

BACHELOR OF COMPUTER APPLICATIONS (BCA)

**CHOICE BASED CREDIT SYSTEM (CBCS)
CURRICULUM AND SYLLABUS
REGULAR (2023–2024)**



DEPARTMENT OF COMPUTER APPLICATIONS

**FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT
(FASCM)**

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. Tamilnadu, India

Phone No. 0422-2980011 - 14 Fax No: 0422-2980022

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FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT (FASCM)

UNDER – GRADUATE PROGRAMMES
(REGULAR PROGRAMME)

REGULATIONS (2023)

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FACULTY OF ARTS, SCIENC, COMMERCE AND MANAGEMENT UNDERGRADUATE PROGRAMMES REGULAR MODE REGULATIONS – 2023

The following regulations are effective from the academic year 2023-2024 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 2023-2024 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.	BBA	Business Administration
9.	B.Sc.	Biotechnology
10.	B.Sc.	Microbiology
11.	B.Sc.	Computer Science
12.	B.Sc.	Information Technology
13.	B.Sc.	Computer Technology
14.	B.Sc.	Computer Science (Cognitive Systems)
15.	B.Sc.	Computer Science (Artificial Intelligence and Data Science)
16.	BCA	Computer Applications

1.2 Mode of Study

Full-Time

All programs 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.

1.3 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)

2. DURATION OF THE PROGRAMMES

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

Programme(s)	Year of Study	Min. No. of Semesters	Max. No. of Semesters
B.Sc., B.Com., BCA and BBA	I	2	4
	II	4	8
	III	6	12
	IV	4	16

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

3. CHOICE BASED CREDIT SYSTEM

3.1. All programmes are offered under Choice Based Credit System with a total number of 140 to 142 credits for three years. Additionally, 40 to 42 credits can also be earned on successful completion of fourth year.

3.2. Credit

Credit means the weightage given to each course by the experts of the Board of Studies concerned. A total of 180 to 184 credits are offered for four year programme.

4. STRUCTURE OF THE PROGRAMME

4.1 Tamil or any one of the Indian / Foreign Languages viz, Malayalam, Hindi, Sanskrit, French is offered as an ability enhancement course for Arts, Science, Commerce and Management Programmes. Four 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, Skill Enhancement Courses, Project Work, Ability Enhancement Courses, Value Added Courses (Common to all UG Programmes), Summer Internship, Research Project/Dissertation 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 a minimum of 70 credits for three years and 104 Credits for four years programme in Major Courses.

4.2.2. Minor Courses

Students will have the option to choose courses from disciplinary/interdisciplinary minors and skill-based courses. Students have to earn a minimum of 22 credits for three years and 30 Credits for four years programme in Minor Courses.

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 in the first, second and fourth 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. 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 minimum of 04 credits.

4.2.6. Ability Enhancement Course (AEC)

There are four Ability Enhancement Courses offered during the first four semesters. Four credits are awarded for each course and the examinations will be conducted at the end of each semester. Students have to earn a minimum of 16 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 or second year summer term.

4.2.8. Value Added Courses (VAC)

The students will study four Value Added Courses in the first three semesters of their programme. Two credits are awarded for each course and the examinations will be conducted at the end of each semester. Students have to earn a minimum of 08 Credits in Ability Enhancement Courses. The various Value Added Courses offered are given below:

S.No	Name of the Offering Department	Name of the Course
1.	Biotechnology	Environmental Studies
2.	Commerce	Indian Knowledge System
3.	Biochemistry	Health and Wellness
4.	Computer Science	Cyber Security
5.	Computer Science and Design	Mobile Application Development
6.	Computer Science and Engineering	Internet of Things
7.	Food Technology	Nutrition And Dietetics
		Agricultural Waste And Byproducts Utilization
8.	Electrical and Electronics Engineering	Renewable Energy Resources
9.	Commerce	Yoga for Youth Empowerment

4.2.9. Research Project /Dissertation

The candidates shall undertake the project work in the eighth Semester either in the Department/Industry/Research Institute (National / International). The project report shall be submitted at the end of the eighth semester. Students have to earn a minimum of 04 Credits in Research Project/Dissertation Work.

If the candidate undertakes the project work outside the Department, the faculty concerned within the Department shall be the Supervisor and the teacher/scientist under whom the work is carried out will be the Co-supervisor. The candidate shall bring the attendance certificate from the place where the project work 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. Online Course

Students are encouraged to study the online course from SWAYAM/NPTEL/MOOC in any one of the first seven semesters for which examination shall be conducted at the end of the course by the respective external agencies, if any. The student can register to the courses which are approved by the Department. The student shall produce a Pass Certificate from the respective agencies. The credit(s) earned by the students will be transferred to the concerned course in the mark statement.

6. Extra Curricular Activities

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

- NSS
- NCC
- Sports / Mass drill

- YRC
- Club activities
- Other Co-curricular and 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 on the following parameters.

- 75% weightage for active participation in Extra Curricular Activities in / out of the KAHE.
- 25% weightage for Exemplary Awards/Honours/Prizes secured.

6.1 Marks for Co-curricular and 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.

7. 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.

8. MAXIMUM MARKS

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).

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

9. a. 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 12 of this regulation.

b. ONLINE COURSE COORDINATOR

To help students in planning their online courses and for general advice 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 advise the students regarding the online courses and monitor their participation.

10. 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 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.

11. 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.

12. REQUIREMENTS TO APPEAR FOR THE END SEMESTER EXAMINATION

a. Ideally, 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 attend at least 75% of the classes and the conduct of the candidate has been satisfactory during the course.

b. A candidate who has secured attendance between 65% and 74% (both included), due to medical reasons (Hospitalization / Accident / Specific Illness) or due to participation in University / District / State / National / International level sports or due to participation in Seminar / Conference / Workshop / Training Programme / Voluntary Service / Startup Activity / Extension activities or similar programmes with prior permission from the Registrar 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 to condone the shortage of attendance. 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 pay the prescribed condonation fee to the KAHE.

c. However, a candidate who has secured attendance less than 65% in the current semester due to any reason shall not be permitted to appear for the current semester examinations. But he/she will be permitted to appear for his/her supplementary examinations, if any and he/she has to re-do the same semester with the approval of the Dean, Students Affairs and Registrar.

13. PROCEDURE FOR AWARDING MARKS FOR INTERNAL ASSESSMENT

13.1 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 class, the test marks and the record of class work (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.

13.2 Continuous Internal Assessment (CIA): The performance of students in each course will be continuously assessed by the respective faculty. The Retest will be conducted and considered based on the requirements and recommendations by the Head of the Department. The guidelines 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 (1 ½ units- Unit I and II)	8
5.	Test – II (1 ½ units Unit II and III)	8
6.	Test III (2 units Unit IV and V)	9
Continuous Internal Assessment: Total		40

Practical Courses

S. No.	Category	Maximum Marks
1.	Attendance	5
2.	Observation work	5
3.	Record work	5
4.	Model Examination	20
5.	<i>Viva – voce</i> [Comprehensive]*	5
Continuous Internal Assessment: 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.

13.3 Portions for Test Question Paper

Portions for Internal Test – I : First 1 ½ Units (Unit I and II)

Portions for Internal Test – II : Second 1 ½ Units (Unit II and III)

Portions for Internal Test – III : Two units (Unit IV and V)

13.4 Pattern of Test Question Paper

Instruction	Remarks
Maximum Marks	50 marks
Duration	2 Hours
Part – A	Objective type (20 x1=20)
Part - B	Short Answer Type (3 x2 = 6)
Part - C	3 Eight mark questions ‘either – or’ choice (3 x 8 = 24 Marks)

13.5 Attendance

Marks Distribution 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

14. ESE EXAMINATIONS

14.1 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 60 marks.

Pattern of ESE Question Paper:

Instruction	Remarks
Maximum Marks	60 marks for ESE.
Duration	3 hours (½ Hr for Part – A Online & 2 ½ Hours for Part – B and C)
Part - A	20 Questions of 1 mark each (20 * 1 = 20 Marks) Question No. 1 to 20 Online Multiple Choice Questions
Part- B	5 Questions of 2 marks each (5 * 2 = 10 Marks) Covering all the five units of the syllabus Question No. 21 to 25
Part- C	5 six marks Questions of 6 marks each (5 * 6 = 30 Marks.) Question No. 26 to 30 will be 'either-or' type, covering all five units of the syllabus; i.e., (Question No. 26: Unit - I, either 26 (a) or 26 (b), Question No. 27: Unit - II, either 27 (a) or 27 (b), Question No. 28: Unit - III, either 28 (a) or 28 (b), Question No. 29: Unit - IV, either 29 (a) or 29 (b), Question No. 30: Unit - V, either 30 (a) or 30 (b))

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

Experiments	: 40 Marks
Record	: 10 Marks
<i>Viva-voce</i>	: 10 Marks
Total	: 60 Marks

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.

14.3. Evaluation of Project Work

14.3.1 The project work shall carry a maximum of 100 marks. (CIA - 40 and ESE – 60*)

*Combined valuation of Internal and External Examiners.

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

14.3.3 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.

14.3.4 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. For this purpose, the same Internal and External examiner shall evaluate the resubmitted report in the subsequent semester.

9.3.5 Copy of the approved project report after the successful completion of *viva-voce* examination shall be kept in the KAHE library.

15. PASSING REQUIREMENTS

15.1 Passing minimum: There is a passing minimum, 20 marks out of 40 marks for CIA and the passing minimum is 30 marks out of 60 marks in ESE. The overall passing in each course is 50 out of 100 marks (Sum of the marks in CIA and ESE examination).

15.2 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).

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

15.4 CIA marks (if it is pass) obtained by the candidate in the first appearance 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.

15.5 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.

16. IMPROVEMENT OF MARKS IN THE COURSES ALREADY PASSED

Candidates desirous to improve the marks secured in a passed course 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.

17. 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

18. GRADE SHEET

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

- i. The list of courses enrolled during the semester and the grade scored.
- ii. The Grade Point Average (**GPA**) for the semester and

- iii. The Cumulative Grade Point Average (**CGPA**) of all courses enrolled from first semester onwards.
- iv. Remark on Extension Activities (only in the 6th Semester Grade Sheet)

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

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

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

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

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

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

where,

- C_i is the credit fixed for the course 'i' in any semester
- GP_i 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**.

19. REVALUATION

A candidate can apply for revaluation or re-totalling 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. For the same, 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 theory courses.

20. TRANSPARENCY AND GRIEVANCE COMMITTEE

Revaluation and Retotaling are allowed on representation (clause 19). 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; the marks awarded by the External examiner will be final. The student has to pay the prescribed fee for the same.

21. ELIGIBILITY FOR THE AWARD OF THE DEGREE

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

- 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 class 2.1.
- Not any disciplinary action pending against him / her.
- The award of the degree must be approved by the Board of Management.

22. CLASSIFICATION OF THE DEGREE AWARDED

22.1 Candidate who qualifies for the award of the Degree (vide clause 21) having passed the examination in all the courses in his / her 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**.

22.2 Candidate who qualifies for the award of the Degree (vide clause 21) 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**.

22.3 All other candidates (not covered in clauses 22.1 and 22.2) who qualify for the award of the degree (vide Clause 21) shall be declared to have passed the examination in the **Second Class**.

23. PROVISION FOR WITHDRAWAL FROM END-SEMESTER EXAMINATION

- 23.1** Based on valid reasons and on prior application the Candidate may be granted permission to withdraw from appearing for the examination of any one course or consecutive examinations of more than one course in a semester examination.
- 23.2** Such withdrawal shall be permitted only once during the entire period of study of the degree programme.
- 23.3** Withdrawal of application is valid only if it is made within 10 days prior to the commencement of the examination in that course or courses and recommended by the HoD / Dean concerned and approved by the Registrar.
- 23.3.1** Notwithstanding the requirement of mandatory TEN days notice, applications for withdrawal for special cases under extraordinary conditions will be considered on the merit of the case.
- 23.4** Withdrawal shall not be construed as an appearance for the eligibility of a candidate for First Class with Distinction. This provision is not applicable to those who seek withdrawal during **VI/VIII semester**.
- 23.5** Withdrawal from the End semester examination is **NOT** applicable to arrear courses of previous semesters.
- 23.6** The candidate shall reappear for the withdrawn courses during the examination conducted in the subsequent semester.

24. PROVISION FOR AUTHORISED BREAK OF STUDY

- 24.1** Break of Study shall be granted only once for valid reasons for a maximum of one year during the entire period of study of the degree programme. However, in extraordinary situation the candidate may apply for additional break of study not exceeding another one year by paying prescribed fee for break of study. If a candidate intends to temporarily discontinue the programme in the middle of the semester for valid reasons, and to rejoin the programme in a subsequent year, permission may be granted based on the merits of the case provided he / she applies to the Registrar, but not later than the last date for registering for the end semester examination of the semester, through the Head of the Department stating the reasons therefore and the probable date of rejoining the programme.
- 24.2** The candidate thus permitted to rejoin the Programme after the break shall be governed by the Curriculum and Regulations in force at the time of rejoining. Such candidates may have to do additional courses as per the Regulations in force at that period of time.

- 24.3** The authorized break of study (for a maximum of one year) will not be counted for the duration specified for passing all the courses for the purpose of classification. (vide clause 22). However, additional break of study granted will be counted for the purpose of classification.
- 24.4** The total period for completion of the Programme reckoned from, the commencement of the first semester to which the candidate was admitted shall not exceed the maximum period specified in clause 2.1 irrespective of the period of break of study (vide clause 24.1) in order that he/she may be eligible for the award of the degree.
- 24.5** If any student is detained for want of requisite attendance, progress and good conduct, the period spent in that semester shall not be considered as permitted 'Break of Study' or 'Withdrawal' (Clause 23 and 24) is not applicable for this case.

25. RANKING

A candidate who qualifies 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.

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.

29. 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 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.

DEPARTMENT OF COMPUTER APPLICATIONS												
FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT												
UG PROGRAM (CBCS) – Bachelor of Computer Applications												
(2023–2024 Batch and onwards)												
Course Code	Name of the Course	Objectives and out comes		Instruction hours / week			Credits	Maximum Marks			Category	Page. No.
		PEOs	POs	L	T	P		CIA	ESE	Total		
								40	60	100		
SEMESTER I												
23LSU101	Language - I	IV	e,f	4	-	-	4	40	60	100	AEC 1	001
23ENU101	English - I	II	d,i	3	-	-	3	40	60	100	MDC 1	006
23CAU101	Programming in C	I	a,b,c	5	-	-	5	40	60	100	Major 1	008
23CAU102	Numerical Methods	III	g,h	4	-	-	3	40	60	100	Min 1	010
23CAU111	Programming in C – Practical	I	a,b,c	-	-	4	2	40	60	100	Major 2	012
23SEC101	Office Automation - Practical	IV	c,d	-	-	6	3	40	60	100	SEC 1	014
23VAC101	Environmental Studies	II	d,e	2	-	-	2	40	60	100	VAC 1	019
	Activity/Library/Seminar			2	-	-	-	-	-	-		022
Semester Total				20	-	10	22	280	420	700		
SEMESTER II												
23LSU201	Language – II	IV	e,f	4	-	-	4	40	60	100	AEC 2	023
23ENU201	English - II	II	d,i	3	-	-	3	40	60	100	MDC 2	027
23CAU201	Object Oriented Programming	III	a,b	5	-	-	5	40	60	100	Major 3	029
23CAU202	Discrete Structures	I	a,b,c	4	-	-	3	40	60	100	Min 2	031
23CAU211	Object Oriented Programming - Practical	III	a,b	-	-	4	2	40	60	100	Major 4	033
23SEC201	Web Programming - Practical	IV	c,d,e	-	-	6	3	40	60	100	SEC 2	035
23VAC201	Indian Knowledge Systems	V	e	2	-	-	2	40	60	100	VAC 2	037
23VAC202	Yoga for Youth Empowerment	V	e	2	-	-	2	100	-	100	VAC 3	039
Semester Total				20	-	10	24	380	420	800		

SEMESTER III

23LSU301	Language – III	IV	e,f	4	-	-	4	40	60	100	AEC 3	040
23ENU301	English - III	II	d,i	3	-	-	3	40	60	100	MDC 3	043
23CAU301	Relational Database Management System	III	a,b	5	-	-	5	40	60	100	Major 5	045
23CAU302	Data Structures	IV	c,d	4	-	-	4	40	60	100	Major 6	047
23CAU303	Operations Research	III	a,b	4	-	-	3	40	60	100	Min 3	049
23CAU311	Relational Database Management System – Practical	III	a,b	-	-	3	1	40	60	100	Major 7	051
23CAU312	Data Structures - Practical	IV	c,d	-	-	3	1	40	60	100	Major 8	053
23VAC301	Health and Wellness	II	e	2	-	-	2	40	60	100	VAC 3	055
23CAU391	Internship*			-	-	-	2	100		100	Summer Internship	057
	Activity/Library/Seminar			2	-	-	-	-	-	-		058
Semester Total				24	-	6	25	420	480	900		

SEMESTER IV

23LSU401	Language – IV	IV	e,f	4	-	-	4	40	60	100	AEC 4	059
23ENU401	English - IV	II	d,i	3	-	-	3	40	60	100	SEC 3	062
23CAU401	Programming in Python	III	a,h	4	-	-	4	40	60	100	Major 9	064
23CAU402	Operating Systems	I	f	4	-	-	4	40	60	100	Major 10	066
23CAU403	Cyber Security	II	d,e	3	-	-	3	40	60	100	Major 11	068
23CAU404	Probability and Statistics	IV	h	4	-	-	3	40	60	100	Min 4	070
23CAU411	Programming in Python - Practical	III	a,h	-	-	3	1	40	60	100	Major 12	073
23CAU412	Operating Systems - Practical	I	f	-	-	3	1	40	60	100	Major 13	075
	Activity/Library/Seminar			2	-	-	-	-	-	-		077
Semester Total				24	-	6	23	320	480	800		

SEMESTER V

23CAU501	Computer Networks	I	c,h	5	-	-	5	40	60	100	Major 14	078
23CAU502A	PHP Programming	II	e,f	5	-	-	5	40	60	100	Major 15	080
23CAU502B	.Net Programming	III	j,h									082
23CAU503A	Edge Computing	II	a,i	4	-	-	4	40	60	100	Major 16	084
23CAU503B	Cloud Computing	V	e,i									086
23CAU504	Basics of Accounting	I	a,b,c	6	-	-	5	40	60	100	Min 5	088
23CAU511	Computer Networks - Practical	I	c,h	-	-	5	2	40	60	100	Major 17	090
23CAU512A	PHP Programming – Practical	II	e,f	-	-	5	2	40	60	100	Major 18	092
23CAU512B	.Net Programming - Practical	III	j,h									094
23CAU591	Internship*			-	-	-	2	100		100	Summer Internship	096
Semester Total				20		10	25	340	360	700		

SEMSTER VI

23CAU601	Machine Learning	II	d,e	6	-	-	6	40	60	100	Major 19	097
23CAU602A	Block Chain Technology	I	c,h	6	-	-	6	40	60	100	Major 20	099
23CAU602B	Cyber Forensic	I	b,c									101
23CAU603	Entrepreneurship	III	a,b	6	-	-	5	40	60	100	Min 6	103
23CAU611	Machine Learning – Practical	I	b,c	-	-	4	2	40	60	100	Major 21	105
23CAU691	Project			-	-	8	4	40	60	100	Major 22	107

ECA/ NCC/ NSS/ Sports/ General interest et

Good

Semester Total				18	-	12	23	200	300	500		
Grand Total				126		54	142	1940	2460	4400		

SEMESTER VII												
23CAU701	Artificial Intelligence	I	b,c,g	6	-	-	6	40	60	100	Major 23	108
23CAU702	Text Analytics	I	b,c,g	6	-	-	6	40	60	100	Major 24	110
23CAU703	Statistical Computing	I	b,c,g	6	-	-	5	40	60	100	Min 7	112
23CAU711	Artificial Intelligence – Practical	I	b,c,g	-	-	6	3	40	60	100	Major 25	114
23CAU712	Text Analytics – Practical	III	h,j	-	-	6	3	40	60	100	Major 26	116
Semester Total				18	-	12	23	200	300	500		
SEMESTER VIII A												
23CAU801	Data Visualization	I	b,c,g	6	-	-	4	40	60	100	Major 27	118
23CAU802	Advanced Java	I	b,c,g	6	-	-	4	40	60	100	Major 28	120
23CAU803	Organizational Behavior	I	b,c,g	6	-	-	3	40	60	100	Minor 8	122
23CAU811	Data Visualization - Practical	I	b,c,g		-	6	4	40	60	100	Major 29	124
23CAU812	Advanced Java – Practical	I	b,c,g	-	-	6	4	40	60	100	Major30	126
Semester Total				18	0	12	19	200	300	500		
SEMESTER -VIII -B												
23CAU801	Research Methodology and IPR	I	b,c,g	6	-	-	4	40	60	100	Major 27	128
23CAU811	SPSS - Practical	I	b,c,g	-	-	6	3	40	60	100	Minor 8	130
23CAU911	Research Project/Preparation of Research Project	I	b,c,g	-	-	18	12	100	200	300	Major 28	132
Semester Total				6	0	24	19	180	320	500		
Grand Total				150		90	184	2320	3080	5400		

Ability Enhancement Courses (AEC)		
Semester	Course Code	Name of the Course
I	23LSU101	Language – I
II	23LSU201	Language – II
III	23LSU301	Language – III
IV	23LSU401	Language – IV

Multi-Disciplinary Courses (MDC)		
Semester	Course Code	Name of the Course
I	23ENU101	English – I
II	23ENU201	English – II
III	23ENU301	English – III

Major		
Semester	Course Code	Name of the Course
I	23CAU101	Programming in C
	23CAU111	Programming in C – Practical
II	23CAU201	Object Oriented Programming
	23CAU211	Object Oriented Programming - Practical
III	23CAU301	Relational Database Management System
	23CAU302	Data Structures
	23CAU311	Relational Database Management System – Practical
	23CAU312	Data Structures - Practical
IV	23CAU401	Programming in Python
	23CAU402	Operating Systems
	23CAU403	Cyber Security
	23CAU411	Programming in Python - Practical
	23CAU412	Operating Systems - Practical
V	23CAU501	Computer Networks
	23CAU502A	PHP Programming
	23CAU502B	Edge Computing
	23CAU511	Computer Networks - Practical
	23CAU512A	PHP Programming – Practical
VI	23CAU601	Machine Learning
	23CAU602A	Block Chain Technology
	23CAU602B	Cyber Forensic
	23CAU611	Machine Learning – Practical
	23CAU691	Project
VII	23CAU701	Artificial Intelligence
	23CAU702	Text Analytics
	23CAU711	Artificial Intelligence – Practical
	23CAU712	Text Analytics – Practical

