B.Sc. COMPUTER SCIENCE

(COGNITIVE SYSTEMS)

CHOICE BASED CREDIT SYSTEM (CBCS)

Curriculum and Syllabus

Regular (2023 – 2024)

DEPARTMENT OF COMPUTER SCIENCE

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

KARPAGAM ACADEMY OF HIGHER EDUCATION

(Deemed to be University)

(Established Under Section 3 of UGC Act, 1956)

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

Eachanari (Post), Coimbatore – 641 021.
Tamil Nadu, India
Phone No. 0422-2980011 - 15 Fax No: 0422-2980022-23

E mail ID: info@kahedu.edu.in

Web: www.kahedu.edu.in

FACULTY OF ARTS, SCIENCE, COMMERCE AND MANAGEMENT

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 advice 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.	*Viva – voce* [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

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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
Viva-voce : 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.

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

$\sum_i$

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

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

CGPA of the entire programme = .

Sum of the credits of the courses of the entire programme

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

where,

Ci is the credit fixed for the course 'i' in any semester
GPi is the grade point obtained for the course 'i' in any semester
'n' refers to the Semester in which such courses are credited.

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

19. REVALUATION

A candidate can apply for revaluation or re-totaling of his / her semester examination answer script (**theory courses only**), within 2 weeks from the date of declaration of results, on payment of a prescribed fee. 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.

Karpagam Innovation and Incubation Council (KIIC)

(A Section 8 Company)

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

Norms to Student Start-Ups

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

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

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

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

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

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

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

Guide lines to award Credits/ Marks to a Student startup

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

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

Annexure I

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

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

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

PROGRAM OUTCOMES: The program must enable students to attain by the time of graduation

a) An ability to apply knowledge of computing and mathematics appropriate to the program's student outcomes and to the discipline

b) An ability to analyze a problem, and identify and define the computing requirements appropriate to its solution

c) An ability to design, implement and evaluate a computer-based system, process, component or program to meet desired needs.

d) An ability to function effectively on teams to accomplish a common goal

e) An understanding of professional, ethical, legal, security and social issues and responsibilities

f) An ability to communicate effectively with a range of audiences

g) An ability to use current techniques, skills and tools necessary for computing practice

h) An ability to use and apply current technical concepts and practices in the core information technologies of human computer interaction, information management, programming, networking and web systems and technologies

i) An ability to effectively integrate IT-based solutions into the user environment

j) An understanding of best practices and standards and their application

PROGRAM SPECIFIC OUTCOME (PSOs)

- Apply skills in the areas like Virtualization and Cloud, Client Relationship Management Infrastructure Management, Information Technology Infrastructure Library and Robotic Process Automation to design and develop applications.
- Acquaintance with latest trends in technological development and thereby innovate new ideas and solutions to the existing problems.
- Apply cognitive, design thinking and critical problem-solving skills for successful career and entrepreneurship.
- An ability to produce cost effective, quality and maintainable software products and solutions (services) meeting the global standards and requirements with the knowledge acquired and using the emerging techniques, tools and process management methodologies and principles and able to comprehend and write effective project reports in multidisciplinary environment in the context of changing technologies.

PROGRAMME EDUCATIONAL OBJECTIVES (PEOs)

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

PEO II: To provide the knowledge in artificial intelligence techniques and apply them to develop relevant models and real time products.

PEO III: To provide knowledge in data science for modern computational data analysis and modeling methodologies.

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

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

MAPPING of PEOs and POs

POs	a	b	c	d	e	f	g	h	i	j	k	l	m	n
PEO I	X	X	X				X	X	X		X			X
PEO II			X					X				X	X	X
PEO III			X				X	X		X		X	X	X
PEO IV			X	X	X	X			X		X			
PEO V					X					X		X		

DEPARTMENT OF COMPUTER SCIENCE
FACULTY OF ARTS, SCIENCE COMMERECE AND MANAGEMENT
UG PROGRAM (CBCS) – B.Sc. Computer Science (Cognitive Systems)
(2023–2024 Batch and onwards)

Course code	Name of the course	Objectives and out comes		Instruction hours / week			Credit(s)	Maximum Marks			Category	Page No
		PEOs	POs	L	T	P		CIA	ESE	Total		
								40	60	100		
SEMESTER – I												
23LSU101	Language – I	IV	d,e	4	-	-	4	40	60	100	AEC 1	1
23ENU101	English - I	IV	d,e	3	-	-	3	40	60	100	MDC 1	7
23CGU101	Operating Systems	I	a,b,c,g	4	-	-	3	40	60	100	Major 1	9
23CGU102	Numerical Methods	III	a,b,h	4	-		4	40	60	100	Minor 1	11
23CGU103	Object Oriented Programming using C++	I	a,c,f,h	4			3	40	60	100	Major 2	14
23CGU111	Operating Systems - Practical	I	a,b,c,g	-	-	3	1	40	60	100	Major 3	17
23SEC112	Problem Solving using Worksheets – Practical	III	a,g,h,i	-	-	6	3	40	60	100	SEC 1	19
23VAC101	Environmental Studies			2			2	40	60	100	VAC 1	21
Semester Total				**21**	**-**	**9**	**23**	**320**	**480**	**800**		
SEMESTER – II												
23LSU201	Language – II	IV	d,e,f	4	-	-	4	40	60	100	AEC 2	24
23ENU201	English - II	IV	d,e,f	3	-	-	3	40	60	100	MDC 2	29
23CGU201	Computer Networks	I	a,d,e	3	-	-	3	40	60	100	Maj 4	31
23CGU202	Probability and Statistics	III	b,c,h	4	-	-	4	40	60	100	Minor2	33
23CGU203	Data Structures	I	c,d,f	3			3	40	60	100	Major5	36
23CGU211	Computer Networks - Practical	I	a,d,e,f,k	-	-	3	1	40	60	100	Major6	38
23CGU212	Object Oriented Programming using C++ - Practical	I	a,c,f,h		-	3	1	40	60	100	Major7	40
23SEC211	Web Programming - Practical	I	a,c,h	-	-	3	3	40	60	100	SEC 2	43
23VAC201	Indian Knowledge System			2	-	-	2	40	60	100	VAC2	45
23VAC202	Yoga for Youth Empowerment			-	-	2	2	100	-	100	VAC3	45a
Semester Total				**19**	**-**	**11**	**26**	**460**	**540**	**1000**		

