-	-	-	2	-	3	-	-	-	-	-	-
CO5	2	-	3	1	-	-	-	1	-	-	3	-	-	-	-	-	-
Average	2	-	3	1	-	-	-	1	2	-	3	-	-	-	-	2	3

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

PREREQUISITE:

- Digital identity concepts and access control principles.

COURSE OBJECTIVES (CO):

- Impart knowledge about digital identity and its management concepts and techniques.
- Understand the importance of identity and access management in organizations and apply access control techniques through user groups.
- Develop the ability to prepare and implement various access control mechanisms.

COURSE OUTCOMES (COs):

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

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

UNIT I DIGITAL SECURITY & GOVERNANCE**9 HOURS**

Access control & identity management, Identification, Authentication and Authorization, Classification of Information, Separation of Duties, need for strong credentials. Access Controls: Models, Authentication Factors, Network Access Control Security Governance: Managing Information Security, Organization and responsibilities Information Security Governance, Security Incident Management, Application Security, Data and information Analyze, Role of databases and database management systems, Knowledge management systems and data warehouses, Secure Coding Practices, ISO 27001 - Domains, Introduction to SOX, HIPAA, CoBIT.

UNIT II IDENTITY AND ACCESS MANAGEMENT**9 HOURS**

Introduction to IAM: Introduction to IAM, Enterprise or Organizational Identities, Electronics and non-electronics Identities, AM Frame work, Key Principles, and Definitions, Common Challenges and Key Considerations, IAM Roadmap and Strategy Implementation: Implementation Methodology and Approach, Access Request, Approval, and Provisioning Enforcement: Authentication, Authentication Implementation Approaches, Authorization, Logging and Monitoring Access Review and Certification: Benefits and Objectives, Access Review and Certification Processes Roles and Rules: Rules and Enforcement, The RBAC Model and the Access Management Life Cycle, RBAC

Implementation Considerations, Guiding Principles and Lessons Learned Privileged Access Management: Understanding Privileged Access, Key Business Drivers, Privileged Access Management Program

UNIT III DIRECTORY SERVICES

10 HOURS

The LDAP Protocol, LDAP Basics: Objects in LDAP, Object Classes, Attributes, and Schema, 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

10 HOURS

Multi-Factor Authentication (MFA): Introduction to Authentication Methods, Principles of Multi-Factor Authentication, Biometrics and Behavioural Authentication, Security and Privacy Considerations in MFA, Implementing MFA in Different Environments

UNIT V SSO, AND FEDERATED SYSTEMS

10 HOURS

Federated Systems and SSO: Introduction to Federated Identity, Federated Identity Standards and Protocols, Design and Implementation of Federated Systems Single Sign-On: Fundamentals of Single Sign-On, Single Sign – On Protocols (SAML, OAuth, OpenID Connect), Implementing SSO in Different Environments, SSO Security Best Practices

TOTAL: 48 HOURS

TEXT BOOKS:

1. Godbole, N. (2016). *Cybersecurity*. Wiley India Pvt. Ltd.
2. Brooks, C. J., Grow, C., Craig, P., & Short, D. (2016). *Cybersecurity essentials*. John Wiley & Sons
3. Peltier, T. R. (2012). *Information security risk analysis*. CRC Press

REFERENCE BOOKS:

1. Whitman, M., & Mattord, H. (2022). *Principles of information security (2nd ed.)*. Thomson Course Technology
2. Johnson, D. (2020), *Single Sign-On: The Comprehensive Guide*, Springer.

WEB REFERENCES:

1. <https://nptel.ac.in/courses/106/105/106105171>
2. <https://www.simplilerarn.com>
3. <http://elarning.vtu.ac.in/econtent/courses/video/BS/14CPL.16.html>
4. <https://learndata.com>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Basic understanding of databases and SQL.

COURSE OBJECTIVES(CO):

- Understand the basic concepts and applications of database systems, including SQL query
- Master transaction processing and concurrency control in databases.
- Learn about database storage structures, techniques, and review relevant case studies.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Demonstrate the basic elements of a relational database management system.	Understand
CO2	Identify the data models for relevant problems.	Understand
CO3	Analyze entity relationship and convert entity relationship diagrams into RDBMS and formulate SQL queries on the respect data into RDBMS and formulate SQL queries on the data	Analyze
CO4	Develop the understanding of key notions of query evaluation and optimization techniques.	Apply
CO5	Apply normalization for the development of application software's along with case studies.	Apply

UNIT I INTRODUCTION and DATABASE DESIGN MODEL**10 HOURS**

Introduction: Database System Applications - View of Data - Database Architecture. Database Design and the E-R Model: Overview of the Design Process - The Entity-Relationship Model - Constraints - Removing Redundant Attributes in Entity Sets - Entity Relationship Diagrams - Extended E-R Features.

UNIT II INTRODUCTION TO SQL**10 HOURS**

Overview of SQL Query Language - SQL Data Definition - Basic Structure of SQL Queries - Additional Basic Operations - DDL, DML, TCL and DCL statements - SELECT Operations - Set Operations - Null Values - Aggregate Functions - Nested Sub-Queries - Modification of the Database.

UNIT III RELATIONAL DATABASE DESIGN**10 HOURS**

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

UNIT IV INTERMEDIATE and PL/ SQL**10 HOURS**

Intermediate SQL: Join Expressions - Views - Materialized Views - Transactions - Commit - Rollback – Integrity Constraints - Assertions - SQL Data Types and Schemas - Authorization. PL/SQL:

Introduction to PL/SQL-Variable-Constants-Conditional Statements-Cursor-Implicit Cursors-PL/SQL Explicit Cursors - PL/SQL Procedures - PL/SQL Functions - PL/SQL Exception Handling - PL/SQL Triggers.

UNIT V TRANSACTIONS and CONCURRENCY CONTROL

8 HOURS

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

case study :Database Connectivity with Front End Tools - Case Study using real life database applications-SQLite Database.

TOTAL: 48 HOURS

TEXT BOOKS:

- 1 Silberschatz, A., Korth, H. F., & Sudarshan, S. (2018). *Database system concepts* (6th ed.). McGraw-Hill Education.
- 2 Elmasri, R., & Navathe, S. B. (2016). *Fundamentals of database systems* (7th ed.). Pearson Education.

REFERENCE BOOKS:

1. Moses Antony Rajendran, M., & Jothi Francina, V. (2023). *Relational database management systems*. LAP Lambert Academic Publishing.
2. Blokdyk, G. (2019). *Relational database management system: A complete guide*.
3. Silberschatz Abraham, Korth Henry F., and Sudarshan S (2018), "*Database System Concepts*", 6th Edition, McGraw Hill Education, India.

WEBSITES:

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

CO,PO,SO Mapping

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

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

Instruction Hours /week:L: 4 T: 0 P: 0

Marks: Internal : 40 External : 60 Total: 100

End Semester Exam: 3 Hours

PREREQUISITE:

- Programming and software development concepts.

COURSE OBJECTIVES(CO):

- Introduce fundamental concepts, issues, and techniques in software testing.
- Familiarize students with various testing activities, methodologies, and tools for software verification and validation.
- Provide an in-depth understanding of system testing techniques, including integration, functional, acceptance testing, and software reliability analysis

COURSE OUTCOMES(COs):

Upon completion of this course the students will be able to

Cos	Course Outcomes	Blooms Level
CO1	Understanding of software testing principles and techniques, allowing for the creation of effective test plans and strategies.	Understand
CO2	Construct test cases for software testing techniques	Apply
CO3	Apply acquired knowledge and skills to assess software quality, identify areas for improvement, and implement strategies to enhance the overall quality of software products.	Apply
CO4	Identify defect prevention techniques and software quality assurance metrics.	Apply
CO5	Demonstrate proficiency in utilizing test tools and automation techniques to enhance testing efficiency and effectiveness.	Understand

UNIT I – SOFTWARE TESTING - CONCEPTS, ISSUES, AND TECHNIQUES 10 HOURS

Quality Revolution, Verification and Validation, Failure, Error, Fault, and Defect, Objectives of Testing, Testing Activities, Test Case Selection White-Box and Black, test Planning and design, Test Tools and Automation, Power of Test. Test Team Organization and Management-Test Groups, Software Quality Assurance Group, System Test Team Hierarchy, Team Building.

UNIT II – SYSTEM TESTING 10 HOURS

System Testing - System Integration Techniques-Incremental, Top-Down Bottom-Up Sandwich and Big Bang, Software and Hardware Integration, Hardware Design Verification Tests, Hardware and Software Compatibility Matrix Test Plan for System Integration. Built- in Testing. functional testing - Testing a Function in Context. Boundary Value Analysis, Decision Tables. acceptance testing - Selection of Acceptance Criteria, Acceptance Test Plan, Test Execution Test. software reliability - Fault and Failure, Factors Influencing Software, Reliability Models.

