B.Sc. COMPUTER TECHNOLOGY

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2024 – 2025)

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

DEPARTMENT OF COMPUTER 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 - 14 Fax No: 0422-2980022-23

E mail ID: info@kahedu.edu.in
Web: www.kahedu.edu.in

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

UNDER – GRADUATE PROGRAMMES

(REGULAR PROGRAMME)

REGULATIONS
(2024)

CHOICE BASED CREDIT SYSTEM (CBCS)

KARPAGAM ACADEMY OF HIGHER EDUCATION

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

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

Eachanari (Post), Coimbatore – 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)
(Accredited with A+ Grade by NAAC in the Second Cycle)
Eachanari Post, Coimbatore - 641 021, India

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

REGULATIONS – 2024

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

1 PROGRAMMES OFFERED, MODE OF STUDY AND ADMISSION REQUIREMENTS

1.1 UG Programmes Offered

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

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

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

1.2 Admission Requirements (Eligibility)

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

1.3 Mode of Study

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

2. DURATION OF THE PROGRAMMES

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

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

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

2.3 Multiple Entry and Exit

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

3. CHOICE BASED CREDIT SYSTEM

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

4. STRUCTURE OF THE PROGRAMME

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

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

4.2.1. Major Courses

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

4.2.2. Minor Courses

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

4.2.3. Multidisciplinary Courses (MDC)

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

4.2.4. Skill Enhancement Courses (SEC)

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

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

4.2.5 Minor Project Work

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

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

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

4.2.6.Ability Enhancement Course (AEC)

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

4.2.7. Internship

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

4.2.8. Value Added Courses (VAC)

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

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

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

4.2.9. Research Project /Dissertation

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

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

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

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

5. ADVANCED LEARNERS AND ON-DEMAND EXAMINATION

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

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

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

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

6. CREDIT TRANSFER THROUGH ONLINE PLATFORM / INTERNATIONAL STUDIES

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

7. EXTRA CURRICULAR ACTIVITIES

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

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

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

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

8. MEDIUM OF INSTRUCTION

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

9. MAXIMUM MARKS

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

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

10. FACULTY MENTOR

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

11. ONLINE COURSE COORDINATOR

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

12. CLASS COMMITTEE

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

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

13. COURSE COMMITTEE FOR COMMON COURSES

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

14. REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

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

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

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

15. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

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

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

Theory Courses

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

Practical Courses

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

*

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

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

15.3 Portions for Test Question Paper

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

15.4 Pattern of Test Question Paper

Theory Courses:

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

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

15.5 Attendance

Distribution of Marks for Attendance

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

.

16. ESE EXAMINATIONS

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

16.2 Pattern of ESE Question Paper:

Theory Courses:

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

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

The 100 Marks will be converted to 60 Marks.

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

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

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

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

16.3. Evaluation of Project Work

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

(CIA - 40 and ESE – 60*)

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

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

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

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

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

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

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

17. PASSING REQUIREMENTS

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

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

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

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

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

18. IMPROVEMENT OF MARKS IN THE COURSES ALREADY PASSED

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

19. AWARD OF LETTER GRADES

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

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

20. GRADE SHEET

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

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

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

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

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

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

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

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

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

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

where,

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

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

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

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

21. REVALUATION

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

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

22.TRANSPARENCY AND GRIEVANCE COMMITTEE

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

23. ELIGIBILITY FOR THE AWARD OF THE DEGREE

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

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

24.CLASSIFICATION OF THE DEGREE AWARDED

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

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

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

25. RANKING

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

26. SUPPLEMENTARY EXAMINATION

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

27. DISCIPLINE

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

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

27. KAHE ENTRANCE EXAMINATION

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

28. REVISION OF REGULATION AND CURRICULUM

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

Annexure I

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

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

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

Karpagam Innovation and Incubation Council (KIIC)

(A Section 8 Company)

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

Norms to Student Start-Ups

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

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

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

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

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

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

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

Guide lines to award Credits/ Marks to a Student startup

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

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

Annexure I

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

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

15.	B. Com	International Accounting and Finance	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level
16.	B.Com	Information Technology	Candidates who have passed Higher Secondary Education (XII) or any equivalent Examination conducted by a State Government or a University or Board under the 10+2 pattern Commerce as a subject under the academic or vocational stream at the Higher Secondary level

PROGRAMME OUTCOMES (POs):

By the end of the programme, our graduates will

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

PROGRAMME SPECIFIC OUTCOMES (PSOs)

1. Graduates will be equipped with strong problem-solving, analytical, and computational skills, allowing them to analyze complex problems and devise effective solutions using modern computational tools and techniques.
2. Graduates will stay updated with and adapt to rapidly evolving technologies such as artificial intelligence, machine learning, cloud computing, and IoT, leveraging these for innovative solutions in various industries.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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

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

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

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

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

MAPPING of PEOs and POs

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

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

Course Code	Name of the Course	Category	Objectives and Outcomes		Instruction Hours / Week			Credit	Maximum Marks			Page. No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER I												
24LSUT101/ 24LUH101/ 24LUM101/ 24LUS101/ 24LUF101	Language – 1	AEC 1	1,2,3	-	4	-	-	3	40	60	100	1
24ENU101	English – I	MDC 1	2,3,7,12	-	3	-	-	3	40	60	100	13
24CTU101	Programming in C	Major 1	1,3,4,5,6,8, 10,11,	1	4	-	-	3	40	60	100	15
24CTU102	Fundamentals of Information Technology	Major 2	1,3,4,5,7,8, 10,11,13,15	1	4	-	-	3	40	60	100	17
24CTUA101	Numerical Methods	Minor 1	3,4	-	4	-	-	3	40	60	100	19
24CTU111	Programming in C – Practical	Major 3	1,3,4,5,6,8, 10,11	1	-	-	3	2	40	60	100	21
24SEC111	Office Automation - Practical	SEC 1	1,4,5,6,8,10, 11	1	-	-	6	3	40	60	100	23
24VAC101	Yoga for Youth Empowerment	VAC 1	4,5,6,8,10	-	2	-	-	2	100	-	100	27
Semester Total					**21**	**0**	**09**	**22**	**380**	**420**	**800**	
SEMESTER II												
24LSUT201/ 24LUH201/ 24LUM201/ 24LUS201/ 24LUF201	Language – II	AEC 2	1,2,3	-	4	-	-	3	40	60	100	29
24ENU201	English – II	MDC 2	2,3,9	-	3	-	-	3	40	60	100	41
24CTU201	Object Oriented Programming	Major 4	1,3,4,5,6, 8,11	1	4	-	-	3	40	60	100	43
24CTU202	Data Structure and Algorithms	Major 5	1,3,4,5,6,8	1	4	-	-	3	40	60	100	45
24CTU203	Community Engagement and Social Responsibility	Major 6	1,2,3,4,5,6,7, 8,10,15	2	2	-	-	2	40	60	100	46 A
24CTUA201	Discrete Structures	Minor 2	3,4,5	-	4	-	-	3	40	60	100	47
24CTU211	Object Oriented Programming – Practical	Major 7	1,3,4,5,6,8, 11	1	-	-	3	2	40	60	100	49
24SEC211	Web Programming – Practical	SEC 2	1,2,3,4,5,6,7, 9,11,13	1	-	-	4	3	40	60	100	51
24VAC201	Environmental Studies	VAC 2	1,8,9,11,12, 13,15	-	2	-	-	2	100	-	100	54
Semester Total					**23**	**0**	**07**	**24**	**420**	**480**	**900**	

Course Code	Name of the Course	Category	Objectives and Outcomes		Instruction Hours / Week			Credit(s)	Maximum Marks			Page. No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER III												
24LSUT301/ 24LUH301/ 24LUM301/ 24LUS301/ 24LUF301	Language – III	AEC 3	1,2,3		4	-	-	3	40	60	100	56
24ENU301	English – III	MDC 3	1,2,3,4		3	-	-	3	40	60	100	66
24CTU301	Operating Systems	Major 8	1,2,4,5,8, 9,11,13, 15	2	5	-	-	3	40	60	100	68
24CTU302	Computer Networks	Major 9	1,3,4,5,7, 8,9,11,13	1	5	-	-	3	40	60	100	71
24CTUA301	Operation Research	Minor 3	3,4,5,6		4	-	-	3	40	60	100	73
24CTU311	Operating Systems – Practical	Major 10	1,3,4,5,8, 9,11	2	-	-	3	2	40	60	100	75
24CTU312	Computer Networks - Practical	Major 11	1,3,4,5,8, 9,11,15	1	-	-	4	2	40	60	100	77
24VAC301	VAC - Indian Knowledge System	VAC 3	9,11,12, 13,15	-	2	-	-	1	100	-	100	79
24CTU391	Internship*	Summer Internship	-	-	-	-	-	2	100	-	100	81
Semester Total					**23**	**-**	**7**	**22**	**480**	**420**	**900**	
SEMESTER IV												
24LSUT401/ 24LUH401/ 24LUM401/ 24LUS401/ 24LUF401	Language – IV	AEC 4	1,2,3		4	-	-	3	40	60	100	82
24ENU401	English – IV	SEC 3	1,2,4		3	-	-	3	40	60	100	93
24CTU401	Relational Database Management System	Major 12	1,3,4,5,8, 9,11,15	1	3	-	-	3	40	60	100	95
24CTU402	Network Security	Major 13	1,3,4,5,7, 8,11,15	1	4	-	-	3	40	60	100	97
24CTU403	Programming in Python	Major 14	1,3,4,5,8, 9,11,15	1	3	-	-	2	40	60	100	99
24CTUA401	Probability and Statistics	Minor 4	3,4,5,6		4	-	-	3	40	60	100	101
24CTU411	Programming in Python and RDBMS - Practical	Major 15	1,3,4,5,8, 9,11	1	-	-	4	2	40	60	100	104
24CTU412	Network Security - Practical	Major 16	1,3,4,5,6, 7,8,9,15	1	-	-	3	2	40	60	100	106
24VAC401	Universal Human Values	VAC 4	3,4,5,7,1 2	1	2	-	-	1	100	-	100	109
Semester Total					**23**	**-**	**7**	**22**	**420**	**480**	**900**	

Course Code	Name of the Course	Category	Objectives and Outcomes		Instruction Hours / Week			Credit(s)	Maximum Marks			Page. No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER V												
24CTU501	Digital Identity and Access Management	Major 17	1,3,4,5,8, 9,10,12	1	6	-	-	3	40	60	100	112
24CTU502__	Major Elective - I	Major 18	-	-	5	-	-	3	40	60	100	114
24CTU503__	Major Elective - II	Major 19	-	-	5	-	-	3	40	60	100	121
24CTUA501	Basics of Accounting	Minor 5	1,2,3,5,6, 9,10,11,1 2	1	6	-	-	6	40	60	100	127
24CTU512__	Major Elective – I - Practical	Major 20	-	-	-	-	4	2	40	60	100	129
24CTU513__	Major Elective – II - Practical	Major 21	-	-	-	-	4	2	40	60	100	135
24CTU591	Internship*	Summer Internship	-	-	-	-	-	2	100	-	100	141
Semester Total					**22**	**-**	**8**	**21**	**340**	**360**	**700**	
SEMESTER VI												
24CTU601	IT Service Management	Major 22	1,3,4,5,8, 9,13,15	1	5	-	-	4	40	60	100	142
24CTU602__	Major Elective - III	Major 23	-	-	5	-	-	4	40	60	100	144
24CTUA601	Entrepreneurship	Minor 6	1,3,4,5,6, 7,8,10,11 ,12	1	6	-	-	6	40	60	100	153
24CTU611	IT Service Management - Practical	Major 24	1,3,4,5,8, 9,10	1	-	-	3	2	40	60	100	155
24CTU612__	Major Elective – III - Practical	Major 25	-	-	-	-	3	2	40	60	100	157
24CTU691	Project	Major 26	-	-	-	-	8	4	40	60	100	165
ECA/NCC/NSS/Sports/General Interest etc		-	-	-	-	-	-	-	-	-	-	-
Semester Total					**16**	**-**	**14**	**22**	**240**	**360**	**600**	
Grand Total					**128**	**-**	**52**	**133**	**2280**	**2520**	**4800**	

Course Code	Name of the Course	Category	Objectives and Outcomes		Instruction Hours / Week			Credit(s)	Maximum Marks			Page. No
			PO	PSO	L	T	P		CIA	ESE	Total	
									40	60	100	
SEMESTER VII												
24CTU701	Internet of Things	Major 27	1,2,6,7,8, 9,10,11	1	6	-	-	4	40	60	100	166
24CTU702	J2EE	Major 28	1,3,4,5,6, 8,10,11	1	6	-	-	4	40	60	100	168
24CTUA701	Statistical Computing	Minor 7	1,2,3,7,8, 9,11,12, 13	-	6	-	-	4	40	60	100	170
24CTU711	Internet of Things – Practical	Major 29	1,3,4,5,8, 9,11,15	1,2	-	-	6	4	40	60	100	172
24CTU712	J2EE – Practical	Major 30	1,3,4,5,6, 8,10,11	1	-	-	6	4	40	60	100	174
Semester Total					**18**	**-**	**12**	**20**	**200**	**300**	**500**	
SEMESTER VIII A												
24CTU801A	MongoDB	Major 31	1,3,5,6,7, 8,11,12, 13,14	1	6	-	-	4	40	60	100	176
24CTU802	Data Visualization	Major 32	1,2,3,4,7, 8,10,11, 13	1,2	6	-	-	4	40	60	100	178
24CTUA801	Organizational Behavior	Minor 8	1,3,4,5,6, 7,9,10,11	1	6	-	-	4	40	60	100	180
24CTU811A	MongoDB - Practical	Major 33	1,3,4,5,6, 8,9,10,11 ,12	1	-	-	6	4	40	60	100	182
24CTU812	Data Visualization - Practical	Major 34	1,3,4,7,8, 10,11,12, 13,15	1	-	-	6	4	40	60	100	185
Semester Total					**18**	**-**	**12**	**20**	**200**	**300**	**500**	
SEMESTER VIII B												
24CTU801B	Research Methodology and IPR	Major 35	1,2,3,4,5, 6,7,8,9, 10,11,12	1	6	-	-	4	40	60	100	187
24CTUA811/ 24CTUA812/ 24CTUA813	SPSS / NS2 Tool / Data Analytics Tool – Practical	Minor 9	-	-	-	-	6	4	40	60	100	189
24CTU891	Research Project	Project 1				-	18	12	100	200	300	195
Semester Total					**6**	**-**	**24**	**20**	**180**	**320**	**500**	
Grand Total					**164**	**-**	**76**	**173**	**2680**	**3120**	**5800**	

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

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

Major		
Semester	**Course Code**	**Name of the Course**
I	24CTU101	Programming in C
	24CTU102	Fundamentals of Information Technology
	24CTU111	Programming in C – Practical
II	24CTU201	Object Oriented Programming
	24CTU202	Data Structure and Algorithms
	24CTU203	Community Engagement and Social Responsibility
	24CTU211	Object Oriented Programming – Practical
III	24CTU301	Operating System
	24CTU302	Computer Networks
	24CTU311	Operating System – Practical
	24CTU312	Computer Networks – Practical
IV	24CTU401	Relational Database Management System
	24CTU402	Network Security
	24CTU403	Programming in Python
	24CTU411	Programming in Python and RDBMS – Practical
	24CTU412	Network Security – Practical
V	24CTU501	Digital Identity and Access Management
VI	24CTU601	IT Service Management
	24CTU611	IT Service Management – Practical
	24CTU691	Project
VII	24CTU701	Internet of Things
	24CTU702	J2EE
	24CTU711	Internet of Things – Practical
	24CTU712	J2EE – Practical
VIII A	24CTU801A	MongoDB
	24CTU802	Data Visualization
	24CTU811A	MongoDB – Practical
	24CTU812	Data Visualization - Practical
VIII B	24CTU801B	Research Methodology and IPR
	24CTU891	Research Project

Major Elective I Select Any one from the courses listed below along with corresponding practical course		
Semester	**Course Code**	**Name of the Course**
V	24CTU502A	Full Stack Web Development
	24CTU502B	Microservice Architecture
	24CTU502C	Enterprises JAVA
	24CTU512A	Full Stack Web Development - Practical
	24CTU512B	Microservice Architecture - Practical
	24CTU512C	Enterprises JAVA - Practical

Major Elective II Select Any one from the courses listed below along with corresponding practical course		
Semester	**Course Code**	**Name of the Course**
V	24CTU503A	Soft Computing
	24CTU503B	Cloud Application Development
	24CTU503C	Business Intelligence
	24CTU513A	Soft Computing – Practical
	24CTU513B	Cloud Application Development – Practical
	24CTU513C	Business Intelligence - Practical

Major Elective III Select Any one from the courses listed below along with corresponding practical course		
Semester	**Course Code**	**Name of the Course**
VI	24CTU602A	Introduction to AI and Machine Learning
	24CTU602B	Deep Learning
	24CTU602C	Data Science
	24CTU602D	Fundamentals of Geographic Information Systems
	24CTU612A	Introduction to AI and Machine Learning – Practical
	24CTU612B	Deep Learning – Practical
	24CTU612C	Data Science – Practical
	24CTU612D	Fundamentals of Geographic Information Systems – Practical

Minor		
Semester	**Course Code**	**Name of the Course**
I	24CTUA101	Numerical Methods
II	24CTUA201	Discrete Structures
III	24CTUA301	Operation Research
IV	24CTUA401	Probability and Statistics
V	24CTUA501	Basics of Accounting
VI	24CTUA601	Entrepreneurship
VII	24CTUA701	Statistical Computing
VIII A	24CTUA801	Organizational Behaviour
VIII B	24CTUA811/ 24CTUA812/ 24CTUA813	SPSS / NS2 Tool / Data Analytics Tool – Practical

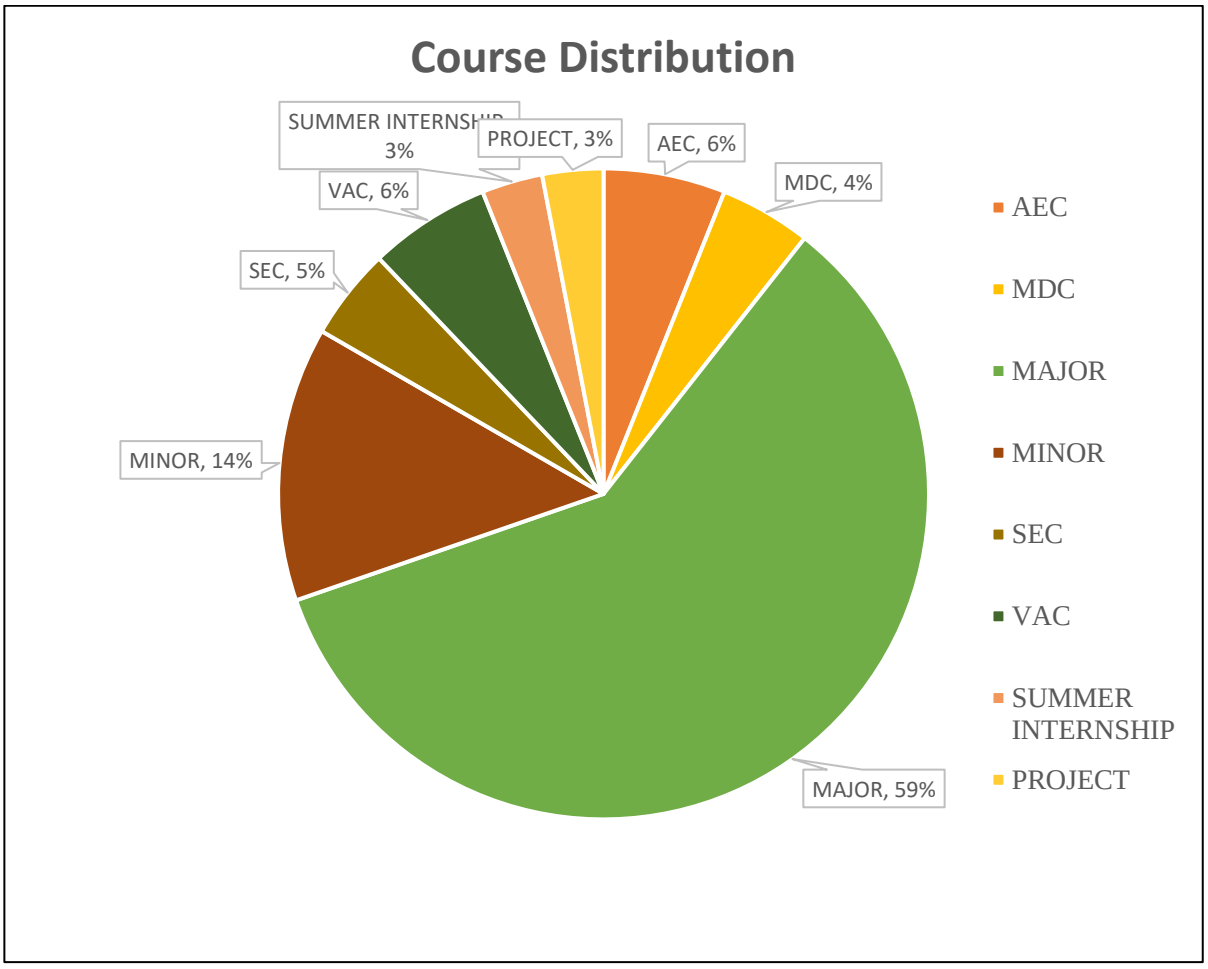
Skill Enhancement Courses (SEC)		
Semester	**Course Code**	**Name of the Course**
I	24SEC111	Office Automation – Practical
II	24SEC211	Web Programming – Practical
IV	24ENU401	English – IV

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

Summer Internship		
Semester	**Course Code**	**Name of the Course**
III	24CTU391	Internship*
V	24CTU591	Internship*

Course Distribution Table

Category	No of Courses		Total
	Theory	Practical	
AEC	4	0	4
MDC	3	0	3
MAJOR	23	17	40
MINOR	8	1	9
SEC	1	2	3
VAC	4	0	4
SUMMER INTERNSHIP	0	2	2
PROJECT	0	2	2
Total	43	24	67



முதல் பருவம்

Language - I (இலக்கிய இன்பம்)

4H-3C

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

பாடத்திட்டப் பொதுநோக்கம்

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

பாடத்திட்டப் பயன்விளைவு

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

அலகு – I **(10 மணிநேரம்)**

சங்க இலக்கியம்–எட்டுத்தொகை-முச்சங்கங்கள் பற்றிய செய்திகள் சங்க இலக்கியத்தின் தோற்றுவாய் – எட்டுத்தொகை அறிமுகம் **சங்க இலக்கியம் - நற்றிணை -** நின்ற சொல்லர் –குறிஞ்சி – தலைவி கூற்று–1

சங்க இலக்கியம் - குறுந்தொகை - நிலத்தினும் பெரிதே–குறிஞ்சி – தலைவி கூற்று- 3 **அறஇலக்கியம் - திருவள்ளுவர் – திருக்குறள் (எண்கள்-திருக்குறள் வரிசை எண்ணைக் குறிப்பன) பாயிரம் –** 8 அறவாழி அந்தணன்,13 - விண்இன்று பொய்ப்பின், 34 - மனத்துக்கண் மாசிலன் ஆதல் **இல்லற இயல் - இல்வாழ்க்கை -** 41- அன்பும் அறனும் உடைத்தா 50-வையத்துள்வாழ்வாங்கு **அன்புடைமை-**80-அன்பின்வழியது, **விருந்தோம்பல் -** 90 – மோப்பக்குழையும், **இனியவைகூறல் -** 95 – பணிவுடையன் இன்சொலன், **செய்நன்றி அறிதல் -** 103 – பயன் தூக்கார், **புறங்கூறாமை -** 190 – ஏதிலார் குற்றம், **ஒப்புரவுஅறிதல் -** 216 – பயன்மரம் **ஈகை:** 228 – ஈத்துவக்கும் இன்பம், **துறவற இயல் - தவம் -** 261 – உற்றநோய் **வாய்மை -** 291 – வாய்மை எனப்படுவது, **வெகுளாமை -** 306 – சினமென்னும் **இன்னாசெய்யாமை :** 316-இன்னா எனத்தான் உணர்ந்தவை **நிலையாமை** - 331 – நில்லாதவற்றை, **ஊழியல் - ஊழ் -** 373 – நுண்ணியநூல் **ஆள்வினை உடைமை** - 618 –பொறியின்மை யார்க்கும், 620-ஊழையும் உப்பக்கம்

நட்பு - 792-ஆய்ந்தாய்ந்து, 794-குடிப்பிறந்து, 797-ஊதியம் என்பது. **காப்பியம் - சிலப்பதிகாரம்:**

மங்கலவாழ்த்துப் பாடல் - பொதியில்ஆயினும் – 'கோவலன் என்பான்மன்னோ' (14-38), 'நீலவிதானத்து' – 'நோன்புஎன்னை'(48-53).