SEMESTER – III												
23LSU301	Language – III	IV	d,e,f	4	-	-	4	40	60	100	AEC 3	47
23ENU301	English - III	IV	d,e,f	3	-	-	3	40	60	100	MDC 3	51
23CGU301	Infrastructure Management	I	a,b,d ,h,k	3	-	-	2	40	60	100	Major 8	53
23CGU302	Python Programming	I	a,b,i	3	-	-	3	40	60	100	Major 9	55
23CGU303	Virtualization and Cloud	III	a,e,k	3	-	-	2	40	60	100	Major 10	57
23CGU304	Information Technology Infrastructure Library	I	a,b,d ,h,k	3	-	-	2	40	60	100	Major 11	59
23CGU311	Infrastructure Management-Practical	I	a,b,d ,h,k	-	-	3	1	40	60	100	Major 12	61
23CGU312	Python Programming-Practical	I	a,b,i	-	-	3	1	40	60	100	Major 13	63
23CGU313	Virtualization and Cloud- Practical	III	a,e,k	-	-	3	1	40	60	100	Major 14	65
23VAC301	Health and Wellness			2			2	40	60	100	VAC 4	67
23CGU391	Internship*						2	100		100	Summer Internship	69
Semester Total				**21**	**-**	**9**	**23**	**500**	**600**	**1100**		
SEMESTER – IV												
23LSU401	Language – IV	IV	d,e,f	4	-	-	4	40	60	100	AEC 4	70
23ENU401	English - IV	IV	d,e,f	3	-	-	3	40	60	100	SEC 3	73
23CGU401	Programming in JAVA	I	b,c,f ,h	3	-	-	3	40	60	100	Major 15	75
23CGU402	Database Management System	I	a,b,c ,i	3	-	-	3	40	60	100	Major 16	78
23CGU403	Cyber Security	V	b,c, g,h	3			2	40	60	100	Major 17	80
23CGU404	Process Management	III	b,c,e	2	-	-	2	40	60	100	Major 18	83
23CGU405	Campus to corporate	IV	a,c,d	2		-	2	40	60	100	Major 19	85
23CGU406	Operations Research	III	a,b,c	5	-	-	5	40	60	100	Minor 3	87
23CGU411	Programming in JAVA - Practical	I	b,c,f ,h	-	-	3	1	40	60	100	Major 20	90
23CGU412	Database Management System – Practical	I	a,b,c ,i	-	-	2	1	40	60	100	Major 21	92
Semester Total				**25**	**-**	**5**	**26**	**400**	**600**	**1000**		

SEMESTER –V												
23CGU501	Client Relationship Management	IV	b,c, k	4	-	-	3	40	60	100	Major 22	94
23CGU502	Introduction to Digital Technology	II	c,d,j ,k	3	-	-	2	40	60	100	Major 23	97
23CGU503	Software Testing	V	b,c,f	3	-	-	3	40	60	100	Major 24	99
23CGU504	Basics of Accounting			6	-	-	6	40	60	100	Minor 4	101
23CGU511	Client Relationship Management–Practical	IV	b,c, k	-	-	4	2	40	60	100	Major 25	103
23CGU512	Introduction to Digital Technology–Practical	II	c,d,j ,k	-	-	5	2	40	60	100	Major 26	105
23CGU513	Software Testing - Practical	V	b,c,f	-	-	5	2	40	60	100	Major 27	107
23CGU591	Internship*						2	100		100	Summer Internship	109
	Semester Total			**16**		**14**	**22**	**380**	**420**	**800**		
SEMESTER –VI												
23CGU601	IT Cognition	IV	a,b,e	6	-	-	5	40	60	100	Major 28	110
23CGU602A	Machine Learning	III	a,b,c	6	-	-	5	40	60	100	Major 29	112
23CGU602B	Natural Language Processing	III	a,b,c									114
23CGU603	Entrepreneurship	IV	a,b, g	6	-	-	5	40	60	100	Minor 5	116
23CGU611A	Machine Learning-Practical	III	a,b,c	-	-	4	2	40	60	100	Major 30	119
23CGU611B	Natural Language Processing-Practical	III	a,b,c									122
23CGU691	Project	III	a,b,c	-	-	8	5	40	60	100	Major 31	124
	Semester Total			**18**	**-**	**12**	**22**	**200**	**300**	**500**		
	Grand Total			**120**	**-**	**60**	**142**	**2260**	**2940**	**5200**		
SEMESTER –VII												
23CGU701	Deep Learning	III	a,b,f, g	6	-	-	5	40	60	100	Major 32	125
23CGU702	Fullstack Development	I	a,b,d ,g	6	-	-	5	40	60	100	Major 33	127
23CGU703	Statistical Computing	III	b,c,i	6	-	-	4	40	60	100	Minor 6	129