Unit III - SYSTEM TEST CATEGORIES 10 HOURS

System test categories Taxonomy of System Tests, Interface Tests Functionality Tests.GUI Tests, Security Tests Feature Tests, Robustness Tests, Boundary Value Tests Power Cycling Tests

Interoperability Tests, Scalability Tests, Stress Tests, Load and Stability Tests, Reliability Tests, Regression Tests, Regulatory Tests.

UNIT IV – SOFTWARE QUALITY

10 HOURS

Software quality - People 's Quality Expectations, Frameworks and ISO-9126, McCall's Quality Factors and Criteria – Relationship. Quality Metrics. Quality Characteristics ISO 9000:2000 Software Quality Standard. Maturity models.

UNIT V - AUTOMATION TESTING USING SELENIUM

8 HOURS

Introduction of Selenium- Selenium components- Overview of the Testing framework- Selenium Architecture- Selenium Features- Selenium IDE- IDE-Features- IDE Commands IDE-First Test Case-Selenium Web Driver- Web Driver-Architecture- Web Driver-Features- WebDriver Commands- Locating Strategies

TOTAL: 48 HOURS

TEXT BOOKS:

1. Desai, S., & Srivastava, A. (2018). *Software testing: A practical approach*. PHI Learning.
2. Limaye, M. (2016). *Software quality assurance*. Tata McGraw-Hill Education.
3. Tian, J. (2016). *Software quality engineering: Testing, quality assurance, and quantifiable improvement*. John Wiley & Sons, Inc.

REFERENCE BOOKS:

1. Kshirasagar Naik, Priyadarshi Tripathy, (2011), *Software Testing and Quality Assurance: Theory and Practice*, Wiley.
2. Paul C. Jorgensen, (2013), *Software Testing: A Craftsman's Approach* (4th Edition), CRC Press.

WEBSITES:

1. https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
2. <https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-the-basics-of-software-quality-management/>
3. <http://softwaretestingfundamentals.com/software-quality-assurance/>
4. <https://www.softwaretestinghelp.com/software-quality-assurance/>
5. https://www.tutorialspoint.com/software_testing/software_testing_qa_qc_testing.htm
6. <https://www.altexsoft.com/whitepapers/quality-assurance-quality-control-and-testing-the-basics-of-software-quality-management/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Financial concepts

COURSE OBJECTIVES(CO):

- Understand basic accounting concepts and prepare various subsidiary books.
- Prepare financial statements and account for depreciation on fixed assets.
- Prepare accounts for nonprofit organizations.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand basic concepts on Accounting	Understand
CO2	Prepare various subsidiary books	Understand
CO3	Prepare financial statements	Apply
CO4	Carry out depreciation on fixed assets	Apply
CO5	Prepare accounts for nonprofit organizations	Apply

UNIT I**14 HOURS**

Accounting – Definition- Fundamentals of Book Keeping – Branches of Accounting – Nature of Accounts - Accounting Concepts and Conventions – Journal – Ledger.

UNIT II**14 HOURS**

Subsidiary books – Introduction – Types of subsidiary books - purchases book - sales book- returns book - cash book - single column cash book – Two column cash book -Three column Cash book - petty cash book

UNIT III**14 HOURS**

Trial balance - Errors and their rectification - Final accounts of a sole trader with adjustments – Trading and Profit and Loss Account - Balance Sheet – Difference between Profit and Loss Account and Balance Sheet.

UNIT IV**15 HOURS**

Depreciation- Definition- Methods of depreciation- straight line method- written down value method- annuity value method- sinking fund method- provisions and reserves

UNIT V**15 HOURS**

Accounts for Non-Profit organization- Receipts and Payments and income and expenditure account and Balance sheet – Difference between Receipts and Payments and income and expenditure account and Balance sheet

TOTAL: 72 HOURS

TEXT BOOKS:

1. N.Vinayakam, P.L.Maniam and K.L.Nagarajan, (2012) *Principles of Accountancy* New Delhi. S.Chand & Company Ltd
2. S. P. Jain & K. L. Narang, (2010), *Advanced Accountancy*, Sultan Chand & Sons. New Delhi
3. T.S.Grewal,(2011) *Introduction to Accountancy*, New Delhi S.Chand & Company Ltd.
4. R.L.Gupta, V.K.Gupta and M.C.Shukla, (2010), *New Delhi Financial Accounting*, Sultan Chand.

REFERENCE BOOKS:

1. T.S.Grewal, S.C. Gupta, and S.P. Jain, (2010), *Advanced Accountancy*, Sultan Chand, New Delhi.
2. K.L. Narang and S.N. Maheswari, (2010), *Advanced Accountancy*, Kalyani Publishers, New Delhi.

CO, PO, PSO Mapping

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

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

Instruction Hours/week: L:0 T:0 P: 5

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs)

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

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

List of Programs**1. Network reconnaissance and Protection**

1. Installing 'iptables' in Ubuntu VM to allow/block communication between VMs
 - Installing Email server and Web server in VMs. Usage of Firewall (iptables) in blocking/allowing a sub-network from accessing the servers
 - Configuring iptable to block Telnet inbound and outbound connections
2. Use 'nmap' tool to perform vertical and horizontal scanning for checking open and closed ports. Use nmap commands for performing the following experiments:
 - Use ping sweeping to determine which hosts are running.
 - Check for vulnerable services available using TCP connect scans.

- Perform OS Fingerprinting to determine the OS of target machine.
- Choose different options under each category according to your creativity.

2. Web Penetration testing using Burp Suite.

1. Configure burp suite in machine A and access the request and response going through machine B. Both A and B machines should be pingable.
2. Intercept an https request through BurpSuite using import/export CA certificates.
3. Intercept a web application login credentials using BurpSuite and resend request using repeater.
4. Use intruder to brute force password list

3. Exploiting the vulnerabilities on a system

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

4. Mobile & Smart phone security Lab

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

Tools Recommendation:

1. Firewall UTM Box – Fortigate 40F
2. Open Source SIEM – ELK
3. Kali Linux OS included with Burpsuite Community Version, OWASP ZAP, Metasploit, OpenVAS

TOTAL: 60 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

1. "Network Security Assessment: Know Your Network" by Chris McNab.
2. "The Web Application Hacker's Handbook: Finding and Exploiting Security Flaws" by Dafydd Stuttard and Marcus Pinto.

3. "Android Hacker's Handbook" by Joshua J. Drake, Zach Lanier, Collin Mulliner, Pau Oliva Fora, Stephen A. Ridley, Georg Wicherski.
4. "Android Security Internals: An In-Depth Guide to Android's Security Architecture" by Nikolay Elenkov.

WEBSITES:

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

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- HTML/CSS, JavaScript

COURSE OBJECTIVES(CO):

- Gain knowledge of the basic concepts, characteristics, user-interface design, and fundamentals of Full Stack application development.
- Learn and apply AngularJS and React JS to build dynamic and interactive user interfaces.
- Obtain practical experience in developing applications with Node.js and managing data using MongoDB.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts of Full Stack Development	Understand
CO2	Develop applications with Node JS.	Understand
CO3	Identify various concepts of developing applications using Node JS	Understand
CO4	Apply and implement React JS to test and run the applications.	Apply
CO5	Utilize rapid prototyping techniques to design and develop sophisticated database connectivity through MONGO DB.	Understand

List of Programs

1. Develop Angular JS program that allows user to input their first name and last name and display their full name. Note: The default values for first name and last name may be included in the program.
2. Develop an Angular JS application that displays a list of shopping items. Allow users to add and remove items from the list using directives and 7: The default values of items may be included in the program.
3. Develop a simple Angular JS calculator application that can perform basic mathematical operations (addition, subtraction, multiplication, division) based on user input.
4. Create a custom server using http module and explore the other modules of Node JS like OS, path, event.
5. Build a responsive web application for shopping cart with registration, login, catalog and cart pages using CSS3 features, flex and grid.
6. Write a program to create a voting application using React JS
7. Write a program to create a simple calculator Application using React JS
8. Create a Simple Login form using React JS
9. Execute the Commands of MongoDB and operations in MongoDB : Insert, Query, Update, Delete and Projection.

10. Implementation of Aggregation and Map Reduce functions in MongoDB.

TOTAL: 60 HOURS

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, (2011) “*Android Wireless Application Development*”, Pearson Education, 2nd ed.
2. Jerome DiMarzio, (2016) “*Beginning Android Programming with Android Studio*”, 4th Edition
3. Android Programming: (2021) “*The Big Nerd Ranch Guide*” (4th Edition) by Bill Phillips, Chris Stewart, and Kristin Marsicano.
4. Reto Meier, (2010) “*Professional Android 2 Application Development*”, Wiley India Pvt Ltd
5. Mark L Murphy, (2014) “*Beginning Android*”, Wiley India Pvt Ltd
6. Barry Burd, (2020) *Android Application Development All in one for Dummies*, Edition: 3
7. Dawn Griffiths, David Griffiths, (2017) “*Head First Android Development: A Brain-Friendly Guide*”.
8. Neil Smyth , (2017) “*Android Studio 3.0 Development Essentials: Android*”, 8th Edition.
9. Azat Mardan, (2015) *Full Stack JavaScript: Learn Backbone.js, Node.js and MongoDB*. Apress.