VIII A	23CAU801	Data Visualization
	23CAU802	Advanced Java
	23CAU811	Data Visualization -Practical
	23CAU812	Advanced Java – Practical
VIII B	23CAU801	Research Methodology and IPR
	23CAU911	Research Project/Preparation of Research Project

Minor		
Semester	Course Code	Name of the Course
I	23CAU102	Numerical Methods
II	23CAU202	Discrete Structures
III	23CAU303	Operations Research
IV	23CAU404	Probability and Statistics
V	23CAU504	Basics of Accounting
VI	23CAU603	Entrepreneurship
VII	23CAU703	Statistical Computing
VIII A	23CAU803	Organizational Behaviour
VIII B	23CAU811	SPSS - Practical

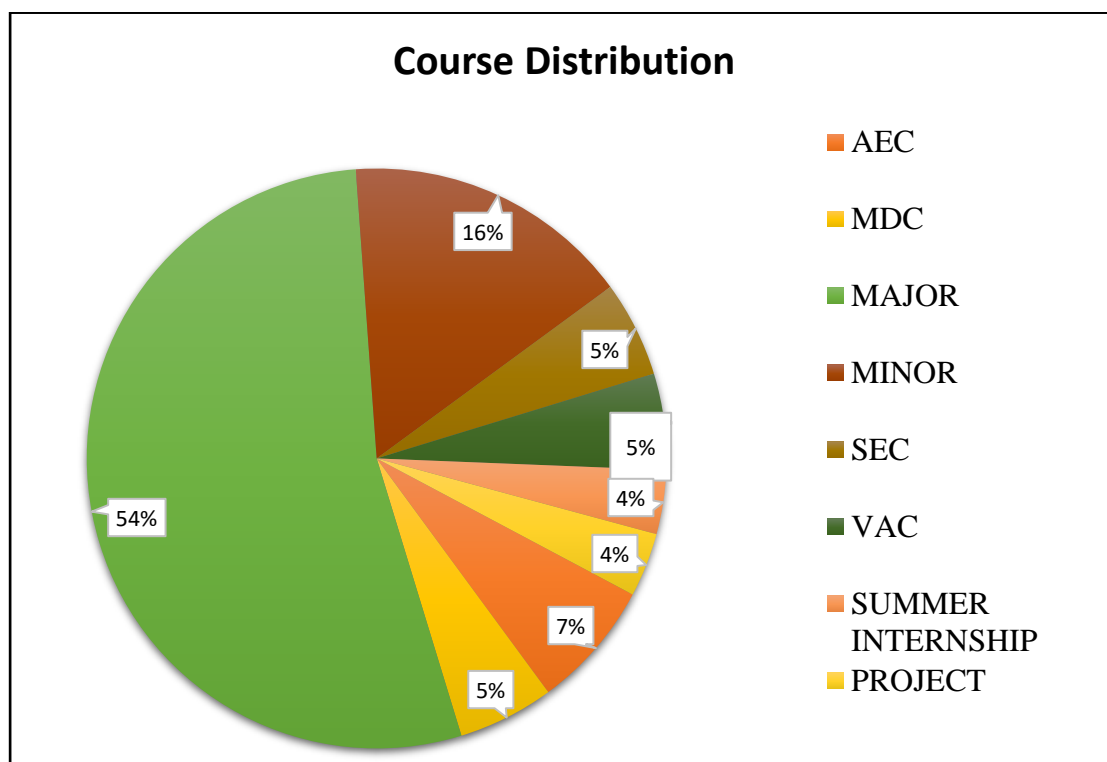
Skill Enhancement Courses (SEC)		
Semester	Course Code	Name of the Course
I	23SEC101	Office Automation – Practical
II	23SEC201	Web Programming – Practical
IV	23ENU401	English – IV

Value Added Courses (VAC)		
Semester	Course Code	Name of the Course
I	23VAC101	Environmental Science
II	23VAC201	Indian Knowledge Systems
II	23VAC202	Yoga for Youth Empowerment
IV	23VAC301	Health and Wellness

Summer Internship		
Semester	Course Code	Name of the Course
III	23CAU391	Summer Internship*
V	23CAU591	Summer Internship*

Course Distribution Table

Category	No of Courses		Total
	Theory	Practical	
AEC	4	0	4
MDC	3	0	3
MAJOR	17	13	30
MINOR	8	1	9
SEC	1	2	3
VAC	3	0	3
SUMMER INTERNSHIP	0	2	2
PROJECT	0	2	2
Total	36	18	54



முதல் பருவம்

பகுதி - I, தமிழ், தாள் 1

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல் வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும், மேம்படுத்துதல்.
- ஆய்வுநோக்கை மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும் பங்கினை உணர்த்துதல்.
- வளர்ந்து வரும் சமூகத்தில் அறஉணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல். அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன்விளைவு

- இந்தியக் குடியரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்.
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத்திறன் பெற்றிருத்தல்

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	M	S	S	M	M	L	M	L	L
CO2	L	M	L	M	S	S	S	M	L	S	L	L
CO3	M	L	L	M	M	M	M	M	L	S	L	L
CO4	L	L	L	M	S	S	S	L	L	M	L	L
CO5	L	L	L	M	M	M	S	S	L	S	L	L

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 - விண்ணின்று பொய்ப்பின், 34 - மனத்துக்கண் மாசிலன் ஆதல்

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

அன்புடைமை - 80 - அன்பின்வழியது

விருந்தோம்பல் - 90 - மோப்பக்குழையும்

இனியவைகூறல் - 95 - பணிவுடையன் இன்சொலன்

செய்நன்றி அறிதல் - 103 - பயன் தூக்கார்

புறங்கூறாமை - 190 - ஏதிலார் குற்றம்

ஒப்புரவு அறிதல் - 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 - நிலலாதவற்றை

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 - 'வார்ஓலிகூந்தலை' - 'சிறப்பின் கண்ணகிதனக்குஎன்' (84-90)

அரங்கேற்று காதை - 'மாமலர்நெடுங்கண்' - 'அகம்மறந்து' (170-175).

மதுரைக்காண்டம் - கொலைக்களக்காதை : 'இருமுதுகுரவர்' - 'எழுந்தனன்யான்' (67-83), 'வினைவிளைகாலம்' - 'கொணர்காங்குஎன்' (148-153)

கட்டுரை காதை - 'கடிபொழில்' - 'இல்சாபம்பட்டனிர்' (138-170)

வழக்குரைக் காதை - 'அல்லவை செய்தார்க்கு' - 'தோற்றான்உயிர்' (82-93)

வஞ்சிக் காண்டம் - நடுகல்காதை - 'மதுரைமுதூர்' - '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)

சொல்லிலக்கணம் - 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 - ஓளவையார்- கொன்றை வேந்தன் (1-50 பாடல்கள்)

காப்பியம் - சூளாமணி-அரசியல்சருக்கம்- 1. நாவினே 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)

சிறிலக்கியங்கள் 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, எப்புவிசனும், வைத்தவர்,
ஈன்றவர்காப்பியம் - கம்பராமாயணம் - சுந்தரகாண்டம்

(தேர்ந்தெடுக்கப்பட்ட பாடல்கள் மட்டும்) வண்மையில்லை- தாய் ஒக்கும்- ஒரு பகல்- எதிர் வரும்- தருவனத்துள்- எண் இலா -சொல் ஒக்கும்- இவ்வண்ணம்- எண் அரு- தடுத்து இமையாமல்- தோள் கண்டார்- மைந்தரை- அந்நகர்- சிவந்த வாய்- ஏய வரங்கள்- நின்மகன்- ஆழிசூழ்- மன்னவன்- பின்னும்- கிள்ளையொடு- எந்தையும்- பஞ்சி ஒளிர்- மயில் உடை- ஆண்டு -மற்றுஇனி-கண்டனன்- வேலையுள்-மண்ணொடும்- வாங்கிய- இங்குஉள- கண்டனென்- பைய பைய- அந்நெறி- குகனொடும்-கூவி-மாக்கூடு- அற்றவன்- ஆள் ஐயா-கார்நின்ற.

கடிதப்பயிற்சி

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

அலகு -5

(08 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

SEMESTER-I
PART II 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

Course Objectives

- To enable the learner to communicate effectively and appropriately in real life situation
- To develop and integrate the use of the four language skills.
- To give basic knowledge on grammar.
- To train students to acquire proficiency in English by reading different genres of literature and learning grammar.
- To identify the meaning of words using context clues.

Course Outcomes

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	Discover the knowledge of interpersonal skills.	Analyze
CO3	Construct and maintain social relationships.	Apply
CO4	Classify communication skills in business environment.	Understand
CO5	Explain communication competency through LSRW skills.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	S	S	S	M	M	L	M	L	L
CO2	M	M	L	S	M	S	S	M	L	M	L	L
CO3	L	L	L	M	S	M	M	M	L	S	L	L
CO4	L	L	L	S	S	S	S	L	L	M	L	L
CO5	L	L	L	S	M	S	S	S	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT I	7 Hours
<p>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</p>	
UNIT II	7 Hours
<p>LISTENING: Principles of Listening Skills SPEAKING: Descriptions READING: Reading Techniques WRITING: Paragraph Writing LITERATURE: Of Friendship by Francis Bacon GRAMMAR: Articles</p>	
UNIT III	7 Hours
<p>LISTENING: Barriers of Listening SPEAKING: Telephone Conversations READING: Reading Comprehension Passages WRITING: Precise Writing LITERATURE: The Umbrella man by Roald Dahl GRAMMAR: Tense</p>	
UNIT IV	7 Hours
<p>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</p>	
UNIT V	8 Hours
<p>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</p>	

Suggested Readings

- 1 1.Wren & Martin, 2008, *High School English Grammar & Composition*, S.Chand & Company Ltd, Board of Editors,
- 2 2. Krashen, Stephen D (1982) *Principles and practice in second language acquisition*. New York: Pergamon Press.

SEMESTER-I
PROGRAMMING IN C

5H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand the concepts and techniques in C Programming.
- To equip and indulge themselves in problem solving using C.
- To understand the working of Decision Making and Control Structures.
- To impart the basic knowledge of Function Structure and Union.
- To know the fundamentals of Pointer and File Management Pointer.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Learn about the Computer fundamentals and the Problem solving	Understand
CO2	Understand the basic concepts of C programming	Understand
CO3	Describe the reason why different decision making and loop constructs are available for iteration in C	Apply
CO4	Demonstrate the concept of User defined functions, Recursions Scope and Lifetime of Variables, Structures and Unions	Analysis
CO5	Demonstrate the concept of User defined functions , Recursions , Scope and Lifetime of Variables, Structures and Unions	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	P11	P12
CO1	S	L	S	M	M	M	S	M	S	L	M	S
CO2	L	M	S	S	M	L	S	L	S	L	L	L
CO3	S	S	L	M	L	M	S	M	S	M	S	S
CO4	L	L	S	M	S	M	S	M	S	M	L	L
CO5	S	S	M	M	M	M	S	M	S	M	M	S

S-Strong; M-Medium; L-Low

UNIT I**12 Hours**

Overview of C: Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants – Operators & 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**12 Hours**

Decision Making and Looping: Decision Making and Branching: 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**12 Hours**

Introduction To Array and String: Arrays Introduction, Declaration of Arrays, Types of Arrays. Character Arrays and Strings: Declaring and Initializing String Variables, Reading Strings from Terminal, Writing Strings to Screen, Arithmetic Operations on Characters, String-handling Functions, Example Programs (with and without using built-in string functions)

UNIT IV**12 Hours**

User-Defined Functions, Structures and Unions: 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- Multi file Programs. Structures and Unions

UNIT V**12 Hours**

Pointers & File Management Pointers: Introduction-Understanding pointers -Accessing the address of a variable Declaration and Initialization of pointer Variable – Accessing a variable through its pointer Chain of pointers Pointer Expressions – Pointer Increments and Scale factor- Pointers and Arrays- Pointers and Strings – Array of pointers – Pointers as Function Arguments Functions returning pointers – Pointers to Functions – Pointers and Structures. File Management in C.

Suggested Readings

- 1 E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- 2 Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.

Websites

- 1 <http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html>
- 2 <https://nptel.ac.in/courses/106/105/106105171>

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

Course Objectives (CO)

- To understand the basic concepts of numerical methods and to develop mathematical skills in the areas of numerical methods
- To understand numerical techniques as powerful tool in scientific computing.
- To provide suitable and effective methods called Numerical Methods, for obtaining approximate representative numerical results of the problems.
- To solve problems in the field of Applied Mathematics, Theoretical Physics and Engineering which requires computing of numerical results using certain raw data.
- To solve complex mathematical problems using only simple arithmetic operations. The approach involves formulation of mathematical models of physical situations that can be solved with arithmetic operations.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Apply Numerical analysis which has enormous application in the field of science	Apply
CO2	Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.	Understand
CO3	Familiar with calculation and interpretation of errors in numerical method.	Understand
CO4	Develop and apply the appropriate numerical techniques for the problem, interpret the results, and assess accuracy.	Apply
CO5	Understand the concept of difference operators, the use of Interpolation, Numerical Differentiation & Integration and numerical solutions of ordinary differential equations and use of Interpolation	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M	S	L	L	M	S	S	M	L	M
CO2	M	L	L	S	M	S	L	S	M	S	M	L
CO3	L	S	M	S	S	M	L	S	M	M	S	M
CO4	L	S	M	M	S	S	S	M	S	S	L	M
CO5	M	M	S	M	M	M	S	M	M	L	M	M

S-Strong; M-Medium; L-Low

UNIT I: 10 Hours

The Solutions of Numerical Algebraic and Transcendental equations: Bisection method -Iteration method- False Position method - Newton's method .

UNIT II: 10 Hours

Solution of Simultaneous Linear algebraic Equation – Gauss elimination method- Gauss Jordan method- Gauss Jacobi method- Gauss Seidel methods.

UNIT III: 10 Hours

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

UNIT IV: 9 Hours

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

UNIT V: 9 Hours

Numerical Solution of Ordinary Differential Equations: Taylor's series - Euler's method –Modified Euler's method - Runge-Kutta methods (fourth order Runge Kutta method only).

Suggested Readings

- 1 Kandasamy P., Dr. Thilagavathy K., and Dr.Gunavathi K.,(2013). Numerical Methods, Published By S.Chand & Company Pvt. Ltd., New Delhi.
- 2 Jain M.K., Iyengar S.R.K., and Jain R.K . (2012). Numerical Methods for Scientific and Engineering Computation, New Age International Publishers, New Delhi.
- 3 Veerarajan T., and Ramachandran T., (2008). Numerical Methods with Programs in C, Tata McGraw-Hill Publishing company limited, New Delhi.
- 4 Bradie B.,(2007) .A Friendly Introduction to Numerical Analysis, Pearson Education,India.

Websites

- 1 <https://youtu.be/tcqsLqlyjmk>
- 2 https://youtu.be/0XcOwBY_Ryw

SEMESTER-I
PROGRAMMING IN C PRACTICAL

4H-2C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To impart writing skill of C programming to the students and solving problems.
- To understand problem statements and identify appropriate solutions.
- To Demonstrate the use of IDE and C Compiler.
- To impart the concepts like looping, array, functions, pointers, file, structure.
- To Develop programs using C Programming Language.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Apply the concept of Control Structures to solve any given problem.	Apply
CO2	Apply the concept of single and multi-dimensional arrays to solve problems related to searching, sorting and matrix operations.	Apply
CO3	Apply the concept of Strings for writing programs related to character array.	Apply
CO4	Write programs using concept of user defined and recursive functions.	Analysis
CO5	Apply concept of structures to write programs.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	M	S	M	S	M	S	S	M	M
CO2	S	M	S	L	M	L	S	L	S	S	L	S
CO3	S	S	S	M	L	M	S	M	S	S	S	M
CO4	S	S	S	M	S	M	S	M	S	S	L	S
CO5	S	S	S	M	M	M	S	M	S	S	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

48 Hours

- 1 Write a C program to find the sum of individual digits of a positive integer.
- 2 Write a C program to find the sum, average for a given set of numbers.
- 3 Write a C program to count the number of Vowels in the given sentence
- 4 Implement a C Program to generate the following series of numbers
 - i. Armstrong numbers between 1 to 100
 - ii. Prime numbers between 1 to 50
- 5 Implement a C Program to display the following
 - i. Floyd's triangle
 - ii. Pascal Triangle
- 6 Implement a C program the following Banking operations using Functions
 - i. Deposit
 - ii. Withdrawal
 - iii. Balance Enquiry
- 7 Implement a C Program using Recursion
 - i. Fibonacci number generation.
 - ii. Factorial
- 8 Generate Student mark sheets using Structures
- 9 Implement a C Program strings with following operations
 - i. Concatenating two strings
 - ii. Reversing the string
 - iii. Finding length of the string
- 10 Perform String operations using Pointers
- 11 Write a C Program to create a File and to display the contents of that file with line numbers.
- 12 Write a C Program to merge two files into a single file.

Suggested Readings

- 1 E. Balaguruswamy, "Programming in ANSI C", 8th Edition, 2019, McGraw Hill Education, ISBN: 978-93-5316-513-0.
- 2 Kernighan B.W and Dennis M. Ritchie, "The C Programming Language", 2nd Edition, 2015, Pearson Education India, ISBN: 978-93-3254-944-9.
- 3 Yashavant P. Kanetkar, "Let Us C", 16th Edition, 2019, BPB Publications, ISBN: 978- 93-8728-449-4.

Websites

- 1 <http://elearning.vtu.ac.in/econtent/courses/video/BS/14CPL16.html>
- 2 <https://nptel.ac.in/courses/106/105/106105171>

SEMESTER-I
OFFICE AUTOMATION - PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

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

Course Outcomes

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	M	M	M	S	M	L	S	M	M
CO2	S	M	S	M	S	L	S	S	S	M	S	S
CO3	M	S	S	M	M	M	S	M	L	S	M	M
CO4	S	S	S	M	S	M	S	M	S	M	S	S
CO5	M	S	S	M	M	M	M	S	S	S	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

72 Hours

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 inches.
 - ii. Use heading "Gandhi Jayanti", font size: 16, font color: red, font face:Arial Black.
 - iii. With first letter "dropped" (use drop cap option) of the first paragraph containing a picture at the right side
 - iv. Use three columns from the second paragraph onwards till the half of the page.
 - v. Then use heading "Computer basics"
 - vi. Create paragraph using two columns till the end of the page.
- 2 Create a Mathematical question paper using, at least five equations
 - i. With fractions, exponents, summation function
 - ii. With at least one „m*n" matrix
 - iii. Basic mathematical and geometric operators.
 - iv. Use proper text formatting, page color and page border.
- 3 Create a flowchart using,
 - i. Proper shapes like ellipse, arrows, rectangle, and parallelogram.
 - ii. Use grouping to group all the parts of the flowchart into one single object.
- 4 Create a table using table menu with,
 - i. At least 5 columns and 10 rows.
 - ii. Merge the first row into one cell.
 - iii. Merge the second row into one cell, then split the second row into three cells.
 - iv. Use proper table border and color.
- 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. (Mailing à step bystep mail merge wizard letters start from a template select template à letters à select proper template create new documentation OK)

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.

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
------	------	-----	-----	-----	-----	-----	-------	---	-------
- ii. Grade is calculated as,
 - a. If % ≥ 90, then grade A
 - b. If % ≥ 80 and < 90, then grade B
 - c. If % ≥ 70 and < 80, then grade C
 - d. If % ≥ 60 and < 70, then grade D
 - e. If % < 60, then grade F

3 Create a sales table using the following data,

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

- i. Draw the bar-graph to compare the sales of the three items for four years using insert option.
- ii. Draw a line-graph to compare the sales of three items for four years using insert option.
- iii. Draw different pie-charts for the given data using insert option.

- iv. Use condition, to highlight all the cells having value ≥ 1000 with redcolor (use conditional formatting).

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. Must contain at least one table.
 - ii. Must contain at least 5 bullets, 5 numbers.
 - iii. The heading must be, font size:32, font-face: Arial Rounded MT Bold,font-color: blue.
- 2 Create a power-point presentation with minimum 10 slides
 - i. Use word art to write the heading for each slides.
 - 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.

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.

Suggested Readings

- 1 Vikas Gupta, "Comdex 14-1in-1 Computer course Kit", Dream Tech
- 2 Bittu Kumar, "Master in Ms-Office"
- 3 Fundamentals of computers - V.Rajaraman - Prentice- Hall of india
- 4 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.
- 5 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>

SEMESTER-I
ENVIRONMENTAL STUDIES

2H-2C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

The main objectives of the course are

- To create awareness about environmental problems among people
- To develop an attitude of concern for the environment
- To motivate public to participate in environment protection and improvement
- 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 and methodologies to analyze the interactions between social and environmental processes

Course Outcomes

The learners will be able to

COs	Course Outcomes	Blooms Level
CO1	Understand the concepts and methods from ecological and physical sciences and their application in environmental problem solving	Understand
CO2	Study the concepts and methods from economic, political, and social analysis as they pertain to the design and evaluation of environmental policies and institutions	Understand
CO3	Learn the ethical, cross-cultural, and historical context of environmental issues and the links between human and natural systems	Apply
CO4	Understand the transnational character of environmental problems and ways of addressing them, including interactions across local to global scales	Apply
CO5	Apply systems concepts and methodologies to analyse and understand interactions between social and environmental processes	Apply
CO6	Creating the awareness about environmental problems among people	Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	S	S	L	M	M	L	M	L	L
CO2	L	M	L	S	M	M	M	L	L	M	L	L
CO3	M	L	L	M	S	M	L	M	L	L	L	L
CO4	M	L	L	S	S	M	M	L	L	M	L	L
CO5	L	L	L	M	M	S	L	M	L	L	L	L

S-Strong; M-Medium; L-Low

Unit I:

5 Hours

INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS:

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

Unit II:

5 Hours

NATURAL RESOURCES - RENEWABLE AND NON-RENEWABLE RESOURCES:

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

Unit III:

5 Hours

BIODIVERSITY AND ITS CONSERVATION:

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 :

5 Hours

ENVIRONMENTAL POLLUTION:

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

Unit V :

4 Hours

SOCIAL ISSUES AND THE ENVIRONMENT:

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).