23CGU711	Deep Learning - Practical	III	a,b,f,g	-	-	6	3	40	60	100	Major 34	132
23CGU712	Fullstack Development - Practical	I	a,b,d,g	-	-	6	3	40	60	100	Major 35	134
	Semester Total			**18**	**-**	**12**	**20**	**200**	**300**	**500**		
SEMESTER -VIII A												
23CGU801A	Data Science	III	b,c,d,h	6	-	-	4	40	60	100	Major 36	136
23CGU802A	Big Data Analytics	III	a,b,i,j	6	-	-	4	40	60	100	Major 37	138
23CGU803A	Organizational Behaviour	IV	a,b,i	6	-	-	4	40	60	100	Minor 7	141
23CGU811A	Data Science -Practical	III	b,c,d,h		-	6	4	40	60	100	Major 38	143
23CGU812A	Big Data Analytics - Practical	III	a,b,i,j	-	-	6	4	40	60	100	Major 39	145
	Semester Total			**18**	**-**	**12**	**20**	**200**	**300**	**500**		
	SEMESTER -VIII -B											
23CGU801B	Research Methodology and IPR			6	-	-	4	40	60	100	Major 36	147
23CGU812B	Statistical Analysis using R Practical-	III	a,b,i,j	-	-	6	4	40	60	100	Minor 7	150
23CGU891B	Research Project/Preparation of Research Project	I	a,b,d,j		-	18	12	120	180	300	Major 37	152
	Semester Total			**12**	**-**	**18**	**20**	**200**	**300**	**500**		
	Grand Total			**156**	**-**	**84**	**182**	**2660**	**3540**	**6200**		

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

Multidisciplinary Courses (MDC)		
Semester	**Course Code**	**Name of the Course**
I	23ENU101	English – I
II	23ENU201	English – II
III	23ENU301	English – III

Major Courses		
Semester	**Course Code**	**Name of the Course**
I	23CGU101	Operating Systems
	23CGU103	Object Oriented Programming using C++
	23CGU111	Operating Systems - Practical
II	23CGU201	Computer Networks
	23CGU203	Data Structures
	23CGU211	Computer Networks – Practical
	23CGU212	Object Oriented Programming using C++ - Practical
III	23CGU301	Infrastructure Management
	23CGU302	Python Programming

	23CGU303	Virtualization and Cloud
	23CGU304	Information Technology Infrastructure Library
	23CGU311	Infrastructure Management-Practical
	23CGU312	Python Programming-Practical
	23CGU313	Virtualization and Cloud- Practical
IV	23CGU401	Programming in JAVA
	23CGU402	Database Management System
	23CGU403	Cyber Security
	23CGU404	Process Management
	23CGU405	Campus to corporate
	23CGU411	Programming in JAVA – Practical
	23CGU412	Database Management System – Practical
V	23CGU501	Client Relationship Management
	23CGU502	Introduction to Digital Technology
	23CGU503	Software Testing
	23CGU511	Client Relationship Management–Practical
	23CGU512	Introduction to Digital Technology–Practical
	22CGU513	Software Testing - Practical
VI	23CGU601	IT Cognition
	23CGU602A	Machine Learning
	23CGU602B	Natural Language Processing
	23CGU611A	Machine Learning-Practical
	23CGU611B	Natural Language Processing-Practical
	23CGU691	Project
VII	23CGU701	Deep Learning

	23CGU702	Fullstack Development
	23CGU711	Deep Learning – Practical
	23CGU712	Fullstack Development – Practical
VIII A	23CGU801A	Data Science
	23CGU802A	Big Data Analytics
	23CGU811A	Data Science -Practical
	23CGU812A	Big Data Analytics – Practical
VIII B	23CGU801B	Research Methodology and IPR
	23CGU891B	Research Project/Preparation of Research Project

Skill Enhancement Courses (SEC)		
Semester	**Course Code**	**Name of the Course**
I	23SEC112	Problem Solving using Worksheets – Practical
II	23SEC211	Web Programming -Practical
IV	23ENU401	English – IV