REFERENCES:

1. <https://developer.android.com/guide>
2. https://en.wikipedia.org/wiki/Android_10
3. Develop App for Free
4. <https://flutter.dev/>
5. <http://ai2.appinventor.mit.edu>
6. https://en.wikipedia.org/wiki/Android_version_history
7. <https://aws.amazon.com/mobile/mobile-application-development/> (Unit 1)
8. https://en.wikipedia.org/wiki/Mobile_app_development

CO, PO, PSO Mapping

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

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

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

List of Programs**VB.NET**

1. Write a Program to perform various string manipulation functions.
2. Using windows application form, create a form, place controls and manipulate data.
3. Write a program to create inventory control using class library.
4. Write a program to create Web Services Using VB.NET
5. Write a program to create a screen saver using controls
6. Create an ActiveX program with simple example.
7. Using windows Application: Design Employee Details, use SQL Server as back end and also use checked list box.

ASP.NET

8. Write a program to create an on-line quiz using content page holder.
9. Write a program to retrieve Cookies information
10. Write a program to count web page hits

TOTAL: 60 HOURS

TEXT BOOKS:

1. Visual Basic 6.0 Programming, Content Development Group, TMH, 8th reprint, 2007.
2. Programming with Visual Basic 6.0, Mohammed Azam, Vikas Publishing House, Fourth Reprint, 2006.
3. Gray Cornell (2003), "Visual Basic 6 from ground up" TMH, New Delhi, 1st Edition,
4. VB.Net in Nutshell 2016. 2nd Edition. Steven Roman, Paul Lomax, Oreilly
5. Deitel and Deitel, T.R.Nieto (1998), "Visual Basic 6 – How to Program", Pearson Education. First Edition.

WEBSITES:

1. www.microsoft.com/NET/
2. www.en.wikipedia.org/wiki/.net
3. www.vbtutot.com
4. <https://freevideolectures.com/course/3002/dot-net-tutorial>
5. <https://www.nptelvideos.com/video.php?id=1760&c=21>

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs)

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

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

UNIT I: INTRODUCTION TO GENERATIVE AI**15 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) 15 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**13 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 (SIE)”, Mc Graw.
2. Dan W. Patterson, “Introduction to AI and ES”, Pearson Education.

REFERENCE BOOKS:

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

WEBSITES:

1. <https://www.tutorialspoint.com/>
2. <https://www.geeksforgeeks.org/>
3. <https://www.slideshare.net/slideshow/>
4. <https://www.quora.com/>
5. <https://www.ibm.com/blog/>
6. <https://www.analyticsvidhya.com/blog/2023/03/>
7. <https://www.techtarget.com/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not Applicable

COURSE OBJECTIVES (CO):

The goal of this course is for students to:

1. Understand the theory and practices of finding the vulnerabilities.
2. Understand the different attacks and then defining the appropriate security policy.
3. Understand the action to detect or prevent the attacks and thus reduce the damages.

COURSE OUTCOMES (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Describe and understand the basics of the ethical hacking.	Understand
CO2	Able to perform the foot printing and scanning.	Understand
CO3	Characterize the malware and their attacks and detect and prevent them.	Apply
CO4	Understand the concepts of web server hacking and attacks.	Analyze
CO5	Able to analyze Intrusion Detection Systems and physical security.	Analyze

UNIT I- Introduction to Ethical Hacking

10HOURS

Security Fundamental - Security Testing - Hacker and Cracker – Descriptions - Test Plans keeping it legal - Ethical and Legality-Technical Foundations of Hacking: The Attacker’s Process The Ethical Hacker’s Process- Security and the Stack.

UNIT II – Foot printing and Scanning

9HOURS

AI Governance by Human-right centered design, Normative models, Role of professional norms, Teaching Machines to be Moral.

UNIT III - Malware Threats and Session Hijacking

10 HOURS

Viruses and Worms- Trojans - Covert Communication - Keystroke Logging and Spyware – Malware Counter Measures- Sniffers - Session Hijacking - Denial of Service - Distributed Denial of Service.

UNIT IV- Web Server Hacking and Attacks

9HOURS

Web Server Hacking - Web Application Hacking - Database Hacking - Wireless Technologies – Mobile Security and Attacks: Wireless Technologies - Mobile Device Operation and Security – Wireless

LANs- Smart City and Equity.

UNIT V - Intrusion Detection Systems

10HOURS

Intrusion Detection Systems - Firewalls - Honeypots - Physical Security - Social Engineering – Case Studies: Intrusion detection Real Secure Tripwire Dragon Snort, Packet sniffing Leave the sniffer running, Passwords in procedures & documents. Ethical AI

TOTAL: 48 HOURS

TEXT BOOKS:

1. Michael Gregg, "Certified Ethical Hacker", Version 10, Third Edition, Pearson IT Certification, 2019.

REFERENCE BOOKS:

1. Roger Grimes, "Hacking the Hacker", 1st Edition, Wiley, 2017.
2. Patrick Engebretson, "The Basics of Hacking and Penetration Testing" Syngress, 2013

WEBSITES

1. https://onlinecourses.nptel.ac.in/noc22_cs13/preview
2. <https://www.simplilearn.com/learn-ethical-hacking-online-free-course-skillup>
3. https://onlinecourses.nptel.ac.in/noc25_hs104/preview

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

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

PREREQUISITE:

- Statistics, programming Python or R and databases

COURSE OBJECTIVES(CO):

- Provide an overview of the growing field of big data analytics and the skills required to design scalable systems for handling large volumes of unstructured data.
- Teach fundamental techniques and tools for designing and analyzing large data sets, including principles for scalability and streaming capabilities.
- Equip students with skills to solve complex real-world problems and support decision-making through big data analytics.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Explain the motivation for big data systems and identify the main sources of Big Data in the real world.	Understand
CO2	Demonstrate an ability to use frameworks like Hadoop, NOSQL to efficiently store retrieve and process Big Data for Analytics.	Understand
CO3	Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.	Understand
CO4	Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.	Understand
CO5	Apply the adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.	Apply

UNIT I INTRODUCTION TO BIG DATA**15 HOURS**

Evolution of Big data – Best Practices for Big data Analytics – Big data characteristics – Validating – The Promotion of the Value of Big Data – Big Data Use Cases- Characteristics of Big Data Applications – Perception and Quantification of Value -Understanding Big Data Storage – A General Overview of High-Performance Architecture – HDFS – MapReduce and YARN – Map Reduce Programming Model.

UNIT II CLUSTERING AND CLASSIFICATION**15 HOURS**

Advanced Analytical Theory and Methods: Overview of Clustering – K-means – Use Cases – Overview of the Method – Determining the Number of Clusters – Diagnostics – Reasons to Choose and Cautions - Classification: Decision Trees – Overview of a Decision Tree – The General Algorithm – Decision Tree Algorithms – Evaluating a Decision Tree – Decision Trees in R – Naïve Bayes – Bayes' Theorem – Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM**14 HOURS**

Advanced Analytical Theory and Methods: Association Rules – Overview – Apriori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Finding Association & finding similarity – Recommendation System: Collaborative Recommendation- Content Based Recommendation – Knowledge Based Recommendation- Hybrid Recommendation Approaches.

UNIT IV STREAM MEMORY**14 HOURS**

Introduction to Streams Concepts – Stream Data Model and Architecture – Stream Computing, Sampling Data in a Stream – Filtering Streams – Counting Distinct Elements in a Stream – Estimating moments – Counting oneness in a Window – Decaying Window – Real time Analytics Platform (RTAP) applications.

UNIT V NO SQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION**14 HOURS**

NoSQL Databases : Schema-less Models|: Increasing Flexibility for Data Manipulation-Key Value Stores- Document Stores – Tabular Stores – Object Data Stores – Graph Databases Hive – Sharding – Hbase – Analyzing big data with twitter – Big data for E-Commerce Big data for blogs – Review of Basic Data Analytic Methods using R.

TOTAL: 72 HOURS**TEXT BOOKS:**

- 1 EMC Education Services. (2018). *Data science and big data analytics: Discovering, analyzing, visualizing, and presenting data*. Wiley.
- 2 Jannach, D., & Zanker, M. (2017). *Recommender systems: An introduction*. Cambridge University Press .
- 3 Pries, K. H., & Dunnigan, R. (2016). *Big data analytics: A practical guide for managers*. CRC Press.