மனையறம்படுத்த காதை - 'வார்ஒலிகூந்தலை' – 'சிறப்பின் கண்ணகிதனக்குஎன்' (84-90)**அரங்கேற்று காதை** -'மாமலர்நெடுங்கண்' - 'அகம்மறந்து' (170-175). **மதுரைக்காண்டம்**-கொலைக்களக்காதை, 'இருமுதுகுரவர் '-' எழுந்தனன்யான்' (67-83),'வினைவிளைகாலம்' - ' கொணர்கஈங்குஎன' (148-153) **கட்டுரை காதை** - 'கடிபொழில்' - 'இல்சாபம்பட்டனிர்' (138-170) **வழக்குரைக் காதை** - 'அல்லவை செய்தார்க்கு' - 'தோற்றான்உயிர்' (82-93) **வஞ்சிக் காண்டம்** -நடுகல்காதை - 'மதுரைமூதூர்' - 'மன்னவர்ஏறு' (218-234) **வாழ்த்துக் காதை** - 'என்னேஇஃது' - 'தோன்றுமால்' (9) **எழுத்திலக்கணம்** - முதல் மற்றும் சார்பெழுத்துகள்

அலகு- 2 **(10 மணிநேரம்)**

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

அலகு– 3 **(10 மணிநேரம்)**

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

சங்க இலக்கியம் -அகநானூறு - ஈன்று புறம்தந்த எம்மும் உள்ளாள் – பாலை– நற்றாய்கூற்று-35 **அற இலக்கியம் -ஔவையார்- கொன்றை வேந்தன் (**1-50 பாடல்கள்**) காப்பியம் - சூளாமணி–அரசியல்சருக்கம்**- 1. நாவியே கமழும்(1131), 2. கண்மிசை கனிந்த (1132),3. விரைசெலலிவுளித்(1133),
4. அரைசர்கள் வருக (1134), 5. அருளுமாறடிகள் (1135), 6. விஞ்சையருலக (1136), 7. சொரிகதிர் (1137), 8. கரியவன் வளைந்த(1138), 9. மடித்தவா யெயிறு (1139),10. விஞ்சயரதனைக் (1140), **துறவுச்சருக்கம்** – பயாபதி மன்னனின் துறவுநெறி -1. மன்னிய புகழி(1840), 2. திருமகிழலங்கன் (1841) , 3. ஆங்கவ ரணைந்த (1842),4. அலகுடன் விளங்கு (1843), 5. தன்னையோர் அரசனாக்கி (1844), 6. சென்றநாள்(1845), 7. எரிபுரை (1846.), 8. பிறந்தனர்(1847), 9. பிறந்தநாம் (1848), 10. தொகைமலர் (1849) 11. ஒழுகிய(1850). **பொருள் இலக்கணம் -** அகத்திணை மற்றும் புறத்திணை இலக்கணங்கள்.

அலகு- 4 **(10 மணிநேரம்)**

சிற்றிலக்கியங்கள் தோற்றமும் வளர்ச்சியும் **சங்க இலக்கியம் - ஐங்குறுநூறு :** தாய்சாப்பிறக்கும் – தோழிகூற்று – மருதம் - களவன்பத்து: 24 **சங்க இலக்கியம் - புறநானூறு :** உற்றுழிஉதவியும்-183, பல்சான்றீரே – பொதுவியல்-195 **அற இலக்கியம் – வேதநாயகம் பிள்ளை -நீதி நூல்-** தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள் மட்டும் சின்னவோர் பொருள், கடவுளை வருத்தி, எப்புவிகளும், வைத்தவர், ஈன்றவர். **காப்பியம் – கம்பராமாயணம் – சுந்தரகாண்டம் (**தேர்ந்தெடுக்கப்பட்ட பாடல்கள் மட்டும் **)** வண்மையில்லை 84 - தாய் ஒக்கும் 171 - ஒரு பகல் 284 - எதிர் வரும் 314 – தருவனத்துள் 327 - எண் இலா 328 - சொல் ஒக்கும் 413 – இவ்வண்ணம் 559 - எண் அரு 598 - தடுத்து இமையாமல் 1979 - தோள்

கண்டார் 1008 – மைந்தரை 1339 – அந்நகர் 1445 - சிவந்த வாய் 1550 - ஏய வரங்கள் 1593 – நின்மகன் 1526 – ஆழிசூழ் 1601 – மன்னவன் 1604 – பின்னும் 1752 – கிள்ளையொடு 1701 – எந்தையும் 2159 - பஞ்சி ஒளிர் 2762 - மயில் உடை 3248 – ஆண்டு 3390 –மற்றுஇனி 3812- கண்டனன் 5249 – வேலையுள் 6037 –மண்ணொடும் 6038- வாங்கிய 6170 – இங்குஉள 6172 – கண்டனென் 6031 - பைய பைய 6174 – அந்நெறி 6185 – குகனொடும் 6507 –கூவி 7131 –மாக்கூடு 7760 – அற்றவன் 9168 - ஆள் ஐயா 7271 - கார்நின்ற-10043.

கடிதப்பயிற்சி

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

அலகு – 5 **(8 மணிநேரம்)**

காப்பியங்கள் - தோற்றமும் வளர்ச்சியும் **சங்க இலக்கியம் - பத்துப்பாட்டு**: சிறுபாணாற்றுப்படை வானம் வாய்த்த – யாம் அவண்நின்றும் வருதும் (அடிகள்: 84-143), செய்நன்றி அறிதலும் – நல்லியக்கோடனை நயந்தனிர் செலினே (207-269). **அற இலக்கியம் – குமரகுருபரர் - நீதி நெறி விளக்கம்** (தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள் மட்டும்) உறுதி பயப்ப, முயலாது வைத்து, உலையாமுயற்சி, காலம் அறிந்து, மெய்வருத்தம்

கடிதப்பயிற்சி

5. கல்விக் கடன்வேண்டி வங்கிமேலாளருக்கு விண்ணப்பம்
6. வசிப்பிடத்திற்கு அடிப்படை வசதிவேண்டி வட்டாட்சியருக்கு விண்ணப்பம்
7. விருதுபெற்ற நண்பனுக்குப் பாராட்டுக் கடிதம்
8. புத்தகங்கள் அனுப்பி உதவவேண்டி, பதிப்பகத்தாருக்கு விண்ணப்பம்.

மொத்த மணிநேரம் 48

Karpagam Academy of Higher Education, Coimbatore – 21.

பார்வை நூல்கள்

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

இணையதளம்

1. www.tvu.org.in

2. www.maduraitamilproject.com

இதழ்கள்

1. International Research Journal of Indian Literature, irjil.in

2. International Tamil Research Journal, iorpress.in

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.8**	**2.6**	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

24LSUH101

Semester I

HINDI-PAPER- I **4H-3C**

(Prose, Non-detailed, Nibandh, Grammar)

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

End Semester Exam: 3 Hours

PREREQUISITE:
Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

UNIT -I **9 HOURS**

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

UNIT -II **9 HOURS**

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

UNIT -III **10 HOURS**

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

UNIT-IV **10 HOURS**

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

UNIT-V **10 HOURS**

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

TOTAL: 48 HOURS

TEXT BOOKS:

1. Prose :Nuthan Gathya Sangrah (lesson-1,5,6,8,9).
Editor : Jayaprakash
Publisher : Sumithra Prakasan,
16|5.Hasting Road,
Illahabad.211001.

2. Non-detailed: Naveen Ekhanki Sangrah
Editor : Dr. Srimathi Malathi Tiwari
Publisher: Sumithra Prakashan,
204.Leela Apartment,
Ashok Nagar, Illahabad-211001.

3. Nibandh : Subod Hindi Nibandh
Editor : Dr. Braj Kishor Prasad Sing
Publisher: Manoj Publication
1583-84 Dariba Kala, Chandni Chouk,
Delhi – 110006.

4. Grammar: Sugam Hindi Vyakaran
Writer: Pro. Vamshidhar & Dharmapal
Publication: Shiksha Bharathi, Kashmir Gat, Delhi - 110006

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.8**	**2.4**	**2.4**	**-**	**-**	**-**	**-**	**-**	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-I
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 ofthe people of this state.

COURSE OUTCOME(COs):

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

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

Semester I

SANSKRIT I **4H-3C**

(POETRY, GRAMMAR AND TRANSLATION**)**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

UNIT I **9 HOURS**

Introduction to Poetry, Definition of Poetry

UNIT II **9 HOURS**

Five Maha Kavyas

UNIT III **10 HOURS**

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

UNIT IV **10 HOURS**

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

UNIT V **10 HOURS**

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

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

TOTAL: 48 HOURS

TEXT BOOKS:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester I

FRENCH I **4H-3C**

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

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

End Semester Exam: 3 Hours

PREREQUISITE:
Not Required

COURSE OBJECTIVES (CO):
The objectives of this course are:

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

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

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

Unite – I **9 HOURS**

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

Unité - II **9 HOURS**

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

Unité - III **10 HOURS**

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

Unité IV **10 HOURS**

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

Unité V **10 HOURS**

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

TOTAL: 48 HOURS

REFERENCE BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de francais**, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud **Deldphin, Saison 1 – Cahier d'activites** , Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, Marie- Françoise Gliemenn,**Les exercices de grammaire**,Hachette FLE, Paris,2005
4. Christian Beaulieu, Je **pratique, Exercises de grammaire A1**, Dider,Paris,2015
5. Nathalie BIE, philippe SANTINAN,**Grammaire pour adolescents-250 exercises,** CLE International , Paris , 2005

WEBSITES :

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

CO, PO, PSO Mapping

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

SEMESTER-I

English - I

3H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:

Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

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

UNIT-I **8 HOURS**

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

UNIT- II **7 HOURS**

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

UNIT- III **7 HOURS**

LISTENING: Barriers of Listening
SPEAKING: Telephone Conversations
READING: Reading Comprehension Passages
WRITING: Precise Writing
LITERATURE: The Umbrella man by Roald Dahl
GRAMMAR: Tense

UNIT- IV **7 HOURS**

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

UNIT V **7 HOURS**

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

TOTAL: 36 HOURS

TEXT BOOK

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

REFERENCE BOOKS:

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

WEB SITES:

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

CO, PO, PSO Mapping

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

SEMESTER-I

Programming in C

4H - 3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To provide the knowledge about computer fundamentals.
- To Learn to apply logic and critical thinking to solve C Programming problems
- To understand the use of conditional statements, looping statements and arrays in C Programming
- To understand the concepts of User-Defined Functions, Structures and Unions for writing C Programs
- To Implement the concept of Pointers and File Management for writing C Programs

Course Outcomes (COs):

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

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

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 **9 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 Chainof pointers-Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers to Functions–Pointers and Structures -Structures and Unions.

UNIT V File Management **10 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. Balagurusamy, 2018. Programming in ANSI C, 7th Edition.
2. Stephen G. Kochan,2014.Programming in C, 4th Edition.
3. Brian W. Kernighan and Dennis M. Ritchie, 2015.The C Programming Language, 2nd Edition.

Reference Books:

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

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/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	1	-	-	1	-	-	-	2	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	-	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	-	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**	-	**2.4**	**3**	**2.25**	**1.25**	-	**1.3**	-	**2**	**1**	-	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-I

Fundamentals of Information Technology

4H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To Deal with the basic concepts of computers.
- To Know about the computer input and output devices architecture.
- To Summarise storage memories of computer
- To Understand the basic computer software including the operating system and its concepts.
- To Explain basic of networks fundamentals

Course Outcomes (COs):

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

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

Unit I: Introduction to Computers **9 Hours**

Introduction - History of Information Technology - Careers in Information Technology - Researching and Using the Web - Characteristics of computer - Evolution of Computer - Block Diagram Of a computer - Generations of Computer - Classification of Computers - Applications of Computer - Capabilities and limitations of computer.

Unit II: I/O Devices **9 Hours**

Input Devices: Keyboard - Terminals and its types. Pointing Devices - Scanners and its types - Voice Recognition Systems - Vision Input System - Touch Screen - **Output Devices:** Monitors and its types. Printers: Impact Printers and its types. Non-Impact Printers and its types - Plotters - types of plotters - Sound cards - Speakers.

Unit III: Storage Fundamentals **10 Hours**

Primary Storage: RAM ROM - PROM - EPROM - EEPROM. **Secondary Storage**: Magnetic Tapes - Magnetic Disks. Cartridge tape - hard disks - Floppy disks Optical Disks - Compact Disks - Zip Drive - Flash Drives. **Number Systems and Boolean Algebra:** Decimal–Binary– Octal–Hexadecimal-Converting Techniques in Number Systems-1's Complements - 2's Complements-Rules and Laws of Boolean Algebra-Basic Gates (NOT, AND & OR).

Unit IV Software **10 Hours**

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

Unit V: Networks Fundamentals **10 Hours**

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

Total : 48 Hours

Text Books:

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

Reference Book:

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

Websites:

1. www.geeksforgeeks.org

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	1	-	2	3	-	3	2	-	2	-	3	3	-
CO2	3	-	1	1	-	-	2	1	-	2	1	-	-	-	2	3	-
CO3	2	-	-	2	-	-	-	-	-	2	3	-	-	-	-	3	-
CO4	3	-	-	-	2	-	-	2	-	2	-	-	1	-	-	3	-
CO5	2	-	1	2	-	-	3	-	-	3	-	-	-	-	2	3	-
AVG	**2.6**	-	**1.3**	**1.6**	**1.5**	-	**2.3**	**2**	-	**2.4**	**2**	-	**1.5**	-	**2.3**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-I

Numerical Methods

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:

Understanding of basic calculus.

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

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

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

UNIT II SOLUTION OF SIMULTANEOUS LINEAR ALGEBRAIC EQUATION 10 HOURS

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

UNIT III INTERPOLATION **10 HOURS**

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

UNIT IV NUMERICAL DIFFERENTIATION AND INTEGRATION **9 HOURS**

Numerical Differentiation: Newton's forward difference and Newton's backward difference formula. Numerical Integration: Trapezoidal Rule and Simpson 's Rule.

UNIT V NUMERICAL SOLUTION OF ORDINARY DIFFERENTIAL EQUATIONS

9 HOURS

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

TOTAL: 48 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEBSITES:

1. https://testbook.com/maths/bisection-method
2. https://kanchiuniv.ac.in/coursematerials/Numerical%20-%20Algebraic%20equations.pdf
3. https://youtu.be/TIWRyzzFUYQ?si=rK4kUBpTzVpavVdU
4. https://theengineeringmaths.com/wp-content/uploads/2017/11/num-diff-integ-web.pdf

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	1	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**-**	**-**	**1**	**2.6**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-I

Programming in C - Practical

3H - 2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To provide the knowledge about computer fundamentals.
- To Learn to apply logic and critical thinking to solve C Programming problems
- To understand the use of conditional statements, looping statements and arrays in C Programming
- To understand the concepts of User-Defined Functions, Structures and Unions for writing C Programs
- To Implement the concept of Pointers and File Management for writing C Programs

Course Outcomes (COs):

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

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

List of Programs

1. Write a C program to find the sum, average, standard deviation for a given set of numbers.
2. Write a C program to generate n prime numbers from 1 to 50.
3. Write a C program to generate Fibonacci series.
4. Write a C program to print magic square of order n where n>3and n is odd.
5. Write a C program to sort the given set of numbers in ascending order.
6. Write a C program to check whether the given string is a palindrome or not using pointers.
7. Write a C program to count the number of Vowels in the given sentence.
8. Write a C program to find the factorial of a given number using recursive function.
9. Write a C program to print the students Mark sheet assuming roll no, name, and marks in 5 subjects in a structure. Create an array of structures and print the mark sheet in the University pattern.

10.Write a function using pointers to add two matrices and to return the resultant matrix to the calling function.
11.Write a C program which receives two filenames as arguments and check whether the file contents are same or not. If same delete the second file
12.Write a program which takes a file as command line argument and copy it to another file. At the end of the second file write the total i) no of chars ii) no.of words and iii) no.of lines.

Total : 36 Hours

Text Books:

1 E. Balagurusamy, 2018. Programming in ANSI C, 7th Edition.
2 Stephen G. Kochan, 2014.Programming in C, 4th Edition.

Reference Books:

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

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

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

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

WEBSITES

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	1	-	-	1	-	-	-	2	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**	-	**2.4**	**3**	**2.25**	**1.25**	-	**1.3**	-	**2**	**1**	-	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-I

Office Automation -Practical

6H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

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

Course Outcomes (COs):

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

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

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 „2*n‟ matrix
    iii. Basic mathematical and geometric operators.
    iv. Use proper text formatting, page color and page border.
3. Create a flowchart using,
    i. Proper shapes like ellipse, arrows, rectangle, and parallelogram.
    ii. Use grouping to group all the parts of the flowchart into one single object.
4. Create a table using table menu with,
    i. At least 5 columns and 10 rows.
    ii. Merge the first row into one cell.
    iii. Merge the second row into one cell, then split the second row into three cells.
    iv. Use proper table border and color.
    v. Insert proper content into the table with proper text formatting.
5. Create a table using two columns,
    i. The left column contains all the short-cut keys and right-side column contains the function of the short-cut keys.
    ii. Insert a left column using layout option. Name the heading as Serial No.
6. Create two letters with the following conditions in Ms Word and find the difference.
    i. Write a personal letter to your friend using at least 100 words and two paragraphs. The date must be in top-right corner. Use „justify‟ text- alignment and 1.5 line spacing for the body of the letter. Letter must contain proper salutation and closing.
    ii. Use step by step mail-merge wizard to design a letter.
7. Create a letter, which must be sent to multiple recipients.
    i. Use Mail-Merge to create the recipient list.
    ii. Use excel sheet to enter the recipient.
    iii. Start the mail merge using letter and directory format. State the difference.

List of Programs (MS Excel)

1 Create a table “Student result” with following conditions.
    i. The heading must contain, Sl. No., Name, Mark1, Mark2, Mark3, Total, average and result with manual entry.
    ii. Use formulas for total and average.
    iii. Find the name of the students who has secured the highest and lowest marks.
    iv. Round the average to the nearest highest integer and lowest integer (use ceiling and floor function respectively).
2 Do as directed
    i. Create a notepad file as per the following fields
    Slno name th1 th2 th3 th4 th5 total % grade
3 Import this notepad file into excel sheet using data from text option.
4 Grade is calculated as,
    i. If %>=90, then grade A
    ii. If %>=80 and <90, then grade B
    iii. If %>=70 and <80, then grade C
    iv. If %>=60 and <70, then grade D
    v. If %<60, then grade F
    vi.

5 Create a sales table using the following data,

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

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

List of Programs (MS Power Point)

1. Create a power-point presentation with minimum 5 slides.
   i. The first slide must contain the topic of the presentation and name of the presentation.
   ii. Must contain at least one table.
   iii. Must contain at least 5 bullets, 5 numbers.
   iv. The heading must be, font size:32, font-face: Arial Rounded MT Bold, font-color: blue.
   v. The body must be, font size: 24, font-face: Comic Sans MS, font-color: green.
   vi. Last slide must contain „thank you".
2. Create a power-point presentation with minimum 10 slides
   i. Use word art to write the heading for each slide.
   ii. Insert at least one clip-art, one picture
   iii. Insert at least one audio and one video
   iv. Hide at least two slides
3. Create a power-point presentation with minimum 5 slides
   i. Use custom animation option to animate the text; the text must move left to right one line at a time.
   ii. Use proper transition for the slides.

List of Programs (MS Access)

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

Total : 72 Hours

Text Books:

1. Vikas Gupta, “Comdex 14-1in-1 Computer course Kit”, Dream Tech
2. Bittu Kumar, “Master in Ms-Office”

Reference Books:

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

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	2	-	-	-	-	-	2	1	-	-	-	-	3	-
CO2	3	-	-	2	2	2	-	1	-	2	2	-	-	-	-	3	-
CO3	3	-	-	1	-	1	-	-	-	2	1	-	-	-	-	3	-
CO4	3	-	-	2	-	1	-	-	-	2	1	-	-	-	-	3	-
CO5	3	-	-	3	-	2	-	-	-	1	3	-	-	-	-	3	-
AVG	**3**	-	-	**2**	**2**	**1.5**	-	**1**	-	**1.8**	**1.6**	-	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, ‘-‘ – No Correlation																	

24VAC101

SEMESTER-I

Value Added Course -Yoga for Youth Empowerment

2H-2C

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

End Semester Exam:3 Hours

PREREQUISITE:

Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

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

UNIT I YOGA AND PHYSICAL HEALTH **8 HOURS**

Manavalakalai (SKY) Yoga: Introduction Education as a means for youth empowerment-Greatress of Education Yoga for youth Empowerment. Simplified Physical Exercises Hand, Leg, Breathing, Eye exercises Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acupressure, Relaxation exercises Benefits Yogasanas 1: Pranamasana Hastha Uttanasana Pada Hasthasana - AswaSanjalana Asana ThuvipathaasvaSarjalana asana AstangaNamaskara - Bhujangasana Atha Muktha Savasana AswaSanjalanaAsara Pada Hasthasana-Hastha UttanasanaPranamasana - Pranayama: Naddisudei-Clearance Practice-Benefits - Simplified Physical Exercise-Kayakalpa Practices - Meditation Practices.

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

UNIT II GREATNESS OF LIFE FORCE AND MIND **7 HOURS**

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

UNIT III PERSONALITY DEVELOPMENT – SUBLIMATION **7 HOURS**

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

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

UNIT IV HUMAN RESOURCE DEVELOPMENT **7 HOURS**

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

UNIT V LAW OF NATURE **7 HOURS**

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

YOGA PRACTICES: Thandasana Chakrasana (sideways) Vruchasana Thirikonasana Varasana

TOTAL: 36 HOURS

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	-	3	3	-	-	-	-	1	-	-	-	-	-	-	2
CO2	-	-	-	3	2	2	-	1	-	2	-	-	-	-	-	-	2
CO3	-	-	-	1	3	1	-	-	-	1	-	-	-	-	-	-	2
CO4	-	-	-	2	3	1	-	-	-	1	-	-	-	-	-	-	2
CO5	-	-	-	3	3	2	-	-	-	-	-	-	-	-	-	-	2
AVG	-	-	-	**2.4**	**2.8**	**1.5**	-	**1**	-	**1.25**	-	-	-	-	-	-	**2**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

இரண்டாம் பருவம்

Language - II (இலக்கிய நெறிகள்)

4H-3C

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

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்

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

பாடத்திட்டப் பயன்விளைவு

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

அலகு – I **(8 மணிநேரம்)**

நாயன்மார்கள் : தமிழ் இலக்கிய வரிசையில் திருமுறைகளும் நாலாயிரத் திவ்யப்பிரபந்தமும் – பன்னிரு திருமுறைகள் அறிமுகம் – திருமுறை ஆசிரியர்களின் இலக்கியப் பங்களிப்பு **சைவம்-பெரியபுராணம்** - காரைக்கால் அம்மையார் புராணம் . **முக்கூடற்பள்ளு** - 2 பாடல்கள் - சித்திரக்காலிவாலான் (நெல் வகைகள்) குற்றாலத் திரிகூடமால்வரை (மீன்வகைகள், காளை வகைகள்) **கவிதை : மகாகவி பாரதியார்** - யோகசித்தி **கவிதை : கவிமணி தேசிக விநாயகம் பிள்ளை** - வாழ்க்கைத் தத்துவங்கள் **கவிதை : கவிஞர் சுகந்திசுப்பிரமணியம்** - புதையுண்டவாழ்க்கை **சிறுகதை : மகாமசானம்** - புதுமைப்பித்தன்

இலக்கணம் - வாக்கியஅமைப்பு : தனிவாக்கியம் – தொடர்வாக்கியம் – கலவைவாக்கியம் -தன்வினை வாக்கியம் – பிறவினை வாக்கியம்- செய்வினை, செயப்பாட்டு வினைவாக்கியம், கட்டளைவாக்கியம் – வினாவாக்கியம் – உணர்ச்சி வாக்கியம். நன்னூல் – பொதுவியல் - அறுவகைவினா (385) - எண்வகைவிடை (386).

அலகு– 2 **(12 மணிநேரம்)**

ஆழ்வார்கள் : இலக்கியப் பங்களிப்பு - திவ்யப் பிரபந்தத்தில் பக்திநெறியும் இலக்கிய நயமும் **உரைநடை :** தோற்றமும் வளர்ச்சியும்

வைணவம் : பெரியாழ்வார் திருமொழி: 3 -ஆம் பத்து – பத்தாம் திருமொழி 'நெறிந்தகருங்குழல்மடவாய்' – சீதைக்கு அனுமன் தெரிவித்த அடையாளம். **கவிதை - கவிஞர் வைரமுத்து** - வித்தியாசமான தாலாட்டு **சிற்பி பாலசுப்பிரமணியன்** - பாரதி எங்கள் கண்மணி **அரங்க பாரி** - கண்ணீர்! கண்ணீர்! **தமிழலங்காரம்** – வண்ணச்சரபம் தண்டபாணி சுவாமிகள் - 10 பாடல்கள் 1. கடல் நீரில் கல்மிதக்கும், 2. வண்டமிழ் ஆற்றுதி, 3. கோளத்தை முட்டி 4.