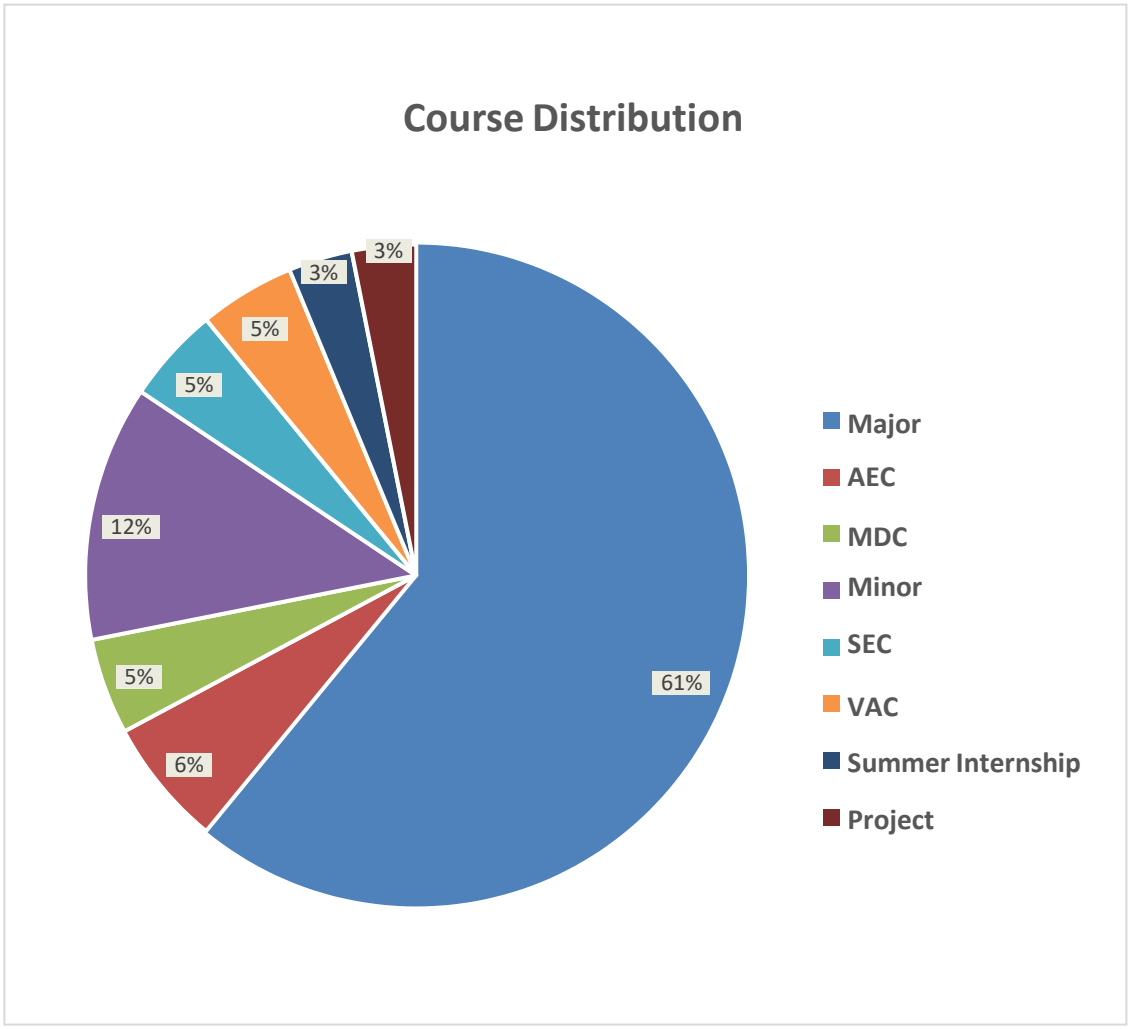
Minor Course		
Semester	**Course Code**	**Name of the Course**
I	23CGU102	Numerical Methods
II	23CGU202	Probability and Statistics
IV	23CGU406	Operations Research
V	23CGU504	Basics of Accounting
VI	23CGU603	Entrepreneurship
VII	23CGU703	Statistical Computing

VIII A	23CGU803A	Organizational Behaviour
VIII B	23CGU812B	Statistical Analysis using R Practical
Value Added Courses		
Semester	**Course Code**	**Name of the Course**
I	23VAC101	Environmental Studies
II	23VAC201	Indian Knowledge System
III	23VAC301	Health and Wellness

Summer Internship		
Semester	**Course Code**	**Name of the Course**
III	23CSU391	Internship*
V	23CSU591	Internship*

Course Distribution Table:

Category	**No. of Courses**		**Total**
	Theory	**Practical**	
Major	23	16	39
AEC	4	-	4
MDC	3	-	3
Minor	7	1	8
SEC	1	2	3
VAC	3	-	3
Summer Internship	-	2	2
Project	2	-	2
Total	43	19	64


Course Distribution
61%
6%
5%
12%
5%
5%
3%
3%
Major
AEC
MDC
Minor
SEC
VAC
Summer Internship
Project

2023-2024

BACHELOR OF COMPUTER SCIENCE(COGNITIVE SYSTEMS)
23LSU101

SEMESTER-I
LANGUAGE-I

4H -4C

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

இலக்கிய இன்பம்

பாடத்திட்டப் பொதுநோக்கம்

- 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 குடியுரிமைப்பணி 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 பன்நோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
- வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
- சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்புத்திறன் 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

S-Strong; M-Medium; L-Low

அலகு – I (10 மணிநேரம்)

சங்க இலக்கியம் – எட்டுத்தொகை - முச்சங்கங்கள் பற்றிய செய்திகள் – சங்க இலக்கியத்தின் தோற்றுவாய் – எட்டுத்தொகை அறிமுகம்

சங்க இலக்கியம் - நற்றிணை - நின்ற சொல்லர் –குறிஞ்சி – தலைவி கூற்று–1

சங்க இலக்கியம் - குறுந்தொகை - நிலத்தினும் பெரிதே–குறிஞ்சி – தலைவி கூற்று- 3

அறஇலக்கியம் - திருவள்ளுவர் – திருக்குறள் (எண்கள்-திருக்குறள் வரிசை எண்ணைக் குறிப்பன)

பாயிரம் – 8 அறவாழி அந்தணன்,13 - விண்இன்று பொய்ப்பின்,

34 - மனத்துக்கண் மாசிலன் ஆதல்

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

அன்புடைமை - 80 - அன்பின்வழியது, **விருந்தோம்பல் -** 90 – மோப்பக்குழையும்,

இனியவைகூறல் - 95 – பணிவுடையன் இன்சொலன்,

செய்நன்றி அறிதல் - 103 – பயன் தூக்கார்,

புறங்கூறாமை - 190 – ஏதிலார் குற்றம், **ஒப்புரவுஅறிதல் -** 216 – பயன்மரம்

ஈகை: 228 – ஈத்துவக்கும் இன்பம், **துறவற இயல் - தவம் -** 261 – உற்றநோய்

வாய்மை - 291 – வாய்மை எனப்படுவது, **வெகுளாமை -** 306 - சினமென்னும்

இன்னாசெய்யாமை : 316-இன்னா எனத்தான் உணர்ந்தவை

நிலையாமை - 331 – நில்லாதவற்றை, **ஊழியல் - ஊழ் -** 373 – நுண்ணியநூல்

ஆள்வினை உடைமை - 618 –பொறியின்மை யார்க்கும், 620-ஊழையும் உப்பக்கம்

நட்பு - 792-ஆய்ந்தாய்ந்து, 794-குடிப்பிறந்து, 797-ஊதியம் என்பது

காப்பியம் - சிலப்பதிகாரம்:

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

மனையறம்படுத்த காதை - 'வார்ஒலிகூந்தலை' – 'சிறப்பின் கண்ணகிதனக்குஎன்' (84-90)

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

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

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

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

வஞ்சிக் காண்டம் - நடுகல்காதை - 'மதுரைமூதூர்' - 'மன்னவர்ஏறு' (218-234)

வாழ்த்துக் காதை - 'என்னேஇஃது' - 'தோன்றுமால்' (9)

எழுத்திலக்கணம் - முதல் மற்றும் சார்பெழுத்துகள்

அலகு- 2 (10 மணிநேரம்)

சங்க இலக்கியம் – பத்துப்பாட்டு அறிமுகம்

சங்க இலக்கியம் - பதிற்றுப்பத்து : ஏழாம்பத்து- எறிபிணம் இடறிய செம்மறுக்– 65

சங்க இலக்கியம் - கலித்தொகை : அகன்ஞாலம் விளக்கும் - நெய்தல்கலி – தலைவிகூற்று- 119.

அற இலக்கியம் -முன்றுறையரையனார் - பழமொழி நானூறு 5 பாடல்கள்

காப்பியம் -மணிமேகலை : விழாவறைகாதை : 'தேவரும் மக்களும்' - 'மருங்குஎன்' (66-72)

ஊரலர் உரைத்தகாதை : 'நாவல்ஓங்கிய' - 'உண்டுகொல்'(1-17), 'கற்றுத்துறைபோகிய' – 'தீத்தொழில்படாஅள்' (32-57).

பாத்திரம் பெற்றகாதை : 'போதிநீழல்' - 'நல்அறம்கண்டனை' (73-98)

சிறைக்கோட்டம் அறக்கோட்டம் ஆக்கியகாதை -'வாழிஎம்கோ' - 'அரசுஆள்வேந்துஎன்' (129-163)

சொல்இலக்கணம் - பெயர், வினை, இடை, உரிச்சொல்-விளக்கமும்பயிற்சியும்

அலகு– 3 (10 மணிநேரம்)

அறஇலக்கியங்கள் அறிமுகம்

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

சங்க இலக்கியம் -அகநானூறு - ஈன்று புறம்தந்த எம்மும் உள்ளாள் – பாலை– நற்றாய்கூற்று-35

அற இலக்கியம் -ஔவையார்- கொன்றை வேந்தன் (1-50 பாடல்கள்**)**

காப்பியம் - சூளாமணி–அரசியல்சருக்கம்- 1. நாவியே கமழும்(1131), 2. கண்மிசை கனிந்த (1132),3. விரைசெலலிவுளித்(1133), 4. அரைசர்கள் வருக (1134), 5. அருளுமாறடிகள் (1135), 6. விஞ்சையருலக (1136), 7. சொரிகதிர் (1137), 8. கரியவன் வளைந்த(1138), 9. மடித்தவா யெயிறு (1139),10. விஞ்சயரதனைக் (1140), **துறவுச்சருக்கம்** – பயாபதி மன்னனின் துறவுநெறி -1. மன்னிய புகழி(1840), 2. திருமகிழலங்கன் (1841) , 3. ஆங்கவ ரணைந்த (1842), 4. அலகுடன் விளங்கு (1843), 5. தன்னையோர் அரசனாக்கி (1844), 6. சென்றநாள்(1845), 7. எரிபுரை (1846.), 8. பிறந்தனர்(1847), 9. பிறந்தநாம் (1848), 10. தொகைமலர் (1849) 11. ஒழுகிய(1850).

பொருள் இலக்கணம் - அகத்திணை மற்றும் புறத்திணை இலக்கணங்கள்.

அலகு- 4 (10 மணிநேரம்)

சிற்றிலக்கியங்கள் தோற்றமும் வளர்ச்சியும்

சங்க இலக்கியம் - ஐங்குறுநூறு : தாய்சாப்பிறக்கும் – தோழிகூற்று – மருதம் - களவன்பத்து: 24

சங்க இலக்கியம் - புறநானூறு : உற்றுழிஉதவியும்-183, பல்சான்றீரே – பொதுவியல்-195

அற இலக்கியம் – வேதநாயகம் பிள்ளை -நீதி நூல்- தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள் மட்டும் சின்னவோர் பொருள், கடவுளை வருத்தி, எப்புவிகளும், வைத்தவர், ஈன்றவர்

காப்பியம் – கம்பராமாயணம் – சுந்தரகாண்டம் (தேர்ந்தெடுக்கப்பட்ட பாடல்கள் மட்டும் **)**