Suggested Readings

- 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 ed.). New Age International Pvt. Ltd. Publications, New Delhi.
- 3 Arvind Kumar. 2009. A Textbook of Environmental Science. APH Publishing Corporation, New Delhi.
- 4 Botkin., and Keller. 2014. Environmental Science: Earth as a Living Planet. (9th ed.) Wiley
- 5 Mishra, D.D. 2010. Fundamental Concepts in Environmental Studies. S.Chand & Company Pvt. Ltd., New Delhi.
- 6 Odum,E.P., Odum, H.T. and Andrews, J. 1971. Fundamentals of Ecology. Philadelphia: Saunders.
- 7 Rajagopalan, R. 2016.Environmental Studies: From Crisis to Cure, Oxford University Press.
- 8 Sing, J.S., Sing. S.P. and Gupta, S.R. 2014. Ecology, Environmental Science and Conservation. S. Chand & Publishing Company, New Delhi.
- 9 Singh, M.P., Singh, B.S., and Soma, S. Dey. 2004. Conservation of Biodiversity and Natural Resources. Daya Publishing House, New Delhi.
- 10 Tripathy. S.N., and Sunakar Panda. (2011). Fundamentals of Environmental Studies (3rd ed.). Vrianda Publications Private Ltd, New Delhi.
- 11 Uberoi, N.K. 2010. Environmental Studies. (2nd ed.). Excel Books Publications, New Delhi.
- 12 Verma, P.S., and Agarwal V.K. 2016. Environmental Biology (Principles of Ecology).S. Chand and Company Ltd, New Delhi.
- 13 Environmental Biotechnology: Principles and Applications, Second Edition 2nd Edition by Bruce Rittmann and Perry McCarty , 2020

இரண்டாம் பருவம்
பகுதி - I, தமிழ், தாள் 2

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்

- கற்றல்வழி சிந்தனைத் திறனையும், கருத்து வெளிப்பாட்டுத் திறனையும்,
- ஆய்வு நோக்கையும் மேம்படுத்துதல்.
- இலக்கியங்கள் உணர்த்தும் வாழ்வின் நுட்பமான பகுதிகளை உணர்த்துதல்.
- மனித மனத்தினைப் பக்குவப்படுத்துதலில் இலக்கியம் தரும்பங்கினை உணர்த்துதல்.
- வளர்ந்துவரும் சமூகத்தில் அற உணர்வு, பண்பாடு போன்றவை குறித்து அறிவூட்டல். அரசுத் தேர்வுகளுக்கு மாணவர்களை ஆயத்தமாக்குதல்.

பாடத்திட்டப் பயன்விளைவு

- இந்தியக் குடியரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச் சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித் துறையாகிய, 'அறிவியல்தமிழ்' 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச் சிந்தனை வளர்ச்சி.
- வேலை வாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத் திறன் மேம்பாடும் பெற்றிருத்தல்.
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	M	S	S	M	M	L	M	L	L
CO2	L	M	L	L	S	S	S	L	L	S	L	L
CO3	M	L	M	M	M	M	M	M	L	S	L	L
CO4	L	L	L	M	S	S	S	L	L	M	L	L
CO5	L	M	L	M	M	M	S	S	L	S	L	L

S-Strong; M-Medium; L-Low

அலகு - I

(08 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

(08 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!

தமிழ்லங்காரம் - 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. அத்தனைபொத்து.

சிறுகதை : ஆர். சூடாமணி - அந்நியர்கள்

கட்டுரை : ஆளுமைத்திறன் அறிவோம்- தன்னம்பிக்கை மாதஇதழிலிருந்து

அணிஇலக்கணம் : உவமையணி - பிறிதுமொழிதல் அணி - சிலேடை அணி - தீவக அணி- ஏகதேச உருவக அணி - வேற்றுமையணி - பின்வருநிலையணி

அலகு - 3

(08 மணிநேரம்)

புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்

சிற்பிலக்கியம் - தோற்றமும்வளர்ச்சியும்

மதுரைசொக்கநாதர் - தமிழ்விடுதாது - 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**(08 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.வாலின் குரங்கு, 4.தவளே இவள், 5.சுரக்கும் திருவருட், 6.வதிவாய் விளைபயில்,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**(08 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

SEMESTER-II
PART 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

Course Objectives

- To refresh the grammar knowledge of the students to improvise their language.
- To make the students to speak and write errors free English.
- To make the students understand different kinds of communication.
- To help the students develop their listening, speaking, reading and writing skills.
- To Introduce literary works to the students to enhance their analytical and aesthetic skills.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Strengthen the foundation of the language to elevate the command of standard grammar.	Remember
CO2	Formulate and communicate persuasive arguments for specific business outcome.	Apply
CO3	Utilize fundamentals of language for reading, writing and effective communication.	Apply
CO4	Standardize and demonstrate understanding of LSRW skills.	Understand
CO5	Introduce literature to enhance the moral and aesthetic values.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	S	S	S	M	M	L	M	L	L
CO2	L	M	L	S	M	S	M	M	L	M	L	L
CO3	L	L	L	M	S	M	L	M	L	S	L	L
CO4	L	L	L	S	S	S	M	L	L	M	L	L
CO5	L	L	L	M	M	S	L	M	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT-I		6 Hours
Listening	: Listening for Pleasure (Poetry)	
Speaking	: Developing speaking skills	
Reading	: Reading strategies	
Writing	: Developing a story with pictures	
Literature	: Refuge Mother and Child by Chinua Achebe	
Grammar	: Voice	
UNIT- II		6 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	
Grammar	: Subject, verb, agreement	
UNIT-III		6 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		6 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		6 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	

Suggested Readings

- 1 Oxford Handbook of Writing: St. Martins Handbook of Writing 2013 Cambridge University Press
- 2 Sound Business, Julian Treasure 2012Oxford University Press
- 3 Hornby, A,S.(1975) The Guide to patterns and usage in English: oxford university Press.

SEMESTER-II

OBJECT ORIENTED PROGRAMMING

5H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- Enable to differentiate procedure oriented and object-oriented concepts.
- Explain the importance of data hiding in object-oriented programming
- Impart knowledge of object oriented programming concepts and implement the min C++
-

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Implement the basic programming concepts in C++ & java	Understand
CO2	Apply the concepts of object-oriented programming	Apply
CO3	Handle multiple threads and build exception-free codes	Understand
CO4	Identify the concepts of inheritance and its types and develop applications using overloading features.	Analysis
CO5	Create simple applications with inheritance, interface and package	Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	M	M	M	S	M	S	M	M	L
CO2	S	M	S	M	M	L	S	L	S	M	M	L
CO3	S	S	S	M	M	M	S	M	S	M	M	M
CO4	S	S	S	M	S	M	S	M	S	M	S	M
CO5	S	S	S	M	M	M	S	M	S	M	M	M

S-Strong; M-Medium; L-Low

UNIT I**10 Hours**

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

UNIT II**10 Hours**

CLASSES AND OBJECTS: 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**10 Hours**

TEMPLATES AND FILES: 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- Standard Template Library : Overview- Container Class - Vectors- Lists- Maps- Algorithms – String Class.

UNIT IV**10 Hours**

JAVA BASICS: Overview of Java - Program Structure - Class - Objects - Methods – Inheritance – Package – Interface – Exception handling – String Handling – Multithreading - Threads - Synchronization – Deadlocks.

UNIT V**10 Hours**

PACKAGES AND AWT: Packages : I/O Packages - Collections : Set - Sorted Set - List - Map - Sorted Map - Enumeration - Vector - Stack - Dictionary - Hash table- Applet – Applications – AWT – Working with Windows, Graphics, Text – Using AWT controls – Layout managers – Menus – Dialog Box – Introduction to Swing

Suggested Readings

- 1 OBJECT ORIENTED PROGRAMMING : OBJECT ORIENTED PROGRAMMING - I
Dr. Manmohan Singh, Rahul Sharma , ankit Chakrawarti
- 2 Joel Murach, Mary Delamater, 2018. C++ Programming, Mike Murach & Associates Inc.
- 3 **Object Oriented Programming Methodolgy**, Harish G. Narula
- 4 **Advanced Java Black Book**, Dr. R. Nageswara Rao

Websites

- 1 www.programmingsimplified.com
- 2 [www.programiz.com / cpp -programming](http://www.programiz.com/cpp-programming)
- 3 www.cplusplus.com

SEMESTER-II
DISCRETE STRUCTURES

4H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives (CO)

- To learn the basic concepts of sets, types of sets, functions and relations
- To understand about Pigeonhole principle, Permutation and Combination, Mathematical Induction
- To solve the problems using Recurrence relations and generating functions.
- To know the basic concepts of Logical Connectives, Graphs and Trees.
- To express ideas using mathematical notation and to solve problems with the help of mathematical analysis tool.

Course Outcomes

On successful completion of the course, students will be able to

COs	Course Outcomes	Blooms Level
CO1	Familiar with elementary algebraic set theory.	Understand
CO2	Acquire a fundamental understanding of the core concepts in growth of functions.	Apply
CO3	Describe the method of recurrence relations	Apply
CO4	Get wide knowledge about graphs and trees	Analysis
CO5	Initiate to knowledge from inference theory and to Solve problems with the help of mathematical analysis tool	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	M	L	M	S	M	M	M	S	S
CO2	S	S	S	L	M	M	S	M	S	M	M	S
CO3	S	S	S	L	L	M	S	M	S	M	S	S
CO4	S	S	S	S	L	M	S	S	S	S	S	S
CO5	S	S	S	S	M	M	S	S	S	S	M	S

1. **S-Strong; M-Medium; L-Low**

UNIT I : **8 Hours**

Propositional Logic: 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 : **8 Hours**

Sets: Introduction - Finite and infinite sets - Uncountably infinite sets - Relations and its types - Properties of Binary Relations – Closure - Partial Ordering Relations - Definition of Functions and its classification – Types of functions - Composition of functions.

UNIT III : **8 Hours**

Combinatorics: Pigeonhole principle - Permutation and Combination - Mathematical Induction - Principle of Inclusion and Exclusion.

UNIT IV: **8 Hours**

Recurrences: Recurrence Relations - Generating Functions - Linear Recurrence Relations with Constant Coefficients and their Solution.

UNIT V: **8 Hours**

Graph Theory: Introduction - Basic Terminology - Graph Representation - Types of graphs - Multigraphs and Weighted Graphs - Graph Isomorphism – Connectivity - Euler and Hamiltonian Paths and Circuits - Trees - Basic Terminology and Properties of Trees.

Suggested Readings

- 1 Kenneth Rosen., (2019). Discrete Mathematics and Its Applications (8th ed.), McGraw Hill Company, New Delhi.
- 2 Dr. Singaravelu A., and Dr. 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 Sharma J. K., (2011). Discrete Mathematics (Third Edition), Rajiv Beri for Macmillan Publishers India Ltd. New Delhi.
- 5 Hein, J.L., (2010). Discrete Structures, Logic, and Computability (3rd ed.), Jones and Bartlett Publishers, New Delhi.
- 6 Tremblay, J. P., and Manohar R., (2008). Discrete Mathematical Structures with Applications to Computer Science (1st ed.), McGraw-Hill Book Company, New Delhi.

Websites

- 1 <https://youtu.be/u4lQh46VoU4>
- 2 <https://youtu.be/fZqfKJ-cb28>
- 3 <https://www.youtube.com/watch?v=6WGWFwgXhd4>

SEMESTER-II

OBJECT ORIENTED PROGRAMMING - PRACTICAL

4H-2C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand how C++ improves C with object-oriented feature.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.
- To learn the characteristics of an object-oriented programming language: data abstraction and information hiding, inheritance, and dynamic binding of the messages to the methods.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Handle different event in java using the delegation event model, event listener and class	Understand
CO2	Solve the real time problems using classes and objects	Apply
CO3	Experiment with multithreading, exception handling mechanism and collections.	Understand
CO4	Demonstrate constructors and method overloading using classes and objects.	Apply
CO5	Make use of exception handling mechanisms and multithreaded model to solve real world problems	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	M	M	M	S	M	S	M	M	L
CO2	S	M	S	M	M	L	S	L	S	M	L	L
CO3	S	S	S	M	M	M	S	M	S	M	M	M
CO4	S	S	S	M	S	M	S	M	S	S	M	M
CO5	S	S	S	M	M	M	S	M	S	M	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

40 Hours

- 1 Write a program to print sum of digits using constructor and destructor
- 2 Write a program to check palindrome number using class and objects
- 3 Write a program to swap numbers using friend function.
- 4 Write a program to perform multiplication of two matrices using operator overloading.
- 5 Write a program that will read 10 integers from user and store them in an array using pointers.
- 6 Write a program to demonstrate the student mark list using inner class and outer class
- 7 Write a program to demonstrate the employee payroll using inheritance
- 8 Write a program to demonstrate the try, catch block
- 9 Write a program to count the number of lines, words and characters in a given text.
- 10 Write a program that uses a single file for both reading and writing the data.

Suggested Readings

- 1 Antonio Mallia, Francesco Zoffoli, 2019, C++ Fundamentals, Packt Publishing, Ltd.
- 2 Bjarne Stroustrup, 2014, Programming - Principles and Practice using C++, 2nd Edition, Addison-Wesley.
- 3 Herbert Schildt., "Java: The Complete Reference", 11th Edition, McGraw Hill Education, New Delhi, 2019.
- 4 Jamie Jaworski, "Java Unleashed", SAMS Tech media Publications, 1999.

Websites

- 1 www.programmingsimplified.com
- 2 [www.programiz.com /cpp -programming](http://www.programiz.com/cpp-programming)
- 3 www.cplusplus.com
- 4 www.learncpp.com
- 5 www.udemy.com

SEMESTER-II
WEB PROGRAMMING - PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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 find, evaluate, and use online information resources.
- To use Google Apps for education effectively
- To introduce the fundamentals of HTML functions.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamentals of Internet and the Web concepts	Understand
CO2	Understand the various component of web concepts	Understand
CO3	Explain the usage of internet concepts and analyze its components.	Analysis
CO4	Identify and apply the online information resources	Apply
CO5	Inspect and utilize the appropriate Google Apps for education effectively	Analysis

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	S	S	S	M	M	S	S	L	L
CO2	S	M	S	L	S	S	S	S	L	S	M	M
CO3	L	S	L	M	S	M	M	S	S	M	S	S
CO4	S	S	S	S	L	S	S	S	M	S	L	S
CO5	S	L	M	L	S	S	L	M	M	M	S	L

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

60 Hours

LIST OF PROGRAMS USING HTML

- 1 Design a web page using text formatting, List, Image, table and anchor tags.
- 2 Create a website of your department with minimum five links using HTML.
- 3 Design a form to read student details using form elements.
- 4 To create a web page using Frames in HTML.
- 5 Create a document using Form to support Local Processing of Order form.
- 6 Create a web page with the following. i) Cascading style sheets. ii) Use your college information for the web pages Using Frames

LIST OF PROGRAMS USING JavaScript

- 7 To write JavaScript program to compute squares and cubes of numbers from 5 to 15.
- 8 To write JavaScript program to find the largest of three numbers.
- 9 To write JavaScript program to find the factorial of a number.
- 10 To write JavaScript program to calculate sum and average of numbers.
- 11 To write JavaScript program to count the number of negative numbers, positive numbers and zeros in the list.
- 12 To write JavaScript program to prompt username and display it.

Suggested Readings

- 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 [http://www. freeCodeCamp Guides.com/](http://www.freeCodeCamp Guides.com/)
- 3 [http://www. Codrops CSS Reference/](http://www.Codrops CSS Reference/)

SEMESTER-II
INDIAN KNOWLEDGE SYSTEMS

2H-2C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

COURSE OBJECTIVES:

To make the students

- To understand the Indian knowledge systems about origin, evolution and ontological approach
- To comprehend the Indian knowledge approaches with respect to time and language
- To obtain key knowledge on life and mind of Indian knowledge system
- To acquire key information on torchbearers of Indian knowledge system
- To attain strong knowledge on the role of Women in ancient and modern India

COURSE OUTCOMES:

Learners should be able to

COs	Course Outcomes	Blooms Level
CO1	Understand the rich heritage that resides in our traditions.	Understand
CO2	Comprehend the Indian knowledge	Understand
CO3	Understand the importance of philosophical concepts	Understand
CO4	Understand the origin of Indic thought and practices	Understand
CO5	Understand role of Women in ancient and modern India.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	L	M	S	L	M	M	L	L	L	L
CO2	L	M	L	L	M	M	M	L	L	M	L	L
CO3	L	L	L	M	S	M	L	M	L	L	L	L
CO4	M	L	L	L	S	M	M	L	L	M	L	L
CO5	L	L	L	M	S	M	L	M	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT I : **4 Hours**

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

UNIT II : **4 Hours**

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

UNIT III : **4 Hours**

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

UNIT IV : **4 Hours**

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

UNIT V: **4 Hours**

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

Suggested Readings

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

Websites

- 1 <https://iks.iitgn.ac.in/wp-content/uploads/2016/01/Indian-Knowledge-Systems-Kapil-Kapoor.pdf>
- 2 <https://www.sanskritimagazine.com/india/traditional-knowledge-systems-of-india/>

COURSE OBJECTIVES:**To make the students**

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

COURSE OUTCOMES:

Learners should be able to

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	M	S	S	M	M	L	M	L	L
CO2	L	M	L	M	S	S	S	M	L	S	L	L
CO3	M	L	L	M	M	M	M	M	L	S	L	L
CO4	L	L	L	M	S	S	S	L	L	M	L	L
CO5	L	L	L	M	M	M	S	S	L	S	L	L

UNIT: 1**(8)****Yoga and Physical Health**

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

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

UNIT:2**(7)****Greatness of Life force and Mind**

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:3**(7)****Personality Development - Sublimation**

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, Enviornment) 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: 4**(7)****Human Resource Development**

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)

Law of Nature

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

Yoga Practices: Thandasana Chakrasana (sideways) Vruchasana Thirikonasana Varasana

Text Book

Yoga for Yotuth Empowerment, 2023

Reference Books:

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

மூன்றாம் பருவம்

பகுதி - I, தமிழ் இலக்கிய வரலாறு- தாள் 3

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

பாடத்திட்டப் பொதுநோக்கம்

- இந்தியக் குடியரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
- கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
- தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத்திறன் பெற்றிருத்தல்

பாடத்திட்டப் பயன்விளைவு

1. வரலாற்றிற்கு முற்பட்ட தமிழகத்தை மாணவர்களுக்கு அறிமுகப்படுத்துதல்
2. பழந்தமிழர் பண்பாடு சார்ந்த வாழ்க்கை முறையை மாணவர்கள் அறிய ஊக்குவித்தல்
3. தமிழ்மொழியின் பழைமையும், திராவிட மொழிகளில் தமிழ்மொழியின் தனிச்சிறப்பையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.
4. தமிழர்களின் வாழ்வியல், தமிழர் கலைகள், ஆற்றங்கரைப் பண்பாடுகள் குறித்து மாணவர்கள் அறியச் செய்தல்.
5. இந்தியக் குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில் விருப்பப் பாடமாக இடம்பெறுகின்ற தமிழ் நாகரிகமும் பண்பாடும் குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
6. **Mapping with Programme Outcomes**

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	M	S	S	M	M	L	M	L	L
CO2	L	M	L	M	S	S	S	M	L	S	M	L
CO3	M	M	L	M	M	M	M	M	L	S	L	L
CO4	L	L	L	M	S	S	S	L	L	M	L	L
CO5	L	L	L	M	M	M	S	S	L	S	L	L

7. S-Strong; M-Medium; L-Low

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-சீராப்புராணம்-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-மனோன்மனீயம் - தமிழின் உரைநடை இலக்கிய வளர்ச்சி-தமிழின்பம் முதலான

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

அலகு: 5 தமிழின் ஜந்திலக்கணம்

(08 மணிநேரம்)

தமிழின் எழுத்து-சொல்-பொருள்-யாப்பு-அணி என்றமைந்த தமிழின் ஜந்திலக்கணக்கொள்கைகள்-நன்னூல்-தொல்காப்பியம் யாப்பருங்கலக்காரிகை - புறப்பொருள் வெண்பாமாலை -நம்பி அகப்பொருள் முதலான இலக்கண நூல் சிந்தனைகள்.

பாடநூல்:

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

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.

SEMESTER-III
PART II ENGLISH III

3H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To enable students learn correct pronunciation, spelling, meaning and usage of English Vocabularies.
- To give English language skill practice to students to enhance their English proficiency.
- To expose students to native speakers" spoken language to enable students to recognize native speakers" accent and language usage.
- 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

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

COs	Course Outcomes	Blooms Level
CO1	Demonstrate the skill to write in English without grammatical error.	Apply
CO2	Practice listening effectively to communication in English.	Apply
CO3	Develop the ability to speak English language with the right way of pronunciation.	Understand
CO4	Express the viewpoints with confidence in English.	Analyze
CO5	Express values and skills gained through effective communication to other disciplines.	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	S	S	S	M	M	L	M	L	L
CO2	L	M	L	S	M	S	M	M	L	M	L	L
CO3	L	L	L	M	S	M	L	M	L	S	L	L
CO4	L	L	L	S	S	S	M	L	L	M	L	L
CO5	L	L	L	M	M	S	L	M	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT-I **8 Hours**

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

UNIT- II **7 Hours**

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

UNIT-III **7 Hours**

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

UNIT- IV **7 Hours**

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

UNIT-V **7 Hours**

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

Suggested Readings

- 1 Oxford Handbook of Writing: St. Martins Handbook of Writing 2013 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.

SEMESTER-III

RELATIONAL DATABASE MANAGEMENT SYSTEM

5H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To describe a good introduction to the discipline of database management systems.
- To give a good formal foundation on the data models and E-R model.
- To demonstrate the principles database constraints behind systematic database design by covering normalization concept.
- To introduce the concepts of basic SQL as a universal Database language.
- To have an introductory knowledge about the PL/SQL concept

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	outline the necessity of database along with various Data models	Understanding
CO2	express the ways to work with combined table using relational model	Applying
CO3	Applying normalization techniques and organize the order of storing data	Analyzing
CO4	develop SQL and PL/SQL operations	Applying
CO5	make use of the complex queries using SQL	Applying

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	L	L	S	L	S	L	L	L	M
CO2	L	L	L	M	M	L	M	M	L	L	M	S
CO3	L	M	L	L	L	M	L	L	L	M	L	L
CO4	M	L	L	L	L	S	L	L	L	L	L	L
CO5	L	L	L	M	L	L	M	L	S	L	M	M

S-Strong; M-Medium; L-Low

UNIT – I**12 Hours****INTRODUCTION AND DATABASE DESIGN MODEL**

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**12 Hours****INTRODUCTION TO SQL**

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**12 Hours****RELATIONAL DATABASE DESIGN**

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**12 Hours****INTERMEDIATE AND PL/ SQL**

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**12 Hours****TRANSACTIONS AND CONCURRENCY CONTROL**

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

Suggested Readings

- 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.
- 3 Ramakrishnan Raghu, Gehrke Johannes, "Database Management Systems", 3 Edition, McGraw Hill Education, 2014

Websites

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

SEMESTER-III
DATA STRUCTURES

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

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

Course Outcomes

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	M	S	M	S	S	M	S	S	M	S	L
CO2	S	L	L	L	L	M	S	L	M	S	L	M
CO3	M	S	M	S	M	L	M	S	L	M	S	L
CO4	M	L	S	L	S	M	S	M	S	M	L	S
CO5	L	S	L	S	L	M	S	L	M	L	M	S

S-Strong; M-Medium; L-Low

UNIT I

9 Hours

Arrays and Stacks

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

UNIT II

9 Hours

Queues and Linked Lists

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

UNIT III

10 Hours

Trees

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

UNIT IV

10 Hours

Graph

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

UNIT V

10 Hours

Sorting, Searching and Hashing

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.