எக்காலம்என்று, 5. கடலூர் மயானத்தொர், 6. தேவாதிதேவன், 7. விண்மாரி, 8. தேவர்முனிவர், 9. அழுதேங்கிநஞ்சிட்ட, 10. அத்தனை பொத்து.

சிறுகதை : ஆர். சூடாமணி – அந்நியர்கள் **கட்டுரை : ஆளுமைத்திறன் அறிவோம்**- தன்னம்பிக்கை மாதஇதழிலிருந்து **அணிஇலக்கணம் :** உவமையணி – பிறிதுமொழிதல் அணி – சிலேடை அணி – தீவக அணி- ஏகதேச உருவக அணி – வேற்றுமையணி – பின்வருநிலையணி

அலகு - 3 **(10 மணிநேரம்)**

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

அலகு – 4 **(10 மணிநேரம்)**

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

கவிதை - கவிஞர்தாமரை - தொலைந்துபோனேன் **சிறுகதை – அம்பை** - ஜ-வல்லூறுகள் **கட்டுரை- முனைவர் ப. தமிழரசி** - நொய்யல், **சொல்லின் செல்வர் ரா.பி.சேதுப்பிள்ளை** - காளத்திவேடனும் கங்கைவேடனும்

மொழிபெயர்ப்புப் பயிற்சிகள் : தமிழ்-ஆங்கில மொழிபெயர்ப்புப் பயிற்சிகள் -2.

அலகு – 5 **(8 மணிநேரம்)**

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

மொத்த மணிநேரம் 48

பார்வை நூல்கள்

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

இணையதளம்

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

இதழ்கள்

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	2.6	2.8	2.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

HINDI-PAPER- II **4H-3C**

(Modern Poetry, Drama, Novel, Grammar)

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

End Semester Exam: 3 Hours

PREREQUISITE:
Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

UNIT-I **9 HOURS**

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

UNIT-II **9 HOURS**

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

UNIT-III **10 HOURS**

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

UNIT-IV **10 HOURS**

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

UNIT-V **10 HOURS**

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

TOTAL: 48 HOURS

REFERENC BOOKS:

1. Modern Poetry : Bhoomija
   Writer : Nagarjun
   Editors : Somdev & shobhakanth
   Publisher : Rdha Krishna Publication
   New Delhi - 110051
2. Drama : Dhruva Swamini
   Writer : Jaysankar Prasad
   Publisher : Sakshi Publication
   S 16,Naveen Shahdhara
   Delhi – 110032
3. Novel : Nirmala
   Writer : Premchandh
   Publisher : Prabhath Prakashan
   4/19 Asaf Ali Road
   New Delhi – 110002

4. Grammar : Sugam Hindi Vyakaran
   Writer : Pro. Vamsidhar & Dharmapal
   Publisher : Siksha Bharathi
   Madharsa Road
   New Delhi – 110006.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**2.4**	**2.4**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-II
MALAYALAM II

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:
Not required

COURSE OBJECTIVE(CO):

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

COURSE OUTCOME(COs):

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

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

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

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

Semester II

SANSKRIT II

(PROSE, GRAMMAR AND TRANSLATION**)** **4H-3C**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

UNIT I **9 HOURS**

Introduction to Sanskrit Prose, Important prose works in Sanskrit

UNIT II **9 HOURS**

Balaramayana – Balakanda

UNIT III **10 HOURS**

Balaramayana – Ayodhyakanda

UNIT IV **10 HOURS**

Balaramayana – Aranyakanda

UNIT V **10 HOURS**

Athmanepada Declension of ending nouns (feminine)

Passages from Sanskrit Self Teacher (Simple sentences)

TOTAL: 48 HOURS

TEXT BOOK:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**2.8**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester II

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):
The objectives of this course are:

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

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

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

Unité - I **9 HOURS**

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

Unité - II **9 HOURS**

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

Unité - III **10 HOURS**

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

Unité -IV **10 HOURS**

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

Unité - V **10 HOURS**

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

TOTAL: 48 HOURS

Text Books:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de francais,** Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, **Saison 1 – Cahier d'activites ,** Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, Marie- Françoise Gliemenn,**Les exercices de grammaire,**Hachette FLE, Paris,2005
4. Christian Beaulieu, Je **pratique, Exercises de grammaire A1,** Dider,Paris,2015
5. Nathalie BIE, philippe SANTINAN,**Grammaire pour adolescents-250 exercises,** CLE International , Paris , 2005

WEBSITES :

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

CO, PO, PSO Mapping

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

SEMESTER-II

English - II

3H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

COURSE OBJECTIVES(CO):

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

Course Outcomes (COs):

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

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

UNIT-I **8 HOURS**

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

UNIT- II **7 HOURS**

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

UNIT-III **7 HOURS**

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

UNIT- IV **7 HOURS**

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

UNIT-V **7 HOURS**

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

TOTAL: 36 HOURS

TEXT BOOK

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

REFERENCE BOOKS:

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

WEB SITES:

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

CO, PO, PSO Mapping

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

SEMESTER-II

Object Oriented Programming

4H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To Provide the fundamental knowledge and skills to become a proficient C++ programmer.
- To Understand all the features of Object Oriented Programming for developing software based on the concepts of Object Oriented Programming.
- To Develop C++ Programs using Templates and Streams.
- To Introduce the concepts of Inheritance, Multithreading and Exception Handling using Java programs
- To Inculcate Java programming skills using AWT Packages and Applets

Course Outcomes (COs):

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

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

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

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

UNIT II Classes and Objects **8 HOURS**

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

UNIT III Templates and Files **10 HOURS**

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

UNIT IV Java Basics **10 Hours**

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

UNIT V Packages and AWT **10 Hours**

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

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

Total : 48 Hours

Text Books

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

Reference Books

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

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	2	1	-	1	-	-	-	-	-	-	-	3	-
CO2	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO3	3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	2	3	2	2	-	2	-	-	-	-	-	-	-	3	-
AVG	3	-	2.6	2.4	1.8	1.25	-	1.25	-	-	1	-	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-II

Data Structure and Algorithms

4H-3C

Instruction Hours/week: 1:4 T:0 P:0 **Marks:** Internal**:40** External**:60** Total**:100**

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

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

Course Outcomes (COs):

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

COs	Course Outcomes (COs)	Blooms Level
CO1	Explain basic data structure concepts arrays, linked lists, stacks and queues.	Understand
CO2	Apply the concept of stack, queue and linked list	Applying
CO3	Construct a tree and perform various operations on a tree along with implementation	Applying
CO4	Examine the solution for solving various computing problems using graph data structure	Analyzing
CO5	Implement sorting and searching techniques	Understanding

UNIT 1 Introduction to Algorithms and Analysis **8 Hours**

Introduction-Study of algorithms-Data structure introduction-How to create programs-How to analyse programs: time complexity, space complexity- Recursion. Data structure- types.

UNIT 2 Linear Data Structures **10 Hours**

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

UNIT 3 Non-linear Data Structures – Trees **10 Hours**

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

UNIT 4 Non-linear Data Structures – Graphs **10 Hours**

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

UNIT 5 Sorting, Searching and Hashing Techniques **10 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. R. S. Salaria, "Data structures & Algorithms Using C", 5th Edition, Khanna Book Publishing Co.Pvt. Ltd.,SRS Enterprises, New Delhi, 2022.
2. Thomas H. Cormen, C.E. Leiserson, R L.Rivest and C. Stein, Introduction to Algorithms , Third edition, MIT Press, 2009.
3. Mark A. Weiss,Data Structures & Algorithm Analysis in C++, 3rd edition, 2008, PEARSON.

Reference Books:

1. Kurt Mehlhorn, and Peter Sanders – Algorithms and Data Sturctures The Basic Toolbox, Springer-Verlag Berlin Heidelberg, 2008.
2. Horowitz, Sahni, and S. Anderson-Freed , Fundamentals of Data Structures in C UNIVERSITIES PRESS,Second Edition,2008.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	1	-	-	1	-	-	-	-	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	-	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	
CO4	-	-	3	3	3	1	-	1	-	-	-	-	-	-	-	3	-
CO5	-	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**	-	**2.4**	**3**	**2.25**	**1.25**	-	**1.3**	-	-	-	-	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-II

Community Engagement and Social Responsibility

2H-2C

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

End Semester Exam:3 Hours

PREREQUISITE:

Not Applicable

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I INTRODUCTION AND PRINCIPLES **8 HOURS**

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

UNIT II RURAL DEVELOPMENT **8 HOURS**

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

UNIT III COMMUNITY AND RESEARCH **8 HOURS**

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

TOTAL: 24 HOURS

TEXT BOOK:

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

CO, PO, PSO Mapping

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

SEMESTER-II

Discrete Structures

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:

Understanding of basic algebra and calculus.

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES(COs):

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

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

UNIT I PREPOSITIONAL LOGIC **12 HOURS**

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

UNIT II SETS **12 HOURS**

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

UNIT III COMBINATORICS **12 HOURS**

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

UNIT IV RECURRENCES **12 HOURS**

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

UNIT V GRAPH THEORY **12 HOURS**

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

TOTAL: 60 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEBSITES:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	1	2	1	-	-	-	-	-	-	-	-	-	-	-	-
CO2	-	-	2	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**-**	**-**	**1.3**	**2.4**	**1**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-II

Object Oriented Programming - Practical

3H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To provide the fundamental knowledge and skills to become a proficient C++ programmer.
- To understand all the features of Object Oriented Programming for developing software based on the concepts of Object Oriented Programming.
- To develop C++ Programs using Templates and Streams.
- To introduce the concepts of Inheritance, Multithreading and Exception Handling using Java programs
- To inculcate Java programming skills using AWT Packages and Applets

Course Outcomes (COs):

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

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

List of Programs

1. C++ Program using a program to get and print student data using Inheritance.
2. C++ program using class and object for binary tree traversal
3. C++ Program implementing Function Overloading and Constructor
4. C++ Program implementing String Class using
5. C++ Program implementing File Handling
6. C++ program to sort an array using pointers
7. C++ program for Implementation of Stack and Queue using Array

8. Simple Java applications - for understanding methods & Handling Strings in Java
9. Simple Package creation.
10. JAVA Program for Developing user-defined interfaces and implementation
11. Implementing Exception Handling Mechanism in Java
12. JAVA Program for Creation of thread in Java applications

Total : 36 Hours

Text Books

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

Reference Books

1. Bjarne Stroustroup, 2014, Programming - Principles and Practice using C++, 2nd Edition, Addison-Wesley.
2. Stefan Bjornander, 2016, C++ Windows Programming, Published by Packt Publishing Ltd.
3. Richard L. Stegman, 2016, Focus on Object-oriented Programming with C++, 6th Edition, CreateSpace Independent Publishing Platform.
4. Harry, H. Chaudhary, 2014, Head First C++ Programming: The Definitive Beginner's Guide, First Create space Inc, O-D Publishing, LLC USA.
5. Debasish Jana, 2014, C++ And Object-Oriented Programming Paradigm, Published by PHI Learning Pvt. Ltd

Websites

1. www.programmingsimplified.com
2. www.programiz.com / cpp -programming
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.com

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	2	1	-	1	-	-	-	-	-	-	-	3	-
CO2	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO3	3	-	2	1	1	-	-	-	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	2	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	2	3	2	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**		**2.6**	**2.4**	**1.8**	**1.25**	**-**	**1.25**	**-**	**-**	**1**	**-**	**-**	**-**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-II

Web Programming - Practical

6H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To introduce the fundamentals of Internet and the Web functions.
- To impart knowledge and essential skills necessary to use the internet and its various components.
- To understand the features of various html programming tags for developing web sites
- To understand the features of Cascading Style Sheet for developing web sites
- To understand the role of Java Script for web development.

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the fundamentals web page development using HTML tags	Understand
CO2	Develop web page integrating HTML and CSS	Apply
CO3	Utilize frame tag and list tag to develop a website	Apply
CO4	Build website using Javascript and validate forms	Apply
CO5	Apply the concept of functions and event handling in Java Script to develop web sites	Apply

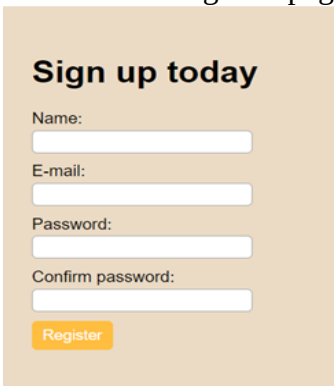
List of Programs:

1. Create an HTML page using tags to accomplish the following:
   - (i) A paragraph containing text “All that glitters is not gold”. Bold face and italicize this text
   - (ii) Create equation: x = 1/3(y1 2 + z1 2
   - (iii) Put a background image to a page and demonstrate all attributes of background image
   - (iv) Create unordered list of 5 fruits and ordered list of 3 flowers.

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

<table>
<tr><td rowspan="9">Department</td><td rowspan="3">Sem1</td><td>SubjectA</td></tr>
<tr><td>SubjectB</td></tr>
<tr><td>SubjectC</td></tr>
<tr><td rowspan="3">Sem2</td><td>SubjectE</td></tr>
<tr><td>SubjectF</td></tr>
<tr><td>SubjectG</td></tr>
<tr><td rowspan="3">Sem3</td><td>SubjectH</td></tr>
<tr><td>SubjectI</td></tr>
<tr><td>SubjectJ</td></tr>
</table>

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



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

<table>
<tr><td>About

Department 1

Department 2

Department 3</td><td>This frame would show the contents according to the link clicked by the user on the left frame.</td></tr>
</table>

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

<table>
<tr><td>Department Names (could be along with Logos)</td></tr>
<tr><td>Contents according to the Link clicked</td></tr>
</table>

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

   Add the following properties to the style for **li**:
    - Margin of 5px
    - Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left
7. To write JavaScript program to prompt username and display it.
8. To write a JavaScript Program To Valid An Email Address
9. Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay.
10. Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

Total : 72 Hours

Text Books

1. HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill.
2. WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition.

Reference Books

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

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	1	-	-	2	-	-	-	-	-	-	-	-	3	-
CO2	3	1	-	2	-	1	-	-	-	-	-	-	1	-	-	3	-
CO3	3	-	3	-	2	2	-	-	-	-	2	-	-	-	-	3	-
CO4	3	-	3	3	-	3	-	-	2	-	2	-	2	-	-	3	-
CO5	3	-	2	3	3	-	2	-	-	-	2	-	-	-	-	3	-
AVG	3	1	2.6	2.25	2.5	2	2	-	2	-	2	-	1.5	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

24VAC201

SEMESTER-II

Value Added Course - Environmental Studies

2H-2C

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

End Semester Exam:3 Hours

PREREQUISITE:

Student should know about fundamentals of environment.

COURSE OBJECTIVES (CO):

- To create awareness about structure and functions of various ecosystems.
- To develop an attitude of concern for the natural resources availability and its environment protection.
- To learn about the environment, resources available, biodiversity and its conservation.
- To understand the current scenarios- to find ways for protection and betterment of or habitat.
- To understand the concepts to analyze the interactions between social and environmental problems.

COURSE OUTCOMES (COs):

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

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

UNIT I INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS: 5 HOURS

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

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

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

UNIT III BIODIVERSITY AND ITS CONSERVATION: 5 HOURS

Conservation of biodiversity: in-situ and ex-situ conservation of biodiversity. Values of Biodiversity - Ecological, economic, social, ethical, aesthetic value. Bio-geographical classification of India. Hot-spots of biodiversity. Endangered and endemic species of India. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts.

UNIT IV ENVIRONMENTAL POLLUTION: 4 HOURS

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

UNIT V SOCIAL ISSUES AND THE ENVIRONMENT: 5 HOURS

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

TOTAL: 24 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

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

மூன்றாம் பருவம்

Language - III (தமிழ் இலக்கிய வரலாறு)

4H-3C

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

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்

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

பாடத்திட்டப் பயன்விளைவு

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

அலகு:1 சங்க இலக்கியம் **(10 மணிநேரம்)**

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

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

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

அலகு:3 திருமுறைகளும் திவ்யப்பிரபந்தமும் **(10 மணிநேரம்)**

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

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

குற்றாலக்குறவஞ்சி, முக்கூடற்பள்ளு, மதுரை மீனாட்சியம்மை பிள்ளைத்தமிழ், மதுரை சொக்கநாதர் தமிழ்விடு தூது, அழகர் கிள்ளைவிடு தூது முதலான சிற்றிலக்கிய வரிசை-தமிழில் புதுக்கவிதை இயக்கங்களின் தோற்றமும் வளர்ச்சியும்-தமிழ்ப் புதுக்கவிதை வடிவங்கள்-தமிழின் நாடக இலக்கியங்கள்-மனோண்மணீயம் – தமிழின் உரைநடை இலக்கிய வளர்ச்சி-தமிழின்பம் முதலான உரைநடை நூல்கள்-தமிழில் சிறுகதை இலக்கிய வளர்ச்சி-இருபதாம் நூற்றாண்டுச் சிறுகததைகள்-தமிழில் புதின இலக்கியங்கள்-இக்கால இலக்கியங்களில் காலந்தோறும் தனி மனிதப் பதிவுகளும், சமுதாயப் பதிவுகளும்.

அலகு: 5 தமிழின் ஐந்திலக்கணம் **(8 மணிநேரம்)**

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

பாடநூல்:

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

மொத்த மணிநேரம் 48

பார்வை நூல்கள்:

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

இணையதளம்

1. www.tvu.org.in

2. www.maduraitamilproject.com

இதழ்கள்

1. International Research Journal of Indian Literature, irjil.in

2. International Tamil Research Journal, iorpress.in

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**2.6**	**2.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

HINDI-PAPER- III **4H-3C**

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

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

UNIT-I **9 HOURS**

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

UNIT-II **9 HOURS**

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

UNIT-III **10 HOURS**

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

UNIT-IV **10 HOURS**

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

UNIT-V **10 HOURS**

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

TOTAL: 48 HOURS

TEXT BOOKS

1.Story : Kahani Manjari
Publisher : D.B.Hindi Prachar Sabha
T.Nagar , Chennai – 600017

2.History of Hindi
Literature : Hindi Sahithya ka Saral Ithihas
Writer : Rajnath Sharma.A
Publisher : Vinoth Pusthak Mandir
Aagra – 02

3.Novel : Gaban
Writer : Premchandh
Publisher : Rajkamal Prakashan
New Delhi – 110002

4.Letter Writing : Sumitha Hindi Nibandh Aur Pathra Lekhan
Writer : Sri Sharan
Publisher : Kalda Publication
Mukhar Ji Nagar, Delhi - 09

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**2.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-III

MALAYALAM III

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:

- Not required

COURSE OBJECTIVE(CO):

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

COURSE OUTCOME(COs):

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

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

Semester III

SANSKRIT III

(Drama and History of Sanskrit Literature) **4H-3C**

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

UNIT I **9 HOURS**

History of Sanskrit Drama and its origin.

UNIT II **9 HOURS**

Important Sanskrit Dramas and important authors.

UNIT III **10 HOURS**

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

UNIT IV **10 HOURS**

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

UNIT V **10 HOURS**

Translation : From the known passages of the above text.

TOTAL: 48 HOURS

TEXT BOOK :

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**2.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester III

FRENCH III **4H-3C**

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

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not Required

COURSE OBJECTIVES (CO):

The objectives of this course are

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

COURSE OUTCOMES (COs):

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

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

Unite – I **9 HOURS**

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

Unité – II **9 HOURS**

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

Unité – III **10 HOURS**

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

Unite – IV **10 HOURS**

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

Unité - V **10 HOURS**

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

TOTAL: 48 HOURS

TEXT BOOKS:

1. Cocton Marie –Noëlle , Duplex Dorothée, Heu Elodie , Kasazian Emilie, Ripaud Delphine, **Saison 1- Méthode de franca**is, Didier, paris.2015.
2. Cocton Marie – Noëlle, Dupleix, Heu Elodie, Kasazian Emilie ,Ripaud Deldphin, S**aison** 1 – **Cahier d'activites** , Dider ,Paris , 2015
3. Anne Akyüz,Bernadette Bazelle- Shahmael,JoëlleBonenfant, **Marie- Françoise Gliemenn,Les exercices de grammaire,Hachette FLE, Paris,200**5
4. Christian Beaulieu, **Je pratiqu**e, Exercises de grammaire A1, Dider,Paris,2015
5. Nathalie BIE, philippe SANTINAN,**Grammaire pour adolescents-250 exercises, CLE International , Paris , 2005**

WEBSITES :

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

CO, PO, PSO Mapping

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

SEMESTER-III

English -III

3H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

COURSE OBJECTIVES (CO):

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

Course Outcomes (COs):

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

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

UNIT-I **8 HOURS**

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

UNIT- II **7 HOURS**

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

UNIT-III **7 HOURS**

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

UNIT- IV **7 HOURS**

WRITING: Descriptive and Narrative-Safety Instructions- Suggestions-Expansion of Abbreviations-Spellings Rules

Translation- Translating Short Sentences and Passages from English to Tamil

UNIT-V **7 HOURS**

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

TOTAL: 36 HOURS

TEXT BOOKS

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

REFERENCE BOOKS:

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

WEB SITES:

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

CO, PO, PSO Mapping

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

SEMESTER-III

Operating Systems

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To Understand the basic concepts and functions of operating systems.
- To Understand Processes, Threads and Deadlocks
- To Analyze Scheduling algorithms
- To Analyze memory management schemes.
- To Explain how protection domains, combined with an access matrix, authentication, uses of cryptography computing.

Course Outcomes (COs):

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

Unit – I Introduction to Operating System **10 hours**

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

Unit – II Process Management **14 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 Storage Management **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 Protection and Security **12 hours**

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

Total : 60 Hours

Text Books:

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

Reference Books:

1. Garry Nutt, “Operating Systems–A Modern perspective” ,Third Edition, Pearson Education
2. Bach,2.J., “Design of UNIX Operating System”, Prentice Hall

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	-	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	-	2	2	1	-	-	-	-	-	-	-	1	-	-	3	-
CO3	2	-	1	2	-	-	-	1	-	-	-	-	-	-	-	3	-
CO4	2	-	-	2	3	-	-	-	1	-	-	-	-	-	-	3	-
CO5	2	-	1	-	-	-	-	-	-	-	2	-	1	-	2	3	-
AVG	**2.4**	-	**1.3**	**2**	**2**	-	-	**1**	**1**	-	**2**	-	**1**	-	**2**	**3**	-
1 – Low, 2 – Medium, 3 – High, ‘-‘ – No Correlation																	

SEMESTER-III

Computer Networks

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To know the basics of computer networks
- To acquire the knowledge about the data link layer in the internet
- To understand the process of protocols, router, cellular networks
- To analyze the network layer with different techniques using routing algorithm
- To analyze the concepts of application layer and network security

Course Outcomes (COs):

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

COs	**Course Outcomes (COs):**	**Blooms Level**
CO1	Expalin the fundamentals concepts of computer network	Understand
CO2	Outline the DLL services and different protocol uses incomputer networks	Understand
CO3	Summarize the uses of various protocols and Connectiondevices	Understand
CO4	Classify the network layer and transport layer services	Analyze
CO5	Analyze the application layer and network security in trouble shooting the network	Analyze

UNIT-I - INTRODUCTION TO COMPUTER NETWORK **12 Hours**

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

UNIT II - DATA LINK LAYER **12 Hours**

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

UNIT III - MULTIPLE ACCESS PROTOCOLS **12 Hours**

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

UNIT IV - NETWORK LAYER AND TRANSPORT LAYER **12 Hours**

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

UNIT-V - APPLICATIONLAYER **12 Hours**

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

Total : 60 Hours

Text Books:

1. Data Communications and Networking with TCP/IP protocols suite – BehrouzA.Forouzan - Fourth Edition TMH, 2006.
2. Computer Networks – Andrew S Tanenbaum, 4th Edition, Pearson Education 2003
3. Data Communications and Networking-2.JAIN, BPB Publication, 2002
4. Data Communications and Networking-Jain Madhulika, BPB Publication, 2002

Reference Books:

1. William Stalling,Computer networks – PHI

Websites

1. https://archive.nptel.ac.in/courses/106/105/106105080/
2. https://open.umn.edu/opentextbooks/textbooks/771
3. https://freecomputerbooks.com/networkComputerBooks.html
4. https://www.freebookcentre.net/Networking/Free-Computer-Networking-Books-Download.html
5. https://www.javatpoint.com/computer-network-tutorial

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	-	-	1	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2		-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	**2**	-	**2**	**2**	**2**	-	**1.33**	**1.66**	**2**	-	**1.5**	-	**1**	-	**2**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-III

Operation Research

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:

- Basic understanding of algebra and mathematical modeling.