வண்மையில்லை 84 - தாய் ஒக்கும் 171 - ஒரு பகல் 284 - எதிர் வரும் 314 – தருவனத்துள் 327 - எண் இலா 328 - சொல் ஒக்கும் 413 – இவ்வண்ணம் 559 - எண் அரு 598 - தடுத்து இமையாமல் 1979 - தோள் கண்டார் 1008 – மைந்தரை 1339 – அந்நகர் 1445 - சிவந்த வாய் 1550 - ஏய வரங்கள் 1593 – நின்மகன் 1526 – ஆழிசூழ் 1601 – மன்னவன் 1604 – பின்னும் 1752 – கிள்ளையொடு 1701 – எந்தையும் 2159 - பஞ்சி ஒளிர் 2762 - மயில் உடை 3248 – ஆண்டு 3390 –மற்றுஇனி 3812- கண்டனன் 5249 – வேலையுள் 6037 –மண்ணொடும் 6038- வாங்கிய 6170 – இங்குஉள 6172 – கண்டனென் 6031 - பைய பைய 6174 – அந்நெறி 6185 – குகனொடும் 6507 –கூவி 7131 –மாக்கூடு 7760 – அற்றவன் 9168 - ஆள் ஐயா 7271 - கார்நின்ற-10043

கடிதப்பயிற்சி

1. வேலைவேண்டி விண்ணப்பம் எழுதுதல்

2.பல்கலைக்கழகப் பன்னாட்டுக் கருத்தரங்கச் செய்தியை நாளிதழில் வெளியிட வேண்டி நாளிதழின் பதிப்பாசிரியருக்குக் கடிதம்

3. கருத்தரங்கப் பங்கேற்புக்கான அனுமதிக் கடிதம்

4. பல்கலைக்கழக விழாவுக்குத் தலைமையேற்க வேண்டி, மாவட்ட ஆட்சியருக்கு விண்ணப்பம்

அலகு – 5 (8 மணிநேரம்)

காப்பியங்கள் - தோற்றமும் வளர்ச்சியும்

சங்க இலக்கியம் - பத்துப்பாட்டு: சிறுபாணாற்றுப்படை

வானம் வாய்த்த – யாம் அவண்நின்றும் வருதும் (அடிகள்: 84-143),

செய்நன்றி அறிதலும் – நல்லியக்கோடனை நயந்தனிர் செலினே (207-269).

அற இலக்கியம் – குமரகுருபரர் - நீதி நெறி விளக்கம் (தேர்ந்தெடுக்கப்பட்ட 5 பாடல்கள் மட்டும்)

உறுதி பயப்ப, முயலாது வைத்து, உலையாமுயற்சி, காலம் அறிந்து, மெய்வருத்தம்

கடிதப்பயிற்சி

5. கல்விக் கடன்வேண்டி வங்கிமேலாளருக்கு விண்ணப்பம்

6. வசிப்பிடத்திற்கு அடிப்படை வசதிவேண்டி வட்டாட்சியருக்கு விண்ணப்பம்

7. விருதுபெற்ற நண்பனுக்குப் பாராட்டுக் கடிதம்

8. புத்தகங்கள் அனுப்பி உதவவேண்டி, பதிப்பகத்தாருக்கு விண்ணப்பம்

பார்வை நூல்கள்

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

இணையதளம்

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

இதழ்கள்

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

SEMESTER-I
ENGLISH I

3H -3C

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

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	BT 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 **8 HOURS**

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

UNIT II **7 HOURS**

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

UNIT III **7 HOURS**

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

UNIT IV **7 HOURS**

LISTENING: Story Narrations
SPEAKING: Group Discussion
READING: Reading Reports and Profiles
WRITING: Letter Writing
LITERATURE: Tyger by Wiiliam Blake
GRAMMAR: Subject and Predicate – Question Tags

UNIT V **7 HOURS**

LISTENING: Listening Strategeis
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

SUGGESTED READINGS

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

SEMESTER-I

OPERATING SYSTEMS

4H -3C

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

Course Objectives

- To Know the basics of an operating systems
- To provide students with the basic skills Implement on Process Management.
- To provide the basic Knowledge of Memory and its management in OS.
- To have an Experimental Learning with file systems and its structure.
- To provide understanding about the Client and Server OS..

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamentals of an operating system	Understand
CO2	Apply the Concept of Scheduling and its algorithm.	Apply
CO3	Demonstrate memory partitions and its techniques.	Understand
CO4	Have an Experimental Exposure in File allocations	Apply
CO5	Understand the installation of client and server OS	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO OPERATING SYSTEMS 09 HOURS

Computer Basics: Definition of a Computer - Characteristics and Applications of Computers – Block Diagram of a Digital Computer – Classification of Computers based on size and working. Hardware Basics: Central Processing Unit – I/O Devices-Memory Devices- Secondary storage devices. Operating System Basics: OS Definition, Functions, OS as a Resource Manager, Types of

OS, Evolution of OS, Operating System Operations, Operating System Services, User Operating System Interface, System Calls, Types of System Calls.

UNIT II PROCESS MANAGEMENT **09 HOURS**

Basic Concepts, Process Scheduling, Operations on Processes, Inter-process Communication, Scheduling Criteria, Scheduling Algorithms, Multiple Processor Scheduling

UNIT III MEMORY MANAGEMENT **10 HOURS**

Memory Management Strategies, Swapping, Contiguous Memory Allocation, Paging, Segmentation, Virtual Memory Management, Demand Paging, Page Replacement Techniques and Algorithms

UNIT IV STORAGE MANAGEMENT **10 HOURS**

File Concept, Access Methods, Directory Structure, Protection, Implementing File Systems, File System Structure, Directory Implementation, Allocation Methods, Free Space Management, Efficiency and Performance, Recovery