Suggested Readings

- 1 R. S. Salaria, “Data structures & Algorithms Using C”, 5th Edition, Khanna Book Publishing Co.Pvt. Ltd.,SRS Enterprises, New Delhi, 2022.
- 2 Alfred V. Aho, Jeffrey D. Ullman,John E. Hopcroft ,Data Structures and Algorithms, 1st edition, Pearson, 2002
- 3 Jean Paul Tremblay and Paul G. Sorensen, An Introduction to Data Structures with Applications, 2nd Edition, Tata McGraw Hill, New Delhi, 2017
- 4 Vijayalakshmi Pai G.A, Data Structures and Algorithms – Concepts, Techniques and Applications, 1st Edition, McGraw Hill Education, New Delhi, 2017.

Websites

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

SEMESTER-III
OPERATION RESEARCH

4H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To learn the basic concepts and applications of linear programming and to impart knowledge in concepts and tools of Operations Research.
- To know the constructive techniques to make effective business decisions
- Define and formulate linear programming problems and appreciate their limitations
- To Identify and develop operational research models from the verbal description of the real system
- To Solve network models like the shortest path, minimum spanning tree, and maximum flow problems

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the basic concepts and application of operation research in various fields and to analyze managerial problems in industry so that they are able to use resources (capitals, materials, staffing, and machines) more effectively	Understand
CO2	Define and formulate linear programming problems and appreciate their limitations	Applying
CO3	Recognize the importance and value of Operations Research and mathematical modelling in solving practical problems in industry	Understand
CO4	Identify and develop operational research models from the verbal description of the real system	Analyzing
CO5	Solve network models like the shortest path, minimum spanning tree, and maximum flow problems	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	M	L	M	S	S	L	M	M	M
CO2	M	S	S	M	M	M	S	S	L	M	S	M
CO3	S	S	S	S	M	L	S	M	S	M	M	M
CO4	S	M	S	M	S	S	M	S	S	S	M	M
CO5	M	S	S	L	M	L	M	M	M	M	M	M

S-Strong; M-Medium; L-Low

UNIT I**9 Hours**

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

UNIT II**9 Hours**

Transportation Model: 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**10 Hours**

The Assignment problem : Mathematical Formulation of the Problem – Hungarian Method – Unbalanced Assignment Problem- Maximization Case in Assignment Problem - Travelling Salesman Problem. **Queuing Theory :** Introduction – Characteristics of Queuing System. Problems in (M/M/1):(□/FIFO) and (M/M/1):(N/FIFO) models .

UNIT IV**10 Hours**

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

UNIT V**10 Hours****PERT AND CPM**

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

Suggested Readings

- 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.
- 3 Hamdy A. Taha . (2012). Operations Research-An Introduction, Nineth edition, published byDorling Kindersley (India) Pvt. Ltd., licensees of Pearson Education in South Asia.
- 4 Prem Kumar Gupta and Hira D.S.,(2014). Operations Research , S. Chand & Company Ltd, Ram Nagar, New Delhi.
- 5 Srinivasan G., (2017). Operations Research: Principles and Applications, PHI, New Delhi

Websites

- 1 <https://youtu.be/vUMGvpsb8dc>
- 2 <https://youtu.be/ltOuvM2KmD4>

SEMESTER-III

RELATIONAL DATABASE MANAGEMENT SYSTEM - PRACTICAL

3H-1C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- The course describes the data, organizing the data in database, database administration.
- Introduction to SQL language to retrieve the data from the database with suitable application development.
- Gain knowledge on application of oracle statements to extract the particular data base.
- To design and build database systems and demonstrate their competence
- To give insightful knowledge on storing and protecting the different types of database of the real world applicatipons

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	write basic SQL queries for database manipulations	Understanding
CO2	make use of the complex queries using SQL	Applying
CO3	develop SQL and PL/SQL commands to create and manipulate databases	Applying
CO4	manipulate database using PL/SQL functions and procedures.	Analyzing
CO5	solve real world problems using SQL and PL/SQL	Applying

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	M	L	L	L	L	L	M	M
CO2	L	M	S	M	S	M	S	L	L	M	S	L
CO3	M	L	L	L	S	M	M	L	L	L	S	M
CO4	L	S	M	S	M	S	S	S	M	S	M	S
CO5	M	M	M	M	L	L	L	M	S	M	L	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

36 Hours

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

Suggested Readings

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

Websites

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

SEMESTER-III

DATA STRUCTURES - PRACTICAL

3H-1C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

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

Course Outcomes

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	L	S	L	L	L	S	M	L	L	S	L
CO2	M	L	S	L	M	S	M	M	M	M	M	M
CO3	L	L	M	L	S	L	L	L	L	L	L	M
CO4	L	M	M	M	L	M	L	S	M	M	L	S
CO5	S	S	L	S	L	S	L	S	L	L	S	L

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

36 Hours

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

Suggested Readings

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

Websites

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

SEMESTER-III
HEALTH AND WELLNESS

2H-2C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To introduce the fundamental concepts of physical education, health and fitness.
- To provide a general understanding on nutrition, first aid and stress management.
- To familiarize the students regarding yoga and other activities for developing fitness.
- To create awareness regarding hypo-kinetic diseases, and various measures of fitness and health assessment.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Able to describe the principles of health and wellness from an interdisciplinary perspective.	Understanding
CO2	Able to think and act ethically in the context of health, nutrition and wellness.	Understanding
CO3	Acquire knowledge about the benefits of physical activity, nutrition for health,	Understanding
CO4	Create awareness among the public about the importance of health and importance of yoga	Understanding

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	M	S	M	M	M	L	L	L	L
CO2	L	L	L	L	M	M	M	L	L	L	L	L
CO3	L	M	L	M	S	L	L	M	L	L	L	L
CO4	M	L	L	L	S	M	M	L	L	M	L	L
CO5	L	L	L	M	S	M	L	M	M	L	L	L

S-Strong; M-Medium; L-Low

UNIT 1: 5 Hours

Definition and concept of health -biomedical concept, ecological concept, psychosocial concept, holistic concept. Dimensions of health – physical, mental Health; causes and consequences of mental conflicts and frustrations; Introduction to common mental disorders: Insomnia, Depression, Stress, Anxiety disorders, Social, Spiritual, Emotional, Vocational and other dimensions. Determinants of health - biological, environmental factors, behavioral and socio culture.

UNIT II: 5 Hours

Basic concept of nutrition. Food intake and regulations, calorific value of food, dietary need and recommended dietary allowances. Assessment of nutritional status - energy value of carbohydrates, proteins and fats. Balanced diet. Healthy foods: Healthy diet, for adults, infants and young children, aged adults. Food pyramid. Factors influencing eating behaviour. Concepts of food safety and standards, Food Preservation.

UNIT III: 5 Hours

Lifestyle Disease and its Management: Types, Risk Factors, Diagnosis, and Prevention - Heart Disease, Obesity, Type 2 Diabetes, Stroke, Hypertension. Stress management, Prevent Lifestyle Diseases - Maintaining a Balance Between Physical Activity and Food Consumption. Opting for Periodic Health Check-ups. Consequences of alcohol and drug misuse

UNIT IV: 5 Hours

Importance and Scope of Physical Education -Modern concept of health, physical fitness and wellness. Exercise and weight loss, Exercises for a healthy heart, regular exercise for mental health -workout plan - myths about exercise and aging, Tips for using a fitness device. Cardiorespiratory Fitness, Musculoskeletal Fitness.

UNIT V: 4 Hours

Benefits and Importance of yoga in our life – Pranayama – Surya Namaskar-Padmasana- Pachimothasana- Bhujangasana- Dhanurasana - Sarvangasana -Matsyasana- Salabhasan Halasana- Chakrasana- Vrikshasana- Padahastasana – Savasana

Suggested Readings

- 1 Benu Gupta, Mukesh Agarwal and Sunita Arora (2019).A Textbook on Physical Education and Health Education: Fitness, Wellness and Nutrition.
- 2 Manjari Chandra (Author) (2020). Eat Up, Clean Up: Your Personal Journey To A Healthy Life
- 3 Srilakshmi B (2014). Nutrition Science: New Age International (P) Ltd. Publishers. 4th edition. New Delhi
- 4 Yogeswar (2021).Everyday Yoga: An Illustrated Guide to H: An Illustrated Guide to Healing

SEMESTER-III
SUMMER INTERNSHIP

2C

நான்காம் பருவம்

பகுதி - I, தமிழர் நாகரிகமும் பண்பாடும் - தாள் 4

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

பாடத்திட்ட பயன் விளைவு

1. வரலாற்றிற்கு முற்பட்ட தமிழகத்தை மாணவர்களுக்கு அறிமுகப்படுத்துதல்
2. பழந்தமிழர் பண்பாடு சார்ந்த வாழ்க்கை முறையை மாணவர்கள் அறிய ஊக்குவித்தல்
3. தமிழ்மொழியின் பழைமையும், திராவிட மொழிகளில் தமிழ்மொழியின் தனிச்சிறப்பையும் மாணவர்களுக்கு அறிமுகப்படுத்துதல்.
4. தமிழர்களின் வாழ்வியல், தமிழர் கலைகள், ஆற்றங்கரைப் பண்பாடுகள் குறித்து மாணவர்கள் அறியச் செய்தல்.
5. இந்தியக் குடியரிமைப் பணி முதலான போட்டித் தேர்வுகளில் விருப்பப் பாடமாக இடம்பெறுகின்ற தமிழ் நாகரிகமும் பண்பாடும் குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.

பாடத்திட்டப் பொது நோக்கம்

1. இந்தியக் குடியரிமைப்பணி முதலான போட்டித் தேர்வுகளில், விருப்பப்பாடமாக இடம்பெறுகின்ற, 'தமிழ்இலக்கியவரலாறு' குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.
2. கல்வெட்டியல், ஓலைச்சுவடியியல் மற்றும் தொல்லியல் சார்ந்த ஆவணத் தேடலுக்குரிய ஆய்வு மனப்பான்மையுடன், இலக்கியங்களை அணுகுதல்.
3. தமிழின் வளர்ச்சித்துறையாகிய, 'அறிவியல்தமிழ்'; 'இணையதமிழ்' குறித்த பன்னோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்ப்புத்திறன் பெற்றிருத்தல்.

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	M	S	S	M	M	L	M	L	L
CO2	L	M	L	M	S	S	S	M	L	S	M	L
CO3	M	M	L	M	M	M	M	M	L	S	L	L
CO4	L	L	L	M	S	S	S	L	L	M	L	L
CO5	L	L	L	M	M	M	S	S	L	S	L	L

S-Strong; M-Medium; L-Low

அலகு -1

(08 மணிநேரம்)

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

அலகு -2 தமிழின் தொன்மை

(08 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

(08 மணிநேரம்)

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

அலகு -4 கட்டடக்கலையும் தமிழர் பண்பாடும்

(08 மணிநேரம்)

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

அலகு -5 ஆற்றங்கரை நாகரிகம்

(08 மணிநேரம்)

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

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.

SEMESTER-IV
PART II ENGLISH IV

3H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

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

Course Outcomes

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	L	S	S	S	M	M	L	M	L	L
CO2	L	M	L	S	M	S	M	L	L	L	L	L
CO3	M	L	L	M	S	M	L	M	L	M	L	L
CO4	L	L	L	S	S	S	M	L	L	M	L	L
CO5	L	L	L	M	M	S	L	M	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT-I	6 Hours
Concept of Communication- Barriers to Communication- Body Language-Personality Development- Etiquette and Manners-Soft Skills.	
UNIT- II	6 Hours
Listening Comprehension-Reading Comprehension-Paragraph Writing-Precis Writing-Collocation	
UNIT-III	6 Hours
Writing-Writing Resume and Covering Letter- Types of Letter Writing-Writing MoU- Dicto Composition--Term Paper-Book Reviews	
UNIT- IV	6 Hours
Speaking-Interview Skills-Preparing Welcome address and Vote of Thanks-Compering	
UNIT-V	6 Hours
Punctuation Marks- Figures of Speech	

Suggested Readings

- 1 Oxford Handbook of Writing: St. Martins Handbook of Writing 2013 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.

SEMESTER-IV
PROGRAMMING IN PYTHON

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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

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

COs	Course Outcomes	Blooms Level
CO1	Provide Basic knowledge of Python	Understand
CO2	learn how to design and program Python applications	Apply
CO3	learn how to use lists, tuples, and dictionaries in Python programs	Understand
CO4	Applying file operations and database creation.	Apply
CO5	Provide knowledge about python packages and GUI programming	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	S	L	M	L	S	M	M	L	S
CO2	S	S	L	S	M	M	S	M	M	M	M	L
CO3	S	M	M	S	L	S	L	S	S	L	L	M
CO4	L	S	L	M	L	M	L	M	S	S	L	S
CO5	S	M	L	M	S	S	M	S	L	M	M	L

S-Strong; M-Medium; L-Low

UNIT I **8 Hours**

OVERVIEW OF PROGRAMMING AND INTRODUCTION TO PYTHON

Overview of Programming : Structure of a Python Program, Elements of Python. Introduction to Python: Python Interpreter, Using Python as calculator, Python shell, Indentation. Atoms, Identifiers and keywords, Literals, Strings, Operators.

UNIT II **8 Hours**

CREATING PYTHON PROGRAMS

Creating Python Programs: I/O Statements, Control statements, Defining Functions, default arguments, Errors and Exceptions.

UNIT III **8 Hours**

PYTHON COMPLEX DATA TYPES

Python Complex data types: Using string data type and string operations, Defining list and list slicing, Use of Tuple data type. String, List and Dictionary, Manipulations Building blocks, string, List manipulation. Dictionary manipulation, Programming using string, list and dictionary in-built functions. Python Functions, Organizing python codes using functions.

UNIT IV **8 Hours**

PYTHON FILE OPERATIONS

Python File Operations: Reading files, Writing files in python, Understanding read functions, read(), readline(), readlines(). Understanding write functions, write() and writelines() Manipulating file pointer using seek Programming, using file operations. Database Programming: Connecting to a database, operations, Transaction Control, Disconnecting from a database, Exception Handling in Databases.

UNIT V **8 Hours**

PYTHON PACKAGES AND OBJECTS AND CLASSES

Python packages: Simple programs using the built-in functions of packages matplotlib, numpy, pandas etc. GUI Programming: Tkinter introduction, Tkinter and Python Programming, Tk Widgets, Tkinter examples. Python programming with IDE. Objects and Classes: Define a Class with class – Inheritance – Override a Method – Add a Method – Get Help from Parent with super – In self Defense.

Suggested Readings

- 1 Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist learning with Python / 1st Edition, 2012
- 2 Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978- 1111822705
- 3 Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016
- 4 Charles Dierbach, "Introduction to Computer Science using Python", Wiley, 2015

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/>

SEMESTER-IV
OPERATING SYSTEM

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand basic concepts of Operating System, its functions and services.
- To familiarize the management functions of Operating System.
- To acquire knowledge about basic concepts of mass storage structure
- To acquire knowledge in Linux Operating System.
- To enrich the knowledge about OS like Unix , Linux and Windows XP is introduced as case study

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Ability to understand about basic concepts of Operating System, its functions and services.	Understand
CO2	Understanding about Process Management, CPU scheduling, File handling and I/O operations.	Apply
CO3	Ability to understand about memory management	Analyze
CO4	Understanding about of mass storage structure	Apply
CO5	Acquiring basic knowledge about OS like Linux and Windows 10	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	M	L	S	M	M	L	L	M	S
CO2	S	S	L	S	M	M	S	M	M	M	L	M
CO3	S	M	M	S	L	S	L	S	S	L	M	S
CO4	M	S	L	M	M	S	M	M	S	S	S	L
CO5	S	L	L	M	S	S	M	M	L	L	M	S

S-Strong; M-Medium; L-Low

UNIT I

8 Hours

Introduction-Defining Operating System-Computer-System Organization- Computer System Organization- Computer System Architecture- Operating- System Structure- Operating System Operations- Process Management- Memory Management- Storage Management Protection and Security- Kernel Data Structures- Computing Environments- Open-Source Operating Systems.

UNIT II

8 Hours

Processes Management: Process Concept- Process Scheduling- Operations on Processes Interprocess Communication- Examples of IPC Systems- Communication in Client–Server Systems. **Deadlocks:** System Model- Deadlock Characterization- Methods for Handling Deadlocks Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock.

UNIT III

8 Hours

Main Memory: Background- Swapping- Contiguous Memory Allocation- Segmentation- PagingStructure of the Page Table. **Virtual Memory:** Background- Demand Paging- Page Replacement- Allocation of Frames - Thrashing- Memory Mapped Files- Allocating Kernel Memory.

UNIT IV

8 Hours

Mass Storage Structure: Overview of Mass-Storage Structure- Disk Structure- Disk Attachment Disk Scheduling- Disk Management- Swap-Space Management- RAID Structure- Stable-Storage Implementation. **File –System Interface:** File Concept- Access Methods- Directory and Disk Structure- File- System Mounting- File Sharing- Protection.

UNIT V

8 Hours

The Linux System: Linux History- Design Principles- Kernel Modules- Process Management Scheduling- Memory Management-File Systems- Input and Output- Interprocess Communication- Network Structure- Security. **Windows 10 :** History- Design Principles- System Components- Terminal Services and Fast User Switching- File System- Networking- Programmer Interface.

Suggested Readings

- 1 Silberschatz, Galvin Gagne, Operating System Concepts, 9th Edition, Wiley India Edition,2013
- 2 Deitel Deitel Choffnes, Operating Systems, 3rd Edition, Pearson Education, 2003.
- 3 Stuart E. Madnick, John J.Donovan. Operating Systems, 3rd Edition, Tata McGraw Hill,2003.
- 4 "Modern Operating Systems" by Andrew S. Tanenbaum
- 5 "Operating System Principles" by Galvin, Abraham Silberschatz, and Greg Gagne

Websites

- 1 <https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/>
- 2 <https://hackr.io/tutorials/learn-operating-systems>
- 3 <https://www.mygreatlearning.com/operating-system/tutorials>

SEMESTER-IV
CYBER SECURITY

3H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand of the basic Mathematical tools for cryptography concepts.
- To learn the concept of AES, Blowfish algorithm and its applications.
- To recognize the concept of public key cryptosystems.
- To understand the concept of Digital Signature Algorithms
- To learn about Firewall and its applications.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understanding basic Mathematical tools for cryptography concepts	Understand
CO2	Understanding the concept of AES, Blowfish algorithm and its applications	Understand & Apply
CO3	Analyzing the concept of public key cryptosystems.	Understand
CO4	Understanding the concept of Digital Signature Algorithms	Analyze
CO5	Understanding the concept of and Firewall and its applications	Understand & Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	M	S	M	L	L	L	L	L	S	S
CO2	M	S	M	L	L	M	M	M	L	L	L	L
CO3	S	M	S	S	S	L	M	M	M	M	S	M
CO4	M	L	M	S	M	S	L	M	S	M	M	S
CO5	S	L	M	S	M	L	L	L	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT I**6 Hours****Introduction and Data Encryption Standards:**

Introduction – Data Encryption Techniques– Substitution Ciphers – Transposition Ciphers – Steganography –Data Encryption Standards: Block ciphers, Block Cipher Modes of Operation– Feistel Ciphers – Data Encryption Stand - Triple DES – DES Design Criteria

UNIT II**6 Hours****Advanced Encryption Standard and Symmetric Ciphers**

Introduction, Advanced Encryption Standard – Overview of Rijndael – Advantages and Limitations of Rijndael, Comparison of AES with other ciphers – Blowfish Encryption Algorithm - RC5 – RC4– RC6 – Comparison Between RC6 and RC5.

UNIT III**6 Hours****Public Key Cryptosystems, Key Management and Authentication**

Introduction, Public key Cryptosystems – The RSA algorithm – Timing Attacks – Key Distribution, Diffie-Hellman Key Exchange – Elliptic Curve Arithmetic – Elliptic Curve Cryptography– Elliptic Curve Security and Efficiency, Zero Knowledge Proof – Authentication: Introduction, authentication methods – Message Digest – Kerberos – X.509 Authentication Service.

UNIT IV**6 Hours****Digital Signatures, Electronic Mail Security and Web Security**

Introduction, Digital Signature Algorithms– Digital Signature Standards (DSS) – Authentication Protocols – Pretty Good Privacy (PGP) – S/MIME – MIME – History of S/MIME – Comparison PGP and S/MIME– Secure Socket Layer (SSL) – SSL session and connection – SSL Record Protocol – SSL in practice – Secure electronic Transactions.

UNIT V**6 Hours****Malicious Software and Firewall**

Malicious Code, viruses – Worms –Trojans – Spyware Best Practices – Digital Immune System – Attacks– Introduction, Packet Filters – Application-level gateways – Circuit level gateways – Firewall Architectures– Trusted System – Access Control.

Suggested Readings

1. V. K. Pachghare, Cryptography and Information Security, PHI. (Text BOOK)
2. William Stalling, Cryptography and Network Security, 4th Edition, PHI
3. Schneier and Bruce, Applied Cryptography: Protocols & Algorithms, 1st Edition, MGH.