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES(COs):

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

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

UNIT I LINEAR PROGRAMMING **9 HOURS**

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

UNIT II TRANSPORTATION MODEL **9 HOURS**

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

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

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

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

UNIT IV INVENTORY CONTROL **10 HOURS**

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

UNIT V PERT AND CPM **10 HOURS**

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

TOTAL: 48 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEBSITES:

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

CO, PO, PSO Mapping

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

SEMESTER-III

Operating Systems - Practical

3H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To learn Unix commands and shell programming.
- To implement various CPU Scheduling Algorithms.
- To implement Process Creation and Inter Process Communication.
- To implement Deadlock Avoidance and Deadlock Detection Algorithms.
- To implement Page Replacement Algorithms, File Organization and File Allocation Strategies.

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Implement the concept UNIX and Shell Program Algorithms	Apply
CO2	Compare the performance of various CPU Scheduling Algorithms.	Understand
CO3	Implement Deadlock avoidance and Detection Algorithms.	Remember& understand
CO4	Create processes and implement IPC.	Analyze
CO5	Analyze the performance of the various Page Replacement Algorithms.	Apply

List of Programs

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

11. Write a C Program to Implementation of the following Page Replacement Algorithms
    a) FIFO b) LRU c) LFU
12. Write a C Program to Implementation of the following File Allocation Strategies
    a) Sequential b) Indexed c) Linked

Total : 36 Hours

Text Books

1. Silberschatz, Galvin Gagne, Operating System Concepts, 9th Edition, Wiley India Edition,2013
2. Deitel Choffnes, Operating Systems, 3rd Edition, Pearson Education, 2003.
3. Stuart E. Madnick, John J.Donovan. Operating Systems, 3rd Edition, Tata McGraw Hill,2003.

Reference Books

1. "Modern Operating Systems" by Andrew S. Tanenbaum.
2. "Operating System Principles" by Galvin, Abraham Silberschatz, and Greg Gagne.
3. "The Linux Programming Interface: A Linux and UNIX System Programming Handbook" by Michael Kerrisk.

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	-	-	3	-	-	-	-	-	-	2	3	-
CO2	2	-	-	2	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	2	-	1	2	3	-	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	2	1	-	-	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	-	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	**2.4**	**-**	**1.5**	**1.75**	**2.25**	**-**	**-**	**2**	**1.5**	**-**	**1**	**-**	**-**	**-**	**1.66**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-III

Computer Networks - Practical

3H-2C

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

End Semester Exam: 3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The Goal of this course is for students to:

- To know the basics of computer networks
- To acquire the knowledge about the data link layer in the internet
- To understand the process of protocols, router, cellular networks
- To analyze the network layer with different techniques using routing algorithm
- To analyze the concepts of application layer and network security

Course Outcomes (COs):

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

COs	Course Outcomes (COs)	Blooms Level
CO1	Apply the fundamentals concepts of computer network and error detection algorithm	Apply
CO2	Apply DLL services and stop and wait protocols in computer networks	Understand
CO3	Experiment the uses of go back and Connection devices	Understand
CO4	Analyze the network layer and transport layer services	Analyze
CO5	Experiment the application of distance vector routing algorithm and Dijkstra algorithm in the computer network	Analyze

List of Programs

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

Total : 36 Hours

Text Books

1. Forouzan,B. A. (2017). Data Communications and Networking (5th ed.).New Delhi: THM.
2. Tanenbaum, A. S. (2012). Computer Networks **(**5th ed.).New Delhi: PHI.

Reference Books

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

Web Sites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	-	-	1	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2	-	-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	**2**	**-**	**2**	**2**	**2**	**-**	**1.33**	**1.66**	**2**	**-**	**1.5**	**-**	**1**	**-**	**2**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-III

Value Added Course – Indian Knowledge System

2H-1C

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

End Semester Exam:3 Hours

PREREQUISITE:

Not Required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

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

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

UNIT 2: FOUNDATION CONCEPT FOR SCIENCE & TECHNOLOGY 5 HOURS

Linguistics & Phonetics in Sanskrit (panini's), Computational concepts in Astadhyayi Importance of Verbs, Role of Sanskrit in Natural Language Processing, Number System and Units of Measurement, concept of zero and its importance, Large numbers & their representation, Place Value of Numerals, Decimal System, Measurements for time, distanceand weight, Unique approaches to represent numbers (Bhūta Saṃkhya System, KaṭapayādiSystem), Pingala and the Binary system, Knowledge Pyramid, Prameya – A Vaiśeṣikan approach to physical reality, constituents of the physical reality, Pramāṇa, Saṃśaya

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

Indian Mathematics, Great Mathematicians and their contributions, Arithmetic Operations, Geometry (Sulba Sutras, Aryabhatiya-bhasya), value of π, Trigonometry, Algebra, Chandah Sastra of Pingala,

Indian Astronomy, celestial coordinate system, Elements of the Indian Calendar Aryabhatiya and the Siddhantic Tradition Pancanga – The Indian Calendar System Astronomical Instruments (Yantras) Jantar Mantar or Raja Jai Singh Sawal.

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

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

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

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

TOTAL: 24 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

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

24CTU391

SEMESTER-III

Internship

0H- 2C

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

நான்காம் பருவம்

Language -IV (தமிழர் நாகரிகமும் பண்பாடும்)

4H-3C

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

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்

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

பாடத்திட்டப் பயன்விளைவு

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

அலகு – I வரலாற்றுக்கு முற்பட்ட தமிழகமும் சங்ககால வரலாறும் **(10 மணிநேரம்)**

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

அலகு – 2 தமிழின் தொன்மை **(10 மணிநேரம்)**

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

அலகு – 3 தமிழர் வாழ்வியல் **(10 மணிநேரம்)**

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

அலகு – 4 கட்டடக்கலையும் தமிழர் பண்பாடும் (10 மணிநேரம்)

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

அலகு – 5 ஆற்றங்கரை நாகரிகம் (8 மணிநேரம்)

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

மொத்த மணிநேரம் 48

பார்வை நூல்கள்

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

இணையதளம்

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

இதழ்கள்

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**2.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

HINDI-PAPER- IV **4H-3C**

(Modern Poetry, One Act, Essay, Translation)

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

End Semester Exam: 3 Hours

PREREQUISITE:

- Not Required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs):

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

UNIT-I **9 HOURS**

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

UNIT-II **9 HOURS**

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

UNIT-III **10 HOURS**

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

UNIT-IV **10 HOURS**

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

UNIT-V **10 HOURS**

a) Kavya Ke Adhar Par Prakruthik Varnan
b) Bheem Aur Raakshas
c) Essay – Adhunik Nari
d) Translation – Lesson –13 to 15

TOTAL: 48 HOURS

REFERENCE BOOKS:

1.Poetry : Panchavati
Writer : Mythili Sharan Guptha
Publisher : Bharathiya Sahithya Sangrah
Kanpur – 208002, Uttar Pradesh

2.One Act Play : Adarsh Akanki
Publisher : D.B.Hindi Prachar Sabha
T. Nagar,Chennai – 600017, Tamil Nadu
3.Essay : Nibandh Nishchay
Editor : Dr.Sharadh Ranjan
Publisher : Hindi Sahithya Sammelan Prayag
12.Sammelan Marg, Illahabadh

4.Translation : Anuvadh Abhyas – III
Publisher : D.B.Hindi Prachar Sabha
T.Nagar, Chennai – 600017, Tamil Nadu

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**3**	**2.6**	**2.6**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

MALAYALAM IV **4H-3C**

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

PREREQUISITE:

Not required

COURSE OBJECTIVE(CO):

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

Able to write articles on their own and improve their creative skills.

COURSE OUTCOME(COs):

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

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

TEXT BOOKS:

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

REFERENCE BOOKS:

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

CO, PO, PSO Mapping

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

Semester IV

SANSKRIT IV **4H-3C**

(Lyrics, Grammar and Translation)

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

End Semester Exam: 3 Hours

PREREQUISITE:

Not required

COURSE OBJECTIVES(CO):

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

COURSE OUTCOMES(COs) :

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

UNIT I **9 HOURS**

Introduction to Sanskrit Lyrics and erotic literature.

UNIT II **9 HOURS**

Devotional Literature, Important works

UNIT III **10 HOURS**

Krishnakarnamrita of Leelasuka (Second Section only)

UNIT IV **10 HOURS**

Grammar – Past tense, Declension of personal pronouns

UNIT V **10 HOURS**

Simple sentences from Sanskrit Self Teacher

TOTAL: 48 HOURS

TEXT BOOK:

Krishnakarnamrita of LeelasukaSri Ramakrishna Mud Mylapore, Chennai.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO3	2	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CO5	3	2	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
AVG	**2.6**	**2.6**	**2.8**	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

Semester IV

FRENCH IV **4H-3C**

(Comprehension,Tradusion, Reduction,Une act)

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

End Semester Exam: 3 Hours

PREREQUISITE:
Not Required

COURSE OBJECTIVES (CO):
The objectives of this course are:

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

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

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

Unite – I **9 HOURS**

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

Unite – II **9 HOURS**

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

Unite – III **10 HOURS**

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

Unite – IV **10 HOURS**

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

Unite – V **10 HOURS**

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

TOTAL: 48 HOURS

TEXT BOOKS:

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

WEBSITES :

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

CO, PO, PSO Mapping

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

SEMESTER-IV

English - IV

3H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (Co):

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

Course Outcomes (COs):

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

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

UNIT-I **8 HOURS**

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

UNIT- II **7 HOURS**

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

UNIT-III **7 HOURS**

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

UNIT- IV **7 HOURS**

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

UNIT-V **7 HOURS**

Punctuation Marks- Figures of Speech

TOTAL: 36 HOURS

TEXT BOOK:

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

REFERENCE BOOKS:

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

WEB SITES:

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

CO, PO, PSO Mapping

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

SEMESTER-IV

Relational Database Management System

3H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

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

Course Outcomes (COs):

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

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

UNIT - I INTRODUCTION AND DATABASE DESIGN MODEL **7 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 **7 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 **7 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 **8 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 **7 Hours**

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

Total : 36 Hours

Text Books:

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

Reference Books:

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

Websites

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

sCO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	3	-	2	-	-	-	-	-	-	1	3	-
CO2	2	3	-	3	-	-	-	-	-	-	-	-	2	-	1	3	-
CO3	3	-	1	-	3	-	-	1	3	-	-	-	-	-	-	3	-
CO4	2	-	2	1	1	-	-	2	1	-	-	-	-	-	-	3	-
CO5	1	2	-	2	2	-	-	-	-	-	-	-	1	-	3	3	-
AVG	**2.23**	**2.5**	**1.5**	**2**	**2.25**	**3**	**-**	**1.66**	**2**	**-**	**-**	**-**	**1.5**	**-**	**1.66**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-IV

Network Security

4H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To provide Basic knowledge of security
- To Deal with principles of encryption algorithms, and conventional and public key cryptography.
- To Enable to know the levels of network security and security tools.
- To Understand Security operation
- To provide knowledge about Attacking Techniques.

Course Outcomes (COs):

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

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

UNIT I Techniques for Network Protection **8 Hours**

Firewalls, packet filter and stateful firewalls - application aware firewalls - personal firewalls – IP tables - Proxies - NAT,

UNIT II Monitoring and Detection **10 Hours**

Intrusion Detection System-Snort - Signature and Anomaly based detection - Honeypots and Honeynets. Network Log management-syslog or SPLUNK;

UNIT III Secure Network Communication **10 Hours**

SCP - SSH - SSL3.0 - TLS1.2 - START TLS - IPSec - VPN and Secure HTTP; Attacks on SSL / TLS: SSL stripping - Drown and Poodle attack; Encrypting and Signing Emails: PGP – GPG / open PGP - DKIM and SPF; Network packet creation and Manipulation using scapy and dpkt libraries; SDN Security

UNIT IV Attack Techniques **10 Hours**

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

UNIT V LAN Attacks **10 Hours**

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

Total : 48 Hours

Text Books:

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

Reference Books:

1. W.Stallings, Network Security Essentials: Applications and Standards, 6th Edition, Pearson Prentice Hall, 2016.
2. C.Kaufman,R.PerlmanandM.Speciner,NetworkSecurity:PrivateCommunicationinaPublic World, 2nd Edition, Prentice Hall PTR, 2002.
3. VincentJ.Nestleret.al,PrinciplesofcomputersecurityLabManual,4thEdition,McGraw-Hill, 2014

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	-	-	1	-	2	-	1	-	-	-	-	3	-
CO2	2	-	2	3	3	-	-	2	-	-	-	-	-	-	2	3	-
CO3	2	-	2	2	2	-	2	1	-	-	-	-	-	-	1	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	3	-	2	-	1	-	3	3	-
AVG	2	-	2	2	2	-	1.33	1.66	2	-	1.5	-	1	-	2	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-IV

Python Programming

3H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To provide Basic knowledge of Python
- To learn how to design and program Python applications.
- To learn how to use lists, tuples, and dictionaries in Python programs.
- To Understand file operation and database creations.
- To provide knowledge about python packages and GUI programming.

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic concept of Python	Understand
CO2	Outline how to design and program Python applications	Understand
CO3	Summarize how to use lists, tuples, and dictionaries in Python programs	Understand
CO4	Applying file operations and database creation.	Apply
CO5	Build applications using python packages and GUI programming	Apply

UNIT I INTRODUCTION TO PYTHON **8 Hours**

Introduction to Python - The IDLE Python Development Environment - The Python Standard Library - Literals - Numeric Literals - String Literals - Control Characters - String Formatting - Implicit and Explicit Line Joining Variables and Identifiers - Variable Assignment and Keyboard Input- Identifier-Keywords and Other Predefined Identifiers in Python – Operators - Various Operators - Relational Operators-Membership Operators – Boolean Operators - Expression and Data Types -Operator Precedence and Boolean Expressions - Operator Associativity - Mixed-Type Expression.

UNIT II PYTHON CONTROL STRUCTURES AND LISTS **7 Hours**

Control Structure -Selection Control- If Statement - Indentation in Python - Multi-Way Selection - Iterative Control - While Statement - Input Error Checking - Infinite loops - Definite vs. Indefinite Loops. List Structures - Common List Operations - List Traversal - Lists (Sequences) in Python- Python List Type - Tuples- Sequences- Nested Lists Iterating Over Lists (Sequences) in Python - For Loops - The Built-in range Function - Iterating Over List Elements vs. List Index Values- While Loops and Lists (Sequences)

UNIT III PYTHON FUNCTIONS **7 Hours**

Dictionaries and sets. Defining Functions - Calling Value-Returning Functions - Calling Non-Value-Returning Functions - Parameter Passing - Keyword Arguments in Python Default Arguments in Python - Variable Scope - Recursive functions.

UNIT IV PYTHON EXCEPTION HANDLING AND STRINGS **7 Hours**

Exception Handling -The Propagation of Raised Exceptions - Catching and Handling Exceptions -Exception Handling and User Input. String Processing - String Traversal - String-Applicable Sequence Operations -String Methods - Using Text Files - Opening Text Files - Reading Text Files - Writing Text Files.

UNIT V OBJECTS ORIENTED PROGRAMMING **7 Hours**

Objects and Classes: Define object- object references -Define a Class- Encapsulation - Inheritance – subtypes- defining subclasses in python – Polymorphism- use of polymorphism - Turtle Graphics- Creating a Turtle Graphics Window - The "Default" Turtle- Fundamental Turtle Attributes and Behaviour- Additional Turtle Attributes.

Total : 36 Hours

Text Books:

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

Reference Books:

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

Websites:-

1. http://docs.python.org/3/tutorial/index.html
2. http://interactivepython.org/courselib/static/ pythons
3. http://www.ibiblio.org/g2swap/byteofpython/read/
4. https://www.netacad.com/courses/networking/ccna-switching-routing-wireless-essentials

Book Link:

1. https://bedford-computing.co.uk/learning/wp-content/uploads/2015/10/Introduction-to-Computer-Science-Using-Python.pdf

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	-	-	3	-	-	-	-	-	-	-	3	-
CO2	3	-	-	2	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	2	-	3	2	3	-	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	2	1	2	-	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	**2.6**	**-**	**2.33**	**1.75**	**2.2**	**-**	**-**	**2**	**1.5**	**-**	**1**	**-**	**-**	**-**	**1.5**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-IV

Probability and Statistics

4H-3C

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

End Semester Exam:3 Hours

PREREQUISITE:

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

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES(COs):

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

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

UNIT I BASICS OF PROBABILITY **10 HOURS**

Trial, event -Sample space – Mutually exclusive event – Exclusive and exhaustive events – Dependent and independent events – Simple and compound events – Mathematical properties – Counting Principle for equally likely outcomes; probability rule -; Law of Total Probability, Addition and multiplication theorem, Combinations and Permutations. Conditional Probability Bayes Rule.

UNIT II DISCRETE AND CONTINUOUS PROBABILITY DISTRIBUTIONS **10 HOURS**

Random variables (discrete and continuous) - Mathematical expectation - Binomial distribution -Poisson distribution and its properties. Central Limit theorem, Uniform distribution - Normal distribution - conditions and properties, Standard normal distribution - Exponential distribution.

UNIT III BASICS OF STATISTICS AND UNI VARIATE ANALYSIS 10 HOURS

Meaning and definition of statistics - Frequency Distribution, Concepts of measurement, scales of measurement of data, Different types scales (ratio, interval, nominal and ordinal); Measures of central tendency: Arithmetic Mean, Median, Mode. Measures of dispersion – Range, Coefficient of range - Quartile deviation - Coefficient of Quartile deviation - Standard deviation and Coefficient of variation.

UNIT IV BIVARIATE ANALYSIS 9 HOURS

Correlation – Meaning and definition - Scatter diagram –Karl Pearson's Correlation Coefficient. Rank Correlation. Regression: Regression in two variables – Properties of Regression, uses of Regression.

UNIT V INDEX NUMBERS 9 HOURS

Definition – Types of Index numbers – Problems in the construction of index numbers – Construction of simple index numbers – Simple aggregate method and Simple average of price relatives using A.M, G.M – Construction of weighted index numbers – Laspeyre's, Paasche's, Dorbish Bowley's, Marshall Edge worth and Fisher's ideal index numbers - Simple problems.

TOTAL: 48 HOURS

TEXT BOOKS:

1. Pillai, R.S.N. and Bagavathi, V. (2002). Statistics, S. Chand & Company Ltd, New Delhi.
2. Srivastava, T.N. and Shailaja Rego. (2012). Statistics for Management, 2nd Edition, McGraw HillEducation, New Delhi.
3. Evans James, R. (2017). Business Analytics, 2nd Edition, Pearson Education, New Delhi.

REFERENCE BOOKS:

1. Dinesh Kumar, U. (2017). Business Analytics: The Science of Data - Driven Decision Making, Wiley, New Delhi.
2. Sheldon Ross, (2007). Introduction to Probability Model, Ninth Edition, Academic Press, Indian Reprint.
3. Robert V. Hogg, Joseph W. McKean and Allen T. Craig., (2007). Introduction to Mathematical Statistics, Pearson Education, Asia.
4. Irwin Miller and Marylees Miller, John E. Freund, (2006). Mathematical Statistics with Application, Seventh Edition, Pearson Education, Asia.

WEBSITES:

1. https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-2014/
2. https://www.youtube.com/watch?v=COI0BUmNHT8&list=PLyqSpQzTE6M_JcleDbrVyPnE0PixKs2JE
3. https://nptel.ac.in/courses/110107114/
4. http://172.16.25.76/course/view.php?id=1642

CO, PO, PSO Mapping

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

SEMESTER-IV

Programming in Python and RDBMS - Practical

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To 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, the student will be able to

COs	Course Outcomes (COs):	Blooms Level
CO1	Demonstrate the basics of Python programming	Understand
CO2	Apply control statements and using python modules,packages	Apply
CO3	Create simple python programs with and without using packages	Apply
CO4	Interpret algorithm and visualize the results with real time datasets	Analyze
CO5	Examine draw charts using different data sets.	Analyze

List of Programs - Python

1. Create simple programs using arithmetic Boolean and logical operators.
2. Develop program using control flow statements.
3. Develop program using LOOP control structures.
4. Create simple programs using list, dictionary, and strings.
5. Create simple programs using File handling: open and close a file, read, write a file.
6. Write a program using string handling and regular expressions.
7. Write a program with exception handling.
8. Create simple programs for factorial and Fibonacci number using Recursion.

List of Programs – RDBMS

9. Basic SQL SELECT Statements – Creating and managing tables using DDL, DML, Integrity constraints.
10. DCL, TCL and DB Object (View, Sequence, Index, Synonym, Alias) commands
11. Displaying Data from Multiple Tables using SQL operators, GROUPBY, HAVING and ORDERBY clause and also perform join operation.
12. Write a program to perform Basic PL/SQL programs
13. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
14. Write a PL/SQL block that handles exceptions.
15. Write SQL Triggers for insert, delete, and update operations in a database table.
16. Write the PL/SQL programs to create the recursive function for factorial of given number

Total : 48 Hours

Text Books

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

Reference Books:

1. Wesley J. Chun, “Core Python Applications Programming”, 3rd Edition, Pearson Education, 2016.
2. Jeeva Jose & P.SojanLal, “Introduction to Computing and Problem Solving with PYTHON”, Khanna Publishers, New Delhi, 2016.
3. Elmasri Ramez, Navathe Shamkant B, "Fundamentals of Database Systems", 7th Edition, Pearson Education, 2016.
4. Ramakrishnan Raghu, Gehrke Johannes, "Database Management Systems", 3rd Edition, McGraw Hill Education,2014

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

SEMESTER-IV

Network Security - Practical

3H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To provide Basic knowledge of security
- To deal with principles of encryption algorithms, and conventional and public key cryptography.
- To enable to know the levels of network security and security tools.
- To Understand Security operation
- To provide knowledge about Attacking Techniques.

Course Outcomes (COs):

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

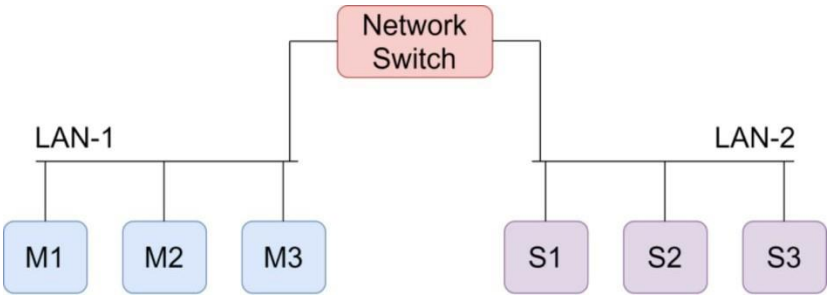
COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic knowledge on security models	Understand
CO2	Analyze and design classical encryption techniques and block ciphers.	Analyze
CO3	Design network application security schemes, such as PGP, S/ MIME, IPSec, SSL, TLS,	Apply
CO4	Analyze the DNS and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

List of Experiments :

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

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

1. Configure LAN-1 and LAN-2 as separate VLANs in the network switch (use inter VLAN ACL).
2. Create a SPAN port in the network switch and send the mirrored traffic to a promiscuous mode port for the purpose of IDS and other packet analysis. Practice port based and VLAN based mirroring.
3. Familiarize with 802.1x, Network Admission Control, Microsoft NAP, RADIUS protocol, RADIUS per port ACL



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

The Client machines (Client-1 and Client-2) and Admin machine are installed in different VMs. All the three machines are interconnected through a network switch with different IP addresses. The Admin runs a program that generates 2048 bit RSA public and private key for a Client that wants to communicate. Admin generates 2048 bit RSA public and private key for Client-1 and Client-2. The private keys are distributed to client machines and public keys are stored in a structure in the admin machine. When Client-1 wants to send message to Client-2, it encrypts the messages with public key of Client-2. The message is decrypted by Client-2 with its private key. Similar communication pattern from Client-2 to Client-1 need to be maintained.

Manually capture the traffic between the hosts to ensure the proper working of the encryption. Construct an asynchronous communication between Client-1 and Client-2. Run a Wireshark/ TCPdump at the SPAN/Promiscuous port of the network switch and identify the communication between the communicating entities (Admin, Client-1, and Client-2).

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

Use Wireshark to solve the below scenarios:

1. You, as a SOC analyst noted that someone try to send information (PING) to unknown IP address and you are suspecting some malicious information might transferred in it. Analyse the log file and find the data.

a) Find the source and destination IP of that log.

b) Find the Data length (Bytes) and verify the checksum status on destination.