UNIT V OPERATING SYSTEMS **10 HOURS**

Introduction to Linux: Versions, Components, Features; Installation of Linux OS, Managing Directories, Managing Files. Introduction to Windows: Versions, GUI Components, Features; Installation of Client OS and Server OS, Installation of Roles and Features, Managing Users and Groups, Managing Devices and Printers, Storage Management, Managing and Monitoring of Server, Backup & Restoration

SUGGESTED READINGS

1 Greg Tomsho. (2017). Guide to Operating System", 5th Edition, 2017.
2 William PanekTylor Wentworth. (2010). Microsoft Windows 7 Administration, Wiley Publishing
3 Charles Edge.(2010). Chris Barker EhrenSchwiebert, "Beginning MacOSX Snow Leopard Server", 2010
4 Mitch Tulloch. (2009). Windows 7 Essential Guidance

WEBSITES

1 https://searchitchannel.techtarget.com/tip/Windows-7-user-accounts-and-groups-management
2 https://docs.microsoft.com/
3 https://www.microsoft.com/en-in/evalcenter/evaluate-windows-server-2012

SEMESTER-I

NUMERICAL METHODS

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 (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	S	L	L	M	L	S	S	M	M	M	M
CO2	S	S	S	M	L	S	M	M	L	M	M	M
CO3	S	S	L	L	L	M	L	M	M	M	M	M
CO4	S	S	L	L	M	L	M	M	M	L	M	M
CO5	S	S	L	L	M	L	M	M	L	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 Jordon 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 Scientificand 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

OBJECT ORIENTED PROGRAMMING USING C++

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 how C++ improves C with object-oriented feature.
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the difference between top-down and bottom-up approach.	Understand
CO2	Apply the concepts of object-oriented programming in constructor and destructor.	Apply
CO3	Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.	Understand
CO4	Apply pointer concepts in C++.	Apply
CO5	Understand the concepts of file handling.	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION **10 HOURS**

Principles of object-oriented programming: Basic concepts of object-oriented programming – Benefits of OOP – Applications of OOPs – Structure of C++ Program C++ Tokens – Control Statement – Decision Making Statements- Loop Statements - Inline Functions – Friend Function - Function Overloading.

UNIT II CONTROL STRUCTURE, FUNCTIONS AND CONSTRUCTORS 12 HOURS

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

UNIT III OPERATOR OVERLOADING AND INHERITANCE 10 HOURS

Operator overloading: Defining operator overloading – overloading unary operators – overloading binary operators – overloading binary operators using friends – type conversions. Inheritance: - Inheritance – defining derived classes – single, multilevel, multiple, hierarchical inheritance- hybrid inheritance – virtual base classes – abstract classes.

UNIT IV POINTERS AND I/O OPERATIONS **8 HOURS**

Pointers: Pointers to objects – this pointer – pointers to derived classes – virtual functions- Pure Virtual Functions. Managing console I/O operations: - C++ streams – C++ stream classes – unformatted I/O operations – formatted console I/O operations – Managing output with manipulators.

UNIT V FILE MANAGEMENT **8 HOURS**

Files - Classes for file stream operations – Opening and Closing a file – sequential input and output operations – updating a file random access – Command Line Arguments. Templates and Exceptions: - Templates – class templates – function templates – member function templates – exception handling.

SUGGESTED READINGS

1. Antonio Mallia, Francesco Zoffoli. (2019). C++Fundamentals, Packt Publishing, Ltd.
2. Joel Murach, Mary Delamater. (2018). C++ Programming ,MikeMurach& Associates Inc.
3. Stefan Bjornander. (2016). C++ Windows Programming, Published byPacktPublishingLtd.
4. Richard L. Stegman. (2016). Focus on Object-oriented Programming with C++,6thEdition, CreateSpace Independent Publishing Platform.
5. Bjarne Stroustroup. (2014). Programming - Principles and Practice using C++, 2ndEdition,Addison-Wesley.
6. Harry, H. Chaudhary. (2014). Head First C++ Programming: The Definitive Beginner's Guide, First Create space Inc, O-D Publishing, LLC USA.
7. Debasish Jana. (2014). C++ And Object-Oriented Programming Paradigm,PublishedbyPHI Learning Pvt. Ltd.

WEBSITES

1. www.programmingsimplified.com
2. www.programiz.com / cpp-programming
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.com
6. https://nptel.ac.in/courses/106101208/
7. http://172.16.13.33/course/view.php?id=599

SEMESTER-I

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 Know the Installation and configuration of an operating systems
- To provide students with the basic knowledge and skills Implement disk Partition.
- To providethe basic Knowledge of Logical OS installation.
- To have an Experimental Learning with Client server communication.
- To provide understanding to create group policy in Windows 2012.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Interpret the fundamentals of an Installation and Configuration of an operating system.	Understand
CO2	Apply the Concept of Disk Partition and DNS, DHCP Server.	Apply
CO3	Demonstrate OS monitoring and managing using Administrative Tools and ADS.	Understand
CO4	Have an Experimental Exposure in Client Server Communication.	Apply
CO5	Summarize the group policy in Windows 2012.	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Installation of Linux OS (CentOS)
    - Explain the steps to Install the Linux OS
    - Demonstrate Working with Directories in Linux (*pwd, cd, absolute and relative paths, ls, mkdir, rmdir, file, touch, rm, cp. mv, rename, head, tail, cat, tac, more, less, strings, chmod*)
    - Demonstrate Working with Files in Linux (*ps, top, kill, pkill, bg, fg, grep, locate, find, date, cal, uptime, whoami, finger, uname, man, df, du, free, whereis, which*)
2. Installation of Windows Client OS
    - Explain the steps to Install the Client OS
    - Install a Virtual Machine with Windows Client OS
3. Managing Windows Client OS
    - Explain the steps to Create Users and Groups
    - Demonstrate the usage of Devices and Printers
    - Demonstrate the usage of Disk Management Console
4. Installation of Windows Server OS
    - Explain the steps to Install the Server OS
    - Install a Virtual Machine with Windows Server OS
5. Managing Windows Server OS
    - Demonstrate how to Install Roles and Features
    - Demonstrate the Usage of Server Storage Management
    - Explain the various Management and Monitoring requirements
    - Explain the Backup Types and steps to take Backups