REFERENCE BOOKS:

- 1 Lin, J., & Dyer, C. (2015). *Data-intensive text processing with MapReduce* (Vol. 3, No. 1, pp. 1-177). Morgan & Claypool Publishers.
- 2 Loshin, D. (2016). *Big data analytics: From strategic planning to enterprise integration with tools, techniques, NoSQL, and graph*. Morgan Kaufmann/Elsevier.

WEBSITES

1. <https://www.ibm.com/analytics/big-data-analytics>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Not Applicable

COURSE OBJECTIVES(CO):

The goal of this course is for students to:

- Learn the basics of Blockchain technology.
- Explore various aspects of Blockchain technology like application in various domains.
- Gain idea about private and public Blockchain, and smart contract.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand and explore the working of Blockchain technology.	Understand
CO2	Analyze the working of Smart Contracts.	Analyze
CO3	Understand and analyze the working of Hyperledger.	Analyze
CO4	Apply the learning of solidity to build de-centralized apps on Ethereum.	Apply
CO5	Develop applications on Blockchain.	Apply

UNIT I INTRODUCTION OF CRYPTOGRAPHY AND BLOCKCHAIN 10 HOURS

What is Blockchain, Blockchain Technology Mechanisms & Networks, Blockchain Origins, Objective of Blockchain, Blockchain Challenges, Transactions and Blocks, P2P Systems, Keys as Identity, Digital Signatures, Hashing, and public key cryptosystems, private vs. public Blockchain.

UNIT II - BITCOIN AND CRYPTOCURRENCY 10 HOURS

What is Bitcoin, The Bitcoin Network, The Bitcoin Mining Process, Mining Developments, Bitcoin Wallets, Decentralization and Hard Forks, Ethereum Virtual Machine (EVM), Merkle Tree, Double-Spend Problem, Blockchain and Digital Currency, Transactional Blocks, Impact of Blockchain Technology on Cryptocurrency.

UNIT III – INTRODUCTION TO ETHEREUM 8 HOURS

What is Ethereum, Introduction to Ethereum, Consensus Mechanisms, Metamask Setup, Ethereum Accounts, Transactions, Receiving Ethers, Smart Contracts.

UNIT IV - INTRODUCTION TO HYPERLEDGER AND SOLIDITY PROGRAMMING 10 HOURS

What is Hyperledger? Distributed Ledger Technology & its Challenges, Hyperledger& Distributed Ledger Technology, Hyperledger Fabric, Hyperledger Composer. Solidity – Language of Smart Contracts, Installing Solidity & Ethereum Wallet, Basics of Solidity, Layout of a Solidity Source File & Structure of Smart Contracts, General Value Types.

UNIT V - BLOCKCHAIN APPLICATIONS 10 HOURS

Internet of Things, Medical Record Management System, Domain Name Service and Future of Blockchain, Alt Coins.

TOTAL:48 HOURS

TEXT BOOKS:

1. Imran Bashir (2018), “*Mastering Blockchain: Distributed Ledger Technology, Decentralization, and Smart Contracts Explained*”, Second Edition, Packt Publishing.
2. Narayanan, J. Bonneau, E. Felten, A. Miller, S. Goldfeder (2016), “*Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction*” Princeton University Press.
3. Antonopoulos (2014), *Mastering Bitcoin*, O’Reilly Publishing.

REFERENCE BOOKS:

1. Antonopoulos and G. Wood, (2018) “*Mastering Ethereum: Building Smart Contracts and Dapps*”, O’Reilly Publishing.
2. D. Drescher, (2017) *Blockchain Basics*. Apress.

WEBSITES:

1. https://101blockchains.com/free-blockchain-resources/?utm_source
2. https://www.coursera.org/courses?utm_source
3. https://tech.seas.harvard.edu/free-blockchain?utm_source

CO,PO,PSO Mapping

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

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

25CSU602DG

Digital Marketing

Instruction Hours/week: L: 4 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam:3 Hours

PREREQUISITE:

- Not Applicable.

COURSE OBJECTIVES(CO):

- Learn the fundamentals of Digital Marketing (DM)
- Familiarize students with Marketing Automation tools and strategies.
- Explore the components of the Digital Marketing Mix.
- Impart knowledge on Email and Mobile Marketing techniques.
- Develop skills in blog creation and optimization.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the Fundamentals of Digital Marketing	Understand
CO2	Analyze the Role of Marketing Automation	Analyze
CO3	Analyze Digital Marketing Mix Strategies	Analyze
CO4	Understand Email and Mobile Marketing Techniques	Understand
CO5	Understand Optimize Blogs for Digital Marketing	Understand

UNIT I INTRODUCTION TO DIGITAL MARKETING (DM)**10 HOURS**

Introduction to Digital Marketing (DM)-Meaning, Definition, Need of DM, Scope of DM, History of DM, Concept and approaches to DM, Examples of good practices in DM.

UNIT II MARKETING AUTOMATION**10 HOURS**

Marketing Automation: Definition, Advantages, Marketing Automation Softwares: CRM, Sales force, Analytics; Customer Experience (CX), How does marketing automation help marketers, Marketing automation tools.

UNIT III DIGITAL MARKETING MIX**10 HOURS**

Digital Marketing Mix: Online Advertising, Lead Generation, Social Media Marketing, Content and Copywriting. Influencer Marketing: Influencer, Payment to Influencer, difference between influencer marketing and celebrity endorsements.

UNIT IV EMAIL MARKETING**9 HOURS**

Email Marketing- Need for Emails, Types of Emails, options in Email advertising, Features of MailChimp, Mobile Marketing: Overview of the B2B and B2C Mobile Marketing.

UNIT V BLOGS**9 HOURS**

What are Blogs, Importance of Blogs, Personal Blogs, Corporate Blogs, Popular Blog Platforms, What are Tags, Widgets, Blog Optimization, and Blog Stats.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Jodie the Mom (2023) *Email Marketing Planner: Organize and Track Your Emails.*
2. Dave Evans., Susan Bratton, (2010). *Social Media Marketing: The Next Generation of Business Engagement.* Wiley
3. Michael J. Thibault (2023). *The Influencer Blueprint: A Step-by-Step Guide to Harnessing the Power of Influencer Marketing for Business Success.*

REFERENCE BOOKS:

1. George Pain (2019). *Marketing Automation and Online Marketing: Automate Your Business through Marketing Best Practices such as Email Marketing and Search Engine Optimization.*
2. Stevan Roberts (2016). *Marketing AI: From Automation to Revenue Performance Marketing.*

WEB SITES

1. <https://learndigital.withgoogle.com/digitalgarage>
2. <https://business.adobe.com/products/marketo/adobe-marketo.html>
3. <https://mailchimp.com/resources/>
4. <https://moz.com/blog>

CO, PO, PSO Mapping

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

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

25BAU601G

Entrepreneurship Development

Semester-VI

6H-4C

Instruction Hours/week: L: 6 T: 0 P: 0

Marks: Internal: 40 External: 60 Total: 100

End Semester Exam:3 Hours

PREREQUISITE:

- Concepts and management principles

COURSE OBJECTIVES(CO):

- Explain entrepreneurship concepts and how entrepreneurs handle business situations.
- Analyze various aspects, scope, and challenges of entrepreneurial ventures, and understand the objectives of entrepreneurs.
- Discuss venture development steps, new trends in entrepreneurship, and analyze the role of government in entrepreneurship development.

COURSE OUTCOMES(COs):

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

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

UNIT I INTRODUCTION TO ENTREPRENEURSHIP**15 HOURS**

Introduction - Entrepreneur - meaning- Importance-Qualities, nature, types, traits, culture, similarities and economic and differences between Entrepreneur and Intrapreneur. Entrepreneurship development-its importance- Role of Entrepreneurship -Entrepreneurial environment

UNIT II EVOLUTION OF ENTREPRENEURS**15 HOURS**

Entrepreneurial promotion. Training and developing motivation: factors - mobility of Entrepreneurs - Entrepreneurial change - occupational mobility-factors in mobility - Role of consultancy organizations in promoting Entrepreneurs-Forms of business for Entrepreneurs.

UNIT III CORPORATE ENTREPRENEURSHIP**15 HOURS**

Creating and starting the venture - Steps for starting a small industry - selection of types of organization - International entrepreneurship opportunities. Need for corporate entrepreneurship, domain of corporate entrepreneurship, conditions favourable for Corporate entrepreneurship, benefits of Corporate entrepreneurship.

UNIT IV FAMILY AND NON FAMILY ENTREPRENEUR & WOMEN ENTREPRENEURS 14 HOURS

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

UNIT V ENTREPRENEURSHIP DEVELOPMENT AND GOVERNMENT ROLE 13 HOURS

Entrepreneurship Development and Government: Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available. Women Entrepreneurs Reasons for low / no women Entrepreneurs their Role, Problems and Prospects.