2. Now you have found that some kind of file is been downloaded by insider in unencrypted web traffic. Your task is to

a) Find the type of file.

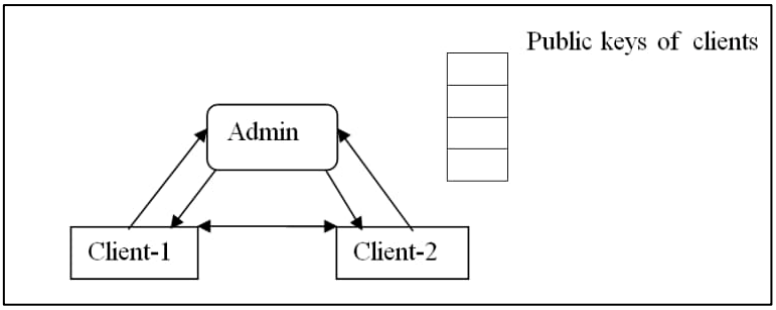
b) Export that file from that web traffic, then analyse the file for any secret information.

c) Find the hostname in which the file is stored.

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

a) Find the call-ID when the status of the call is ringing.

4. On further investigation, you have a suspect on some wireless device communications. List out the Bluetooth devices communications from this traffic and find the details about native Bluetooth adapter.



5. Analyse the captured WPA handshake from this traffic and report in detail about it to your administrator.

a) Geo locate all the endpoint of wireless devices.

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

4. Wireless Security Lab :

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

Total : 36 Hours

Tools Recommendation:

Firewall UTM Box – Fortigate 40F

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

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	3	-	2	-	-	-	-	-	-	1	3	-
CO2	2	-	-	3	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	3	-	1	2	3	-	-	1	3	-	-	-	-	-	-	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	-	-	-	-	1	-	3	3	-
AVG	**2.2**	**-**	**1.5**	**2**	**2.2**	**3**	**1**	**2.5**	**2**	**-**	**-**	**-**	**1**	**-**	**1.33**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

24VAC401

SEMESTER-IV

Value Added Course – Universal Human Values

2H-1C

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

End Semester Exam:3 Hours

PREREQUISITE:

Not Required

COURSE OBJECTIVES (CO):

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

COURSE OUTCOMES (COs):

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

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

UNIT I INTRODUCTION **5 HOURS**

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

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

Understanding human being as a co-existence of the sentiment 'I' and the material 'Body'. Understanding the needs of self ('I') and 'Body' – sukh and Suvidha. Understanding the body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the characteristics and activities of 'I' and harmony in 'I'. Understanding the harmony of I with the Body: Sanyam and helth; correct appraisal of physical needs, meaning of prosperity in detail. Programs to ensure Sanyam and health.

UNIT III UNDERSTANDING HARMONY IN THE FAMILY AND SOCIETY- HARMONY IN HUMANHUMAN RELATIONSHIP 5 HOURS

Understanding values in human-human relationship; meaning of justice (nine universal values in relationship) and program for its fulfillment to ensure mutual happiness; Trust and respect as the foundational values of relation, Understanding the meaning of trust; Difference between intention and competence understanding the meaning of respect, Difference between respect and differentiation; the other salient values in relationship. understanding harmony in the family and society (society being an extension of family): Resolution, prosperity, fearlessness and coexistence as comprehensive human goals. Visualizing a universal harmonious order in society- undivided society, universal order- from family to world family.

UNIT IV UNDERSTANDING HARMONY IN THE NATURE AND EXISTENCE- WHOLE EXISTENCE AS CO- EXISTENCE 4 HOURS

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

UNIT V IMPLICATION OF THE ABOVE HOLISTIC UNDERSTANDING OF HARMONY ON PROFESSIONAL ETHICS 5 HOURS

Natural acceptance of human values. Definitiveness of Ethical Human Conduct. Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics: a) Ability to utilize the professional competence for augmenting universal human order b) Ability to identify the scope and characteristics of people-friendly and ecofriendly production systems, c) Ability to identify and develop appropriate technologies and management patters for above production systems. Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order a) At the level of individual: as socially and ecologically responsible engineers, technologists and managers b) At the level of society: as mutually enriching institutions and organizations.

TOTAL: 24 HOURS

TEXT BOOKS:

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

REFERENCE BOOKS:

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

WEB SITES:

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

CO, PO, PSO Mapping

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

SEMESTER-V

Digital Identity and Access Management

6H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To Understand the importance of Identity and Access Management in an organization
- To understand Identity Governance and Administration
- To apply various access control techniques through user groups.
- To develop capacity to prepare various access control mechanism.

Course Outcomes (COs):

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

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

UNIT I DIGITAL SECURITY & GOVERNANCE **15 hours**

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

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

UNIT II IDENTITY AND ACCESS MANAGEMENT **15 hours**

Introduction to IAM: Introduction to IAM - Enterprise or Organizational Identities - Electronics and non-electronics Identities - AM Frame work - Key Principles - and Definitions - Common Challenges and Key Considerations - IAM Roadmap and Strategy

Implementation: Implementation Methodology and Approach - Access Request - Approval - and Provisioning Enforcement: Authentication - Authentication Implementation Approaches - Authorization - Logging and Monitoring

Access Review and Certification: Benefits and Objectives - Access Review and Certification Processes Roles and Rules: Rules and Enforcement - The RBAC Model and the Access Management Life Cycle - RBAC Implementation Considerations - Guiding Principles and Lessons Learned. Privileged Access Management: Understanding Privileged Access - Key Business Drivers - Privileged Access Management Program

UNIT III DIRECTORY SERVICES **14 hours**

The LDAP Protocol, LDAP Basics: Objects in LDAP - Object Classes - Attributes - and Schema - Server Configuration -First Steps with LDAP -Updating a Directory with a Batch Process - The LDIF Standard LDAP Models: Information Model (Object classes - Object Identities - Attributes - Matching Rules) Naming model - Functional Model (LDAP operations) - Security Model (Authentication and Authorization)

Directory Architectures: Introduction to Replication and Partitioning - Data Distribution between LDAP and Non-LDAP Systems -Partitioning -Replication -Data Distribution between LDAP and Non-LDAP Systems

UNIT IV SECURED ACCESS PARADIGMS: EXPLORING MULTI-FACTOR AUTHENTICATION, SSO, AND FEDERATED SYSTEMS **14 hours**

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

UNIT V SSO **14 hours**

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

Total : 72 Hours

Text Books:

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

Reference Books:

1. Brooks, Charles J., Christopher Grow, Philip Craig, and Donald Short. Cyber security essentials. John Wiley & Sons, 201
2. Thomas R. Peltier, Information Security Risk Analysis, CRC Press;2001
3. Whitman,2. and Mattord, H., Principles of Information Security, Second Edition, Boston: Thomson Course Technology; 2008

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	2	-	3	1	2	-	-	3	2	2	3	2	-	-	-	3	-
CO2	-	-	1	3	2	-	-	2	-	1	2	3	-	-	3	3	-
CO3	2	-	3	-	-	-	-	1	3	2	3	2	-	-	-	3	-
CO4	2	-	2	-	-	-	-	-	2	3	-	-	-	-	3	3	-
CO5	-	-	3	2	2	-	-	2	3	-	3	3	-	-	-	3	-
AVG	**2**	-	**2.4**	**2**	**2**	-	-	**2**	**2.5**	**2**	**2.75**	**2.5**	-	-	**3**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

FULL STACK WEB DEVELOPMENT

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To understand how front end and back end techniques necessary to build web applications.
- To learn how to make websites interactive,
- To create data driven web applications.
- To Get familiar with the latest web development technologies
- To Learn all about SQL and NoSQL databases

Course Outcomes (COs):

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

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

Unit I Introduction CSS **12 Hours**

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

Unit II JavaScript **12 Hours**

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

Unit III JavaScript **12 Hours**

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

Unit IV – ReactJS **12 Hours**

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

Unit V – NodeJS **12 Hours**

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

Total : 60 Hours

Text Books:

1. Jon Duckett (2020) - HTML & CSS: Design and Build Websites + JavaScript & Query: Interactive Front-End Web Development
2. Greg Lim, (2020), Beginning Node.js, Express & MongoDB Development Paperback.

Reference Books:

1. Ethan Brown (2019), Web Development with Node and Express: Leveraging the JavaScript Stack
2. Anthony Accomazzo, Ari Lerner, and Nate Murray, (2018) Fullstack React: The Complete Guide to ReactJS and Friends,

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	-	2	2	-	-	-	2	-	2	-	-	-	-	3	-
CO2	3	1	3	-	-	1	-	1	2	1	1	-	-	2	-	3	-
CO3	2	2	1	1	-	-	-	-	2	-	-	-	1	-	-	3	-
CO4	2	1	1	2	3	-	-	-	3	1	-	-	2	-	-	3	-
CO5	2	-	-	3	3	3	1	-	3	-	2	3	3	2	-	3	-
AVG	2.4	1.75	1.66	2	2.66	2	1	1	2.4	1	1.66	3	2	2	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Microservice Architecture

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To Gain a thorough understanding of the philosophy and architecture of Web applications using ASP.NET Core MVC;
- Gain a practical understanding of.NET Core;
- Acquire a working knowledge of Web application development using ASP.NET Core MVC 6 and Visual Studio
- Persist data with XML Serialization and ADO.NET with SQL Server

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basics of .NET framework and the object-oriented programming.	Understand
CO2	Illustrate the procedures, File I/O, Error handling and Message queues.	Understand
CO3	Outline the components in VB.NET IDE, ADO.NET and also the window forms.	Understand
CO4	Apply HTML server controls, Web controls, Validation controls and state management and tracing.	Apply
CO5	Build web services and deploying and publishing web services, Finding and consuming web services.	Analyze

UNIT I Microservices **12 Hours**

Understanding Microservices, Adopting Microservices, The Microservices Way. Microservices Value Proposition: Deriving Business Value, defining a Goal-Oriented, Layered Approach, Applying the Goal-Oriented, Layered Approach. Designing Microservice Systems: The Systems Approach to Microservices, A Microservices Design Process, Establishing a Foundation: Goals and Principles, Platforms, Culture..

UNIT II Service Design: **12 Hours**

Microservice Boundaries, API design for Microservices, Data and Microservices, Distributed Transactions and Sagas, Asynchronous Message-Passing and Microservices, dealing with Dependencies, System Design and Operations: Independent Deployability, More Servers, Docker and Microservices, Role of Service Discovery, Need for an API Gateway, Monitoring and Alerting. Adopting Microservices in Practice: Solution Architecture Guidance, Organizational Guidance, Culture Guidance, Tools and Process Guidance, Services Guidance..

UNIT III Building Microservices with ASP.NET Core: 12 Hours

Introduction, Installing .NET Core, Building a Console App, Building ASP.NET Core App. Delivering Continuously: Introduction to Docker, Continuous integration with Wercker, Continuous Integration with Circle CI, Deploying to Dicker Hub. Building Microservice with ASP.NET Core: Microservice, Team Service, API First Development, Test First Controller, Creating a CI pipeline, Integration Testing, Running the team service Docker Image.

UNIT IV Creating Data Service: 12 Hours

Choosing a Data Store, Building a Postgres Repository, Databases are Backing Services, Integration Testing Real Repositories, Exercise the Data Service.Event Sourcing and CQRS: Event Sourcing, CQRS pattern, Event Sourcing and CQRS, Running the samples. Building an ASP.NET Core Web Application: ASP.NET Core Basics, Building Cloud-Native Web Applications. Service Discovery: Cloud Native Factors, Netflix Eureka, Discovering and Advertising ASP.NET Core Services. DNS and Platform Supported Discovery.

UNIT V Configuring Microservice Ecosystems: 12 Hours

Using Environment Variables with Docker, Using Spring Cloud Config Server, Configuring Microservices with etcd, Securing Applications and Microservices: Security in the Cloud, Securing ASP.NET Core Web Apps, Securing ASP.NET Core Microservices. Building Real-Time Apps and Services: Real-Time Applications Defined, Websockets in the Cloud, Using a Cloud Messaging Provider, Building the Proximity Monitor.

Putting It All Together: Identifying and Fixing Anti-Patterns, Continuing the Debate over Composite Microservices, The Future.

Total : 60 Hours

Text Books:

1. Microservice Architecture: Aligning Principles, Practices, and Culture Irakli Nadareishvili, Ronnie Mitra, Matt McLarty, and Mike Amundsen O'Reilly First Edition 2016
2. Building Microservices with ASP.NET CoreKevin Hoffman O'Reilly First 2017

Reference Books:

1. Building Microservices: Designing Fine-Grained Systems Sam Newman O'Reilly First
2. Production-ready Microservices Susan J. Fowler O'Reilly 2016

Websites

1. www.microsoft.com/NET/
2. www.tutorialspoint.com
3. www.javatpoint.com
4. https://freevideolectures.com/course/3002/dot-net-tutorial
5. https://www.nptelvideos.com/video.php?id=1760&c=21

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	3	-	2	-	-	-	-	-	-	1	3	-
CO2	2	-	-	3	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	3	-	1	2	3	-	-	1	3	-	-	-	-	-	-	3	-
CO4	2	-	2	1	1	-	1	2	1	-	-	-	-	-	-	3	-
CO5	1	-	-	2	2	-	-	-	-	-	-	-	1	-	**3**	3	-
AVG	**2.2**	-	**1.5**	**2**	**2.2**	**3**	**1**	**1.66**	**2**	-	-	-	**1**	-	**1.66**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Enterprises JAVA

5H-3C

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

End Semester Exam:3 Hours

Course Objectives (CO):

The goal of this course is for students to:

- To understand the basic concepts of Enterprise Java and Java EE Architecture.
- To be familiar with Cookies, Session and Java Server Pages.
- To gain knowledge about JavaBeans and Interceptors.
- To get real-world, practical knowledge through classroom JPA Application and Hiberate

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic concepts of Enterprise Java and Java EE Architecture	Understand
CO2	utilize Cookies and Session	Apply
CO3	Build and Run the Web Application using Interceptor	Apply
CO4	Gain knowledge about JavaBeans and Interceptors	Apply
CO5	Practical knowledge through classroom JPA Application and Hiberate	Analyze

Unit I Understanding Java EE **12 Hours**

Understanding Enterprise Application - Java enterprise edition - Java EE Technologies - Java EE evolution - Glassfish server. **Java EE Architecture, Server and Containers:** Types of System Architecture - Java EE Server - Java EE Containers. **Introduction to Java Servlets:** The Need for Dynamic Content - Java Servlet Technology - **Servlet API and Lifecycle:** Java Servlet API - The Servlet Skeleton - The Servlet Life Cycle - A Simple Welcome Servlet **Working With Servlets:** Getting Started - Using Annotations Instead of Deployment Descriptor. **Working with Databases:** JDBC Architecture - Accessing Database - The Servlet GUI and Database Example.

Unit II Request Dispatcher **12 Hours**

Resquest dispatcher Interface - Methods of Request dispatcher - Request dispatcher Application. **COOKIES:** Kinds Of Cookies - Creating Cookies Using Servlet - Dynamically Changing The Colors Of A Page. **SESSION:** Lifecycle Of Http Session - Session Tracking With Servlet API - A Servlet Session Example. **Working With Files:** Uploading Files - Creating an Upload File Application - Downloading Files - Creating a Download File Application. **Working With Non-Blocking I/O:** Creating a Non-Blocking Read Application - Creating The Web Application - Creating Java Class - Creating Servlets - Retrieving The File - Creating index.jsp

UNIT III Introduction To Java Server Pages: **12 Hours**

Overview of Java Server Pages - Disadvantages Of JSP - JSP v\s Servlets - Life Cycle of a JSP Page. **Getting Started With Java Server Pages:** Comments - JSP Document - JSP Elements - JSP GUI Example. **Action Elements:** Including other Files - Forwarding JSP Page to Another Page - Passing Parameters for other Actions - Loading a JavaBean. **Implicit Objects, Scope And El Expressions:** Implicit Objects - Character Quoting Conventions - Unified Expression Language [Unified El] - Expression Language

UNIT IV Introduction To Enterprise Java beans: **12 Hours**

Enterprise Bean Architecture - Benefits of Enterprise Bean - Types of Enterprise Bean - Accessing Enterprise Beans - Enterprise Bean Application - Packaging Enterprise Beans **Working With Session Beans:** Types of Session Beans - Remote and Local Interfaces - Accessing Interfaces - Lifecycle of Enterprise Beans - Packaging Enterprise Beans **Working with Message Driven Beans:** Lifecycle of a Message Driven Bean - Uses of Message Driven Beans.

UNIT V Introduction to Java Persistence API: **12 Hours**

The Java Persistence API - JPA - ORM - Database and the Application - Architecture of JPA - JPA Specifications - The Application Development Approach - Creating Database And Tables in Mysql - Creating a Web Application - Adding the Required Library Files - Creating a JavaBean Class - Creating Persistence Unit - Creating JSPS - The JPA Application Structure - Running The JPA Application. **Introduction to Hibernate:** Hibernate - Database and The Application - Components of Hibernate - Architecture of Hibernate - Writing Hibernate Application - The Application Development Approach - Creating Database and Tables in Mysql - Creating a Web Application - Adding The Required Library Files - Creating a Javabean Class - Creating Hibernate Configuration File - Adding a Mapping Class - Running The Hibernate Application.

Total : 60 Hours

Text Books:

1. Sharanam Shah, "Java EE 7 For Beginners" Vaishali Shah SPD Publication First Edition 2017
2. Elder Moraes, "Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development" Packt Publication, First Edition 2018

Reference Book:

1. Uttam Kumar Roy "Advanced Java Programming" , Oxford Press 2015 Edition

Websites

1. https://www.javatpoint.com
2. https://www.tutorialspoint.com/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	1	3	2	2	1	1	2	1	3	3	-	-	-	3	-
CO2	3	2	3	2	2	1	1	3	3	2	3	3	-	-	-	3	-
CO3	2	3	1	3	2	2	3	2	1	2	3	2	-	-	-	3	-
CO4	3	2	2	2	1	1	2	1	2	3	2	3	-	-	-	3	-
CO5	3	2	1	2	1	1	2	3	2	2	3	2	-	-	-	3	-
AVG	**2.8**	**2.2**	**1.6**	**2.4**	**1.6**	**1.4**	**1.8**	**2**	**2**	**2**	**2.8**	**2.6**	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

SOFT COMPUTING

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives

- To learn the basic concepts of Soft Computing
- To become familiar with various techniques like neural networks, genetic algorithms and fuzzy systems.
- To apply soft computing techniques to solve problems.
- To understand the basic operators in Genetic Algorithm.
- To be familiar with various soft computing tools in Fuzzy logic.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Will be able to differentiate Genetic Algorithm and Classification.	Analyze
CO2	Integrate various soft computing techniques for complex problems.	Understand
CO3	Apply suitable soft computing techniques for various applications.	Apply
CO4	Implement the Mutation operators in Genetic Algorithm.	Apply
CO5	Apply soft computing tools in Fuzzy logic compiler design.	Apply

UNIT I INTRODUCTION TO SOFT COMPUTING 12 Hours

Introduction-Artificial Intelligence-Artificial Neural Networks-Fuzzy Systems-Genetic Algorithm and Evolutionary Programming-Swarm Intelligent Systems-Classification of ANNs-McCulloch and Pitts Neuron Model-Learning Rules: Hebbian and Delta- Perceptron Network-Adaline Network-Madaline Network.

UNIT II ARTIFICIAL NEURAL NETWORKS 12 Hours

Back propagation Neural Networks - Kohonen Neural Network -Learning Vector Quantization - Hamming Neural Network - Hopfield Neural Network- Bi-directional Associative Memory - Adaptive Resonance Theory Neural Networks- Support Vector Machines - Spike Neuron Models.

UNIT III FUZZY SYSTEMS 12 Hours

Introduction to Fuzzy Logic, Classical Sets and Fuzzy Sets - Classical Relations and Fuzzy Relations -Membership Functions -Defuzzification - Fuzzy Arithmetic and Fuzzy Measures - Fuzzy Rule Base and Approximate Reasoning - Introduction to Fuzzy Decision Making.

UNIT IV GENETIC ALGORITHMS 12 Hours

Basic Concepts- Working Principles -Encoding- Fitness Function - Reproduction - Inheritance Operators - Cross Over - Inversion and Deletion -Mutation Operator - Bit-wise Operators - Convergence of Genetic Algorithm.

UNIT V HYBRID SYSTEMS **12 Hours**

Hybrid Systems -Neural Networks, Fuzzy Logic and Genetic -GA Based Weight Determination - LR-Type Fuzzy Numbers - Fuzzy Neuron - Fuzzy BP Architecture - Learning in Fuzzy BP- Inference by Fuzzy BP - Fuzzy ArtMap: A Brief Introduction - Soft Computing Tools - GA in Fuzzy Logic Controller Design - Fuzzy Logic Controller.

Total : 60 Hours

Text Books

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.
4. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, ―Neuro-Fuzzy and Soft Computing‖, Prentice-Hall of India, 2002.

Reference Books

1. Kwang H.Lee, ―First course on Fuzzy Theory and Applications‖, Springer, 2005.
2. George J. Klir and Bo Yuan, ―Fuzzy Sets and Fuzzy Logic-Theory and Applications‖, Prentice Hall, 1996.

Websites

1. https://www.javatpoint.com/what-is-soft-computingwww.programiz.com / soft-computing
2. https://www.geeksforgeeks.org/need-for-soft-computing/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	1	3	2	2	1	1	2	1	3	3	-	-	-	3	-
CO2	3	2	3	2	2	1	1	3	3	2	3	3	-	-	-	3	-
CO3	2	3	1	3	2	2	3	2	1	2	3	2	-	-	-	3	-
CO4	3	2	2	2	1	1	2	1	2	3	2	3	-	-	-	3	-
CO5	3	2	1	2	1	1	2	3	2	2	3	2	-	-	-	3	-
AVG	**2.8**	**2.2**	**1.6**	**2.4**	**1.6**	**1.4**	**1.8**	**2**	**2**	**2**	**2.8**	**2.6**	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Cloud Application Development

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- Understand the concepts of cloud computing for developing the cloud applications.
- Gain knowledge in the broad perceptive of cloud architecture and model
- Analyze and understand the importance of various applications of cloud computing.
- To compare the significance of cloud benefits

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the fundamentals of cloud computing and related concepts.	Understand
CO2	Identify compute intensive model and date intensive model	Understand
CO3	Use the map reducing in cloud and graph processing 9	Understand
CO4	Applying cloud resource management and application scaling	Apply
CO5	Examine different cloud programming paradigms, and utilize them to address cloud-based issues.	Analyze

UNIT I INTRODUCTION **12 Hours**

Definition, Characteristics, Benefits, challenges of cloud computing, cloud models: serviceIaaS(infrastructure as service),PaaS(platform as a service),SaaS(software as a ervice), deployment models-public, private, hybrid, community; Types of cloud omputing: Grid computing utility computing, cluster; computing Cloud services: Amazon, Google, Azure, online services, open source private clouds, SLA; Applications of cloud computing: Healthcare, energy systems, transportation, manufacturing, education, government, mobile communication, application development

UNIT II CLOUD ARCHITECTURE, PROGRAMMING MODEL **12 Hours**

Cloud Architecture, programming model: NIST reference architecture, architectural styles of cloud applications, single, multi, hybrid cloud site, redundant, non redundant, 3 tier, multi tier architectures; Programming model: Compute and data intensive

UNIT III CLOUD RESOURCE VIRTUALIZATION **12 Hours**

Cloud resource virtualization: Basics of virtualization, types of virtualization techniques, merits and demerits of virtualization, Full vs Para - virtualization, virtual machine monitor/hypervisor. Virtual machine basics, taxonomy of virtual machines, process vs system virtual machines.

UNIT IV CLOUD RESOURCE MANAGEMENT AND SCHEDULING **12 Hours**

Policies and mechanisms for resource management, resource bundling, combinatorial , fair queuing, start time fair queuing, borrowed virtual time, cloud scheduling subject to deadlines, scheduling map reduce applications subject to deadlines, resource management and application scaling.

UNIT V CLOUD SECURITY **12 Hours**

Risks, privacy and privacy impacts assessments; Multi-tenancy issues, security in VM, OS, virtualization system security issues and vulnerabilities; Virtualization system-specific attacks: Technologies for virtualization-based security enhancement, legal..

Total : 60 Hours

Text Books

1. Dan Marinescu, “Cloud Computing: Theory and Practice‖”, M K Publishers, 1st Edition, 2013,
2. Kai Hwang, Jack Dongarra, Geoffrey Fox,” Distributed and Cloud Computing, From Parallel Processing to the Internet of Things‖”, M K Publishers, 1st Edition, 2011.