Websites

1. <https://www.csis.org/news/cybersecurity-agenda-45th-president>
2. <https://cybersecuritystrategy.pmc.gov.au/assets/img/PMC-Cyber-Strategy.pdf>
3. <https://www.javatpoint.com/cyber-security-tutorial>

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

Course Objectives

- To understand the basic concepts in probability theory and the nature of uncertainty.
- To realize the applications of probability and commonly used probability distributions(both discrete and continuous), Central Limit theorem and their applications in various disciplines.
- To know the various techniques of descriptive and inferential statistics, and how to apply them for examining data in the analytical decision making.
- To draw conclusions based on sample data by constructing statistical hypothesis and estimation with statistical tools and techniques.
- To explain the foundations of probabilistic and statistical analysis which are mostly applied in computer science.
- To understand the index number concepts and its applications.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	To compute problems based on probability and conditional probability in appropriate ways.	Understand
CO2	To describe the probability distributions such as Binomial, Poisson and Normal distribution.	Understand & Apply
CO3	To evaluate various measures of descriptive statistical measures for any given data.	Understand
CO4	To derive the relationship between data using Correlation, Rank Correlation and Regression for two variables.	Analyze
CO5	To understand the basic concept of test of significance and make inferences from statistical tests and also to develop an ability to analyze, demonstrate to provide meaningful information in from the collected statistical data.	Understand & Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	S	S	L	M	S	S	S	S	M	M
CO2	S	S	M	M	M	L	S	S	M	M	S	M
CO3	M	M	S	S	L	M	M	M	S	S	M	M
CO4	S	M	S	M	L	M	S	S	S	M	S	M
CO5	M	S	S	S	M	M	S	S	S	S	M	S

- S-Strong; M-Medium; L-Low

UNIT I

8 Hours

Basics of Probability: 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

8 Hours

Discrete and Continuous Probability Distributions: 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

8 Hours

Basics of Statistics and Uni Variate Analysis: 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

8 Hours

Bivariate Analysis: 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

8 Hours

Index Numbers: 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.

SUGGESTED READINGS

- 1 Evans James, R., (2017), Business Analytics, 2nd edition, Pearson Education, New Delhi.
- 2 Dinesh Kumar, U., (2017), Business Analytics: The Science of Data - Driven Decision Making, Wiley, New Delhi.
- 3 Srivastava T.N., and Shailaja Rego., (2012). 2nd Edition, Statistics for Management, McGraw Hill Education, New Delhi.
- 4 Sheldon Ross., (2007). Introduction to Probability Model, Ninth Edition, Academic Press, Indian Reprint.
- 5 Robert V. Hogg, Joseph W. McKean and Allen T. Craig., (2007). Introduction to Mathematical Statistics, Pearson Education, Asia.
- 6 Irwin Miller and Marylees Miller, John E. Freund, (2006). Mathematical Statistics with Application, Seventh Edition, Pearson Education, Asia.
- 7 Pillai R.S.N., and Bagavathi V., (2002). Statistics, S. Chand & Company Ltd, New Delhi.

WEBSITES

- 1 <https://ocw.mit.edu/courses/mathematics/18-05-introduction-to-probability-and-statistics-spring-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>

SEMESTER-IV

PROGRAMMING IN PYTHON-PRACTICAL

3H-1C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

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

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	understand the essentials of Python programming	Understand
CO2	do basic programs using python modules and packages	understand
CO3	create simple algorithms with and without using packages	Apply
CO4	interpret algorithm and visualize the results with real time datasets	Analyze
CO5	Understand draw charts using different data sets.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	M	S	L	M	L	S	M	S	M	M
CO2	S	S	L	M	M	M	S	M	S	M	L	S
CO3	S	M	M	S	L	S	L	S	S	M	M	M
CO4	M	S	L	M	S	M	L	M	S	S	L	S
CO5	S	M	L	M	S	S	M	S	M	M	S	L

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

30 Hours

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

Suggested Readings

- 1 Allen Downey, Jeffrey Elkner, Chris Meyers. How to think like a computer scientist learning with Python / 1st Edition, 2012
- 2 Kenneth A. Lambert, The Fundamentals of Python: First Programs, 2011, Cengage Learning, ISBN: 978- 1111822705
- 3 Wesley J. Chun, "Core Python Applications Programming", 3rd Edition , Pearson Education, 2016
- 4 Charles Dierbach, "Introduction to Computer Science using Python", Wiley, 2015

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/>

SEMESTER-IV
OPERATING SYSTEMS-PRACTICAL

3H-1C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	M	S	L	M	L	S	M	S	M	L
CO2	S	S	L	S	M	M	S	M	S	M	L	S
CO3	S	M	M	S	L	S	L	S	S	M	M	L
CO4	M	S	L	M	S	M	L	M	S	S	S	M
CO5	S	M	L	M	S	S	M	S	M	M	L	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

30 Hours

- 1 Program to perform process creation
- 2 Program to implement process scheduling – FCFS, SJFS, round robin
- 3 Program to implement inter- process communication using pipes
- 4 Program to perform process synchronization
- 5 Implement producer and consumer problem using semaphores
- 6 Program to perform memory management scheme using first fit and best fit
- 7 Implement a Deadlock Detection Algorithm
- 8 Implement a Paging Technique of Memory Management
- 9 Basics of Linux commands
- 10 Write Simple programs using Shell

Suggested Readings

- 1 Silberschatz, Galvin Gagne, Operating System Concepts, 9th Edition, Wiley India Edition,2013
- 2 DeitelDeitelChoffnes, Operating Systems, 3rd Edition, Pearson Education, 2003.
- 3 Stuart E. Madnick, John J.Donovan. Operating Systems, 3rd Edition, Tata McGraw Hill,2003.
- 4 "Modern Operating Systems" by Andrew S. Tanenbaum
- 5 "Operating System Principles" by Galvin, Abraham Silberschatz, and Greg Gagne
6. "The Linux Programming Interface: A Linux and UNIX System Programming Handbook" by Michael Kerrisk

Websites

- 1 <https://edu.gcfglobal.org/en/computerbasics/understanding-operating-systems/1/>
- 2 <https://hackr.io/tutorials/learn-operating-systems>
- 3 <https://www.mygreatlearning.com/operating-system/tutorials>

SEMESTER-V
COMPUTER NETWORKS

5H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.
- To study data link layer concepts, design issues, and protocols.
- To learn the functions of network layer and the various routing protocols.
- To familiarize the functions and protocols of the Transport layer and Application layer.
- To know about Channel error detection and correction, MAC protocols, Ethernet and WLAN.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the functions of each layer in OSI and TCP/IP model	Apply
CO2	Explain the multiplexing, switching concept and types of transmission media with real time examples.	Apply
CO3	Understand the error detection and correction methods and can implement the data link layer protocols.	Understand
CO4	Analyze the importance of Network Layer and Algorithms associated with the Network Layer.	Analyze
CO5	Apply basic functionalities of transport layer and application layer in Data Communication	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	S	L	M	S	M	S	M	M	S	M
CO2	S	S	L	S	M	S	M	M	S	L	M	S
CO3	M	M	S	M	S	M	M	L	S	M	S	M
CO4	M	S	M	S	S	S	M	S	M	S	M	M
CO5	S	M	S	M	M	M	S	M	S	M	S	S

S-Strong; M-Medium; L-Low

UNIT I**12 Hours**

BASICS OF NETWORKS AND OSI MODEL : Network Hardware: LAN – WAN – MAN – Wireless – Home Networks. Network Software: Protocol Hierarchies – Design Issues for the Layers – Connection-oriented and connectionless services – Service Primitives – The Relationship of services to Protocols. Reference Models: OSI Reference Model – TCP/IP reference Model – Comparison of OSI and TCP/IP – Critique of OSI and protocols – Critique of the TCP/IP Reference model.

UNIT II**12 Hours**

PHYSICAL LAYER: PHYSICAL LAYER – Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission: Electromagnetic Spectrum – Radio Transmission – Microwave Transmission – Infrared and Millimeter Waves – Light Waves. Communication Satellites: Geostationary, Medium-Earth Orbit, Low Earth-orbit Satellites – Satellites versus Fiber.

UNIT III**12 Hours**

DATA-LINK LAYER: Error Detection and correction – Elementary Data-link Protocols – Sliding Window Protocols. **MEDIUM-ACCESS CONTROL SUBLAYER:** Multiple Access Protocols – Ethernet – Wireless LANs – Broadband Wireless – Bluetooth.

UNIT IV**12 Hours**

NETWORK LAYER: Routing algorithms – Congestion Control Algorithms. **TRANSPORT LAYER:** Elements of Transport Protocols – Internet Transport Protocols: TCP.

UNIT V**12 Hours**

APPLICATION LAYER: DNS – E-mail. **NETWORK SECURITY:** Cryptography – Symmetric Key Algorithms – Public Key Algorithms – Digital Signatures.

Suggested Readings

- 1 Computer Networks, Andrew S. Tanenbaum, 4th edition, PHI.
- 2 Data Communication and Networks, Achyut Godbole, 2007, TMH.
- 3 Computer Networks: Protocols, Standards, and Interfaces, Uyles Black, 2nd ed, PHI
- 4 Sathish Jain, Madhulika Jain, Vineeta Pillai, Kratika 2016. A Level Data Communication & Network Technologies .BPB publication.
- 5 Tanenbaum, A.S. 2016. Computer Networks (7thed.). New Delhi: PHI.

Websites

- 1 http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
- 2 www.w3schools.com/tcpip/default.asp
- 3 <http://www.engppt.com/2009/12/networking-fourzan-ppt-slides.html>
- 4 <http://citengg.blogspot.com/p/behrouz-forouzan-computer-networks-4th.html>

SEMESTER-V
PHP PROGRAMMING

5H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives (CO)

- To understand how server-side programming works on the web.
- To learn PHP Basic syntax for variable types and calculations.
- To use PHP built-in functions and creating custom functions
- To understand POST and GET in form submission.
- To receive and process form submission data.
- To create a database in phpMyAdmin, to read and process data in a MySQL database

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Write PHP scripts to handle HTML forms.	Apply
CO2	Write regular expressions including modifiers, operators, and metacharacters	Apply
CO3	Create PHP programs that use various PHP library functions, and that manipulate files and directories.	Apply
CO4	Analyze and solve various database tasks using the PHP language.	Analyze
CO5	Analyze and solve common Web application tasks by writing PHP programs	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	M	S	L	M	M	S	M	M	S	M
CO2	M	S	S	L	S	S	S	M	S	L	M	S
CO3	L	M	M	S	M	M	M	L	S	M	S	M
CO4	S	M	S	M	S	M	S	S	M	S	M	M
CO5	M	S	M	S	M	S	M	M	S	M	S	S

S-Strong; M-Medium; L-Low

UNIT I : **12 Hours**

Introduction to PHP: PHP introduction, inventions and versions, important tools and software requirements (like Web Server, Database, Editors etc.) -PHP with other technologies, scope of PHP -Basic Syntax, PHP variables and constants -Types of data in PHP, Expressions, scopes of a variable (local, global)-PHP Operators.

UNIT II **12 Hours**

PHP Form Introduction- Form Handling - Capturing Form Data-GET and POST form methods- Dealing with multi value fields Redirecting a form after submission - **PHP Form Validation -Email, Name - PHP conditional events and Loops:** PHP branching statements -Looping Statements.

UNIT III **12 Hours**

PHP Function: Function, Need of Function, declaration and calling of a function -PHP Function with arguments, Default Arguments in Function -Function argument with call by value, call by reference, **Recursive function -Built-in Functions-** Scope of Function Global and Local, **PHP Cookies and Sessions..**

UNIT IV **12 Hours**

String Manipulation and Regular Expression: Creating and accessing String, Searching & Replacing String -Formatting, joining and splitting String, String Related Library functions-Use and advantage of regular expression over inbuilt function -Use of functions in regular expression

UNIT V **12 Hours**

Array: Anatomy of an Array, Creating index based and Associative array, Accessing array- Looping with Index based array, with associative array using each() and foreach()-Some useful Library function.

Suggested Readings

- 1 David Sklar, Adam Trachtenberg, 2019. PHP Cookbook: Solutions & Examples for PHP.
- 2 Robin Nixon, 2018. Learning PHP, MySQL, JavaScript, CSS & HTML5, (3rd ed.) Paperback, O'reilly.
- 3 Timothy Boronczyk, Martin E. Psinas, 2016. PHP and MYSQL (Create-Modify-Reuse), Wiley India Private Limited.
- 4 Steven Holzner, 2016. PHP: The Complete Reference Paperback, McGraw Hill Education (India).

Websites

- 1 www.php.net/
- 2 http://www.nptelvideos.com/php/php_video_tutorials.php
- 3 www.w3schools.com/PHP/default.asp

SEMESTER-V
. NET PROGRAMMING

5H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand .NET framework to develop web centric applications.
- To enable students to learn the basics of I/O and object oriented programming.
- To familiar with VB.NET and ASP.NET IDE
- To learn about the ASP.NET controls and ADO.NET.
- To enable the students to learn how to build and deployment of web services.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the basics of .NET framework and the object oriented programming.	Remember
CO2	Understand the procedures, File I/O, Error handling and Message queues.	Understand
CO3	Understand and remember the components in VB.NET IDE, ADO.NET and also the window forms.	Understand
CO4	Understand the HTML server controls, Web controls, Validation controls and state management and tracing.	Apply
CO5	Knowledge on SOAP, building web services and deploying and publishing web services, Finding and consuming web services.	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	M	S	L	M	M	M	M	M	L	S	M
CO2	M	S	L	M	M	S	S	M	L	L	M	S
CO3	M	M	S	M	S	S	S	L	S	M	S	M
CO4	M	M	S	S	S	S	M	S	M	S	M	M
CO5	S	L	S	M	M	S	S	M	S	M	S	S

S-Strong; M-Medium; L-Low

UNIT I**12 Hours**

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

UNIT II**12 Hours**

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

UNIT III**12 Hours**

Basic Windows Controls: Textbox Control- List Box, Checked List Box-Scrollbar and Track Bar Controls-More Windows Control-The common Dialog Controls-The Rich Text Box Control - Handling Strings, characters and Dates. The Tree View and List View Controls: Examining the Advanced Controls-The Tree View Control-The List View Control.

UNIT IV**12 Hours**

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

UNIT V**12 Hours**

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

Suggested Readings

- 1 Evangelos Petroustos, 2019. Mastering Visual Basic.Net, BPB Publications, New Delhi.
- 2 Ying Bai,2018. Practical Database Programming with Visual Basic.Net 2nd Edition, John Wiley & Sons Publication, Canada
- 3 Shirish Chavan. 2017. Visual Basic.Net, 1st Edition, Pearson Education, New Delhi.
- 4 VB.Net in Nutshell 2016. 2nd Edition. Steven Roman, Paul Lomax, Oreilly

Websites

- 1 www.microsoft.com/NET/
- 2 www.en.wikipedia.org/wiki/.net
- 3 www.vbtutot.com

SEMESTER-V
EDGE COMPUTING

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- course will explore research, frameworks, and applications in Edge Computing, with a focus on big data analytics.
- The class will begin with a review of current big data analytics frameworks for Cloud Computing
- Explore frameworks for computing over edge devices and cloud.
- study algorithms for distributed data analytics over edge devices.
- The course content will come from research papers, articles, and software documentation.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	To develop a deep understanding of this content through class presentations and tutorials.	Understand
CO2	create a research project of their choosing that leverages edge and cloud computing technologies.	Apply
CO3	Development on a local machine and only use the cloud for testing and evaluation	Understand
CO4	Analyze the importance of big data analytics	Analyze
CO5	Apply algorithms for distributed data analytics over edge devices	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	M	S	S	M	M	S	L	M	S	M
CO2	L	S	M	M	L	S	S	L	S	M	M	S
CO3	S	M	S	S	S	M	M	S	M	S	S	M
CO4	M	S	S	M	M	M	S	M	S	S	M	M
CO5	S	M	M	S	S	S	M	S	M	M	S	S

S-Strong; M-Medium; L-Low

UNIT I**9 Hours**

INTRODUCTION: History of Centralized and Distributed Computing - Overview of Distributed Computing, Cluster computing, Grid computing. Technologies for Network based systems- System models for Distributed and cloud computing- Software environments for distributed systems and clouds.

UNIT II**9 Hours**

EDGE RESOURCES: Introduction to Edge Computing- issues and challenges - Properties - Characteristics - Service models, Deployment models. Cloud resources: Network and API - Virtual and Physical computational resources- Data-storage. Virtualization concepts - Types of Virtualization. Introduction to Various Hypervisors - High Availability (HA)/Disaster Recovery (DR) using Virtualization, Moving VMs.

UNIT III**10 Hours**

NETWORKS AND SERVICES: Service models - Infrastructure as a Service (IaaS) - Resource Virtualization: Server, Storage, and Network - Case studies. Platform as a Service (PaaS) - Cloud platform & Management: Computation, Storage - Case studies. Software as a Service (SaaS) - Web services - Web 2.0 - Web OS - Case studies - Anything as a service (XaaS).

UNIT IV**10 Hours**

PROGRAMMING: Programming and Software Environments - Parallel and Distributed Programming paradigms - Programming on Amazon AWS and Microsoft Azure - Programming support of Google App Engine - Emerging Cloud software Environment.

UNIT V**10 Hours**

STANDARDS AND PRIVACY: Cloud Access: authentication, authorization and accounting - Cloud Provenance and meta-data - Cloud Reliability and fault-tolerance - Edge Security, privacy, policy and compliance- Edge federation, interoperability and standards.

Suggested Readings

- 1 Kai Hwang, Geoffrey C. Fox and Jack J. Dongarra, "Distributed and cloud computing from Parallel Processing to the Internet of Things", Morgan Kaufmann, Elsevier – 2012.
- 2 Barrie Sosinsky, "Cloud Computing Bible" John Wiley & Sons, 2010.
- 3 Tim Mather, SubraKumaraswamy, and ShahedLatif, Cloud Security and Privacy an Enterprise Perspective on Risks and Compliance, O'Reilly 2009.
- 4 Marco Schwartz, "Internet of Things with the Arduino Yun", Packt Publishing, 2014

Websites

- 1 www.cloudflare.com/learning/serverless/glossary/what-is-edge-computing/
- 2 https://blog.feedspot.com/edge_computing_blogs/
- 3 <https://www.ibm.com/cloud/what-is-edge-computing>

SEMESTER-V
CLOUD COMPUTING

4H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- Learn to identify the basic concepts, policies, and technologies of Cloud
- Learn to identify the impact of a Cloud architecture and Cloud Platforms.
- Learn the objectives of Cloud storage provides and applications.
- To be familiar with the concepts of cloud computing /performance issues in storage.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamentals and essentials of Cloud Computing.	Apply
CO2	Understand the foundation of the cloud computing so that they can start using and adopting Cloud Computing services and tools in their real life scenarios.	Apply
CO3	Understand and design the Cloud Computing environment.	Understand
CO4	Understand the various Cloud storage providers in the world.	Analyze
CO5	Acquire the knowledge about the cloud applications	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	L	M	M	M	S	L	M	M	S	M
CO2	L	M	S	S	S	S	L	S	S	L	M	S
CO3	M	S	M	M	M	M	S	M	M	M	S	M
CO4	S	M	S	M	M	S	M	S	M	S	M	M
CO5	M	S	M	S	S	M	S	M	S	M	S	S

S-Strong; M-Medium; L-Low

UNIT I**9 Hours**

Cloud Computing at a Glance - Historical Developments - Building Cloud Computing Environments - Computing Platforms and Technologies Parallel vs. Distributed Computing - Elements of Parallel Computing - Elements of Distributed Computing - Technologies for Distributed Computing.

UNIT II**9 Hours**

Virtualization: Characteristics - Virtualization Techniques - Virtualization and Cloud Computing - Pros and Cons of Virtualization. **Cloud Computing Architecture:** Cloud Reference Model - Types of Clouds - Economics of Clouds, Open challenges.

UNIT III**10 Hours**

Concurrent Computing-Thread Programming: Programming applications with Threads - Multithreading with Aneka - Programming applications with Aneka threads. **High Throughput Computing-Task Programming:** Task Computing - Task-based Application Models – Aneka Task-Based Programming

UNIT IV**10 Hours**

Data Intensive Computing –Map-Reduce Programming: Introduction - Technologies for data-intensive computing - Aneka MapReduce Programming. **Cloud Platforms in Industry:** Amazon Web Services - Google App Engine - Microsoft Azure.

UNIT V**10 Hours**

Cloud Applications: Scientific Applications: Healthcare – Biology - Geo-science. **Business Applications:** CRM and ERP – Productivity - Social Networking. Media Applications - Multiplayer Online Gaming. **Advanced Topics in Cloud Computing:** Energy Efficiency in Clouds - Market Based Management of Clouds - Federated Clouds / InterCloud - Third Party Cloud Services.

Suggested Readings

- 1 “Mastering Cloud Computing Foundations and Applications Programming”, RajKumar Buyya, Christian Vecchiloa, S. Thamarai Selvi, TMH Publications,
- 2 “Cloud Computing a Practical Approach”, Velte Anthony and Velte T.J Elsenpeter, 1st Edition, 2010, Tata McGraw Hill Pvt Ltd, New Delhi.
- 3 “Cloud Computing with the Windows Azure Platform”, Lennings Roger, Wiley India Pvt. Ltd, 2010, New Delhi.
- 4 Cloud Computing: Concepts, Technology, and Architecture – By Zaigham Mahmood, Ricardo Puttini, and Thomas Erl.

Websites

- 1 http://docwiki.cisco.com/wiki/Introduction_to_cloud_Technologies
- 2 www.w3schools.com/cloud_computing/default.asp
- 3 <http://www.engppt.com/2009/12/cloud-computing-ppt-slides.html>

SEMESTER-V
BASICS OF ACCOUNTING

6H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	S	L	L	S	S	S	S	M	M
CO2	M	S	S	M	M	L	S	S	S	S	M	M
CO3	M	S	S	M	L	M	M	S	S	M	M	M
CO4	S	M	S	M	M	M	S	M	S	M	M	M
CO5	S	S	M	S	M	L	S	S	M	S	M	M

S-Strong; M-Medium; L-Low

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

Suggested Readings

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

Websites

- 1 <https://www.accounting.com/resources/basic-accounting-terms/>
- 2 https://www.tutorialspoint.com/accounting_basics/index.htm

SEMESTER-V
COMPUTER NETWORKS – PRACTICAL

5H-2C

Instruction Hours/week: L:3 T:1 P:2

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives (CO)

- To learn and use network commands.
- To learn socket programming.
- To implement and analyze various network protocols.
- To learn and use simulation tools.
- To use simulation tools to analyze the performance of various network protocols.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Implement various protocols using TCP and UDP.	Apply
CO2	Compare the performance of different transport layer protocols.	Apply
CO3	Use simulation tools to analyze the performance of various network protocols.	Apply
CO4	Analyze various routing algorithms.	Analyze
CO5	Implement error correction codes.	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	L	M	S	M	M	L	M	S
CO2	S	S	S	S	L	M	S	M	S	L	S	M
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	S	M	S	S	S	M	M	S	S
CO5	S	S	M	S	S	S	S	S	S	M	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

60 Hours

- 1 Write a HTTP web client program to download a web page using TCP sockets.
- 2 Simulation of DNS using UDP sockets.
- 3 Write a code simulating ARP /RARP protocols.
- 4 Study of Network simulator (NS) and Simulation of Congestion Control Algorithms using NS.
- 5 Study of TCP/UDP performance using Simulation tool.
- 6 Simulation of Distance Vector/ Link State Routing algorithm.
- 7 Performance evaluation of Routing protocols using Simulation tool.
- 8 Simulation of error correction code (like CRC).
- 9 Simulate and implements top and wait protocol for noisy channel.
- 10 Simulate and implement go back n sliding window protocol.