TOTAL: 72 HOURS**TEXT BOOKS:**

1. Desai, V. (2009). *Dynamics of entrepreneurial development and management*. Himalaya Publishing House.
2. Srinivasan, N. P., & Gupta, G. P. (2020). *Entrepreneurial development*. Sultanchand & Sons
3. Burns, P. (2020). *Corporate entrepreneurship and innovation*. Bloomsbury Academic.

REFERENCE BOOKS::

1. Unni. (2021). *Women entrepreneurship in Indian middle class*. Orient Blackswan Pvt. Ltd.
2. Kumar, S. A., Poornima, S. C., Abraham, M. K., & Jayshree, K. (2021). *Entrepreneurship development* (1st ed.). New Age International Pvt. Ltd.

WEBSITES

1. <https://www.udemy.com/topic/cyber-security/>
2. <https://www.coursera.org/courses?query=cybersecurity>
3. <https://www.simplilearn.com/cyber-security>
4. https://onlinecourses.swayam2.ac.in/cec21_ge10/preview

CO, PO, PSO Mapping

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

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

Instruction Hours/week: L:0 T:0 P:5

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

PREREQUISITE:

- Not Applicable

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Demonstrate fundamental understanding of the history of artificial intelligence (AI) and its foundations.	Understand
CO2	Apply basic principles of AI in solutions that require problem solving, inference, perception, knowledge representation, and learning.	Apply
CO3	Demonstrate awareness and a fundamental understanding of various applications of AI techniques in intelligent agents, expert systems, artificial neural networks and other machine learning models.	Understand
CO4	Demonstrate proficiency developing applications in an 'AI language', expert system shell, or data mining tool.	Understand
CO5	Demonstrate proficiency in applying scientific method to models of machine	Understand

LIST OF PROGRAMS

1. Use OpenAI's GPT-2 model to write a short story based on a given prompt.
2. Apply artistic style transfer to your photos using the Neural-Style-Transfer tool in Python.
3. Create a dataset of GAN-generated images using the DCGAN implementation in TensorFlow.
4. Use the Magenta library to create a short piece of music.
5. Interact with and analyze responses from a conversational AI model using the Rasa open-source framework.
6. Use the Poetry tool from the Hugging Face Transformers library to write a poem.
7. Enhance the quality of low-resolution images using the OpenCV and DAIN (Depth-Aware Video Frame Interpolation) tool.
8. Compare AI-generated news articles with human-written ones using the GPT-2 model from Hugging Face.

9. Create unique AI-generated artwork using the DeepArt or DeepDream algorithms available in Python libraries.

1. Use TensorFlow Hub's Style Transfer model to create a new artwork from your existing photos.

TOTAL: 60 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEBSITES:

1. <https://www.udemy.com/course/road-map-to-artificial-intelligence-and-machine-learning>
2. <https://ai.google/education/>
3. <https://www.iiitd.ac.in/iiit-delhi-pgdcsai/>
4. <https://www.marketingaiinstitute.com/blog/3-free-online-artificial-intelligence-courses-taught-by-google-and-stanford-experts>
5. <https://www.mygreatlearning.com/ai/free-courses>
6. <https://www.classcentral.com/subject/ai>
7. <https://dlabs.ai/blog/top-10-free-machine-learning-and-artificial-intelligence-courses/>

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	-	-	-	-	-	-	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

PREREQUISITE:

- Computer networks, programming, and sensors

COURSE OBJECTIVES(CO):

- The objective of this course is to provide the student with the fundamental knowledge and skills to understand smart objects and IoT Architecture.
- The student will learn various tools of IoT related Protocols.
- To build simple IoT systems using open hardware such as Arduino and Raspberry Pi.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the different real world IoT applications and its functions.	Understand
CO2	Apply of IoT Protocols in Security and Optimizing Networks.	Apply
CO3	Understand how to use Routing and Lossy Network Protocol and Service Protocols.	Understand
CO4	Understand how to manage structured and unstructured data in data analytics framework.	Understand
CO5	Apply the concepts of IoT in various smart systems.	Apply

UNIT I FUNDAMENTALS OF IOT**15 HOURS**

Evolution of Internet of Things – Enabling Technologies – IoT Architectures: oneM2M, IoT World Forum (IoTWF) and Alternative IoT Models – Simplified IoT Architecture and Core IoT Functional Stack – Fog, Edge and Cloud in IoT – Functional Blocks of an IoT Ecosystem – Sensors, Actuators, and Smart Objects – Open Hardware Platforms for IoT

UNIT II IOT PROTOCOLS - I**15 HOURS**

IoT Access Technologies: Physical and MAC Layers, Topology and Security of IEEE 802.15.4, 1901.2a, 802.11ah and LoRaWAN – Network Layer: Constrained Nodes and Constrained Networks – Optimizing IP for IoT: From 6LoWPAN to 6Lo.

UNIT III IOT PROTOCOLS – II**14 HOURS**

Routing over Low Power and Lossy Networks (RPL) – Application Transport Methods: Application Layer Not Present, Supervisory Control and Data Acquisition (SCADA) – Application Layer Protocols: CoAP and MQTT – Service discovery – mDNS.

UNIT IV CLOUD, FOG, DATA ANALYTICS FRAMEWORK **14 HOURS**

Cloud and Fog Topologies – Cloud Services Model – Fog Computing – Structured versus Unstructured Data and Data in Motion Vs Data in Rest – Role of Machine Learning – No SQL Databases – Hadoop Ecosystem – Apache Kafka, Apache Spark – Edge Streaming Analytics and Network Analytics – Security in IoT – CISCO IoT System – IBM Watson IoT Platform.

UNIT V IOT APPLICATIONS **14 HOURS**

Smart and Connected Cities: Street Layer, City Layer, Data Center Layer and Services Layer, Street Lighting, Smart Parking Architecture and Smart Traffic Control – Smart Transportation – Connected Cars.

TOTAL: 72 HOURS**TEXT BOOKS:**

1. Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., & Henry, J. (2017). *IoT fundamentals: Networking technologies, protocols, and use cases for Internet of Things*. Cisco Press.
2. Lea, P. (2018). *Internet of things for architects*. Packt.
3. Höller, J., Tsiatsis, V., Mulligan, C., Karnouskos, S., Savva, S., & Boyle, D. (2014). *From machine-to-machine to the Internet of Things: Introduction to a new age of intelligence*. Elsevier.

REFERENCE BOOKS:

1. Hersent, O., Boswarthick, D., & Elloumi, O. (2012). *The Internet of things: Key applications and protocols*. Wiley.
2. Uckelmann, D., Harrison, M., & Michahelles, F. (Eds.). (2011). *Architecting the Internet of Things*. Springer.
3. Bahga, A., & Madisetti, V. (2015). *Internet of things: A hands-on approach*. Universities Press.

WEBSITES

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

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Object-oriented concepts

COURSE OBJECTIVES(CO):

- Utilize advanced features of the Java language to build and compile robust enterprise-grade applications.
- Design and develop GUI applications using Swings and Servlets.
- Provide a strong foundation in Java Beans, Struts, and JSON for manipulating and storing data effectively.

COURSE OUTCOMES(COs):

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

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

UNIT I SWING**14 HOURS**

Swing: Need for swing components, Difference between AWT and swing, Components hierarchy, Panes, Swing components: JLabel, JTextField and JPasswordField, JTextAres, JButton, JCheckBox, JRadioButton, JComboBox, JList, JTree, JColorChooser, Dialogs.

UNIT II JDBC**14 HOURS**

JDBC: Introduction, JDBC Drivers, JDBC Architecture, JDBC Classes and Interfaces, Making a Connection, Execute SQL Statement, SQL Statements - Simple Statement, Atomic Transaction, Pre-compiled Statement, SQL Statements to Call Stored Procedures. Retrieving Result - Getting Database Information, Scrollable and Updatable ResultSet, Scrollability Type, Concurrency Type, Examples. Result Set Metadata.

UNIT III SERVLETS & JSP**14 HOURS**

Servlets: Server-side Java, Advantages Over Applets, Servlet Alternatives, Servlet Strengths, Servlet Architecture, Servlet Life Cycle, GenericServlet, HttpServlet, First Servlet, Passing Parameters to Servlets, Retrieving Parameters, Server-Side Include, Cookies, Filters, Problems with Servlet.

UNIT IV JSP**15 HOURS**

Introduction and Marketplace, JSP and HTTP, JSP Engines, JSP Syntax, Components, Beans, Session Tracking, Users Passing Control and Data between Pages, Sharing Session and Application Data.

UNIT V NETWORK PROGRAMMING**15 HOURS**

Basic Networking: Java and the Net, Java Networking Classes and Interfaces, Getting Network Interfaces, Getting Interface Addresses, Getting Interface Properties, URL, Creating URL, Parsing URL, Web Page Retrieval, URL Connection, Http URL Connection, URL Encoder/URL Decoder, Proxy, Using Command Line Arguments, Using System Properties, Using Proxy Class, Proxy Selector.