Reference Books:

1. Anthony T. Velte, Toby J. Velte, Robert Elsenpeter, ”Cloud Computing: A Practical approach”, McGraw Hill, 1st Edition, 2009.
2. Arshdeep Bahga, “Cloud Computing: A Hands on Approach”, Vijay Madisetti Universities Publications, 1 st Edition, 2013.

Websites:

1. https://www.oracle.com/in/cloud/application-development
2. http://computingcareers.acm.org/?page_id=12
3. http://en.wikibooks.org/wiki/cloud application

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	1	3	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	-	-	2	2	-	-	-	-	-	1	-	-	-	2	3	-
CO3	2	-	-	-	-	1	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	-	1	2	3	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	**2.6**	**-**	**2**	**1.5**	**2**	**2**	**-**	**1**	**1.33**	**-**	**1**	**-**	**-**	**-**	**2**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, ‘-‘ – No Correlation																	

SEMESTER-V

Business Intelligence

5H-3C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

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

Course Outcomes (COs):

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

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

UNIT I INTRODUCTION **12 Hours**

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

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

UNIT II MATHEMATICAL MODELS **12 Hours**

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

UNIT III CLASSIFICATION AND CLUSTERING **12 Hours**

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

UNIT IV BUSINESS INTELLIGENCE APPLICATIONS **12 Hours**

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

UNIT V KNOWLEDGE MANAGEMENT **12 Hours**

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

Total : 60 Hours

Text Books:

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

Reference Books:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	1	2	-	-	-	2	2	3	-	-	3	-	**2**
CO2	-	-	-	3	2	-	3	-	-	3	2	3	3	-	-	-	**2**
CO3	-	3	-	2	2	3	-	-	-	2	3	2	-	3	-	-	**2**
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	1	-	**2**
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	-	**2**
AVG	**3**	**3**	**2.6**	**2.33**	**1.6**	**2**	**2.5**	**2.5**	**-**	**2.4**	**2.4**	**2.66**	**3**	**3**	**2**	**-**	**2**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Basics of Accounting

6H-6C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To understand basic concepts on accounting
- To prepare various subsidiary books
- To prepare financial statements
- To carry out depreciation on fixed assets
- To prepare accounts for nonprofit organizations

Course Outcomes (COs):

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

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

Note: Distribution of Marks between problems and theory shall be 75% and 25%.

Text Books:

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

Reference Books:

1. R.L.Gupta, V.K.Gupta and 2.C.Shukla,2010, New Delhi Financial Accounting,Sultan Chand
2. T.S.Grewal, S.C.Gupta and S.P.Jain, 2010, New Delhi Advanced Accountancy, Sultan Chand .
3. K.L.Narang and S.N.Maheswari ,2010, New Delhi Advanced Accountancy-Kalyani Publishers.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	3	-	2	1	-	-	2	1	2	3	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	3	1	-	-	-	-	-	3	-
CO3	3	-	3	-	3	2	-	-	3	2	2	3	-	-	-	3	-
CO4	3	-	-	-	3	2	-	-	2	-	-	3	-	-	-	3	-
CO5	3	3	-	-	3	3	-	-	3	2	2	2	-	-	-	3	-
AVG	**3**	**3**	**3**	**-**	**2.75**	**2**	**-**	**-**	**2.6**	**1.5**	**2**	**2.75**	**-**	**-**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Full Stack Web Development -Practical

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To understand how front-end and back-end techniques necessary to build web applications.
- To learn how to make websites interactive,
- To create data-driven web applications.
- To Get familiar with the latest web development technologies
- To Learn all about SQL and NoSQL databases
- To Learn complete web development process

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Design full stack applications with clear understanding of user interface, business logic and data storage.	Apply
CO2	Design and develop user interface screens	Apply
CO3	Implement the functional requirements using appropriate tool	Apply
CO4	Design and develop database based on the requirements	Apply
CO5	Integrate all the necessary components of the application	Apply

List of Programs

1. Applying CSS animation where class spins an element 360 degrees
2. Changing image using mouseover event
3. Create calculator format using java script.
4. Create an array of 10 numbers and sort them using javascript
5. Design and apply your application form for course enrolment using Javascript.
6. Making an Interactive Component using ReactJS
7. Implementing Time Travel in ReactJS
8. Create a event-driven applications using Node.js
9. Write a program to demonstrate EventEmitter Object in Node.js
10. Develop a classifieds web application to buy and sell used products.

Total : 48 Hours

Text Books:

1. Jon Duckett (2020), HTML & CSS: Design and Build Websites + JavaScript & Query: Interactive Front-End Web Development
2. Greg Lim, (2020), Beginning Node.js, Express & MongoDB Development Paperback.

Reference Books:

1. Ethan Brown (2019), Web Development with Node and Express: Leveraging the JavaScript Stack
2. Anthony Accomazzo, Ari Lerner, and Nate Murray, (2018) Fullstack React: The Complete Guide to ReactJS and Friends,

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	1	3	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	-	-	2	2	-	-	-	-	-	1	-	-	-	2	3	-
CO3	2	-	-	-	-	1	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	-	1	2	3	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	**2.6**	**-**	**2**	**1.5**	**2**	**2**	**-**	**1**	**1.33**	**-**	**1**	**-**	**-**	**-**	**2**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Microservice Architecture - Practical

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To create windows forms using arrays and flow control statements.
- To Learn Basic windows controls using Visual Basic.Net and to develop Web Applications using Microsoft ASP.NET programming
- To learn the classes and namespaces in the .NET Framework class library.
- To Understand the concept of Multiple Document Interface and the architecture of .NET
- To assemble multiple forms, modules, and menus into working VB.NET solutions

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Develop Windows based applications using Visual Basic.Net	Apply
CO2	Learn various tools in .net applications	Understand
CO3	Implement ADO.Net concept in VB.Net and ASP.Net applications	Understand
CO4	Create server-side web applications using ASP.NET	Apply
CO5	Apply techniques to develop error-free software	Analyze

List of Programs

1. Write a VB.Net Program to perform various string manipulation functions.
2. Create MDI application having file menu (New, Open, Save, Print, Close) and Format menu (Font, Forecolor, Backcolor).
3. Write a VB.Net program for developing a basic text editor that allows users to create, edit, and save text files. Include features like cut, copy, paste, and find/replace.
4. Write a VB.Net program to create a Screen Saver Application.
5. Develop an online store where users can browse products, add items to their cart, and make purchases.
6. Design an online system for managing events, such as conferences or seminars. Implement features for event registration, attendance management, and event scheduling.
7. Develop web applications using Model View Control.
8. Create MVC Models and write code that implements business logic within Model methods, properties, and events.
9. Create Views in an MVC application that display and edit data and interact with Models and Controllers.

Total : 48 Hours

Text Books:

1. Reynolds and Matthew (2023), Professional VB.Net, 2nd Edition, Wrox Publications
2. Ying Bai (2018). Practical Database Programming with Visual Basic.Net 2nd Edition, John Wiley & Sons Publication, Canada
3. Microservice Architecture: Aligning Principles, Practices, and Culture Irakli Nadareishvili, Ronnie Mitra, Matt McLarty, and Mike Amundsen O'Reilly First Edition 2016
4. Building Microservices with ASP.NET Core Kevin Hoffman O'Reilly First 2017

Reference Books:

1. Shirish Chavan. (2017). Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.
2. Jason N. Gaylord, Christian Wenz, Pranav Rastogi (2013), Professional ASP.Net 4.5 in C# and VB, Wrox Publications
3. Shapiro and Jeremy (2017), Visual Basic.Net: The Complete Reference, McGraw Hill Publications.

Websites

1. www.microsoft.com/NET/
2. www.tutorialspoint.com/vb.net/index.htm
3. www.javatpoint.com/asp-net-tutorial
4. https://freevideolectures.com/course/3002/dot-net-tutorial
5. https://www.nptelvideos.com/video.php?id=1760&c=21

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	3	1	2	1	3	2	2	1	2	3	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	3	1	-	-	1	-	-	3	-
CO3	3	-	3	-	3	2	-	-	3	2	2	3	-	-	-	3	-
CO4	3	-	-	-	3	2	-	-	2	-	-	3	-	1	-	3	-
CO5	3	3	-	3	3	3	-	-	3	2	2	2	-	-	-	3	-
AVG	**3**	**3**	**3**	**2**	**2.75**	**2**	**3**	**2**	**2.6**	**1.5**	**2**	**2.75**	**1**	**1**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Enterprises JAVA - Practical

4H-2C

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

End Semester Exam:3 Hours

Course Objectives (CO):

The goal of this course is for students to:

- To understand the basic concepts of Enterprise Java and Java EE Architecture.
- To be familiar with Cookies, Session and Java Server Pages.
- To gain knowledge about JavaBeans and Interceptors.
- To get real-world, practical knowledge through classroom JPA Application and Hiberate

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic concepts of Enterprise Java and Java EE Architecture	Understand
CO2	Getting familiar with working Cookies and Session	Apply
CO3	Build and Run the Web Application using Interceptor	Apply
CO4	Gain real time knowledge about JavaBeans and Interceptors	Apply
CO5	Practical knowledge through classroom JPA Application and Hiberate	Analyze

List of Programs:

1. Create a simple calculator application using servlet.
2. Create a servlet that uses Cookies to store the number of times a user has visited servlet.
3. Create a registration servlet in Java using JDBC. Accept the details such as Username, Password, Email, and Country from the user using HTML Form
4. Create a servlet demonstrating the use of session creation and destruction.
5. Develop a simple JSP application to display values obtained from the use of intrinsic objects of various types.
6. Create a JSP page to demonstrate the use of Expression language.
7. Create a Currency Converter application using EJB.
8. Create a registration and login JSP application to register and authenticate the user based on username and password using JDBC.
9. Create a JSP application to demonstrate the use of JSTL.
10. Develop simple visitor Statistics application using Message Driven Bean

Total : 48 Hours

Text Books:

3. Sharanam Shah, "Java EE 7 For Beginners" Vaishali Shah SPD Publication First Edition 2017
4. Elder Moraes, "Java EE 8 Cookbook: Build reliable applications with the most robust and mature technology for enterprise development" Packt Publication, First Edition 2018

Reference Book:

2. Uttam Kumar Roy "Advanced Java Programming" , Oxford Press 2015 Edition

Websites

3. https://www.javatpoint.com
4. https://www.tutorialspoint.com/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	3	-	-	2	1	-	2	2	1	2	3	-	-	-	3	-
CO2	-	-	-	1	-	2	3	2	3	1	3	2	2	3	-	3	-
CO3	3	3	-	-	-	-	3	3	3	2	-	-	-	3	-	3	-
CO4	3	-	3	2	-	-	-	3	2	2	-	-	-	-	-	3	-
CO5	3	-	3	3	3	-	-	3	-	-	-	2	-	3	-	3	-
AVG	**3**	**3**	**3**	**2**	**2.5**	**1.5**	**3**	**2.6**	**2.5**	**1.5**	**2.5**	**2.33**	**2**	**3**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Soft Computing - Practical

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

OBJECTIVES:

The goal of this course is for students to:

- Introduce students to soft computing concepts and techniques and foster their abilities in designing and implementing soft computing based solutions for real-world and engineering problems.
- Introduce students to fuzzy systems, fuzzy logic and its applications.
- Explain the students about Artificial Neural Networks and various categories of ANN.

Course Outcomes (COs):

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

COs	Course Outcomes (COs)	Blooms Level
CO1	Explain soft computing techniques and their role in problem solving.	Understand
CO2	Analyze and integrate various soft computing techniques in order to solve problems effectively and efficiently.	Apply
CO3	Use Graph Theory for solving problems	Apply
CO4	Implement fuzzy systems algorithms	Apply
CO5	Analyze M-file to calculate weights and store vector data	Analyze

LIST OF EXPERIMENTS

1. program in MATLAB to perform Union, Intersection and Complement operations.
2. program in MATLAB to implement De-Morgan's Law..
3. program in MATLAB to plot various membership functions.Develop
4. implement FIS Editor.
5. Generate ANDNOT function using McCulloch-Pitts neural net by MATLAB program
6. program for Perceptron net for an AND function with bipolar inputs and targets
7. Write a M-file to calculate the weights for the following patterns using hetero associative neural net for mapping four input vectors to two output vectors.
8. Write an M-file to store vector [-1 -1 -1 -1] and [-1 -1 1 1] in an auto-associative net.Find weight matrix.Test the net with [1 1 1 1] as input

Total : 48 Hours

Text Books

1. N.P.Padhy, S.P.Simon, "Soft Computing with MATLAB Programming", Oxford University Press, 2015.
2. S.N.Sivanandam , S.N.Deepa, "Principles of Soft Computing", Wiley India Pvt.Ltd., 2nd Edition, 2011.
3. S.Rajasekaran, G.A.Vijayalakshmi Pai, "Neural Networks, Fuzzy Logic and Genetic Algorithm, Synthesis and Applications ", PHI Learning Pvt.Ltd., 2017.
4. Jyh-Shing Roger Jang, Chuen-Tsai Sun, EijiMizutani, ―Neuro-Fuzzy and Soft Computing‖, Prentice-Hall of India, 2002.

Reference Books

1. Kwang H.Lee, ―First course on Fuzzy Theory and Applications‖, Springer, 2005.
2. George J. Klir and Bo Yuan, ―Fuzzy Sets and Fuzzy Logic-Theory and Applications‖, Prentice Hall, 1996.

Websites

1. https://www.javatpoint.com/what-is-soft-computingwww.programiz.com / soft-computing
2. https://www.geeksforgeeks.org/need-for-soft-computing/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	1	3	2	2	1	1	2	1	3	3	-	-	-	3	-
CO2	3	2	3	2	2	1	1	3	3	2	3	3	-	-	-	3	-
CO3	2	3	1	3	2	2	3	2	1	2	3	2	-	-	-	3	-
CO4	3	2	2	2	1	1	2	1	2	3	2	3	-	-	-	3	-
CO5	3	2	1	2	1	1	2	3	2	2	3	2	-	-	-	3	-
AVG	**2.8**	**2.2**	**1.6**	**2.4**	**1.6**	**1.4**	**1.8**	**2**	**2**	**2**	**2.8**	**2.6**	**-**	**-**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Cloud Application Development – Practical

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- Apply the tool kits
- Develop the web services/Applications
- Construct virtual machines
- Design the systems, protocols and mechanisms

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the fundamental ideas of the cloud application development, features, benefits, and drawbacks of the many cloud computing models and services.	Understand
CO2	Develop the web services/Applications in cloud framework	Apply
CO3	Construct virtual machines to run in different configuration	Apply
CO4	Design the systems, protocols and mechanisms to support cloud application development	Apply
CO5	Create virtual machines and virtual templates.	Apply

List of Programs

1. Identify the procedure to run the virtual machine of different configuration and examine how many virtual machines can be utilized at particular time using Eucalyptus or OpenNebula or OpenStack
2. Construct virtual block in virtual machine and check whether it holds the data even after the release of the virtual machine using Eucalyptus or OpenNebula or OpenStack
3. Write a program to perform the migration of virtual machine based on the load from one

node to the other using Eucalyptus or OpenNebula or OpenStack

4. Write a program to create a datacenter with one host and run one cloudlet on it using cloudsim toolkit

5. Develop a program to create two datacenters with one host and run two cloudlets on them using cloudsim toolkit

6. Demonstrate how to pause and resume the simulation, and create simulation entities dynamically in cloudsim toolkit

7. Create simulation entities in run-time using a globar manager entity (GlobalBroker) using cloudsim toolkit

8. Implement a MapReduce program to count the occurrence of each word from the file

9. Write a program to use the API'S of Hadoop to interact with it

10. Write a word count program to demonstrate the use of Map and Reduce Tasks

Total : 48 Hours

Text Books

1. Kris Jamsa, "Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile, Security and more", Jones & Bartlett Learning Company LLC, 2013.
2. Rajkumar Buyya, James Broberg, Andrzej goscinski, "Cloud Computing: Principles and Paradigms", Wiley publication, 2014 (Reprint).

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	2	2	-	2	3	3	-	3	2	2	3	-	-	3	-
CO2	3	2	2	2	3	-	3	3	3	-	-	-	1	1	-	3	-
CO3	3	2	2	3	3	3	-	3	-	3	2	2	-	1	-	3	-
CO4	3	2	2	-	-	-	3	-	-	-	-	-	-	-	-	3	-
CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3	-
AVG	**3**	**2**	**2**	**2.33**	**3**	**2.5**	**3**	**3**	**3**	**3**	**2**	**2**	**2**	**1**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-V

Business Intelligence – Practical

4H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Import the legacy data from different sources and load in the target system

Course Objectives (CO):

The goal of this course is for students to:

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

Course Outcomes (COs):

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

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

List of Programs:

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

8. Perform the Linear regression on the given data warehouse data.
9. Perform the logistic regression on the given data warehouse data.

Total : 48 Hours

Text Books:

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

Reference Books:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	1	2	-	-	-	2	2	3	-	-	3	3	-
CO2	-	-	-	3	2	-	3	-	-	3	2	3	3	-	-	3	-
CO3	-	3	-	2	2	3	-	-	-	2	3	2	-	3	-	3	-
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	1	3	-
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	3	-
AVG	**3**	**3**	**2.6**	**2.33**	**1.6**	**2**	**2.5**	**2.5**	**-**	**2.4**	**2.4**	**2.66**	**3**	**3**	**2**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

24CTU591

SEMESTER-V

Internship

0H- 2C

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

SEMESTER-VI

IT Service Management

5H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To acquaint students with the concepts and methods available for software development in industrial environments
- To understand the fundamental principles of software project management.
- To have a good knowledge of responsibilities of project manager.
- To be familiar with the different methods and techniques used for project management.

Course Outcomes (COs):

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

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

UNIT 1 INTRODUCTION **12 Hours**

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

UNIT 2 SOFTWARE DEVELOPMENT **12 Hours**

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

UNIT 3 PROJECT REVIEW **12 Hours**

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

UNIT 4 PROBLEM SOLVING **12 Hours**.

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

UNIT 5 SOFTWARE QUALITY **12 Hours**

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

Total : 60 Hours

Text Books:

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

Reference Books:

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

Website:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	2	3	3	1	2	-	3	2	2	-	-	-	-	3	-
CO2	2	3	2	-	-	1	3	-	-	3	2	3	-	3	-	3	-
CO3	-	-	3	-	2	2	-	-	-	-	3	-	-	-	3	3	-
CO4	3	-	-	2	1	-	-	-	-	-	-	-	3	-	-	3	-
CO5	2	-	3	3	3	3	-	3	2	-	3	-	-	-	-	3	-
AVG	2.5	2.5	2.5	2.66	2.25	1.75	2.5	3	2.5	2.5	2.5	3	3	3	3	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Introduction to AI and Machine Learning

5H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To study the concepts of artificial intelligence
- To learn the methods of solving problems using artificial intelligence
- To introduce the concepts of knowledge reasoning and planning
- To understand the basics of supervised and unsupervised machine learning
- To learn the concepts of machine learning applications

Course Outcomes (COs):

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

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

UNIT I INTELLIGENT AGENTS **12 Hours**

Introduction to AI -Intelligent Agents: Agents and Environments – Concept of Rationality- nature of Environments – Structure of Agents- Problem Solving Agents – Search algorithms.

UNIT II PROBLEM SOLVING AND HEURISTIC SEARCH **12 Hours**

Informed search Strategies – Heuristic functions – Local Search and Optimization Problems- Local Search in Continuous Spaces- Game Theory - Optimal Decisions in Games.

UNIT III KNOWLEDGE REASONING AND PLANNING **12 Hours**

Constraint Satisfaction Problem: Backtracking search in CSP- Local search in CSP- Knowledge based agents- Propositional logic- Agents based on Propositional Logic.

UNIT IV SUPERVISED LEARNING AND UNSUPERVISED LEARNING 12 Hours

Forms of Learning- Supervised Learning — Linear Regression and Classification: Univariate Linear Regression - Linear classification with Logistic Regression- Ensemble Learning: Random Forest - Unsupervised Learning and Transfer Learning - multitask learning.

UNIT V APPLICATIONS 12 Hours

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

Total : 60 Hours

Text Books:

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

Reference Books:

10. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar Foundations of Machine Learning, MIT Press, 2012.

Websites :

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	2	-	-	2	2	-	-	-	3	-	-	3	-
CO2	3	-	3	3	-	-	-	-	1	-	-	-	-	-	2	3	-
CO3	2	-	-	2	2	-	-	2	-	-	-	-	2	-	-	3	-
CO4	1	-	3	3	3	-	-	-	-	-	-	-	-	-	-	3	-
CO5	1	-	2	2	2	-	-	-	-	-	-	-	2	-	3	3	-
AVG	**2**	-	**2.5**	**2.5**	**2.25**	-	-	**2**	**1.5**	-	-	-	**2.33**	-	**2.5**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Deep Learning

5H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To present the mathematical, statistical and computational challenges of building neural networks
- To study the concepts of deep learning
- To enable the students to know deep learning techniques to support real-time applications**Course Outcomes (COs):**

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain mathematics behind functioning of artificial neural networks	Understand
CO2	Apply the given dataset for designing a neural network based solution.	Apply
CO3	Design and implementation of deep learning models for signal/image processing applications	Apply
CO4	Design and deploy simple TensorFlow-based deep learning solutions to classification problems	Apply
CO5	Demonstrate mathematical, statistical and computational challenges of building neural networks	Apply

UNIT- I : Artificial Neural Networks **12 Hours**

Artificial Neural Networks- The Neuron-Expressing Linear Perceptrons as Neurons-Feed-Forward Neural Networks- Linear Neurons and Their Limitations –Sigmoid – Tanh – and ReLU Neurons -Softmax Output Layers – Training Feed-Forward Neural Networks-Gradient Descent-Delta Rule and Learning Rates- Gradient Descent with Sigmoidal Neurons- The backpropagation Algorithm-Stochastic and Minibatch Gradient Descent – Test Sets – Validation Sets – and Overfitting- Preventing Overfitting in Deep Neural Networks – Implementing Neural Networks in TensorFlow.

UNIT- II: Deep Networks **12 Hours**

Deep feedforward network - Regularization for deep learning - Optimization for Training deep models - Local Minima in the Error Surfaces of Deep Networks- Model Identifiability- Spurious Local Minima in Deep Networks- Flat Regions in the Error Surface – Momentum-Based Optimization – Learning Rate Adaptation.

UNIT- III: Convolutional Neural Networks(CNN) **12 Hours**

Convolutional Neural Networks(CNN) – Architecture -Accelerating Training with Batch Normalization- Building a Convolutional Network using TensorFlow- Visualizing Learning in Convolutional Networks – Embedding and Representation Learning

UNIT- IV : Autoencoder Architecture **12 Hours**

Autoencoder Architecture-Implementing an Autoencoder in TensorFlow –Denoising Sparsity in Autoencoders Models for Sequence Analysis – Recurrent Neural Networks- Vanishing GradientsLong Short-Term Memory (LSTM) Units- TensorFlow Primitives for RNN Models-Augmenting Recurrent Networks with Attention.

UNIT-V:Deep Learning Models **12 Hours**

Linear Factor Models - Representation learning - Approximate Inference - Deep Generative Models

Total : 60 Hours

Text Books:

1. Nikhil Buduma, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithm”, O’Reilly, 2017.
2. Ian Goodfellow, YoshuaBengio and Aaron Courville, “Deep Learning”, MIT Press, 2016.
3. Nikhil Ketkar, “Deep Learning with Python: A Hands-on Introduction”, Apress, 2017.

Reference Books:

1. Deep Learning: Methods and Applications Deng & Yu Now Publishers 1st 2013 AurélienGéron,
2. “Hands-On Machine Learning with Scikit- Learn and TensorFlow”, O’Reilly, 2017.

Websites

1. https://onlinecourses.nptel.ac.in/noc20_cs92/
2. https://hadoop.apache.org
3. https://data-flair.training/blogs/apache-hive-tutorial/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	2	2	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	-	-	2	1	-	-	-	2	-	-	-	-	-	-	3	-
CO3	3	-	2	1	-	1	-	-	-	-	-	-	-	1	-	3	-
CO4	3	-	3	1	2	3	-	-	-	-	1	-	-	-	1	3	-
CO5	2	1	1	-	2	3	-	-	-	-	-	-	-	-	-	3	-
AVG	**2.8**	**1**	**2**	**1.5**	**1.75**	**2.33**	**-**	**-**	**1.5**	**-**	**1**	**-**	**-**	**1**	**1**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, ‘-‘ – No Correlation																	

SEMESTER-VI

Data Science

5H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

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

Course Outcomes (COs):

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

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

UNIT I Data Science Technology Stack: **12 Hours**

Rapid Information Factory Ecosystem - Data Science Storage Tools - Data Lake - Data Vault - Data Warehouse Bus Matrix - Data Science Processing Tools -Spark - Mesos -Akka - Cassandra - Kafka - Elastic Search - R -Scala - Python - MQTT - TheFuture

Layered Framework: Definition of Data Science Framework - Cross- Industry Standard Process for Data Mining (CRISP-DM) - Homogeneous Ontology for Recursive Uniform Schema - The TopLayers of a Layered Framework - Layered Framework for High-Level Data Science and Engineering - Business Layer - Utility Layer.