Suggested Readings

- 1 Computer Networks, Andrew S. Tanenbaum, 4th edition, PHI.
- 2 Data Communication and Networks, Achyut Godbole, 2007, TMH.
- 3 Computer Networks: Protocols, Standards, and Interfaces, Uyles Black, 2nd ed, PHI
- 4 Sathish Jain, Madhulika Jain, Vineeta Pillai, Kratika 2016. A Level Data Communication & Network Technologies .BPB publication.
- 5 Tanenbaum, A.S. 2016.ComputerNetworks(7thed.).New Delhi: PHI.

Websites

- 1 http://docwiki.cisco.com/wiki/Introduction_to_WAN_Technologies
- 2 www.w3schools.com/tcpip/default.asp
- 3 <http://www.engppt.com/2009/12/networking-fourozan-ppt-slides.html>
- 4 <http://citengg.blogspot.com/p/behrouz-forouzancomputer-networks4th.html>
- 5 http://www.crectirupati.com/sites/default/files/lecture_notes/DCN%20NOTES.pdf

SEMESTER-V

PHP PROGRAMMING – PRACTICAL

5H-2C

Instruction Hours/week: L:3 T:1 P:2

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives (CO)

- To understand how server-side programming works on the web.
- To learn PHP Basic syntax for variable types and calculations.
- To use PHP built-in functions and creating custom functions
- To understand POST and GET in form submission.
- To create a database in phpMyAdmin, to read and process data in a MySQL database

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Write PHP scripts to handle HTML forms.	Apply
CO2	Write regular expressions including modifiers, operators, and metacharacters.	Apply
CO3	Create PHP programs that use various PHP library functions, and that manipulate files and directories.	Apply
CO4	Analyze and solve various database tasks using the PHP language.	Analyze
CO5	Analyze and solve common Web application tasks by writing PHP programs	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	S	L	M	S	M	M	L	M	S
CO2	S	S	S	S	L	M	S	M	S	L	S	M
CO3	S	S	M	S	M	S	S	S	S	M	M	S
CO4	S	S	S	S	M	S	S	S	M	M	S	S
CO5	S	S	M	S	S	S	S	S	S	M	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

60 Hours

- 1 Simple programs using PHP
- 2 Program with control and looping structures.
- 3 Program on User defined PHP functions
- 4 PHP program using regular expression and string manipulation
- 5 PHP program using arrays and objects
- 6 Develop a PHP application using inheritance and interface
- 7 Develop a program in PHP session handling
- 8 PHP program to trace errors and exceptions
- 9 Connect the Web page to MySQL database
- 10 Create a web page to automate the sales and marketing system

Suggested Readings

- 1 David Sklar, Adam Trachtenberg, 2014. PHP Cookbook: Solutions & Examples for PHP.
- 2 Luke Welling, Laura Thompson, 2008. PHP and MySQL Web Development, (4th ed.), Addition Paperback, Addison-Wesley Professional.
- 3 Welling, Luke, "PHP and MYSQL Web Development", 3rd Edition, Pearson Education, New Delhi, 2005
- 4 Schlossnagle, George, "Advanced PHP Programming", Pearson Education, New Delhi, 2004.

Websites

- 1 www.php.net/
- 2 www.w3schools.com/PHP/default.asp

SEMESTER-V
.NET PROGRAMMING - PRACTICAL

5H-2C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To create windows forms using arrays and flow control statements.
- To Learn Basic windows controls using Visual Basic.Net
- To learn the classes and namespaces in the .NET Framework class library.
- To Develop Web Applications using Microsoft ASP.NET programming.
- 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

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

COs	Course Outcomes	Blooms Level
CO1	Develop Windows based applications using Visual Basic.Net	Remember
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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	L	M	L	S	M	M	L	M	S
CO2	S	S	S	L	M	M	S	M	S	L	S	M
CO3	S	S	S	M	S	M	S	S	S	M	M	S
CO4	S	S	S	M	S	M	S	S	M	M	S	S
CO5	S	S	S	S	S	S	S	S	S	M	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

60 Hours

VB.Net

- 1 Design a program for a various font application.
- 2 Design a form to create a calculator application
- 3 Write a program for a notepad application
- 4 Write a program to prepare employee payroll details
- 5 Design a windows applications to display, add, delete & edit information from database.

ASP.Net

- 1 Write a program to create an on-line quiz using content page holder.
- 2 Design a web Application form and validate it
- 3 Design a Online Recruitment system
- 4 Design a College Website
- 5 Design a web page to display, add, delete & edit information from database.

Suggested Readings

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

Websites

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

SEMESTER-V
SUMMER INTERNSHIP

2C

SEMESTER-VI
MACHINE LEARNING TECHNIQUES

6H-6C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To introduce students to the concepts and techniques of Machine Learning.
- To be able to formulate machine learning problems corresponding to different applications.
- To understand a range of machine learning algorithms along with their strengths and weaknesses.
- To be able to apply machine learning algorithms to solve problems of moderate complexity.
- To apply the algorithms to a real-world problem, optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Explain the regression methods, classification methods and clustering methods.	Explain
CO2	Design and implement deep learning architectures for solving real life problems	Design
CO3	Understand the basic concepts and techniques of Machine Learning.	Understand
CO4	Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory	Learn
CO5	Understand the inference and learning algorithms of K-mean Model.	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	S	M	L	S	M	L	M	L
CO2	L	M	S	M	L	S	L	M	S	M	L	S
CO3	M	M	L	S	M	S	M	L	M	L	S	L
CO4	L	M	S	L	S	L	S	L	S	M	L	M
CO5	M	S	L	M	S	L	M	L	S	L	M	L

S-Strong; M-Medium; L-Low

UNIT I

12 Hours

Introduction to Machine Learning: Introduction – Types of Machine Learning – Supervised Learning – The Brain and the Neuron – Design a Learning System – Perspectives and Issues in Machine Learning – Concept Learning Task – Concept Learning as Search- Statistical Decision Theory - Regression, Classification, Bias Variance – Linear Discriminants – Perceptron – Linear Separability – Linear Regression.

UNIT II

12 Hours

Machine Learning Models: Linear Models – Linear Regression, Multivariate Regression, Subset Selection, Shrinkage Methods- Multi-Layer Perceptron – Going Forwards – Going Backwards: Back Propagation Error – Multi-Layer Perceptron in Practice – Examples of using the MLP – Overview – Radial Basis Functions and Splines – Concepts – RBF Network – Curse of Dimensionality – Interpolations and Basis Functions – Support Vector Machines.

UNIT III

12 Hours

Neural Networks: Introduction, Early Models, Perceptron Learning, Backpropagation, Initialization, Training & Validation, Parameter Estimation - MLE, MAP, Bayesian Estimation- Stopping Criterion & Pruning loss functions, Categorical Attributes- Instability Evaluation Measures- Gradient Boosting, Random Forests, Multi-class Classification, Naive Bayes, Bayesian Networks.

UNIT IV

12 Hours

Tree and Probabilistic Models: Learning with Trees – Decision Trees – Constructing Decision Trees – Classification and Regression Trees – Ensemble Learning – Boosting – Bagging – Different ways to Combine Classifiers - Probability and Learning – Data into Probabilities – Basic Statistics – Gaussian Mixture Models – Nearest Neighbor Methods – Unsupervised Learning – K means Algorithms – Vector Quantization – Self Organizing Feature Map.

UNIT V

12 Hours

Graphical Models – Markov Chain Monte Carlo Methods – Sampling —Markov Chain Monte Carlo –Graphical Models – Bayesian Networks– Hidden Markov Models– Tracking Methods- Partitional Clustering, Hierarchical Clustering, Birch Algorithm, CURE Algorithm, Density-based Clustering- Machine Learning Case Studies in Technology- Machine Learning Case Studies on American Cancer Society on Google Cloud ML Engine.

Suggested Readings

- 1 Ethem Alpaydin, - Introduction to Machine Learning 3e (Adaptive Computation and Machine Learning Series), Third Edition, MIT Press, 2014.
- 2 Charu C. Aggarwal - Neural Networks and Deep Learning , 1st Kindle Edition,2018.
- 3 Kevin P. Murphy - “Probabilistic Machine Learning: An Introduction”,2022.

Websites

- 1 <https://ai.google/education/>
- 2 <https://machinelearningmastery.com/>
- 3 <https://www.tensorflow.org/>

SEMESTER-VI
BLOCK CHAIN TECHNOLOGY

6H-6C

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

End Semester Exam:3 Hours

Course Objectives

- To introduce students to the concepts and techniques of Blockchain Technology.
- To understand a conceptual elements for Blockchain.
- To summarize the major developments related to blockchain and cryptocurrencies.
- To apply the protocols for optimize the models learned and report on the expected accuracy that can be achieved by applying the models.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the security and performance perspective of blockchain technology	Understand
CO2	Learn and apply security analysis and performance-enhancing techniques related to blockchain.	Learn
CO3	Understand the real-life applications of blockchain technology and apply it to provide solutions to some real-life problems.	Understand
CO4	Categorize the various types of blockchains	Categorize
CO5	Evaluate alternative Blockchains and their applicability.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	S	L	S	L	M	M	S	L	S	L
CO2	M	M	L	M	S	M	L	M	L	M	L	M
CO3	L	M	S	L	M	L	L	L	M	L	M	S
CO4	M	M	L	S	L	S	L	S	L	S	L	S
CO5	S	M	S	M	M	L	M	L	M	L	M	L

S-Strong; M-Medium; L-Low

UNIT I Introduction to Blockchain**12 Hours**

Introduction to Blockchain history: Digital Money to Distributed Ledgers Design Primitives: Protocols, Security, Consensus, Permissions, Privacy. Blockchain Architecture and Design. Basic crypto primitives: Hash, Signature, Hashchain to Blockchain, Basic consensus mechanisms

UNIT II Network Security Models**12 Hours**

Network Security, Different type of network attack, Warm hole attack, byzantine attack, network based attack etc, Trust based Secure routing schemes.

UNIT III Bitcoin & Blockchain**12 Hours**

Bitcoin & Blockchain: Blockchain Structure, Basic Operations, Beyond Bitcoin, Gas, minor's role in blockchain. Ethereum Blockchain : Smart Contracts, Ethereum Structure, Ethereum Operations, Incentive Model in blockchain.

UNIT IV Cryptography and cryptocurrency**12 Hours**

Cryptography and cryptocurrency: Algorithms & Techniques Public-Key Cryptography, Public key and private key combinations in Blockchain security, Hashing, Transaction Integrity, Securing Blockchain. Blockchain in Financial Software and Systems (FSS): Settlements, KYC, Capital markets, Insurance Use case II: Blockchain in trade supply chain: Provenance of goods, visibility, tradesupply chain finance, invoice management discounting, etc

UNIT V Privacy and Security on Blockchain**12 Hours**

Blockchain Cryptography Privacy and Security on Blockchain, Blockchain consensus protocols, Various recent works on scalability Secure cryptographic protocols on Blockchain Secured, Multi-party Computation, Blockchain, for science: making better use of the data-mining network, Case Studies: Comparing Ecosystems - Bitcoin, Hyperledger, Ethereum and more

Suggested Readings

- 1 Melanie Swan, "Block Chain: Blueprint for a New Economy", O'Reilly, first edition – 2015
- 2 Daniel Drescher, "Block Chain Basics", Apress; 1st edition, 2017.
- 3 Anshul Kaushik, "Block Chain and Crypto Currencies", Khanna Publishing House, Delhi.

Websites

- 1 <https://ai.google/education/>
- 2 <https://docs.docker.com/get-started/https://console.ng.bluemix.net/docs/services/block%2520chain/index.html>
- 3 [https://developer.ibm.com/patterns/create-and-deploy-block chain-network-usingfabric-sdk-java/](https://developer.ibm.com/patterns/create-and-deploy-block-chain-network-usingfabric-sdk-java/)

SEMESTER-VI
CYBER FORENSIC

6H-6C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To introduce students to the concepts and techniques of Cyber Forensic.
- To understand a appropriate instances for the application of computer forensics.
- To understand the objectives of computer forensics, first of all, people have to recognize the different roles computer plays in a certain crime.
- To apply the protocols for optimize the models learned and report on the expected accuracy that can be achieved by applying the models.
- To Correctly collect and analyze computer forensic evidence the objective is to provide digital evidences which are obtained from digital media.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Explain the principles of network ,mobile and cyber forensic science	Explain
CO2	Learn and apply security analysis and performance-enhancing techniques related to blockchain.	Learn
CO3	Illustrate the cyber-crime investigation procedures	Illustrate
CO4	Apply the cyber-crime techniques to data acquisition and evidence collection	Apply
CO5	Examine the Volatile and Non-volatile Digital Evidence	Examine

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	M	L	L	M	M	L	L	M	L	L	S
CO2	S	L	S	L	S	S	S	L	L	S	S	S
CO3	L	M	M	M	M	L	M	M	M	M	M	M
CO4	S	S	S	S	L	S	S	S	S	S	S	L
CO5	M	M	L	M	M	L	L	M	L	L	L	L

S-Strong; M-Medium; L-Low

UNIT I Introduction to Cybercrime**12 Hours**

Introduction of Cybercrime: Types, The Internet spawns crime, Worms versus viruses, Computers' roles in crimes, Introduction to digital forensics, Introduction to Incident – Incident Response Methodology – Steps – Activities in Initial Response, Phase after detection of an incident.

UNIT II Basics of Digital Forensics**12 Hours**

Digital Forensics- Introduction, Objective and Methodology, Rules of Digital Forensics, Good Forensic Practices, Daubert's Standards, Principles of Digital Evidence. Overview of types of Computer Forensics – Network Forensics, Mobile Forensics, Social Media Forensics and E-mail Forensics. Services offered by Digital Forensics.

UNIT III Data Acquisition and Evidence Gathering**12 Hours**

Data Acquisition of live system, Shutdown Systems and Remote systems, servers. E-mail Investigations, Password Cracking. Seizing and preserving mobile devices. Methods of data acquisition of evidence from mobile devices. Data Acquisition and Evidence Gathering from Social Media. Performing Data Acquisition of encrypted systems. Challenges and issues in cyber-crime investigation.

UNIT IV Forensics Analysis and Validation**12 Hours**

Forensics analysis and validation: Determining what data to collect and analyze, validating forensic data, addressing data-hiding techniques, performing remote acquisitions
Network Forensics: Network forensics overview, performing live acquisitions, developing standard procedures for network forensics, using network tools, examining the honeynet project.

UNIT V Windows and Linux Forensics**12 Hours**

Windows Systems Artifacts: File Systems, Registry, Event logs, Shortcut files, Executables. Alternate Data Streams (ADS), Hidden files, Slack Space, Disk Encryption, Windows registry, startup tasks, jump lists, Volume Shadow, shellbags, LNK files, Recycle Bin Forensics (INFO, \$i, \$r files). Forensic Analysis of the Registry – Use of registry viewers, Regedit. Extracting USB related artifacts and examination of protected storages. Linux System Artifact: Ownership and Permissions, Hidden files, User Accounts and Logs.

Suggested Readings

- 1 Gerard Johansen, "Digital Forensics and Incident Response Incident response tools and techniques for effective cyber threat response", 3rd Edition, 16th Dec 2022.
- 2 LNJN National Institute of Criminology and Forensic Science, "A Forensic Guide for Crime Investigators – Standard Operating Procedures", LNJNNICFS, 2016.
- 3 Thomas J. Holt, Adam M. Bossler, Kathryn C. Seigfried-Spellar, "Cybercrime and Digital Forensics An Introduction" May 31, 2022-3rd Edition

Websites

- 1 <https://www.udemy.com/topic/cyber-security/>
- 2 <https://www.coursera.org/courses?query=cybersecurity>
- 3 <https://www.simplilearn.com/cyber-security>

SEMESTER-VI
ENTREPRENEURSHIP

6H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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

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

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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	S	M	L	M	M	S	S	M	M	S
CO2	S	S	M	S	M	L	S	S	M	S	M	S
CO3	S	S	M	M	M	S	S	M	S	M	S	M
CO4	M	S	S	M	M	L	S	M	S	M	M	S
CO5	S	S	M	M	L	M	M	S	M	S	S	M

S-Strong; M-Medium; L-Low

UNIT I Introduction to Entrepreneurship**12 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**12 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**12 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**12 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**12 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.

Suggested Readings

- 1 Vasanth Desai " Dynamics of Entrepreneurial Development and Management Himalaya Publishing House,2009.
- 2 N.P.Srinivasan & G.P.Gupta," Entrepreneurial Development ", Sultanchand & Sons, 2020
- 3 Paul Burns, Bloomsbury Academic ,"Corporate Entrepreneurship And Innovation",2020.
- 4 UNNI ,"Women Entrepreneurship In Indian Mid Class", Orient Blackswan Pvt. Ltd,2021.

Websites

- 1 <https://www.udemy.com/topic/cyber-security/>
- 2 <https://www.coursera.org/courses?query=cybersecurity>

SEMESTER-VI

MACHINE LEARNING 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

- To introduce students to the basic concepts and techniques of Machine Learning
- To develop skills of using recent machine learning software for solving practical problems
- To gain experience of doing independent study and research.
- Make use of Data sets in implementing the machine learning algorithms
- Implement the machine learning concepts and algorithms in any suitable language of choice

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Apply structured thinking to unstructured problems	Apply
CO2	Design and evaluate the unsupervised models through python in built functions.	Analyze
CO3	Understand the mathematical and statistical prospective of machine learning algorithms through python programming	Understand
CO4	Design and apply various reinforcement algorithms to solve real time complex problems.	Apply
CO5	Develop an appreciation for what is involved in learning from data	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	S	L	L	L	L	M	L	L
CO2	S	M	L	M	L	L	M	S	M	L	S	L
CO3	L	M	S	L	L	M	L	S	L	S	L	M
CO4	M	S	L	L	M	M	L	M	L	L	M	S
CO5	S	S	L	L	L	L	L	L	S	L	L	L

S-Strong; M-Medium; L-Low

List of Programs

40 Hours

- 1 Write a python program to import and export data using Pandas library functions
- 2 Develop Decision Tree Classification model for a given dataset and use it to classify a new sample.
- 3 Write a python program to implement K-Means clustering Algorithm
- 4 Implement and demonstrate the FIND-S algorithm for finding the most specific hypothesis based on a given set of training data samples. Read the training data from a .CSV file.
- 5 Write a program to demonstrate the working of the decision tree based ID3 algorithm. Use an appropriate data set for building the decision tree and apply this knowledge to classify a new sample
- 6 Develop Decision Tree Classification model for a given dataset and use it to classify a new sample.
- 7 Build Artificial Neural Network model with back propagation on a given dataset.
 - a) Implement Random forest ensemble method on a given dataset.
 - b) Implement Boosting ensemble method on a given dataset.
- 8 Write a program to implement k-Nearest Neighbour algorithm to classify the iris data set. Print both correct and wrong predictions. Java/Python ML library classes can be used for this problem
- 9 Implement the non-parametric Locally Weighted Regression algorithm in order to fit data points.
- 10 Build an Artificial Neural Network by implementing the Back-propagation algorithm and test the same using appropriate data sets.
- 11 Write a program to implement the naïve Bayesian classifier for a sample training data set stored as a .CSV file.
- 12 Build Artificial Neural Network model with back propagation on a given dataset.

Suggested Readings

1. C. M. Bishop. Pattern Recognition and Machine Learning. First Edition. Springer, 2006. (Second Indian Reprint, 2015).
2. P. Flach. Machine Learning: The Art and Science of Algorithms that Make Sense of Data. First Edition, Cambridge University Press, 2012.
3. S. J. Russell, P. Norvig. Artificial Intelligence: A Modern Approach. Third Edition, Prentice-Hall, 2010.

Websites

1. www.programmingsimplified.com
2. [www.programiz.com / cpp -programming](http://www.programiz.com/cpp-programming)

3. <https://machinelearningmastery.com/>

BACHELOR OF COMPUTER APPLICATIONS
23CAU691

2023-2024

SEMESTER-VI

PROJECT

8H-4C

Instruction Hours/week: L:0 T:0 P:8

Marks: Internal:40 External:60 Total:100

SEMESTER-VII

ARTIFICIAL INTELLIGENCE

6H-6C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand the Concepts of Artificial Intelligence
- To learn the different problem-solving techniques in AI
- To learn to represent knowledge in solving AI problems
- To understand the different ways of designing software agents
- To know about the various applications of AI.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the Basic concepts of Artificial Intelligence.	Remember, Understand
CO2	Represent a problem using first order and predicate logic.	Apply
CO3	Provide the apt agent strategy to solve a given problem.	Understand
CO4	Design software agents to solve a problem.	Apply
CO5	Analyze the various applications that use AI technology.	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	L	L	M	L	S	S	L	S	L	L
CO2	S	M	M	M	S	M	M	M	L	S	M	S
CO3	S	M	L	M	S	L	L	L	M	M	L	M
CO4	M	M	M	S	M	L	M	M	M	S	M	L
CO5	L	M	L	D	L	M	L	S	S	M	S	L

S-Strong; M-Medium; L-Low

UNIT I**14 Hours**

Introduction to Artificial Intelligence: Definition- History, Types - Future of Artificial Intelligence- Agent in Artificial Intelligence-Intelligent agents– Characteristics of Intelligent Agents– Types of Intelligent Agents –Example of Agents with their PEAS representation-CASE STUDY- Problem Solving Approach to Typical AI problem (Water Jug problem)-Towers of HANOI Problem

UNIT II**14 Hours**

Problem solving Methods: Search Strategies- Uninformed - Informed - Heuristics - Local Search Algorithms and Optimization Problems - Backtracking Search - Game Playing – Alpha - Beta Pruning - Stochastic Games -CASE STUDY- Traveling Salesman Problem

UNIT III**14 Hours**

KNOWLEDGE REPRESENTATION: First Order Predicate Logic – Prolog Programming– Unification – Forward Chaining Backward Chaining – Resolution – Knowledge Representation - Categories and Objects – Events - Reasoning Systems for Categories - Reasoning with Default Information

UNIT IV**15 Hours**

SOFTWARE AGENTS: Architecture for Intelligent Agents – Agent communication – Negotiation and Bargaining – Argumentation among Agents – Trust and Reputation in Multi-agent systems.