TOTAL: 72 HOURS**TEXT BOOKS:**

1. Roy, U. K. (2015). *Advanced Java programming*. Oxford University Press.
2. McFedries, P. (2018). *Web coding & development all-in-one for dummies*. Wiley.
3. Connolly, R., & Hoar, R. (2017). *Fundamentals of web development*. Pearson.

REFERENCE BOOKS:

1. Sklar, J. (2015). *Principles of web design* (6th ed.). Course Technology.
2. Duckett, J. (2014). *HTML and CSS: Design and build websites*. Wiley.

WEBSITES:

1. <http://www.freeCodeCamp Guides.com/>
2. <http://www.Codrops CSS Reference/>
3. <https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide>.
4. <http://www.w3schools.com>.
5. <https://nptel.ac.in/courses/106105084/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- statistics and proficiency in a programming language

COURSE OBJECTIVES(CO):

- Develop statistical skills in sampling, hypothesis testing, and understanding statistical techniques as powerful tools in scientific computing.
- Enable students to gain knowledge about tests for randomness, including the run test, and understand the concepts of the sign test and Wilcoxon Signed Rank test.
- Learn the chi-square test for independence and grasp the concepts of quality, process, and product control using control chart techniques and sampling inspection plans.

COURSE OUTCOMES(COs):

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

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

UNIT I**14 HOURS**

Sample Survey Basic Concept of Sample Survey - Census and Sample Survey - Population and Sample – Parameter and Statistic – Preparation of Questionnaire and Schedules – Principle steps in Sample Survey – Pilot survey – Sampling Distribution - Standard Error - Sampling and Non-sampling Errors – Advantages over Complete Enumeration – Limitations of Sampling.

UNIT II**14 HOURS**

Test of Significance Sampling Distribution - Standard Error – Test of Hypothesis: Simple Hypothesis, Null Hypothesis and Alternative Hypothesis – Test of Significance: Large Sample Test based on Mean, Differences of Means, Proportion and Difference of Proportions - Small Sample Test based on Mean, Difference of Means, Paired ‘t’ Test.

UNIT III**14 HOURS**

Analysis of Variance F-test – Analysis of Variance (ANOVA) – Test procedure for One way and Two way classifications – Simple Problems.

UNIT IV**15 HOURS**

Introduction of Non-parametric Test – Difference between Non-parametric and Parametric Test – Advantage and Limitations of Non-parametric Tests – Comparison of One and Two Populations Test for Randomness – Run Test – Test for Rank Correlation Coefficient – Sign Test. Comparison of Two Populations Median Test – Mann Whitney U Test.

UNIT V**15 HOURS**

Meaning and Concepts of Quality – Quality of Design – Standardization for Quality – Quality Movement – Quality Management – Quality of Conformance – Need for Statistical Quality Control Techniques in Industry – Causes of Quality Variations – Process Control and Product Control – Statistical basis for Control Charts – Uses of Shewart’s Control Charts - R Charts - Charts for Defectives p and np Charts.

TOTAL: 72 HOURS**TEXT BOOKS:**

- 1 Gupta, S. P. (2021). *Statistical methods* (46th ed.). Sultan Chand & Sons.
- 2 Gupta, S. C. (2021). *Statistical quality control* (9th ed.). Khanna Publishing Co.
- 3 Mahajan, M. (2019). *Statistical quality control* (4th ed.). Dhanpat Rai & Co. (P) Ltd., Educational & Technical Publishers.
- 4 Pillai, R. S. N., & Bagavathi, V. (2018). *Statistics* (10th ed.). S. Chand & Company Ltd.

REFERENCE BOOKS:

- 1 Gupta, S. C., & Kapoor, V. K. (2021). *Fundamentals of applied statistics* (5th ed.). Sultan Chand & Sons.
- 2 Montgomery D., (2011), *Statistical Quality Control*, Wiley India Pvt. Ltd, New Delhi.
- 3 Leavenworth G., (2015), *Statistical Quality Control*, Mc - Graw Hill Education Pvt. Ltd., New Delhi.

WEBSITES:

1. <http://www.ing.unipi.it/lanzetta/stat/Chapter20.pdf>
2. <https://www.statisticshowto.com/parametric-and-non-parametric-data/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Computer networks, programming, and sensors

COURSE OBJECTIVES(CO):

- To introduce students to the foundational concepts of the Internet of Things through practical implementation.
- To promote problem-solving and project-based learning through the development of mini-IoT projects addressing real-world scenarios.
- The student will learn to work with various tools and protocols related to IoT communication.

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Understand the different real world IoT applications and its functions.	Understand
CO2	Apply of IoT Protocols in Security and Optimizing Networks.	Apply
CO3	Understand how to use Routing and Lossy Network Protocol and Service Protocols.	Understand
CO4	Understand how to manage structured and unstructured data in data analytics framework.	Understand
CO5	Apply the concepts of IoT in various smart systems.	Apply

List of Programs

1. LED Blinking using Arduino
2. Temperature and Humidity Monitoring using DHT11 Sensor
3. Sending Sensor Data to ThingSpeak using NodeMCU
4. Controlling LED using Blynk App and NodeMCU
5. Motion Detection using PIR Sensor and Arduino
6. Smart Door Alert System using PIR Sensor and Buzzer
7. RFID-based Door Access System using Arduino
8. Soil Moisture-based Smart Irrigation System
9. Home Automation using NodeMCU and Relay Module
10. Gas Leak Detection System using MQ-2 Sensor

TOTAL: 72 HOURS

TEXT BOOKS:

- 1 Hanes, D., Salgueiro, G., Grossetete, P., Barton, R., & Henry, J. (2017). *IoT fundamentals: Networking technologies, protocols, and use cases for Internet of Things*. Cisco Press.
- 2 Lea, P. (2018). *Internet of things for architects*. Packt.
- 3 Höller, J., Tsiatsis, V., Mulligan, C., Karnouskos, S., Savva, S., & Boyle, D. (2014). *From machine-to-machine to the Internet of Things: Introduction to a new age of intelligence*. Elsevier.

REFERENCE BOOKS:

- 1 Hersent, O., Boswarthick, D., & Elloumi, O. (2012). *The Internet of things: Key applications and protocols*. Wiley.
- 2 Uckelmann, D., Harrison, M., & Michahelles, F. (Eds.). (2011). *Architecting the Internet of Things*. Springer.
- 3 Bahga, A., & Madiseti, V. (2015). *Internet of things: A hands-on approach*. Universities Press.

WEBSITES

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

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Java programming skills and familiarity with object-oriented concepts.

COURSE OBJECTIVES(CO):

- Explore advanced topics in Java programming for problem-solving and building robust enterprise-grade applications using advanced features of the Java language.
- Provide a sound foundation in the concepts, practices, and precepts relevant to the industry and business.
- Design and develop GUI applications using Swing, and enhance knowledge to manipulate and store data effectively.

COURSE OUTCOMES(COs):

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

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

List of Programs

1. Implementation of Multi-threading and Exception handling concepts
2. Write a program to read, write and copy a file using byte streams.
3. Write a program to read, write and copy a file using character streams.
4. Develop a program using AWT to display the personal detail of an employee.
5. Develop a banking system using Swing.
6. Write a program to handle Mouse and Key events.
7. Implement TCP/IP protocol for message communication.
8. Implement UDP protocol for message communication.
9. Using JDBC develop a student information system.
10. Implement client/server communication using servlets.
11. Develop a web page using JSP.
12. Implementation of RMI.

TOTAL: 72 HOURS

TEXT BOOKS:

1. Roy, U. K. (2015). *Advanced Java programming*. Oxford University Press.
2. McFedries, P. (2018). *Web coding & development all-in-one for dummies*. Wiley.
3. Connolly, R., & Hoar, R. (2017). *Fundamentals of web development*. Pearson.
4. Duckett, J. (2014). *HTML and CSS: Design and build websites*. Wiley.
5. Powell, T. A., & Schneider, F. (2013). *JavaScript: The complete reference* (3rd ed.). Tata McGraw-Hill.

WEBSITES:

1. <http://www.freeCodeCamp Guides.com/>
2. <http://www.Codrops CSS Reference/>
3. <https://developer.mozilla.org/enUS/docs/Web/JavaScript/Guide>.
4. <http://www.w3schools.com>.
5. <https://nptel.ac.in/courses/106105084/>
6. <https://freevideolectures.com/blog/webdesign-online-courses-and-video-lectures/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Database concepts and Proficiency in a Programming language

COURSE OBJECTIVES(CO):

- Provide students with the knowledge and skills to master the NoSQL database MongoDB.
- Write MongoDB programs using the JavaScript shell and understand MongoDB's architecture, including defining objects, loading data, querying data, and performance tuning.
- Define, compare, and use MongoDB in relation to other RDBMS systems, and perform query optimization, replication, and sharding in MongoDB

COURSE OUTCOMES(COs):

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

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

UNIT I - GETTING STARTED**15 HOURS**

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

UNIT II - APPLICATION DEVELOPMENT**15 HOURS**

Document-oriented data – Principles of schema design – Designing an e-commerce data model – Nuts and bolts on databases, collections, and documents. Queries and aggregation – E-commerce queries – MongoDB's query language – Data Types in MongoDB -Aggregating orders – Aggregation in detail.