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

Operational Management Layer - Processing-Stream Definition and Management - Audit -

Balance - and Control Layer - Balance - Control - Yoke Solution - Cause-and-Effect - Analysis System - Functional Layer - Data Science Process

UNIT III Retrieve Superstep : **12 Hours**

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

UNIT IV Process Superstep : **12 Hours**

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

UNIT V Transform Superstep: **12 Hours**

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

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

Total : 60 Hours

Text Books:

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

Reference Books:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	2	2	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	2	2	2	1	-	-	-	2	-	-	-	-	-	-	3	-
CO3	3	-	2	1	-	1	-	-	-	-	-	-	-	1	-	3	-
CO4	3	-	3	1	2	3	-	-	-	-	1	-	-	-	1	3	-
CO5	2	1	1	-	2	3	-	-	-	-	-	-	-	-	-	3	-
AVG	**2.8**	**1.5**	**2**	**1.5**	**1.75**	**2.33**	**-**	**-**	**1.5**	**-**	**1**	**-**	**-**	**1**	**1**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Fundamentals of Geographic Information System

5H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To illustrate basic ideas and procedures of Geographic Information Systems (GIS)
- To understand principles of data visualization and graphic design, such as color theory, symbolization,
- To explain geographic information science and technology are used in transdisciplinary fields.
- To describe GIS tools to make maps that are useful and successfully communicate the information they are meant to

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic ideas and procedures of Geographic Information Systems (GIS)	Understand
CO2	Implement fundamental principles of data visualization and graphic design, such as color theory, symbolization,	Apply
CO3	Demonstrate how geographic information science and technology are used in transdisciplinary fields.	Analyze
CO4	Apply GIS tools to make maps that are useful and successfully communicate the information they are meant to	Apply
CO5	Apply statistical techniques and mathematical ideas to the data that will be utilized for geographic analysis.	Apply

UNIT I A Gentle Introduction to GIS **12 Hours**

The nature of GIS: Defining GIS - GISystems - GIScience and GIApplications - Spatial data and Geoinformation. **The real world and representations of it:** Models and modelling - Maps - Databases - Spatial databases and spatial analysis **Geographic Information and Spatial Database Models and Representations of the real world Geographic Phenomena:** Defining geographic phenomena - types of geographic phenomena - Geographic fields - Geographic objects - Boundaries **Computer Representations of Geographic Information:** Regular tessellations - irregular tessellations - Vector representations - Topology and Spatial relationships - Scale and Resolution - Representation of Geographic fields - Representation of Geographic objects

UNIT II Geographic Information Systems **12 Hours**

GIS Software - GIS Architecture and functionality - Spatial Data Infrastructure (SDI) **Stages of Spatial Data handling:** Spatial data handling and preparation - Spatial Data Storage and maintenance - Spatial Query and Analysis - Spatial Data Presentation. **Database management Systems:** Reasons for using a DBMS - Alternatives for data management - The relational data model - Querying the relational database. **GIS and Spatial Databases:** Linking GIS and DBMS - Spatial database functionality.

UNIT III Spatial Referencing and Positioning **12 Hours**

Spatial Referencing: Reference surfaces for mapping - Coordinate Systems - Map Projections - Coordinate Transformations **Satellite-based Positioning:** Absolute positioning - Errors in absolute positioning - Relative positioning - Network positioning - code versus phase measurements - Positioning technology Data Entry and Preparation **Spatial Data Input:** Direct spatial data capture - Indirect spatial data captiure - Obtaining spatial data elsewhere **Data Quality:** Accuracy and Positioning - Positional accuracy - Attribute accuracy - Temporal accuracy - Lineage - Completeness - Logical consistency **Data Preparation:** Data checks and repairs - Combining data from multiple sources Point Data Transformation: Interpolating discrete data - Interpolating continuous data

UNIT IV Spatial Data Analysis **12 Hours**

Classification of analytical GIS Capabilities Retrieval - classification and measurement: Measurement - Spatial selection queries – Classification **Overlay functions:** Vector overlay operators -Raster overlay operators Neighbourhood functions: Proximity computations - Computation of diffusion - Flow computation - Raster based surface analysis **Analysis:** Network analysis - interpolation - terrain modeling

UNIT V GIS and Application models **12 Hours**

GPS - Open GIS Standards - GIS Applications and Advances Error Propagation in spatial data processing: How Errors propagate - Quantifying error propagation Data Visualization - GIS and Maps - The Visualization Process Visualization Strategies The cartographic toolbox - Map Cosmetics - Map Dissemination

Total : 60 Hours

Text Books:

1. Principles of Geographic Information Systems- An Introductory Text Book Editors: Otto Huisman and Rolf A. The International Institute of Geoinformation Science and Earth Observation Fourth 2009
2. Principles of Geographic Information Systems P.A Burrough and R.A.McDonnell Oxford University Press Third 1999
3. Fundamentals of Spatial Information Systems, R.Laurini and D. Thompson, Academic Press 1994
4. Fundamentals of Geographic Information Systems Michael N.Demers Wiley Publications Fourth 2009

Reference Books:

1. Introduction to Geographic Information Systems Chang Kang-tsung (Karl), McGrawHill Any above 3rd Edition 2013 7th Edition
2. GIS Fundamentals: A First Text on Geographic Information Systems Paul Bolsatd XanEdu Publishing Inc 5th Edition

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	1	2	-	-	-	2	2	3	-	-	3	3	-
CO2	-	-	-	3	2	-	3	-	-	3	2	3	3	-	-	3	-
CO3	-	3	-	2	2	3	-	-	-	2	3	2	-	3	-	3	-
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	1	3	-
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	3	-
AVG	**3**	**3**	**2.6**	**2.33**	**1.6**	**2**	**2.5**	**2.5**	**-**	**2.4**	**2.4**	**2.66**	**3**	**3**	**2**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Entrepreneurship

6H-6C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

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

Course Outcomes (COs):

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

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

UNIT I Introduction to Entrepreneurship **15 Hours**

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

UNIT II Evolution of Entrepreneurs **15 Hours**

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

UNIT III Corporate Entrepreneurship **14 Hours**

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

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

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

UNIT V Entrepreneurship Development and Government Role **14 Hours**

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

Total : 72 Hours

Text Books:

3. Vasanth Desai " Dynamics of Entrepreneurial Development and Management Himalaya Publishing House,2009.
4. N.P.Srinivasan&G.P.Gupta," Entrepreneurial Development ", Sultanchand&Sons, 2020

Reference Books:

1. Paul Burns, Bloomsbury Academic ,"Corporate Entrepreneurship And Innovation",2020.
2. UNNI ,"Women Entrepreneurship In Indian Mid Class", Orient Blackswan Pvt. Ltd,2021.
3. S Anil Kumar , S C Poornima , 2 K Abraham , K Jayshree ,"Entrepreneurship Development", New Age Publishers; First edition ,2021, NEW AGE International Pvt Ltd.

Websites:

1. https://www.udemy.com/topic/cyber-security/
2. https://www.coursera.org/courses?query=cybersecurity
3. https://www.simplilearn.com/cyber-security
4. https://onlinecourses.swayam2.ac.in/cec21_ge10/preview
5. https://onlinecourses.swayam2.ac.in/cec20_lb06/preview

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	1	2	-	-	-	2	2	3	-	-	-	3	-
CO2	-	-	-	3	2	-	3	-	-	3	2	3	-	-	-	3	-
CO3	-	-	-	2	2	3	-	-	-	2	3	2	-	-	-	3	-
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	-	3	-
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	3	-
AVG	3	-	2.6	2.33	1.6	2	2.5	2.5	-	2.4	2.4	2.66	-	-	-	3	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

IT Service Management – Practical

3H-2C

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

Prerequisite:

Not Required

COURSE OBJECTIVES (CO):

The goal of this course is for students to:

- To understand Software Engineering Lifecycle Models
- To Perform software requirements analysis
- To gain knowledge of the System Analysis and Design concepts using UML.
- To understand software testing and maintenance approaches
- To work on project management scheduling using DevOps

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Apply project management concepts and techniques to an IT project.	Apply
CO2	Evaluate project management approaches as well as cost and schedule estimation strategies.	Analyze
CO3	Apply project estimation and evaluation techniques to real world problem	Apply
CO4	Apply Key project management system techniques	Apply
CO5	Apply project management concepts through working in a group as team leader	Apply

LIST OF EXPERIMENTS:

1. Identify a software system that needs to be developed.
2. Document the Software Requirements Specification (SRS) for the identified system.
3. Identify use cases and develop the Use Case model.
4. Identify the conceptual classes and develop a Domain Model and also derive a Class Diagram from that.
5. Using the identified scenarios, find the interaction between objects and represent them using UML Sequence and Collaboration Diagrams
6. Draw relevant State Chart and Activity Diagrams for the same system.
7. Implement the system as per the detailed design
8. Test the software system for all the scenarios identified as per the usecase diagram
9. Improve the reusability and maintainability of the software system by applying appropriate design patterns.
10. Implement the modified system and test it for various scenarios.

Total : 36 Hours

Text Books:

1. Carlo Ghezzi, Mehdi Jazayeri, Dino Mandrioli, Fundamentals of Software Engineering, 2nd edition, PHI Learning Pvt. Ltd., 2010.
2. Craig Larman, Applying UML and Patterns, 3rd ed, Pearson Education, 2005.

Reference Books:

1. Len Bass, Ingo Weber and Liming Zhu, "DevOps: A Software Architect's Perspective", Pearson Education, 2016
2. Rajib Mall, Fundamentals of Software Engineering, 3rd edition, PHI Learning Pvt. Ltd., 2009.
3. Stephen Schach, Object-Oriented and Classical Software Engineering, 8th ed, McGraw-Hill, 2010.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	2	-	-	2	2	-	-	-	3	-	-	3	-
CO2	3	-	3	3	-	-	-		1	1	-	-	-	-	2	3	-
CO3	2	-	-	2	2	-	-	2	-	-	-	-	2	-	-	3	-
CO4	1	-	3	3	3	-	-	-	-	-	1	-	-	-	-	3	-
CO5	1	-	2	2	2	1	-	-	-	-	-	-	2	-	3	3	-
AVG	**2**	-	**2.5**	**2.5**	**2.5**	**1**	-	**2**	**1.5**	**1**	**1**	-	**2.55**	-	**2.5**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Introduction to AI and Machine Learning – Practical

3H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To study the concepts of artificial intelligence
- To learn the methods of solving problems using artificial intelligence
- To introduce the concepts of knowledge reasoning and planning
- To understand the basics of supervised and unsupervised machine learning
- To learn the concepts of machine learning applications

Course Outcomes (COs):

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

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

List of Programs

1. Implementation of AI algorithm.
2. Implementation of Minimax algorithm.
3. Implementation of Backtracking search.
4. Implementation of Logistic Regression.
5. Implementation of classification using SVM.
6. Implementation of Random Forest.

Total : 36 Hours

Text Books

1. Stuart Russell and Peter Norvig., "Artificial Intelligence – A Modern Approach", Fourth Edition, Pearson, 2020.

2. Ric, E., Knight, K and Shankar, B. 2009. Artificial Intelligence, 3rd edition, Tata McGraw Hill.

3. Mehryar Mohri, Afshin Rostamizadeh, Ameet Talwalkar Foundations of Machine Learning, MIT Press, 2012.

Web References:

1. http://www.myreaders.info/html/artificial_intelligence.html
2. www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_tutorial.pdf

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	-	2	-	-	2	2	-	-	-	3	-	-	3	-
CO2	3	-	3	3	-	-	-	-	1	1	-	-	-	-	2	3	-
CO3	2	-	-	2	2	-	-	2	-	-	-	-	2	-	-	3	-
CO4	1	-	3	3	3	-	-	-	-	-	1	-	-	-	-	3	-
CO5	1	-	2	2	2	1	-	-	-	-	-	-	2	-	3	3	-
AVG	**2**	**-**	**2.5**	**2.5**	**2.5**	**1**	**-**	**2**	**1.5**	**1**	**1**	**-**	**2.33**	**-**	**2.5**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Deep Learning - Practical

3H-2C

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

End Semester Exam: 3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To present the mathematical, statistical and computational challenges of building neural networks
- To study the concepts of deep learning
- To enable the students to know deep learning techniques to support real-time

Course Outcomes (COs):

COs	Course Outcomes (COs)	Blooms Level
CO1	Explain basics of mathematical foundation that will help the learner to understand the concepts of Deep Learning.	Understand
CO2	Apply models of deep learning	Apply
CO3	Design and implement various deep supervised learning architectures for text & image data.	Apply
CO4	Design and implement various deep learning models and architectures.	Apply
CO5	Apply various deep learning techniques to design efficient algorithms for real-world applications.	Apply

List of Programs

1. Build a deep neural network model start with linear regression using a single variable.
2. Build a deep neural network model start with linear regression using multiple variables.
3. Write a program for Time-Series Forecasting with the LSTM Model.
4. Build a feed forward neural network for prediction of logic gates.
5. Write a program to implement deep learning Techniques for image segmentation.
6. Write a program for object detection using image labeling tools.
7. Write a program to predict a caption for a sample image using LSTM.
8. Write a program for character recognition using CNN.
9. Write a program to detect Dog image using YOLO Algorithm.
10. Write a program to develop Autoencoders using MNIST Handwritten Digits.

Total : 36 Hours

Text Books:

4. Nikhil Buduma, “Fundamentals of Deep Learning: Designing Next-Generation Machine Intelligence Algorithm”, O’Reilly, 2017.
5. Ian Goodfellow, YoshuaBengio and Aaron Courville, “Deep Learning”, MIT Press, 2016.
6. Nikhil Ketkar, “Deep Learning with Python: A Hands-on Introduction”, Apress, 2017.

Reference Books:

3. Deep Learning: Methods and Applications Deng & Yu Now Publishers 1st 2013 AurélienGéron,
4. “Hands-On Machine Learning with Scikit- Learn and TensorFlow”, O’Reilly, 2017.

Websites

4. https://onlinecourses.nptel.ac.in/noc20_cs92/
5. https://hadoop.apache.org
6. https://data-flair.training/blogs/apache-hive-tutorial/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	2	2	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	-	-	2	1	-	-	-	2	-	-	-	-	-	-	3	-
CO3	3	-	2	1	-	1	-	-	-	-	-	-	-	1	-	3	-
CO4	3	-	3	1	2	3	-	-	-	-	1	-	-	-	1	3	-
CO5	2	1	1	-	2	3	-	-	-	-	-	-	-	-	-	3	-
AVG	**2.8**	**1**	**2**	**1.5**	**1.75**	**2.33**	**-**	**-**	**1.5**	**-**	**1**	**-**	**-**	**1**	**1**	**3**	-
1 – Low, 2 – Medium, 3 – High, ‘-‘ – No Correlation																	

SEMESTER-VI

Data Science- Practical

3H-2C

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

End Semester Exam:3 Hours

Course Objectives (CO):

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

Course Outcomes (COs):

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

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

List of Programs:

1. Python program to display details about the operating system, working directory, files and
2. directories in the current directory, lists the files and all directories, scan and classify them
3. as directories and files.
4. Python program to convert an array to an array of machine values and vice versa.
5. Python program to get information about the file pertaining to the file mode and to get time
6. values with components using local time and gm time.
7. Python program to connect to Google using socket programming.
8. Python program to perform Array operations using Numpy package.
9. Python program to perform Data Manipulation operations using Pandas package.

10. Python program to display multiple types of charts using Matplotlib package.
11. Python program to perform File Operation on Excel Data Set.
12. Python program to implement with Python Sci Kit-Learn & NLTK.
13. Python program to implement with Python NLTK/Spicy/Py NLPI.

Total : 36 Hours

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	2	2	2	-	-	-	1	-	-	-	-	-	-	3	-
CO2	3	2	2	2	1	-	-	-	2	-	-	-	-	-	-	3	-
CO3	3	-	2	1	-	1	-	-	-	-	-	-	-	1	-	3	-
CO4	3	-	3	1	2	3	-	-	-	-	1	-	-	-	1	3	-
CO5	2	1	1	-	2	3	-	-	-	-	-	-	-	-	-	3	-
AVG	**2.8**	**1.5**	**2**	**1.5**	**1.75**	**2.33**	**-**	**-**	**1.5**	**-**	**1**	**-**	**-**	**1**	**1**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VI

Fundamentals of Geographic Information System - Practical

3H-2C

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

End Semester Exam:3 Hours

Prerequisite:

Installation of QGIS, datasets for both Vector and Raster data, Maps.

Course Objectives (CO):

The goal of this course is for students to:

- To illustrate basic ideas and procedures of Geographic Information Systems (GIS)
- To understand principles of data visualization and graphic design, such as color theory, symbolization,
- To explain geographic information science and technology are used in transdisciplinary fields.
- To describe GIS tools to make maps that are useful and successfully communicate the information they are meant to

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain the basic ideas and procedures of Geographic Information Systems (GIS)	Understand
CO2	Implement fundamental principles of data visualization and graphic design, such as color theory, symbolization,	Apply
CO3	Illustrate how geographic information science and technology are used in transdisciplinary fields.	Analyze
CO4	Apply GIS tools to make maps that are useful and successfully communicate the information they are meant to	Apply
CO5	Apply statistical techniques and mathematical ideas to the data that will be utilized for geographic analysis.	Apply

List of Programs

1. Creating and Managing Vector Data: Adding vector layers, setting properties, formatting, calculating line lengths and statistics
2. Exploring and Managing Raster data: Adding raster layers, raster styling and analysis, raster mosaicking and clipping
3. Making a Map, Working with Attributes, Importing Spreadsheets or CSV files Using Plugins, Searching and Downloading OpenStreetMap Data
4. Working with attributes, terrain Data
5. Working with Projections and WMS Data
6. Georeferencing Topo Sheets and Scanned Maps Georeferencing Aerial

Imagery Digitizing Map Data

7. Managing Data Tables and Saptial data Sets: Table joins, spatial joins, points in polygon analysis, performing spatial queries
8. Advanced GIS Operations, Nearest Neighbor Analysis, Sampling Raster Data using Points or Polygons, Interpolating Point Data
9. Advance GIS Operations, Batch Processing using Processing Framework Automating Complex Workflows using Processing Modeler

Total : 36 Hours

Text Books:

5. Principles of Geographic Information Systems- An Introductory Text Book Editors: Otto Huisman and Rolf A. The International Institute of Geoinformation Science and Earth Observation Fourth 2009
6. Principles of Geographic Information Systems P.A Burrough and R.A.McDonnell Oxford University Press Third 1999
7. Fundamentals of Spatial Information Systems, R.Laurini and D. Thompson, Academic Press 1994
8. Fundamentals of Geographic Information Systems Michael N.Demers Wiley Publications Fourth 2009

Reference Books:

1. Introduction to Geographic Information Systems Chang Kang-tsung (Karl), McGrawHill Any above 3rd Edition 2013 7th Edition
3. GIS Fundamentals: A First Text on Geographic Information Systems Paul Bolsatd XanEdu Publishing Inc 5th Edition

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	1	2	-	-	-	2	2	3	-	-	3	3	-
CO2	-	-	-	3	2	-	3	-	-	3	2	3	3	-	-	3	-
CO3	-	3	-	2	2	3	-	-	-	2	3	2	-	3	-	3	-
CO4	-	-	3	-	2	1	-	2	-	2	2	-	-	-	1	3	-
CO5	3	-	2	-	1	2	2	3	-	3	3	-	-	-	-	3	-
AVG	**3**	**3**	**2.6**	**2.33**	**1.6**	**2**	**2.5**	**2.5**	**-**	**2.4**	**2.4**	**2.66**	**3**	**3**	**2**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

24CTU691

SEMESTER-VI

Project

8H-4C

Instruction Hours/week: L: 0 T:0 P: 8 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours

SEMESTER-VII

Internet of Things

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To study the fundamentals about IoT
- To study about IoT Access technologies
- To study the design methodology and different IoT hardware platforms.
- To study the basics of IoT Data Analytics and supporting services.
- To study about various IoT case studies and industrial applications.

Course Outcomes (COs):

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

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

UNIT – I Fundamentals of IoT **14 Hours**

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

UNIT - II IoT Protocols **14 Hours**

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

UNIT - III Design and Development **14 Hours**

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

UNIT IV Data Analytics and Supporting Services **15 Hours**

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

UNIT V Case Studies/Industrial Applications **15 Hours**

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

Total : 72 Hours

TEXT BOOK:

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

Text Books:

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

Reference Books:

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

Websites:

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.org/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	-	-	-	1	2	2	3	2	2	2	-	-	-	3	-
CO2	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3	-
CO3	-	-	-	-	-	-	-	-	-	-	-	3	-	-	-	3	-
CO4	3	2	-	-	-	-	-	-	-	-	-	2	-	-	-	3	-
CO5	2	2	-	-	-	3	2	3	2	3	3	2	-	-	-	3	-
AVG	**2.66**	**2**	-	-	-	**2**	**2**	**2.5**	**2.5**	**2.5**	**2.5**	**2.4**	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VII

J2EE

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives

- Learn the fundamental knowledge about JDBC, RMI, JSP applications.
- The student will learn to apply the concepts of servlet for developing.
- Understand the different type of listeners which is used for servlet programming.
- Understand and apply the concept of JSP program for developing.
- The student will understand and apply the concepts of MVC and Tag libraries.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamentals of JDBC and JSP applications.	Understand
CO2	Apply the concept of Servlet and RMI application using JDBC	Apply
CO3	Understand how to manage console JSP and Java Beans.	Understand
CO4	Understand how to implement MVC, Hibernate and EJP concepts.	Understand
CO5	Apply the concepts of spring and struts.	Apply

UNIT I – J2EE Platform, JDBC **14 Hours**

Introduction to J2EE- Enterprise Architecture Styles – J2EE platform – Introduction to J2EE APIs – Introduction to Containers – JDBC -JDBC Architecture – Processing Queries – Database Exceptional Handling – Types of JDBC Drivers – JDBC API for Database Connectivity – Statement – Prepared statement – Collable statement – ResultSetMetaData.

UNIT II – RMI Servlet **14 Hours**

RMI Overview – Architecture – Stub and Skeleton – Developing and executing RMI Applications – Servlet Introduction – Architecture – Servlet APIs – Servlet Lifecycle – Developing and Deploying Servlets – Session tracking Approaches (URl Rewriting, Hidden Form Fields, Cookies, Session API) – Servlet Collaboration – Servlet with JDBC.

UNIT III- JSP, Java Beans **14 Hours**

Introduction to JSP Basics – JSP Vs Servlet – JSP Architecture – JSP Elements – JSP implement Objects – Including and forwarding from JSP pages – Working with Session and cookie in JSP – Error Handling and Exceptional Handing in JSP - JDBC with JSP – JavaBean Methods – JavaBean Properties – Common JavaBean Packaging.

UNIT IV – MVC Architecture, EJP and Hibernate **15 Hours**

Introduction to MVC – MVC Architecture – Benefits of EJP – Types of EJP – Session Beans – Entity Beans – Message-Driven Beans – Timer Service – Introduction to Hibernate – Need for Hibernate – Features of Hibernate – Exploring Hibernate Architecture – Jar Files of Hibernate – Hibernate Configuration Files – Hibernate Mapping Files – Hibernate Inheritance – Hibernate Annotations.

UNIT V- Spring, Struts **15 Hours**

Introduction of Spring Framework – Spring Architecture – Spring Framework definition – Spring and MVC – Spring Context – Inversion of Control (IoC) in spring – Aspect Oriented Programming in Spring (AOC) - Understanding Struts Framework – Comparision with NVC using RequestDispatcher – Struts flow of Control – Processing Request with Action Objects – Handling Request parameters with Form Beans – Using Property Files.

Total : 72 Hours

Text Books:

1. Java Complete Reference 11th Edition - Herbert Schildt, Oracle Press
2. Java Server Programming For Professionals, Ivan Bayross, Sharanam Shah – Shroff publication
3. Developing Java Servlets – Techmedia
4. JSP Beginner's Guide – Tata McGraw Hill by Gary Bolling, Bharathi Natarajan

Reference Books:

1. Spring and Hibernate, K. Santosh Kumar, - Tata McGraw-Hill
2. Hibernate Made Easy: Simplified Data Persistence with Hibernate and JPA (Java Persistence API) Annotations by Cameron Wallace McKenzie, Kerri Sheehan
3. Spring Framework: A Step by Step Approach for Learning Spring Framework - CreateSpace Independent Publishing Platform

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	1	-	-	1	-	-	-	2	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**	**-**	**2.4**	**3**	**2.25**	**1.25**	**-**	**1.33**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VII

Statistical Computing

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To develop the statistical skills in the areas of sampling and test of hypothesis.
- To understand statistical techniques as powerful tool in scientific computing.
- To enable the students to gain knowledge about test for randomness and run test.
- To make the students to understand the concept of sign test and Wilcoxon Signed rank test.
- To learn chi-square test for independence as well as to understand the concept of quality, process and product control using control chart techniques and sampling inspection plan.