UNIT V**15 Hours**

APPLICATIONS: AI applications – Language Models – Information Retrieval- Information Extraction – Natural Language Processing - Machine Translation – Speech Recognition – Robot – Hardware – Perception.

Suggested Readings

- 1 Deepak Khemani 2015. “Artificial Intelligence”, Tata Mc Graw Hill Education
- 2 Stuart Russel and Peter Norvig 2016. “AI – A Modern Approach”, 2nd Edition, Pearson Education.
- 3 Peter Jackson, 2016. “Introduction to Expert Systems”, 3rd Edition, Pearson Education.
- 4 Dan W. Patterson, 2017. “Introduction to AI and ES”, Pearson Education.
- 5 Kevin Knight and Elaine Rich, Nair B.,2018. “Artificial Intelligence (SIE)”, Mc Graw Hill.

Websites

- 1 <https://www.simplilearn.com/tutorials/artificial-intelligence-tutorial>
- 2 <https://pdf.co/blog/problem-solving-techniques-in-artificial-intelligence-ai>
<https://stacks.stanford.edu/file/druid:xw061vq8842/xw061vq8842.pdf>
- 3 <https://www.edureka.co/blog/knowledge-representation-in-ai/>
- 4 https://en.wikipedia.org/wiki/Software_agent
- 5 <https://www.interviewbit.com/blog/applications-of-artificial-intelligence>

SEMESTER-VII
TEXT ANALYTICS

6H-6C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To interpret the basics of text analysis.
- To infer about text mining - text analytics and web analytics.
- To illustrate the domains that makeup text analytics and web analytics.
- To explore text visualization techniques and anomaly detection.
- To learn about Events and trends in text streams

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

COs	Course Outcomes	Blooms Level
CO1	Recognize the feasibility of History of Text Mining and Basics of Text Analytics	Apply
CO2	Analyze Seven Practice Areas of Text Analytics	Apply
CO3	Design classification techniques for text mining	Understand
CO4	Evaluate effectively use of Web Analytics and Web Mining and Future of Text and Web Analytics	Apply
CO5	Perform Event operations in Text streams	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	L	M	L	L	M	M	M	L	L	L	M
CO2	M	M	L	L	L	S	L	S	L	S	M	L
CO3	S	S	S	M	M	M	S	M	S	M	L	S
CO4	M	M	L	M	S	L	M	L	M	S	S	M
CO5	S	S	S	M	M	M	S	M	S	M	L	S

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION **14 Hours**

History of Text Mining Roots of text mining - Information extraction and text mining - Development of enabling technology in text mining - Sentiment analysis and opinion mining.

Unit – II **14 Hours**

Text Analytics

Basics of Text Analytics 6: Definition - Business challenges addressed: information organization and access - Discovery of patterns – Discovery.

UNIT III Areas of Text Analytics **14 Hours**

Seven Practice Areas of Text Analytics : Seven practice areas of text analytics - Finding the appropriate solution to a problem - Overall relationship - Visualizing the domains of text analytics.

UNIT IV Web Analytics and Web Mining **15 Hours**

Web Analytics and Web Mining : Value of web analytics - Components of web mining - Concepts and terminology in web analytics - Web analytics and web mining - Optimal paths to successful web analytics evolution in a company.

UNIT V Future of web analytics **15 Hours**

Future of Text and Web Analytics: Text analytics and text mining - Future of web analytics - Future of text mining - Integration of web analytics with standard business intelligence tools – New areas that may use text analytics. Case Studies

Suggested Readings

- 1 Michael W. Berry & Jacob Kogan, "Text Mining Applications and Theory", Wiley publications, 2010.
- 2 Aggarwal, Charu C., and Cheng Xiang Zhai, eds., "Mining text data", Springer Science & Business Media, 2020.
- 3 Miner, Gary, et al., "Practical text mining and statistical analysis for non-structured text data applications", Academic Press, 2012.
- 4 Srivastava, Ashok N., and Mehran Sahami, "Text mining: Classification, clustering, and applications", Chapman and Hall/CRC, 2022.
- 5 Buitelaar, Paul, Philipp Cimiano, and Bernardo Magnini, eds., "Ontology learning from text: methods, evaluation and applications", Vol. 123. IOS press, 2019.

Websites

- 1 https://en.wikipedia.org/wiki/Text_mining
- 2 <https://guides.lib.berkeley.edu/text-mining>
- 3 <https://nptel.ac.in/courses/110107129>
- 4 <https://www.oreilly.com/library/view/text-mining-and/9781612907871/>

SEMESTER-VII
STATISTICAL COMPUTING

6H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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

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

COs	Course Outcomes	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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	M	L	M	S	S	S	S	L	M
CO2	M	S	S	S	L	M	M	M	M	S	M	L
CO3	S	S	S	M	L	L	M	S	S	M	M	M
CO4	M	S	S	S	M	L	S	M	S	M	L	M
CO5	S	S	S	S	M	L	M	M	S	S	M	M

S-Strong; M-Medium; L-Low

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**15 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.

Suggested Readings

- 1 Gupta S. P., (2001), Statistical Methods, Sultan Chand & Sons, New Delhi.
- 2 Gupta S. C., (1974), Statistical Quality Control, Khanna Publishing Co, New Delhi.
- 3 Mahajan M., (2009), Statistical Quality Control, Dhanpat Rai & Co. (P) Ltd., Educational & Technical Publishers, New Delhi.

Websites

- 1 <http://www2.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>

SEMESTER-VII

ARTIFICIAL INTELLIGENCE PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To impart the basic knowledge about the fundamentals of Artificial intelligence.
- To understand the concepts of Algorithms for Artificial intelligence.
- To understand the working of Semiconductor devices and Digital Circuits.
- To impart the basic knowledge of Measuring Instruments and Electrical Installation.
- Know the Principles of pattern recognition with estimation.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	To Understand the concept of Artificial intelligence.	Understand,Apply
CO2	To apply various search algorithms of artificial intelligence.	Understand,Apply
CO3	To apply knowledge representation and reasoning techniques	Apply
CO4	To understand & apply different types of machine learning and models.	Apply
CO5	To understand the design principles of pattern recognition with estimation and apply classification technique	Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	L	M	M	L	L	S	S	L	M	S	M
CO2	M	S	S	L	S	S	M	L	M	S	S	S
CO3	S	M	S	M	M	M	L	M	S	M	M	S
CO4	M	L	M	S	S	S	M	S	L	S	S	L
CO5	L	M	L	L	S	L	L	M	L	S	M	L

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

72 Hours

- 1 Write a Program to Implement Breadth First Search using Python.
- 2 Write a Program to Implement Depth First Search using Python
- 3 Write a Program to Implement Tic-Tac-Toe game using Python.
- 4 Write a Program to Implement 8-Puzzle problem using Python
- 5 Write a Program to Implement Water-Jug problem using Python
- 6 Write a Program to Implement Travelling Salesman Problem using Python
- 7 Write a Program to Implement Tower of Hanoi using Python.
- 8 Write a Program to Implement Monkey Banana Problem using Python.
- 9 Write a Program to Implement 4 Queen Problem.
- 10 Write a Program to Implement a simple chatbot.

Suggested Readings

- 1 Artificial Intelligence by Elaine Rich, Kevin Knight and Nair ISBN-978-0-07- 008770-5, TMH,
- 2 Artificial Intelligence by SarojKausik ISBN:- 978-81-315-1099-5, Cengage Learning
- 3 Artificial Intelligence and Intelligent Systems by Padhy, Oxford University Press,
- 4 Artificial Intelligence: A Modern Approach by Peter and Norvig ISBN-0-13- 1038052

Websites

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

SEMESTER-VII
TEXT ANALYTICS PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- Explain the text analytics framework.
- Analyze various sources of text data.
- Measure machine learning model performance with appropriate metrics.
- Interpret the results, gain insights, and recommend possible actions from analytics performed on text data.
- Implement the text analytics learning concepts in any suitable language of choice

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Apply structured thinking to unstructured problems	Apply
CO2	Analyze various sources of text data.	Analyze
CO3	Understand the mathematical and statistical prospective of machine learning algorithms through python programming	Understand
CO4	Create processes and implement apply various reinforcement algorithms to solve real time complex problems.	Analyze
CO5	Develop an appreciation for what is involved in learning from data	Develop

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	M	L	M	S	S	M	M	L	M	M	S
CO2	M	L	M	M	M	M	M	L	S	L	S	S
CO3	S	M	L	S	S	S	L	S	M	S	L	M
CO4	M	M	M	L	M	L	M	M	M	M	M	L
CO5	S	M	M	M	L	S	S	M	S	S	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

72 Hours

- 1 To Implement Perform Text –Wrangling and pre-processing textual data using python
- 2 Calculate number of words, number of characters, average word length and number of stop words
- 3 Remove the words using Tokenization (Stop words removal, punctuations ,etc.,) for text data.
- 4 Calculate N-grams and term frequency for multiple words in the dataset
- 5 Calculate Inverse Document Frequency and Term Frequency –Inverse Document Frequency (TF-IDF) for words
- 6 Perform sentiment analysis of few tweets in python
- 7 Convert the text into vectors using words embedding techniques
- 8 Write code that groups document by topic
- 9 Solve using supervised model for text data
- 10 Solve using the unsupervised model for text data
- 11 Write a program using any algorithm to retrieve documents.
- 12 To Implementing two different map reduce programs using joins

SUGGESTED READINGS

1. Manning, C. D., Raghavan, P., and Schütze, H. 2008. Introduction to Information Retrieval. Cambridge University Press, 2008.
2. Miner, G., Delen, D., Elder, J., Fast, A., Hill, T., and Nisbet, A. R. (2012). Practical Text Mining and Statistical Analysis for Non-structured Text Data Applications. Elsevier Inc..
3. Bird, S., Klein, E., & Loper, E. (2009). Natural Language Processing with Python. O'Reilly Media, Inc.
4. Abdul-Mageed, M. (2016). Sentiment Analysis.
5. Armony, J., & Vuilleumier, P. (Eds.). (2013). The Cambridge handbook of human affective neuroscience. Cambridge University Press.

WEBSITES

1. <http://www-nlp.stanford.edu/IRbook/>.
2. <http://www.gbv.de/dms/ilmnau/toc/668584769.PDF>
3. <https://guides.lib.berkeley.edu/text-mining>
4. https://en.wikipedia.org/wiki/Text_mining

SEMESTER- VIII-A
DATA VISUALIZATION

6H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To impart the basic knowledge about the Data Visualization techniques.
- To understand the concept of Recent Trends in Data Visualization Techniques.
- To understand the working of various data analysis tasks.
- To impart the basic knowledge of data set in visualization.
- Know the fundamentals of design issues in visual perception.

Course Outcomes

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

COs	Course Outcomes	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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	S	L	M	M	S	L	M	M	M
CO2	S	S	M	S	S	S	M	M	M	L	M	L
CO3	S	S	M	M	M	S	S	L	L	M	M	M
CO4	S	M	S	S	M	M	M	L	M	M	S	M
CO5	S	S	S	S	S	L	S	S	M	S	S	S

S-Strong; M-Medium; L-Low

UNIT I

12 Hours

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

UNIT II

12 Hours

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

UNIT III

12 Hours

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

UNIT IV

12 Hours

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

UNIT V

12 Hours

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

Suggested Readings

- 1 Jon Raasch, Graham Murray, Vadim Ogievetsky, Joseph Lowery, "JavaScript and jQuery for Data Analysis and Visualization", WROX
- 2 Ritchie S. King, Visual story telling with D3" Pearson
- 3 Ben Fry, "Visualizing data: Exploring and explaining data with the processing environment", O'Reilly, 2008.
- 4 Tamara Munzner, Visualization Analysis and Design, AK Peters Visualization Series, CRC Press, Nov. 2014

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/>

SEMESTER-VIII-A
ADVANCED JAVA

6H-5C

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

End Semester Exam:3 Hours

Course Objectives

- To understand the Graphical User Interface (GUI) networking, and database manipulation.
- To know the use of advanced technology in Java such as Internationalization, and Remote method Invocation
- To learn how to work with JavaBeans.
- To develop web application using Java Servlet and Java Server Pages technology.
- To know the architecture of JSP and JSTL.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Identify advance concepts of java programming with database connectivity	Apply
CO2	java.net package contains the fundamental classes for communications and working with networked resources.	Apply
CO3	Design and develop platform independent applications using a variety of component based frameworks	Understand
CO4	Make familiar with Java Servlet concepts by working on projects related to java Servlet.	Apply
CO5	Support for common structural tasks such as iteration and conditional tags for manipulating tags.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	L	M	M	M	S	S	M	S	S	S
CO2	M	M	M	L	M	L	S	L	L	M	M	M
CO3	S	L	L	M	M	M	S	S	M	S	S	S
CO4	M	L	M	M	S	M	M	S	L	M	M	M
CO5	S	S	M	S	S	S	M	S	L	M	M	M

S-Strong; M-Medium; L-Low

UNIT I**12 Hours**

SWING AND DATABASE CONNECTIVITY : Introduction To Swing, MVC Architecture, Applets, Applications and Pluggable Look and Feel, Basic swing components : Text Fields, Buttons, Toggle Buttons, Checkboxes, and Radio Buttons. Java database Programming, java.sql Package, JDBC driver.

UNIT II**12 Hours****NETWORKING, RMI PROGRAMMING, SERIALIZATION AND INTERNATIONALIZATION**

Network Programming With java.net Package, Client and Server Programs, Content And Protocol Handlers. RMI architecture, RMI registry, Writing distributed application with RMI, Naming services, Naming And Directory Services, Overview of JNDI, Object serialization and Internationalization.

UNIT III**12 Hours**

J2EE ARCHITECTURE: J2EE architecture, Enterprise application concepts, n-tier application concepts, J2EE platform, HTTP protocol, web application, Web containers and Application servers

UNIT IV**12 Hours**

SERVLET PROGRAMMING: Server side programming with Java Servlet, HTTP and Servlet, Servlet API, life cycle, configuration and context, Request and Response objects, Session handling and event handling, Introduction to filters with writing simple filter application

UNIT V**12 Hours**

JSP & JSTL: JSP architecture, JSP page life cycle, JSP elements, Expression Language, Tag Extensions, Tag Extension API, Tag handlers, JSP Fragments, Tag Files, JSTL, Core Tag library, overview of XML Tag library, SQL Tag library and Functions Tag library.

Suggested Readings

- 1 Java 6 Programming, Black Book, Dreamtech
- 2 Java RMI, William Grosso Publisher: O' Reilly, Giant Dino
- 3 The Complete Reference,J2EE, Jim Keogh
- 4 Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
- 5 Advanced Java Technology, By M.T. Savaliya, Dreamtech

Websites

- 1 <https://www.javaguides.net/2019/07/java-swing-application-with-database-connection.html>
- 2 https://www.tutorialspoint.com/java_rmi/java_rmi_introduction.htm
- 3 https://www.ibm.com/docs/SS4JE2_7.5.5/org.eclipse.jst.j2ee.doc.user/topics/cjarch.html
- 4 <https://www.javatpoint.com/servlet-tutorial>
- 5 <https://www.javatpoint.com/jstl>

SEMESTER-VIII-A
ORGANIZATIONAL BEHAVIOR

6H-5C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- 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

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

COs	Course Outcomes	Blooms Level
CO1	relate the different personality types and attitudes	Understand
CO2	describe various causes of perception, emotions and moods to shape and modify behavior.	Understand
CO3	discuss the various theories of motivation and apply them to create effective team	Understand
CO4	compare and contrast various leadership theories and styles	Understand
CO5	apply various methods for conflict management	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	M	S	L	M	M	M	S	S	M	S	S	S
CO2	M	M	M	L	M	L	S	L	L	M	M	M
CO3	S	L	L	M	M	M	S	S	M	S	S	S
CO4	M	L	M	M	S	M	M	S	L	M	M	M
CO5	S	S	M	S	S	S	M	S	L	M	M	M

S-Strong; M-Medium; L-Low

UNIT I**12 Hours**

OB: Meaning and Importance - Disciplines Contributing to Organizational Behaviour - Challenges and opportunities for OB. Personality: Its determinants, attributes, traits - Values & attitudes. Perception: Factors Influencing – Link between Perception and Individual Decision making

UNIT II**12 Hours**

Motivation: Motivation - Basic Concepts-Motivation Theories. Group Dynamics and Team Management -Types of Groups, Group Norms and Cohesiveness: Group Roles,– Group Decision making Techniques teams, creating effective team.

UNIT III**12 Hours**

Organizational Culture: Role, Elements of Organizational Culture-Organizational Culture and Performance-Changing and Strengthening Culture-Organizational Socialization-matching people with culture

UNIT IV**12 Hours**

Conflict Process: Sources of Conflict-Structural approach to Conflict Management-Resolving conflict through Negotiation. Organizational Dynamics: Organizational Change- Forces for change, managing resistance to change - Organization Development

UNIT V**12 Hours**

Organizational Theories: Theories of Learning - Behaviour modification. Contingent Workforce Power and Politics in Organization – Leadership and Communication. Stress: Work Stress-Cause and Consequences-Stress Management.

Suggested Readings

- 1 Robbins Stephen. P, "Organizational Behaviour", Pearson Education, 2013.
- 2 Mcshane L. Steven, Von Glinow Mary, and Ann Sharma R. Radha, "Organizational Behaviour", Tata McGraw Hill, 2012.
- 3 Luthans Fred, "Organizational Behaviour", Tata McGraw Hill, 2013.
- 4 Dash Chandra Sekhar, "Organizational Behaviour", International Book House, 2013.
- 5 Kumar Meenakshi, "Organizational Behaviour", Vikas Publication, 2012.

Websites

- 1 <https://libguides.tru.ca/organizationalbehaviour/>
- 2 <https://openstax.org/details/books/organizational-behavior>
- 3 <https://www.hbs.edu/faculty/units/ob/Pages/default.aspx>

SEMESTER- VIII-A
DATA VISUALIZATION - PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

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

Course Outcomes

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

COs	Course Outcomes	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

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	M	S	S	L	M	M	S	L	M	M	M
CO2	S	S	M	S	S	S	M	M	M	L	M	L
CO3	S	S	M	M	M	S	S	L	L	M	M	M
CO4	S	M	S	S	M	M	M	L	M	M	S	M
CO5	S	S	S	S	S	L	S	S	M	S	S	S

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

60 Hours

1. Loading and Distinguishing Dependent and Independent parameters
2. Exploring Data Visualization tools
3. Drawing Charts
4. Drawing Graphs
5. Data mapping
6. Creating Scatter Plot maps
7. Using BNF Notations
8. Working with REGEX
9. Visualize Network Data
10. Understanding Data Visualization frameworks

Suggested Readings

- 1 E. Tufte, The Visual Display of Quantitative Information, Graphics Press. 2nd Edition, 2001
- 2 Alexandru C Telea, Data Visualization: Principles And Practice, 2nd Edition, 2014
- 3 Wang Kaining, Infographic & Data Visualizations, sew Edition. 2013
- 4 Andy Krik, Data Visualisation : A Handbook for Data Driven Design, 1st Edition, 2016

Websites

- 1 <https://www.tableau.com/learn/articles/data-visualization>
- 2 <https://www.ibm.com/in-en/topics/data-visualization>
- 3 <https://www.geeksforgeeks.org/data-visualization-with-python/>
- 4 <https://www.freecodecamp.org/news/d3js-tutorial-data-visualization-for-beginners/>
- 5 <https://www.dataversity.net/demystifying-advanced-data-visualization/>

SEMESTER-VIII
ADVANCED JAVA - PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand the Graphical User Interface (GUI) networking, and database manipulation.
- To know the use of advanced technology in Java such as Internationalization, and Remote method Invocation
- To learn how to work with JavaBeans.
- To develop web application using Java Servlet and Java Server Pages technology.
- To know the architecture of JSP and JSTL.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Identify advance concepts of java programming with database connectivity	Apply
CO2	java.net package contains the fundamental classes for communications and working with networked resources.	Apply
CO3	Design and develop platform independent applications using a variety of component based frameworks	Understand
CO4	Make familiar with Java Servlet concepts by working on projects related to java Servlet.	Apply
CO5	Support for common structural tasks such as iteration and conditional tags for manipulating tags.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	S	S	M	M	L	M	S	S	S	S	L	M
CO2	M	S	S	S	L	M	M	M	M	S	M	L
CO3	S	S	S	M	L	L	M	S	S	M	M	M
CO4	M	S	S	S	M	L	S	M	S	M	L	M
CO5	S	S	S	S	M	L	M	M	S	S	M	M

S-Strong; M-Medium; L-Low

LIST OF PROGRAMS

60 Hours

1. Write a program to access a table Product Master from MySql4.1 database using Java code.
2. Write a program using Servlet to display Visitor Count.
3. Write a program for authentication, which validate the login-id and password by the servlet code.
4. Write a program to connecting a database using user-id and password.
5. Write a program to insert data into the database using the prepared statement.
6. Write a program to read data from the database using the ResultSet.
7. Write a program to read data send by the client (HTML page) using servlet.
8. Write a program to include a HTML page into a JSP page.
9. Write a program to display http request Header in JSP.
10. Write a program to handle the JSP Exception.
11. Write a program to read data send by a client (HTML page) using JSP.
12. Write a program to Develop Login Form in Struts.