UNIT III - UPDATES, ATOMIC OPERATIONS, AND DELETES**15 HOURS**

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

UNIT IV – REPLICATION**14 HOURS**

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

UNIT V - DEPLOYMENT AND ADMINISTRATION**13 HOURS**

Deployment – Monitoring and diagnostics – Maintenance – Performance troubleshooting

TOTAL: 72 HOURS**TEXT BOOKS:**

1. Kyle Banker. (2012). “*MongoDB in Action*”. Manning Publications Co.
2. Rick Copeland. (2013). “*MongoDB Applied Design Patterns*”, 1st Edition, O’Reilly Media Inc.
3. Gautam Rege, (2012). “*Ruby and MongoDB Web Development Beginner's Guide*”. Packt Publishing Ltd
4. Mike Wilson.. (2013). “*Building Node Applications with MongoDB and Backbone*”, O’Reilly Media Inc.

REFERENCE BOOKS:

1. David Hows. (2010). *The definitive guide to MongoDB*, 2nd edition, Apress Publication, 8132230485.
2. Shakuntala Gupta Edward. (2016), *Practical Mongo DB*, 2nd edition, Apress Publications, ISBN 1484206487.

WEBSITES:

1. <http://www.mongodb.org/about/production-deployments/>
2. <http://docs.mongodb.org/ecosystem/drivers/>
3. <http://www.mongodb.org/about/applications/>
4. <http://www.mongodb.org/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Data Analysis

COURSE OBJECTIVES(CO):

- Impart basic knowledge about data visualization techniques and recent trends in the field.
- Understand the working of various data analysis tasks and how they relate to data visualization.
- Learn about data sets in visualization and the fundamentals of design issues in visual perception.

COURSE OUTCOMES(COs):

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

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

UNIT I**15 HOURS**

Introduction to Data Visualization: Acquiring and Visualizing Data, Simultaneous acquisition and visualization, Applications of Data Visualization, Keys factors of Data Visualization (Control of Presentation, Faster and Better JavaScript processing, Rise of HTML5, Lowering the implementation Bar) Exploring the Visual Data Spectrum: charting Primitives (Data Points, Line Charts, Bar Charts, Pie Charts, Area Charts), Exploring advanced Visualizations (Candlestick Charts, Bubble Charts, Surface Charts, Map Charts, Infographics). Making use of HTML5 CANVAS, Integrating SVG.

UNIT II**15 HOURS**

Basics of Data Visualization – Tables: Reading Data from Standard text files (.txt, .csv, XML), Displaying JSON content Outputting Basic Table Data (Building a table, Using Semantic Table, Configuring the columns), Assuring Maximum readability (Styling your table, Increasing readability, Adding dynamic Highlighting), Including computations, Using data tables library, relating data table to a chart.

UNIT III**14 HOURS**

Visualizing data Programmatically: Creating HTML5 CANVAS Charts (HTML5 Canvas basics, Linear interpolations, A Simple Column Chart, Animations), Starting with Google charts (Google Charts API Basics, A Basic bar chart, A basic Pie chart, Working with Chart Animations).

UNIT IV**14 HOURS**

Introduction to D3.js: Getting setup with D3, Making selections, changing selection's attribute, Loading and filtering External data : Building a graphic that uses all of the population distribution data, Data formats you can use with D3, Creating a server to upload your data, D3's function for loading data, Dealing with Asynchronous requests, Loading and formatting Large Data Sets.

UNIT V**14 HOURS**

Advanced Data Visualization: Making charts interactive and Animated: Data joins, updates and exits, interactive buttons, Updating charts, Adding transactions, using keys Adding a Play Button: wrapping the update phase in a function, Adding a Play button to the page, Making the Play button go, Allow the user to interrupt the play, sequence.

TOTAL: 72 HOURS**TEXT BOOKS:**

- 1 Jon Raasch, Graham Murray, Vadim Ogievetsky, and Joseph Lowery, (2014) "*JavaScript and jQuery for Data Analysis and Visualization*," First Edition, Wrox.
- 2 Ritchie S. King, (2014) "*Visual Storytelling with D3: An Introduction to Data Visualization in JavaScript*," First Edition, Addison-Wesley Professional.

REFERENCE BOOKS:

- 1 Tamara Munzner, (2014) *Visualization Analysis and Design*, AK Peters Visualization Series, CRC Press, Nov.
- 2 Nathan Yau, (2013) "*Data Points: Visualization that means something*", Wiley.

WEBSITES:

1. <https://www.tableau.com/learn/articles/data-visualization>
2. <https://www.ibm.com/in-en/topics/data-visualization>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Management Principles

COURSE OBJECTIVES(CO):

- Understand the basic concepts of organizational behavior and individual behavior traits for effective performance.
- Develop perceiving skills for assessing situations and communicating ideas effectively.
- Learn how to perform in teams, manage power, politics, and conflict, and recognize the importance of organizational culture and change.

COURSE OUTCOMES(COs):

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

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

UNIT I ORGANIZATION BEHAVIOUR : INTRODUCTION**15 HOURS**

Organization Behavior: Meaning and definition - Fundamental concepts of OB - Contributing disciplines to the OB field – OB Model - Significance of OB in the organization success - Challenges and Opportunities for OB.

UNIT II BEHAVIOUR AND PERSONALITY**15 HOURS**

Attitudes – Sources - Types - Functions of Attitudes. Values – Importance - Types of Values. Personality – Determinants of personality- Theories of Personality - psycho-analytical, social learning, job-fit, and trait theories.

UNIT III PERCEPTION**15 HOURS**

Perception – factors influencing perception - Person Perception – Attribution Theory – Frequently Used Shortcuts in Judging Others- Perceptual Process- Perceptual Selectivity - Organization Errors of perception – Linkage between perception and Decision making.

UNIT IV GROUP AND STRESS MANAGEMENT**14 HOURS**

Foundation of Group Behavior - Types of Groups - Stages of Group Development - Group Norms - Group Cohesiveness – Stress – Causes of stress – Effects of Occupational Stress- Coping Strategies for Stress.

UNIT V ORGANIZATION CULTURE AND CHANGE**13 HOURS**

Organizational culture- Characteristics of Culture- Types of Culture – Creating and Maintaining an Organizational Culture. Organizational change – Meaning - Forces for Change - Factors in Organizational Change - Resistance to change- Overcoming resistance to change.

TOTAL: 72 HOURS**TEXT BOOKS:**

1. Stephen P. Robbins & Timothy A. Judge, (2012) "*Organizational Behavior*" 15th Edition, Pearson Education India.
2. Mary Uhl-Bien, John R. Schermerhorn Jr., Richard N. Osborn, (2015) "*Organizational Behavior*", 13th Edition, Wiley India.

REFERENCE BOOKS:

1. McShane, (2023) "*Organizational Behavior*" 10th Edition, McGraw Hill.
2. Robert Konopaske, John M. Ivancevich, Michael T. Matteson, (2023) "*Organizational Behavior and Management*", 12th Edition, McGraw-Hill Education.

WEBSITE

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

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Database concepts and Proficiency in a Programming language

Course Objectives(CO):

- Write MongoDB programs using the JavaScript shell and understand MongoDB's architecture, including defining objects, loading data, querying data, and performance tuning.
- Define, compare, and use MongoDB in relation to other RDBMS systems, and perform query optimization, replication, and sharing in MongoDB.
- Learn the fundamentals of MongoDB configuration, backup methods, monitoring, and operational strategies.

Course Outcomes(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Develop Applications on Mongo DB	Understand
CO2	Understand to run Applications on Mongo DB	Understand
CO3	Apply MongoDB programs from JavaScript shell.	Apply
CO4	Understand the detailed architecture, define objects, load data, query data and performance tune of MongoDB	Understand
CO5	Apply the query optimization in MongoDB and replication and sharing in MongoDB	Apply

List of Programs**Structure of 'restaurants' collection :**

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

- Write a MongoDB query
 - to display all the documents in the collection restaurants.
 - 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 Bronx or 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 Bronx or Brooklyn.
 - d. to find the restaurant Id, name, borough and cuisine for those restaurants which achieved a score which is not more than 10.
 - e. to find the restaurant Id, name, borough and cuisine for those restaurants which prepared dish except 'American' and 'Chinees' or restaurant's name begins with letter 'Wil'.
 - f. to find the restaurant Id, name, and grades for those restaurants which achieved a grade of "A" and scored 11 on an ISODate "2014-08- 11T00:00:00Z" among many of survey dates
 - g. to find the restaurant Id, name and grades for those restaurants where the 2nd element of grades array contains a grade of "A" and score 9 on an ISODate "2014-08- 11T00:00:00Z".

5. Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52
6. Write a MongoDB query
 - a. to arrange the name of the restaurants in descending along with all the columns.
 - b. to arranged the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.
7. Write a MongoDB query to know whether all the addresses contains the street or not.
8. Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double.
9. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7.
10. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.

TOTAL: 72 HOURS

TEXT BOOKS:

1. Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.
2. Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O'Reilly
3. Media Inc.
4. Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd
5. Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O'Reilly Media Inc.

WEBSITES:

1. <http://www.mongodb.org/about/production-deployments/>
2. <http://docs.mongodb.org/ecosystem/drivers/>
3. <http://www.mongodb.org/about/applications>

CO, PO, PSO Mapping

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

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

25CSU812AG

Data Visualization - Practical

Semester-VIII - A
6H-3C

Instruction Hours/week: L:0 T:0 P: 6

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

PREREQUISITE:

- Data Analysis

COURSE OBJECTIVES(CO):

- Interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- Explore the relationship between continuous variables using scatter plots and line plots, and present data using various techniques such as charts, diagrams, and maps.
- Utilize Tableau's visualization tools to conduct data analysis, explore unfamiliar datasets, and create data visualizations, dashboards, and Tableau Stories to support communication with diverse audiences.

COURSE OUTCOMES(COs):

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

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

List of Programs

1. Loading and Distinguishing Dependent and Independent parameters
2. Exploring Data Visualization tools
3. Drawing Charts
4. Drawing Graphs
5. Data mapping
6. Creating Scatter Plot maps
7. Using BNF Notations
8. Working with REGEX
9. Visualize Network Data
10. Understanding Data Visualization frameworks

TOTAL: 72 HOURS

TEXT BOOKS:

- 1 Alexandru C Telea (2014), *Data Visualization: Principles And Practice*, 2nd Edition.
- 2 Wang Kaining (2013), *Infographic & Data Visualizations*, New Edition.
- 3 Andy Krik, (2016) *Data Visualisation : A Handbook for Data Driven Design*, 1st Edition.

WEBSITES:

- 1 <https://www.tableau.com/learn/articles/data-visualization>
- 2 <https://www.ibm.com/in-en/topics/data-visualization>
- 3 <https://www.geeksforgeeks.org/data-visualization-with-python/>
- 4 <https://www.freecodecamp.org/news/d3js-tutorial-data-visualization-for-beginners/>
- 5 <https://www.dataversity.net/demystifying-advanced-data-visualization/>

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Research concepts and intellectual property principles

COURSE OBJECTIVES(CO):

- Impart knowledge and skills required for research methodology, including problem formulation, analysis, and solutions.
- Acquire the ability to analyze datasets and interpret results effectively.
- Understand the basics of intellectual property rights, including patent drafting and filing.

COURSE OUTCOMES(COs):

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

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

UNIT I RESEARCH METHODOLOGY**15 HOURS**

Objectives and motivation of research - Types of research - Research approaches – Significance of research -Research methods verses methodology - Research and scientific method – Importance of research methodology - Research process - Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, necessary instrumentations- Criteria of good research. Defining the research problem: Definition of research problem - Problem formulation - Necessity of defining the problem - Technique involved in defining a problem.

UNIT II LITERATURE SURVEY AND DATA COLLECTION**15 HOURS**

Importance of literature survey - Sources of information - Assessment of quality of journals and articles -Information through interne. Effective literature studies approaches, analysis, plagiarism, and research ethics. Data - Preparing, Exploring, examining and displaying.

UNIT III RESEARCH DESIGN AND ANALYSIS**15 HOURS**

Meaning of research design - Need of research design - Different research designs - Basic principles of experimental design - Developing a research plan - Design of experimental set-up - Use of standards and codes. Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS (IPR)**14 HOURS**

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V PATENT RIGHTS (PR)**13 HOURS**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs. Licenses, Licensing of related patents, patent agents, Registration of patent agents.

TOTAL: 72 HOURS**TEXT BOOKS:**

1. Peter S. Menell, Mark A. Lemley, Robert P. Merges, (2021) "Intellectual Property in the New Technological" Vol. I Perspectives.
2. Laura R. Ford, (2021), "The Intellectual Property of Nations: Sociological and Historical Perspectives on a Modern Legal Institution Paperback.
3. R. Ganesan, (2011) "Research Methodology for Engineers", MJP Publishers, Chennai, 2011.
4. Ratan Khananabis and Suvasis Saha, (2015) "Research Methodology", Universities Press, Hyderabad.

REFERENCE BOOKS:

1. Cooper Donald R, Schindler Pamela S and Sharma JK, (2012) "Business Research Methods", Tata McGrawHill Education, 11 Edition.
2. Catherine J. Holland, (2010) "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press.
3. David Hunt, Long Nguyen, Matthew Rodgers, (2011) "Patent searching: tools & techniques",

CO, PO, PSO Mapping

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

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

PREREQUISITE:

- Basic knowledge of statistics and programming

COURSE OBJECTIVES(CO):

- To apply statistical and machine learning techniques using software tools
- To implement data preprocessing, transformation, and visualization techniques
- To perform hypothesis testing, correlation, and regression analysis
- To explore clustering, classification, and dimensionality reduction methods
- To interpret and validate analytical results using datasets

COURSE OUTCOMES(COs):

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

COs	Course Outcomes	Blooms Level
CO1	Explore the fundamental concepts of data analytics.	Understand
CO2	Understand data analysis techniques for applications handling large data.	Understand
CO3	Understand various machine learning algorithms used in data analytics process.	Understand
CO4	Visualize and present the inference using various tools.	Analyze
CO5	Learn to think through the ethics surrounding privacy, data sharing and algorithmic decision-making.	Understand

EXERCISES

1. Data Aggregation and Grouping (Apply SUM(), AVERAGE(), or COUNT() to aggregate data within a group.)
2. Time Series Aggregation (e.g., daily, monthly, or quarterly aggregation) for time series data using Pivot Tables or grouping techniques.
3. Descriptive Statistics (for numerical columns, such as mean, median, mode, standard deviation)
4. Calculate correlation between numerical features using CORREL(), Visualize correlations using a scatter plot for pairs of numerical variables.
5. Working with Numpy arrays, Pandas data frames with Basic plots using Matplotlib
6. Apply any .Csv file to Frequency distributions, Averages, Variability, Normal curves, Correlation and scatter plots, Correlation coefficient
7. Write a program to implement Regression, Z-test, T-test
8. Write a Python Program to Read 'Petrol' and 'CNG' FuelType sales data from Toyota.csv file and show it using the bar chart
9. To test the validating linear models, logistic models
10. Write a Python Program to Get Total Price of all FuelType from Toyota.csv file and show it using a line plot with the following Style properties. Generated line plot must include following Style properties:
 - Line Style dotted and Line-color should be red

- Show legend at the lower right location.
- X label name = Fuel Type
- Y label name = Price
- Add a circle marker.
- Line marker color as red
- Line width should be 3

11. Write a Python program to create and display a DataFrame from a specified dictionary data which has the index labels.

```
exam_data = {'name': ['Dinesh', 'Suresh', 'Rahul', 'Ravi', 'Manoj', 'Hari', 'Yatharth', 'Saurabh', 'Kapil', 'Salini'], 'score': [12.5, 9, 16.5, np.nan, 9, 20, 14.5, np.nan, 8, 19], 'attempts': [1, 3, 2, 3, 2, 3, 1, 1, 2, 1], 'qualify': ['yes', 'no', 'yes', 'no', 'no', 'yes', 'yes', 'no', 'no', 'yes']} labels = ['a', 'b', 'c', 'd', 'e', 'f', 'g', 'h', 'i', 'j']
```

12. The dataset Toyota.csv may be found on the web page. This dataset contains Car information: Price, Age, KM, FuelType, KM, CC and Doors. Save this file and use read.table to import it into R. What are the means and standard deviations of the data variables (excluding Age)? Apply Data Analytic tool.

TOTAL: 72 HOURS

TEXT BOOKS:

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Introducing Data Science, Manning Publications Co., 1st edition, 2016.
2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, An Introduction to Statistical Learning: with Applications in R, Springer, 1st edition, 2013.
3. Bart Baesens, Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Wiley.
4. D J Patil, Hilary Mason, Mike Loukides, Ethics and Data Science, O' Reilly, 1st edition, 2018.
5. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, Introducing Data Science, Manning Publications Co., 1st edition, 2016.

CO, PO, PSO Mapping

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

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

End Semester Exam:- Hours