Course Outcomes (COs):

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

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

UNIT I **14 HOURS**

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

UNIT II **14 HOURS**

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

UNIT III **14 HOURS**

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

UNIT IV **15 HOURS**

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

UNIT V **15 HOURS**

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

Total : 72 Hours

Text Books:

1. Gupta S. P., (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.
2. Gupta S. C., (1974), Statistical Quality Control, Khanna Publishing Co, New Delhi.
3. Mahajan 2., (2009), Statistical Quality Control, Dhanpat Rai & Co. (P) Ltd., Educational & Technical Publishers, New Delhi.

Reference Books:

1. Pillai R.S.N., and Bagavathi V., (2002). Statistics, S. Chand & Company Ltd, New Delhi
2. Gupta S. C and Kapoor V. K., (2007), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
3. Montgomery D., (2011), Statistical Quality Control, Wiley India Pvt. Ltd, New Delhi.
4. Leavenworth G., (2015), Statistical Quality Control, Mc - Graw Hill Education Pvt. Ltd., New Delhi.

Websites

1. http://www.ing.unipi.it/lanzetta/stat/Chapter20.pdf
2. https://www.statisticshowto.com/parametric-and-non-parametric-data/
3. http://onlinestatbook.com/2/introduction/inferential.html

CO, PO, PSO Mapping

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

SEMESTER-VII

Internet of Things - Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

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

Course Outcomes (COs)::

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

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

List of Programs

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

Total : 72 Hours

Text Books:

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

REFERENCE BOOKS:

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

Websites:

1. https://github.com/connectIOT/iottoolkit
2. https://www.arduino.cc/
3. http://www.zettajs.org/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	3	-	-	3	-	-	-	-	-	-	-	3	-
CO2	3	-	-	2	2	-	-	-	-	-	-	-	-	-	1	3	-
CO3	2	-	3	2	3	-	-	1	2	-	-	-	-	-	-	3	-
CO4	2	-	2	1	2	-	-	-	1	-	1	-	-	-	-	3	-
CO5	3	-	2	2	1	-	-	-	-	-	-	-	-	-	2	3	-
AVG	**2.4**	**-**	**2.33**	**1.75**	**2.2**	**-**	**-**	**2**	**1.5**	**-**	**1**	**-**	**-**	**-**	**1.5**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VII

J2EE - Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives

- To Understand the In-depth concepts of JEE
- To Understand the in-depth Life cycle of servlets and JSP.
- To Learn how to communicate with databases using Java.
- To Handle Errors and Exceptions in Web Applications
- To Use NetBeans IDE for creating J2EE Applications
- To impart expertise in Web Application Development using J2EE.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the In-depth concepts of JEE	Understand
CO2	Understand the in-depth Life cycle of servlets and JSP.	Understand
CO3	Learn how to communicate with databases using Java.	Learn
CO4	Handle Errors and Exceptions in Web Applications	Analyze
CO5	Use NetBeans IDE for creating J2EE Applications	Apply

List of Programs

1. Create a sign in form in servlets.
2. Write a servlet Program to lock a server.
3. Write a servlet program that returns list of information in table format.
4. Design a counter that counts number of times user has visited the site in current browsing session.
5. Write a program to retrieve cookies information
6. Build a JAVA Bean for opening an applet from JAR file.
7. Write a program to add controls in BEAN.
8. Design a counter in JAVA BEAN.
9. Write a program to stream contents of a file using JSP.
10. Write a program to insert an applet into JSP page.

Total : 72 Hours

Text Books:

1. Jim Keogh. (2018). The Complete Reference J2EE 1st edtion New Delhi: Tata McGraw Hill.
2. Duane, K. Fields., & Mark, A. Kolb. (2017). Web Development with Java Server Pages (1st ed.). Pune: Manning Publications.
3. Rod Johnson. (2017). J2EE Development without EJB 1st edition. New Delhi:Wiley Dream Tech.

Reference Books:

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

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	1	-	-	1	-	-	-	2	-	-	-	-	-	3	-
CO2	3	-	2	3	1	-	-	-	-	-	1	-	-	-	-	3	-
CO3	3	-	3	3	2	1	-	1	-	-	-	-	-	-	-	3	-
CO4	3	-	3	3	3	1	-	1	-	-	1	-	-	-	-	3	-
CO5	3	-	3	3	3	2	-	2	-	-	-	-	-	-	-	3	-
AVG	**3**	**-**	**2.4**	**3**	**2.25**	**1.25**	**-**	**1.33**	**-**	**2**	**1**	**-**	**-**	**-**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - A

MongoDB

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To provide students the knowledge and skills to master the NoSQL database mongoDB.
- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB and replication and sharding in MongoDB

Course Outcomes (COs):

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

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

UNIT I - GETTING STARTED **14 HOURS**

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

UNIT II - APPLICATION DEVELOPMENT **15 HOURS**

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

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

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

UNIT IV – REPLICATION **14 HOURS**

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

UNIT V - DEPLOYMENT AND ADMINISTRATION **14 HOURS**

Deployment – Monitoring and diagnostics – Maintenance – Performance troubleshooting

Total : 72 Hours

Text Books:

1. Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.
2. Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O‟Reilly Media Inc.
3. Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd

Reference Books:

1. Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O‟Reilly Media Inc.
2. David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
3. Shakuntala Gupta Edward. 2016. Practical Mongo DB , 2nd edition, Apress Publications, 2016, ISBN 1484206487

Websites

1. http://www.mongodb.org/about/production-deployments/
2. http://docs.mongodb.org/ecosystem/drivers/
3. http://www.mongodb.org/about/applications/
4. http://www.mongodb.org/
5. https://nptel.ac.in/courses/106106156/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	1	3	1	3	1	-	3	3	-	-	-	3	-
CO2	3	-	1	-	2	1	-	2	1	-	-	3	-	2	-	3	-
CO3	-	-	-	-	-	2	-	-	3	-	-	3	-	-	-	3	-
CO4	2	-	3	-	2	3	1	-	1	-	-	2	3	2	-	3	-
CO5	3	-	1	-	-	1	2	-	3	-	2	3	3	-	-	3	-
AVG	**2.75**	**-**	**1.66**	**-**	**1.66**	**2**	**1.33**	**2.5**	**1.8**	**-**	**2.5**	**2.8**	**3**	**2**	**-**	**3**	**-**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - A

Data Visualization

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objective

The goal of this course is for students to:

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc
- To use Tableau's visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset.
- To use data visualizations, dashboards, and Tableau Stories to support relevant communication for diverse audiences.

Course Outcomes (COs):

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

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

UNIT I R FUNDAMENTALS **14 HOURS**

Introduction to R: Usage of R – Working with R – Packages. Creating a dataset: Understanding datasets – Data structures – Data input – Annotating datasets..

UNIT II DATA MANAGEMENT **15 HOURS**

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

UNIT III GRAPHS AND STATISTICS 14 HOURS

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

UNIT IV LINEAR REGRESSION 14 HOURS

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

UNIT V INTERMEDIATE AND ADVANCED GRAPHICS 15 HOURS

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

Total : 72 Hours

Text Books:

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

Reference Books:

1. Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.
2. Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014
3. Nathan Yau, "Data Points: Visualization that means something", Wiley, 2013.

Websites

1. https://www.tableau.com/learn/articles/data-visualization
2. https://www.ibm.com/in-en/topics/data-visualization
3. https://www.geeksforgeeks.org/data-visualization-with-python/
4. https://www.freecodecamp.org/news/d3js-tutorial-data-visualization-for-beginners/
5. https://www.dataversity.net/demystifying-advanced-data-visualization/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	2	3	2	-	-	3	3	-	-	2	2	-	-	2	3	3
CO2	2	3	-	2	-	-	3	3	-	3	3	-	2	-	2	3	3
CO3	-	-	-	-	-	-	2	-	-	3	3	-	-	-	-	3	3
CO4	3	2	3	2	-	-	3	-	-	2	3	-	2	-	-	3	3
CO5	3	-	2	3	-	-	2	-	-	3	2	2	-	-	-	3	3
AVG	2.75	2.33	2.66	2.25	-	-	2.6	3	-	2.75	2.6	2	2	-	2	3	3
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - A

Organizational Behavior

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To understand the basic concepts of organizational behavior.
- To analyze the individual behavior traits required for performing as an individual or group.
- To obtain the perceiving skills to judge the situation and communicate the thoughts and ideas.
- To understand how to perform in group and team and how to manage the power, politics and conflict.
- To recognize the importance of organizational culture and organizational change.

Course Outcomes (COs):

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

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

UNIT I: Organization Behavior : Introduction **14 HOURS**

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

UNIT II : Behavior and Personality **14 HOURS**

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

UNIT III: Perception **14 HOURS**

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

UNIT IV: Group and Stress Management **15 HOURS**

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

UNIT V: Organization Culture and Change **15 HOURS**

Organizational culture- Characteristics of Culture- Types of Culture – Creating and Maintaining an Organizational Culture. Organizational change – Meaning - Forces for Change - Factors in Organizational Change - Resistance to change- Overcoming resistance to change.

Total : 72 Hours

Text Books:

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

Reference Books:

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

Websites

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

.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	-	-	3	-	1	2	3	-	3	-	2	-	-	-	-	-	3
CO2	-	-	-	2	2	3	-	-	2	3	3	-	2	-	-	-	3
CO3	3	-	-	-	2	-	-	-	2	3	3	-	3	-	-	-	3
CO4	3	-	3	2	1	-	3	-	-	2	-	-	3	-	-	-	3
CO5	3	-	2	3	-	2	2	-	-	3	-	-	-	-	-	-	3
AVG	**3**	-	**2.66**	**2.33**	**1.5**	**2.33**	**2.66**	-	**2.33**	**1.75**	**2.33**	-	**2.33**	-	-	-	**3**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - A

MongoDB - Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To Write MongoDB programs from JavaScript shell.
- To define, compare and use of MongoDB with other RDBMS
- To explain the detailed architecture, define objects, load data, query data and performance tune of MongoDB
- To perform query optimization in MongoDB and replication and sharing in MongoDB
- To Know the fundamentals of MongoDB configuration and backup methods, monitoring, and operational strategies.

Course Outcomes (COs):

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

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

List of Programs

Structure of 'restaurants' collection :

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

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

5. Write a MongoDB query to find the restaurant Id, name, address and geographical location for those restaurants where 2nd element of coord array contains a value which is more than 42 and upto 52
6. Write a MongoDB query
    a. to arrange the name of the restaurants in descending along with all the columns.
    b. to arranged the name of the cuisine in ascending order and for that same cuisine borough should be in descending order.
7. Write a MongoDB query to know whether all the addresses contains the street or not.
8. Write a MongoDB query which will select all documents in the restaurants collection where the coord field value is Double.
9. Write a MongoDB query which will select the restaurant Id, name and grades for those restaurants which returns 0 as a remainder after dividing the score by 7.
10. Write a MongoDB query to find the restaurant name, borough, longitude and attitude and cuisine for those restaurants which contains 'mon' as three letters somewhere in its name.

Total : 72 Hours

Text Books:

1. Kyle Banker. (2012). MongoDB in Action. Manning Publications Co.
2. Rick Copeland. (2013). MongoDB Applied Design Patterns, 1st Edition, O‟Reilly Media Inc.
3. Gautam Rege, (2012). Ruby and MongoDB Web Development Beginner's Guide. Packt Publishing Ltd

Reference Books:

1. Mike Wilson.. (2013). Building Node Applications with MongoDB and Backbone, O‟Reilly Media Inc.
2. David Hows. (2009). The definitive guide to MongoDB, 2nd edition, Apress Publication, 8132230485
3. Shakuntala Gupta Edward. 2016. Practical Mongo DB , 2nd edition, Apress Publications, 2016, ISBN 1484206487

Websites

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	-	-	1	3	-	3	1	2	3	3	-	-	-	3	-
CO2	3	-	1	2	2	1	-	2	1	-	-	3	-	2	-	3	-
CO3	-	-	-	-	-	2	-	-	3	-	-	3	-	-	-	3	-
CO4	2	-	3	1	2	3	-	-	1	-	-	2	-	2	-	3	-
CO5	3	-	1	-	-	1	-	-	3	2	2	3	-	-	-	3	-
AVG	**2.75**	-	**1.66**	**1.5**	**1.66**	**2**	-	**2.5**	**1.8**	**2**	**2.5**	**2.8**	-	**2**	-	**3**	-
1 – Low, 2 – Medium, 3 – High, ‘-‘ – No Correlation																	

SEMESTER-VIII - A

Data Visualization - Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To interpret data plots and understand core data visualization concepts such as correlation, linear relationships, and log scales.
- To explore the relationship between two continuous variables using scatter plots and line plots.
- To translate and present data and data correlations in a simple way, data analysts use a wide range of techniques — charts, diagrams, maps, etc
- To use Tableau's visualization tools to conduct data analysis, especially exploration of an unfamiliar dataset.
- To use data visualizations, dashboards, and Tableau Stories to support relevant communication for diverse audiences.

Course Outcomes (COs):

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

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

List of Programs

1. Exploring Data Visualization tools
2. Data Mapping
3. Drawing Graphs
4. Creating Scatter Plot Maps
5. Construct new data set by incorporating various data structures for importing the data set

6. Implement the data management operations like sort, merge, subset and aggregate
7. Drawing Charts
8. Visualize the statistics results using descriptive statistics method
9. Predict the result of new data using the regression methods
10. Experiment the different functions in ggplot2 to visualize the results

Total : 72 Hours

Text Books:

1. E. Tufte, The Visual Display of Quantitative Information, Graphics Press. 2nd Edition, 2001
2. Alexandru C Telea, Data Visualization: Principles And Practice, 2nd Edition, 2014

Reference Books:

1. Wang Kaining, Infographic & Data Visualizations, sew Edition. 2013
2. Andy Krik, Data Visualisation : A Handbook for Data Driven Design, 1st Edition, 2016

Websites

1. https://www.tableau.com/learn/articles/data-visualization
2. https://www.ibm.com/in-en/topics/data-visualization
3. https://www.geeksforgeeks.org/data-visualization-with-python/
4. https://www.freecodecamp.org/news/d3js-tutorial-data-visualization-for-beginners/
5. https://www.dataversity.net/demystifying-advanced-data-visualization/

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	-	3	2	-	-	3	3	-	-	2	2	-	-	2	3	-
CO2	2	-	-	2	-	-	3	3	-	3	3	-	2	-	2	3	-
CO3	-	-	-	-	-	-	2	-	-	3	3	-	-	-	-	3	-
CO4	3	-	3	2	-	-	3	-	-	2	3	-	2	-	-	3	-
CO5	3	-	2	3	-	-	2	-	-	3	2	2	-	-	-	3	-
AVG	**2.75**	-	**2.66**	**2.25**	-	-	**2.6**	**3**	-	**2.75**	**2.6**	**2**	**2**	-	**2**	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - B

Research Methodology and IPR

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

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

Course Outcomes (COs):

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

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

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

Objectives and motivation of research - Types of research - Research approaches – Significanceof research -Research methods verses methodology - Research and scientific method - Importance of research methodology - Research process - Approaches of investigation of solutions for research problem - data collection - analysis - interpretation - necessary instrumentations- Criteria of good research. Defining the research problem: Definition of research problem - Problem formulation - Necessity of defining the problem - Technique involved in defining a problem.

UNIT—II : LITERATURE SURVEY AND DATA COLLECTION **14 HOURS**

Importance of literature survey - Sources of information - Assessment of quality of journals and articles -Information through interne. Effective literature studies approaches - analysis - plagiarism - and research ethics. Data - Preparing - Exploring - examining and displaying.

UNIT—III: RESEARCH DESIGN AND ANALYSIS **14 HOURS**

Meaning of research design - Need of research design - Different research designs - Basic principles of experimental design - Developing a research plan - Design of experimental set-up - Use of standards and codes. Overview of Multivariate analysis - Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT-IV: INTELLECTUAL PROPERTY RIGHTS (IPR) **15 HOURS**

Nature of Intellectual Property: Patents - Designs - Trade and Copyright. Process of Patenting and Development: technological research - innovation - patenting - development. Role of WIPO and WTO in IPR establishments - Right of Property - Common rules of IPR practices - Types and Features of IPR Agreement - Trademark - Functions of UNESCO in IPR maintenance.

UNIT-V: PATENT RIGHTS (PR) **15 HOURS**

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System - IPR of Biological Systems - Computer Software etc. Traditional knowledge Case Studies - IPR and IITs. Licenses - Licensing of related patents - patent agents - Registration of patent agents.

Total : 72 Hours

Text Books:

1. Peter S. Menell ,Mark A. Lemley, Robert P. Merges, (2021) "Intellectual Property in the New Technological"Vol. I Perspectives.
2. Laura R. Ford, (2021), "The Intellectual Property of Nations: Sociological and Historical Perspectives on aModern Legal Institution Paperback.
3. R. Ganesan, (2011) "Research Methodology for Engineers", MJP Publishers, Chennai, 2011.

Reference Books:

1. RatanKhananabis and SuvasisSaha, (2015) "Research Methodology", Universities Press, Hyderabad.
2. Cooper Donald R, Schindler Pamela S and Sharma JK,(2012) "Business Research Methods", Tata McGrawHill Education, 11Edition.
3. Catherine J. Holland, (2007) "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press.
4. David Hunt, Long Nguyen, Matthew Rodgers, (2007) "Patent searching: tools & techniques", Wiley.
5. The Institute of Company Secretaries of India, Statutory body under an Act of parliament,"ProfessionalProgramme Intellectual Property Rights, Law and practice", September 2013.

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	2	3	2	1	2	3	2	3	3	2	-	-	-	-	3
CO2	2	3	3	2	1	2	2	2	2	2	2	3	-	-	-	-	3
CO3	3	3	2	3	2	1	1	3	3	2	2	3	-	-	-	-	3
CO4	2	2	3	2	1	2	3	3	2	3	3	2	-	-	-	-	3
CO5	3	3	3	2	3	2	3	2	2	3	2	3	-	-	-	-	3
AVG	**2.6**	**2.8**	**2.6**	**2.4**	**1.8**	**1.6**	**2.2**	**2.6**	**2.2**	**2.6**	**2.4**	**2.6**	-	-	-	-	**3**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - B

SPSS - Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To compute descriptive statistics
- To calculate parametric and non-parametric tests
- To carryout reliability and normality tests
- To comprehend the application of Bivariate and multivariate analysis
- To compute bivariate and multivariate analysis
- To apply statistical techniques on decision making

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Compute descriptive statistics	Understand
CO2	Calculate parametric and non-parametric tests	Understand
CO3	Carryout reliability and normality tests	Analyze
CO4	Comprehend the application of Bivariate and multivariate analysis	Analyze
CO5	Compute bivariate and multivariate analysis	Understand
CO6	Apply statistical techniques on decision making	Apply

List of Programs

1. Simple Frequency
2. Descriptive Statistics
3. Test of Reliability
4. Test of Normality
5. Independent ‘t’Test
6. Analysis of Variance (ANOVA)
7. Paired ‘t’ Test
8. Chi-square
9. Mann Whitney U Test
10. Kruskal Wallis H Test
11. Wilcoxon Test
12. Correlation
13. Regression
14. Factor Analysis
15. Garrett Ranking

Total : 72 Hours

Text Books:

1. Darren George, Paul Mallery (2016), IBM SPSS Statistics 23 Step by Step, Routledge, New Delhi.
2. Asthana and Braj Bhushan (2017), Statistics for Social Sciences (With SPSS Applications), Prentice Hall of India, New Delhi

Reference Books:

1. Keith Mccormick, Jesus Salcedo, Aaron Poh, SPSS Statistics for Dummies, 3rd Edition, Wiley, New Delhi.
2. Keith McCormick, Jesus Salcedo, Jon Peck, Andrew Wheeler, Jason Verlen (2017), SPSS Statistics for Data Analysis and Visualization, Wiley, New Delhi.
3. Brian C. Cronk (2016), How to Use SPSS®: A Step-By-Step Guide to Analysis and Interpretation, 9th Edition, Routledge, New Delhi

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	2	3	2	1	2	3	2	3	3	2	-	-	-	-	3
CO2	3	3	3	2	1	1	2	2	2	2	2	3	-	-	-	-	3
CO3	3	3	2	3	2	1	1	3	3	2	2	3	-	-	-	-	3
CO4	2	2	3	2	1	1	3	3	2	3	3	2	-	-	-	-	3
CO5	3	3	3	2	3	1	3	2	2	3	2	3	-	-	-	-	3
AVG	**2.8**	**2.8**	**2.6**	**2.4**	**1.8**	**1**	**2.2**	**2.6**	**2.2**	**2.8**	**2.4**	**2.6**	-	-	-	-	**3**
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - B

NS2 Tool- Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To compute descriptive statistics
- To calculate parametric and non-parametric tests
- To carryout reliability and normality tests
- To comprehend the application of Bivariate and multivariate analysis
- To compute bivariate and multivariate analysis
- To apply statistical techniques on decision making

Course Outcomes (COs):

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

COs	Course Outcomes (COs):	Blooms Level
CO1	Explain how discrete-event simulation works	Understand
CO2	Apply this knowledge in practice to simulate modern computer networks	Understand
CO3	Evaluate and visualize the obtained results.	Analyze
CO4	Comprehend the application of Bivariate and multivariate analysis	Analyze
CO5	Compute bivariate and multivariate analysis	Understand
CO6	Apply statistical techniques on decision making	Apply

List of Programs:

1. Ethernet LAN protocol. To create Scenario and study the performance of CSMA/CD protocol through simulation
2. Token Bus and Token Ring protocols. To create scenario and study the performance of token bus and token ring protocols through simulation
3. Wireless LAN protocols. To create scenario and study the performance of network with CSMA/CA protocol and compare with CSMA/CD protocols
4. Implementation and study of Stop and Wait protocol
5. Implementation and study of Go back N and Selective Repeat protocols
6. Implementation of Distance Vector Routing algorithm
7. Implementation of Link state routing algorithm

8. Implementation of data encryption and decryption
9. Transfer of files from PC to PC using Windows/ UNIX socket processing

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	2	3	2	1	2	3	2	3	3	2	-	-	-	3	-
CO2	3	3	3	2	1	1	2	2	2	2	2	3	-	-	-	3	-
CO3	3	3	2	3	2	1	1	3	3	2	2	3	-	-	-	3	-
CO4	2	2	3	2	1	1	3	3	2	3	3	2	-	-	-	3	-
CO5	3	3	3	2	3	1	3	2	2	3	2	3	-	-	-	3	-
AVG	**2.8**	**2.8**	**2.6**	**2.4**	**1.8**	**1**	**2.2**	**2.6**	**2.2**	**2.8**	**2.4**	**2.6**	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - B

Data Analytics Tool- Practical

6H-4C

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

End Semester Exam:3 Hours

Prerequisite:

Not Required

Course Objectives (CO):

The goal of this course is for students to:

- To compute descriptive statistics
- To calculate parametric and non-parametric tests
- To carryout reliability and normality tests
- To comprehend the application of Bivariate and multivariate analysis
- To compute bivariate and multivariate analysis
- To apply statistical techniques on decision making

Course Outcomes (COs):

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

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

List of Programs:

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

CO, PO, PSO Mapping

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PO13	PO14	PO15	PSO1	PSO2
CO1	3	3	2	3	2	1	2	3	2	3	3	2	-	-	-	3	-
CO2	3	3	3	2	1	1	2	2	2	2	2	3	-	-	-	3	-
CO3	3	3	2	3	2	1	1	3	3	2	2	3	-	-	-	3	-
CO4	2	2	3	2	1	1	3	3	2	3	3	2	-	-	-	3	-
CO5	3	3	3	2	3	1	3	2	2	3	2	3	-	-	-	3	-
AVG	**2.8**	**2.8**	**2.6**	**2.4**	**1.8**	**1**	**2.2**	**2.6**	**2.2**	**2.8**	**2.4**	**2.6**	-	-	-	**3**	-
1 – Low, 2 – Medium, 3 – High, '-' – No Correlation																	

SEMESTER-VIII - B

Research Project

18H-12C

Instruction Hours/week: L:0 T:0 P:18 **Marks:** Internal**:40** External**:60 T**otal**:100**

End Semester Exam:3 Hours