Suggested Readings

- 1 Java 6 Programming, Black Book, Dreamtech
- 2 Java RMI, William Grosso Publisher: O' Reily, Giant Dino
- 3 The Complete Reference,J2EE, Jim Keogh
- 4 Java Server Programming, Java EE6 (J2EE 1.6), Black Book, Dreamtech
- 5 Advanced Java Technology, By M.T. Savaliya, Dreamtech

Websites

- 1 <https://www.javaguides.net/2019/07/java-swing-application-with-database-connection.html>
- 2 https://www.tutorialspoint.com/java_rmi/java_rmi_introduction.htm
- 3 https://www.ibm.com/docs/SS4JE2_7.5.5/org.eclipse.jst.j2ee.doc.user/topics/cjarch.html
- 4 <https://www.javatpoint.com/servlet-tutorial>
- 5 <https://www.javatpoint.com/jstl>

SEMESTER- VIII B
RESEARCH METHODOLOGY AND IPR

6H-4C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

- To understand the methods and techniques in Research Methodology.
- To study the various methods available for Data Collection
- To understand the importance of Intellectual Property Rights
- To impart the knowledge of filing and publishing patents.
- To know the fundamentals of copyrights for protecting innovations.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Analyze the importance of Research Methodology	Analyze
CO2	Apply the Data Collection methods for doing Research	Apply
CO3	Analyze the role of Intellectual Property Rights for protecting the Intellectual Products	Analyze
CO4	Apply the methods of filing patents for protecting inventions of Individuals	Apply
CO5	Apply the procedure of copyrights for maintaining ownership	Apply

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	M	L	S	M	S	L	M	S	L	L	S
CO2	M	S	M	L	L	M	M	S	L	M	L	L
CO3	S	M	L	M	L	M	L	M	L	S	M	S
CO4	L	M	L	S	M	S	L	M	S	L	L	S
CO5	M	S	L	M	L	L	M	S	M	L	L	M

S-Strong; M-Medium; L-Low

UNIT I RESEARCH FORMULATION AND DESIGN

12 Hours

Nature and Scope of Research in Business- Types of Research - Significance - Research Process- Characteristics of Good Research-Problem Identification and Selection – Review of Literature – Need for review of Literature - Research Design - Meaning, Need, Features of Good Design - Different types of Research Design - Developing a Research Plan -Hypothesis-Meaning- Significance-Testing-Types-Type I/ II Errors. Report Writing - Layout of the report -Analysis and Interpretation - Types of report - Steps in writing the report - Evaluation of report

UNIT II DATA COLLECTION AND ANALYSIS

12 Hours

Accepts of method validation, observation and collection of data - methods of data collection, sampling methods - Data processing and Analysis strategies and tools- Data analysis with statically package (Sigma STAT,SPSS for student t-test, ANOVA, etc.) - Hypothesis testing

UNIT III Overview of IPR

12 Hours

Introduction to Intellectual Property Rights - Concept and Theories - Kinds of Intellectual Property Rights - Economic analysis of Intellectual Property Rights - Need for Private Rights versus Public Interests- Advantages and Disadvantages of IPR.

UNIT IV Patents

12 Hours

Definition, kind of inventions protected by patent- Patentable and Non patentable inventions- Process and product patent - patent of addition - Legal requirements for patents- Granting of patent - Rights of a patent - Exclusive Rights. Patent Application Process: Searching a patent – Drafting of a patent- Filing of a patent- Types of patent Applications

Unit V Copyrights

12 Hours

Copyrights- Rights and Protection covered by copyright – Law of copy rights: Fundamentals of copyright law- originality of material- rights of reproduction – Rights to perform the work publicly- Copyright Ownership Issues-Obtaining Copyright Registration -Notice of Copyright – International Copyright Law- Infringement of Copyright Under Copyright Act

Suggested Readings

- 1 R.Radha Krishnan and S.Balasubramanian, “Intellectual Property Rights” , First Edition, Excel Books, New Delhi, 2012
- 2 Mr.Ramakrishna Chintakunta, “A Textbook of Intellectual Property Rights”, Blue Hill Publications,2022.
- 3 Voldman, Steven H, “From Invention to Patent: Scientist and Engineer’s Guide”, Wiley Publications,2018
- 4 C.R. Kothari , Gaurav Garg , Research Methodology Methods and Techniques, New Age International Publishers, 2019

Websites

- 1 <https://research.com/research/how-to-write-research-methodology>
- 2 <https://blog.ipleaders.in/all-about-intellectual-property-rights-ipr/>
- 3 <https://www.enago.com/academy/researchers-guide-to-patents/>
- 4 <https://www.studocu.com/en-gb/document/university-of-kent/intellectual-property-law/copyright-notes/4708386>

SEMESTER- VIII B
SPSS - PRACTICAL

6H-3C

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

Marks: Internal:40 External:60 Total:100

End Semester Exam:3 Hours

Course Objectives

This course enables the students to learn

- To understand the basic concepts in probability the or and the nature of uncertainty.
- To realize the applications of probability and commonly used probability distributions (both discrete and continuous), Central Limit theorem and their applications in various disciplines.
- To know the various techniques of descriptive and inferential statistics, and how to apply them for examining data in the analytical decision making.
- To draw conclusions based on sample data by constructing statistical hypothesis and estimation with statistical tools and techniques.
- To explain the foundations of probabilistic and statistical analysis which are mostly applied in computer science.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Evaluate various measures of descriptive statistical measures for any given data.	Analyze
CO2	Comprehend the application of Bivariate and multivariate analysis	Apply
CO3	Understand the basic concept of test of significance and make inferences from statistical tests	Understand
CO4	Derive the relationship between data using Correlation, Rank Correlation and Regression for two variables.	Apply
CO5	Develop an ability to analyze, demonstrate to provide meaningful information in from the collected statistical data.	Evaluate

List of Programs**60 Hours**

1. Various other Software Package available for Data Analytics
2. Calculation of Basic Statistical Measures using Excel.
3. Introduction to SPSS Software Package for Data Analytics
4. Drawing of graphs and diagrams using SPSS software
5. Calculation of Mean, Median and Mode
6. Calculation of Standard deviation
7. Calculation of Karl Pearson's Correlation
8. Calculation of Rank Correlation Coefficient
9. Fitting of Linear Regression
10. Hypothesis Testing for small sample test (t - test)
11. Hypothesis Testing for two sample t - test
12. Hypothesis Testing for Large sample (Z-test)
13. Testing Hypothesis using chi-square - test (for Goodness of fit)
14. Testing Hypothesis using chi-square - test (for Contingency Table)

Suggested Readings

- 1 SPSS Lab Manual
- 2 U Dinesh Kumar (2017), Business Analytics: The Science of Data - Driven Decision Making, Wiley, New Delhi.
- 3 Daniel Y Chen (2017), Pandas for everyone - Python data Analysis,
- 4 R. Evans James (2017), Business Analytics, 2nd edition, Pearson Education, New Delhi.

SEMESTER- VIII B

RESEARCH PROJECT PREPARATION OF RESEARCH PROJECT

18H-12C

Instruction Hours/week: L:0 T:0 P:18

Marks: Internal:100 External:200 Total:300

End Semester Exam:3 Hours

MOBILE APPLICATION DEVELOPMENT

COURSE OBJECTIVES

- Develop knowledge about mobile application development.
- Understand the building blocks of mobile apps.
- Gain knowledge about graphics and animations in mobile apps.
- Know about testing of mobile apps.
- Learn the advantages and limitations of development frameworks.
- Understand more about how to distribute apps on mobile market place.

COURSE OUTCOMES

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

COs	Course Outcomes	Blooms Level
CO1	Explain the overview of android with its states and lifecycle.	Knowledge
CO2	Apply the mobile applications for e-marketing in Android and iPhone.	Apply
CO3	Analyze mobile databases and various types of testing.	Analyze
CO4	Develop the simple android applications.	Understand
CO5	Evaluate alternative mobile frameworks, and contrast different programming platforms.	Evaluate

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		S		M		L	S		L			S
CO2			M		L		L		S		M	
CO3	M	L				M				S	L	L
CO4	S		L	S		S		L	M		M	
CO5	L	S			M		M		L		L	

S-Strong; M-Medium; L-Low

UNIT I

Mobility landscape – Mobile platforms – Mobile apps development – Overview of android platform – Setting up the mobile app development environment along with an emulator – A case study on mobile app development

UNIT II

App user interface designing – Mobile UI resources (Layout, UI elements, Draw-able, Menu) – Activity – States and life cycle – Interaction amongst activities – App functionality beyond user interface – Threads, AsyncTask, services – States and lifecycle, Notifications, Broadcast receivers.

UNIT III

Telephony and SMS APIs – Native data handling – On-device file I/O – Shared preferences – Mobile databases such as SQLite, and enterprise data access (via Internet/Intranet). Graphics and animation – Custom views – Canvas – Animation APIs – Multimedia – Audio/video playback and record – Location awareness and native hardware access (sensors such as accelerometer and gyroscope).

UNIT IV

Debugging mobile apps – White box testing – Black box testing and test automation of mobile apps – JUnit for android, Robotium and MonkeyTalk. Versioning – Signing and packaging mobile apps – Distributing apps on mobile market place. Introduction to Objective-C – iOS features

UNIT V

UI implementation – Touch frameworks – Location aware applications using Core Location and MapKit – Integrating calendar and address book with social media application – Using WiFi – iPhone market place – Drawbacks on iOS over Android – Various stores available in online market – Configuration of mobile app – Online e-commerce transaction – E-booking transaction.

Suggested Readings

- 1 Anubhav Pradhan and Anil V Deshpande, Composing Mobile Apps Wiley, First Edition 2014
- 2 Barry Burd, Android Application Development All-in-one for Dummies, John Wiley, First Edition 2012

Websites

- 1 www.impetus.com/mobility
- 2 www.cise.ufl.edu/~helal/classes/f10/notes/intro_to_mobile.ppt
- 3 www.diva-portal.org/smash/get/diva2:626531/FULLTEXT01.pdf
- 4 www.law.fsu.edu/library/databases/ppt/Androidapps.ppt
- 5 www.infosys.com/flypp/resources/Documents/mobile-application-testing.pdf

INTERNET OF THINGS

COURSE OBJECTIVES

- The goal of this course is for the students is to
- Understand the basics of Internet of Things.
- Identify an idea of some of the application areas where Internet of Things can be applied.
- Infer the middleware for Internet of Things.
- Express the concepts of Web of Things .
- Examine the concepts of Cloud of Things with emphasis on Mobile cloud computing.
- Inspect the IOT security protocols.

COURSE OUTCOMES

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

COs	Course Outcomes	Blooms Level
CO1	Explain about IoT architecture and its applications.	Knowledge
CO2	Identify the feasibility and potential impact of IoT solutions in different industries.	Apply
CO3	Apply a systematic and structured approach to designing IoT solutions.	Apply
CO4	Summarize techniques to secure the elements of an IoT device.	Understand
CO5	Illustrate security protocols in various domains of industrial applications.	Knowledge

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1		L	L	M		S	M	M	L	M		
CO2		M	L		S		L		M	S		
CO3	M	L			M	L				S	L	L
CO4	L		L	M		S		L		M	M	
CO5	L	S			M		S	S	L	S	L	

S-Strong; M-Medium; L-Low

UNIT I: INTRODUCTION TO IOT

Introduction to IoT – IoT Architectures – Core IoT Functional Stack, Sensors and Actuators Layer, Communications Network Layer, Applications and Analytics Layer – IoT Data Management and Compute Stack, Fog Computing, Edge Computing, Cloud Computing –

Sensors, Actuators, Smart Objects, Sensor networks. Middleware for IoT: Overview – Communication middleware for IoT –IoT Information Security, WSN and Sensing Model.

UNIT II: IOT COMMUNICATION

Communications Criteria – Access Technologies – IP as IoT Network Layer – Business case – Optimization – Profiles and compliances – Application Protocols – Transport Layer – Application Transport Methods.

UNIT III: DESIGN METHODOLOGY

Design Methodology – Case study – Basic blocks of IoT device – Raspberry Pi – Board, Interfaces, Linux, Setting up, Programming – Arduino – Other IoT Devices.

UNIT IV: DATA ANALYTICS FOR IOT

Data Analytics for IoT – Big Data Analytics Tools and Technology – Edge Streaming Analytics – Network Analytics Applications. Security history, challenges, variations – Risk Analysis Structures – Application in Operational Environment.

UNIT V IOT IN INDUSTRY

Manufacturing, Architecture, Security Protocols – Utilities, Grid Blocks - Smart Cities, Architecture, Use cases – Transportation, Architecture, Use cases.

Suggested Readings

- 1 Honbo Zhou “The Internet of Things in the Cloud: A Middleware Perspective”, CRC Press, 2013
- 2 Dieter Uckelmann, Mark Harrison, Florian Michahelles, “Architecting the Internet of Things”, Springer Berlin, 2011
- 3 David Easley, Jon Kleinberg, “Networks, Crowds, and Markets: Reasoning About a Highly Connected World”, Cambridge University Press, 2010
- 4 Olivier Hersent, Omar Elloumi and David Boswarthick, “The Internet of Things: Applications to the Smart Grid and Building Automation”, Wiley, 2018
- 5 Olivier Hersent, David Boswarthick, Omar Elloumi, “The Internet of Things – Key applications and Protocols”, Wiley, 2019

Websites

- 1 <https://www.javatpoint.com/iot-internet-of-things>
- 2 <https://www.geeksforgeeks.org/introduction-to-internet-of-things-iot-set-1/>
- 3 https://www.tutorialspoint.com/internet_of_things/index.htm
- 4 <https://www.startertutorials.com/blog/physical-design-of-iot.html>
- 5 <https://www.guru99.com/iot-tutorial.html>

NUTRITION AND DIETETICS

COURSE OBJECTIVES

- To explain the basic concepts of food and nutrition.
- To define the overall classification, function, and source of carbohydrates, lipids and proteins.
- To summarize the availability, source, deficiency and physiological role of fat and water-soluble vitamins.
- To outline the role of health and nutritional importance of micro and macro minerals.
- To discuss the recent trends and developments in nutrition

COURSE OUTCOMES

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

COs	Course Outcomes	Blooms Level
CO1	Explain the basics in the area of nutrition all assessment in health and disease.	Understand
CO2	Outline the biological functions of various macro molecules in terms of food and health.	Understand
CO3	Discuss the balanced diet for healthy life to avoid or prevent the deficiency disorders	Create
CO4	Infer an appropriate diet, products that prevent vitamin deficiency disorders.	Understand
CO5	Identify the proper foods rich in mineral to live a healthy life.	Analyze

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L				M		M					L
CO2		M	L			M		S		M		
CO3	M				L	S		M			L	
CO4		L	S				L		L			S
CO5	S			M		M		M	S		M	

S-Strong; M-Medium; L-Low

UNIT I: HUMAN NUTRITION

Six classes of nutrients - Historical perspective of nutrient requirements – Assessment of nutritional status - recommended dietary allowances of macronutrients for all agegroups - Assessment of protein quality - Malnutrition and related disorders –Balanced Diet. Factors influencing dietary intake: Food habits, food fads and fallacies, their influence on health and wellbeing.

UNIT II: BIOMOLECULES

Carbohydrates-Definition, classification, Functions, Sources of Carbo hydrates, Deficiency. Lipids – Definition, classification, function, sources, Properties of fats and oils, Refined & Hydrogenated fats process. Proteins-Definitions, Classification, Function, Amino Acids, Sources of Proteins, Texturized proteins.

UNIT III: VITAMINS

Physiological role, bio-availability, requirements, sources and deficiency of Fat Soluble Vitamins: Vitamin A, Vitamin D, E & K. *f* Water soluble vitamins: Vitamin C, Thiamine, Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6.Stabilityunderdifferent food processing conditions.

UNITIV: MINERALS AND WATER

Physiological role, bio-availability, requirements, sources and deficiency of Macrominerals: Calcium, Phosphorus Magnesium, Sodium, Potassiumchloride. Microminerals: Iron, Zinc, copper, selenium, chromium, iodine, manganese, Molybdenum and fluoride - Chemistry and physical properties of free, bounded and entrapped water, water activity, quality parameters of drinking and mineral water.

UNIT V: RECENT TRENDS IN NUTRITION

Principles of dietary management in gout, rheumatism,AIDS/HIV-Cancer-risk factors, symptoms, dietary management, role of food in prevention of Cancer. Role of functional foods Health foods and novel foods, organically grown foods, personalized nutrition, recent concepts in human nutrition like nutria genomics, nutraceuticals etc.

Suggested Readings

- 1 SunetraRoday. Food Science and Nutrition. Oxford Higher Education / Oxford University Press. 3rdedition 2018.(ISBN-13:9780199489084).
- 2 Charis Galanakis. Nutraceutical and Functional Food Components. Academic Press,1st Edition, 2017. (ISBN:9780128052570).
- 3 AshleyMartin.Nutrition and Dietetics. Syrawood Publishing House.1st Edition, 2016. (ISBN:9781682860588).
- 4 Robert E.C.Wildman. Handbook of Nutraceuticals and Functional Foods. CRCPress,2nd Edition, 2016. (ISBN-10: 9781498770637).
- 5 Srilakshmi. B. Nutrition Science. New Age International Pvt. Ltd, Publishers. 6thEdition.2017.(ISBN-13:9789386418883).

AGRICULTURAL WASTE AND BY PRODUCTS UTILIZATION

COURSE OBJECTIVES

- To categorize the types of agricultural wastes.
- To outline the production and utilization of biomass.
- To explain the various parameters considered to be important in the designing of biogas units.
- To discuss the methods employed in the production of alcohol from agricultural wastes/by products.
- To summarize the overall aspects involved in the production of paper boards and particle boards from agricultural wastes

COURSE OUTCOMES

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

COs	Course Outcomes	Blooms Level
CO1	Illustrate the collection and generation of value-added products from agricultural wastes	Knowledge
CO2	Demonstrate the techniques involved in the production and utilization of biomass.	Understand
CO3	Discuss the various parameters considered to be important in the designing of biogas units.	Create
CO4	Illustrate the various methods employed in the production of alcohol from the by products of agricultural wastes.	Knowledge
CO5	Discuss the appropriate material to produce paper boards and particle boards from agricultural wastes.	Create

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L		M		L				S			S
CO2		S			M		M		L		L	
CO3	S		L	S		M		S	M		M	
CO4		M			M			M				M
CO5	M			L			S			L		

S-Strong; M-Medium; L-Low

UNIT I: TYPES OF AGRICULTURAL WASTES

Introduction and Background Agricultural Waste, Crop Waste, Agricultural Residues(annual crops),Technical terms, properties of agricultural waste- storage and handling - rice by-products utilization-rice bran and germ, rice bran oil, economic products from agriculture waste/by-products.

UNIT II: BIOMASS PRODUCTION AND UTILIZATION

Biomass – types – production and utilization Technology used for the utilization of agricultural wastes: Biomass Gasifier, Nimbkar Agricultural Research Institute(NARI) Gasifier,Rice-Husk Based Gasifier,Heat and Steam from Sugarcane Leaf and Bagasse.

UNIT III: BIOGAS DESIGN AND PRODUCTION

Biogas: Definition, composition, history of biogas, Production of biogas – factors affecting the efficiency; types of biogas plant (floating drum type and fixed dome type)and their components (inlet, outlet, stirrer, slanting pipe, digester, gas holder and gas outer pipe), Selection and Design of biogas plant.

UNIT IV: PRODUCTION OF ALCOHOL FROM WASTE MATERIALS

Production of Alcohol from waste materials: Introduction, Production methods, Cellulolysis (biological approach): Pretreatment, Cellulolytic processes (Chemical and Enzymatic hydrolysis), Microbial fermentation, Gasification process (thermo chemical approach).

UNITV: PRODUCTION OF PAPER BOARD AND PARTICLE BOARDS FROM AGRICULTURAL WASTE

Biodegradable packing materials: merits and demerits, Production and testing of Paper boards and Particle boards from Agricultural Waste: Introduction, History, Terminology and classification, Raw materials, Production steps-Pulping, Classifications of pulp, Bleaching, Plies, Coating, Grades.

Suggested Readings

- 1 Navanietha Krishnaraj Rathinam, Rajesh Sani. Biovalorisation of Wastes to Renewable Chemicals and Biofuels. Elsevier, 1st Edition, 2019. (ISBN:9780128179529)., 2019. (ISBN:9780128179529).
- 2 Efthymia Alexopoulou. Bio energy and Biomass from Industrial Crops on Marginal Lands. Elsevier, 1st Edition, 2020.(ISBN:9780128188644).
- 3 Simona Ciuta, Demetra Tsiamis, Marco J. Castaldi. Gasification of Waste Materials. Academic Press, 1st Edition, 2017.(ISBN:9780128127162).
- 4 Nicholas E. Korres, Pdraig O'Kiely, John A.H. Benzie, Jonathan S. West. Bioenergy Production by Anaerobic Digestion: Using Agricultural Biomass and Organic Wastes. Routledge, 1st Edition, 2013.(ISBN-13:9780415698405).
- 5 Albert Howard, Yashwant Wad. The Waste Products of Agriculture. Benediction Classics, 1st Edition, 2011. (ISBN-13:9781849025).

RENEWABLE ENERGY SYSTEMS

COURSE OBJECTIVES

- To gain the knowledge about environmental aspects of energy utilization.
- To understand the basic principles of solar cells, photovoltaic conversion.
- To understand the basic principles of wind energy conversion.
- To gain the knowledge about hydro and ocean energy.
- To understand the basic principles of Biomass, fuel cell, Geo thermal power plants and MHD.

COURSE OUTCOMES

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

COs	Course Outcomes	Blooms Level
CO1	Discuss remedies/potential solutions to the supply and environmental issues associated with fossil fuels and other energy resources.	Apply
CO2	Selection, Operation and Operation of Solar PV System for different types of applications	Apply
CO3	Selection and Operation of Wind Turbine system	Understand
CO4	Selection and Operation of Hydroelectric Plant and Ocean Energy	Understand
CO5	Biomass Power Generation Types, Applicability and Limitations, Selection and Operation of Fuel Cell, Geo thermal plants and MHD	Understand

Mapping with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	L	S			M		M		L		L	
CO2	M		L	S			M			S		L
CO3		S				L	S		L			S
CO4	S		L	S		S		L	M		M	
CO5			M		L		L		S		M	

S-Strong; M-Medium; L-Low

UNIT I : INTRODUCTION

Energy scenario - Different types of Renewable Energy Sources - Environmental aspects of energy utilization-Energy Conservation and Energy Efficiency- Needs and Advantages, Energy Conservation Act 2003.

UNIT II: SOLARENERGY

Introduction to solar energy: solar radiation, availability, measurement and estimation–Solar thermal conversion devices and storage – solar cells and photovoltaic conversion –PV systems – MPPT. Applications of PV Systems– solar energy collectors and storage.

UNIT III: WINDENERGY

Introduction– Basic principles of wind energy conversion-components of wind energy conversion system - site selection consideration – basic–Types of wind machines. Schemes for electric generation – generator control, load control, energy storage – applications of wind energy –Interconnected systems.

UNIT IV: HYDROENERGY

Hydropower, classification of hydropower,Turbine selection, Ocean energy resources, ocean energy routes. Principles of ocean thermal energy conversion systems, ocean thermal power plants. Principles of ocean wave energy conversion and tidal energy conversion.

UNIT V: OTHER SOURCES

Bio energy and types –Fuel cell, Geo-thermal power plants; Magneto-hydro-dynamic(MHD) energy conversion.

Suggested Readings

- 1 Rai.G.D,Non-conventionalsourcesofenergyKhannapublishers,2011
- 2 Khan.B.H,Non-Conventional Energy Resources ,TheMcGraw Hills, Second edition,2012
- 3 John W Twidell and Anthony D Weir , Renewable Energy Resources , Taylor and Francis – 3rd edition ,2015
- 4 Fundamentals and Applications of Renewable Energy | Indian Edition, by Mehmet Kanoglu, Yunus A. Cengel, John M. Cimbala, cGraw Hill; First edition (10 December 2020), ISBN-10 : 9390385636.