SUGGESTED READINGS

1. Greg Tomsho. (2017). Guide to Operating System", 5th Edition, 2017.
2. William PanekTylor Wentworth. (2010). Microsoft Windows 7 Administration, Wiley Publishing
3. Charles Edge.(2010). Chris Barker EhrenSchwiebert, "Beginning MacOSX Snow Leopard Server", 2010
4. Mitch Tulloch. (2009). Windows 7 Essential Guidance.

WEBSITES

1. https://searchitchannel.techtarget.com/tip/Windows-7-user-accounts-and-groups-management
2. https://docs.microsoft.com/
3. https://www.microsoft.com/en-in/evalcenter/evaluate-windows-server-2012

23SEC112

SEMESTER-I

PROBLEM SOLVING USING WORKSHEETS – 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 Experiment the functions in Microsoft Excel to perform basic calculations and to convert numberto text and text to number.
- To Create applications using VBA code in Excel.
- To Construct formulas, including the use of built-in functions, and relative and absolute references.
- To Demonstrate the macros.
- To provide the understanding about Formatting the Excel sheets.
- To Design an interactive worksheet.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Experiment the functions in Microsoft Excel to perform basic calculations and to convert number to text and text to number.	Apply
CO2	Create application using VBA code	Create
CO3	Construct formulas and make use of built-in functions	Apply
CO4	Demonstrate the Macros	Understand
CO5	Understanding Formatting the Excel sheets	Understand
CO6	Design an Interactive worksheet	Create

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Create sales dashboard (such as Market wise, Product wise, quarter wise sales) in Excel using VBA code
2. Create randomized quiz question paper in Excel using VBA code.
3. Design an attendance tracker using login time of the employee in Excel using VBA code to perform the operation like if employee is late, and then lock the system.

SUGGESTED READINGS

1. Mike Mc Grath.(2017). Excel VBA In Easy StepsBPB Publications.
2. Jeff Webb, Steve Saunders . (2014).Programming Excel with VBA and .NET: Solve Real-World Problems with Excel .Kindle Edition.

WEBSITES

1. https://www.coursera.org/lecture/excel-vba-for-creative-problem-solving-part-2/all-about-worksheets.
2. https://docs.microsoft.com/en-us/office/vba/library-reference/concepts/getting-started-with-vba-in-office

SEMESTER-I

ENVIRONMENTAL STUDIES 2H -2C

Instruction Hours/ Week: L:2 T: 0 P: 0 **Marks:** Internal: **40** External: **60** Total: **100**
End Semester Exam: 3Hours

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 analyze and understand interactions between social and environmental processes	Apply

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

INTRODUCTION - ENVIRONMENTAL STUDIES & ECOSYSTEMS 5 HOURS

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

UNIT II 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

BIODIVERSITY AND ITS CONSERVATION 5 HOURS

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

UNIT IV

ENVIRONMENTAL POLLUTION **5 HOURS**

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

UNIT V

SOCIAL ISSUES AND THE ENVIRONMENT **4 HOURS**

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

SUGGESTED READINGS

1. Anonymous. 2004. A text book for Environmental Studies, University Grants Commission and Bharat Vidypeeth Institute of Environmental EducationResearch, 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

2023-2024

BACHELOR OF COMPUTER SCIENCE(COGNITIVE SYSTEMS)
23LSU201

SEMESTER-II
LANGUAGE -II

4H -4C

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

இலக்கிய நெறிகள்

பாடத்திட்டப் பொதுநோக்கம்

- 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 குடியுரிமைப்பணி 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 பன்நோக்கு 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 (8 மணிநேரம்)

நாயன்மார்கள் : தமிழ் இலக்கிய வரிசையில் திருமுறைகளும் நாலாயிரத் திவ்யப்பிரபந்தமும் பன்னிரு திருமுறைகள் அறிமுகம் – திருமுறை ஆசிரியர்களின் இலக்கியப் பங்களிப்பு

சைவம்-பெரியபுராணம் - காரைக்கால் அம்மையார் புராணம் .

முக்கூடற்பள்ளு - 2 பாடல்கள் - சித்திரக்காலிவாலான் (நெல் வகைகள்) குற்றாலத் திரிகூடமால்வரை (மீன்வகைகள், காளை வகைகள்)

கவிதை : மகாகவி பாரதியார் - யோகசித்தி

கவிதை : கவிமணி தேசிக விநாயகம் பிள்ளை - வாழ்க்கைத் தத்துவங்கள்

கவிதை : கவிஞர் சுகந்திசுப்பிரமணியம் - புதையுண்டவாழ்க்கை

சிறுகதை : மகாமசானம் - புதுமைப்பித்தன்

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

அலகு– 2 (12 மணிநேரம்)

ஆழ்வார்கள் : இலக்கியப் பங்களிப்பு - திவ்யப் பிரபந்தத்தில் பக்திநெறியும் இலக்கிய நயமும்

உரைநடை : தோற்றமும் வளர்ச்சியும்

வைணவம் : பெரியாழ்வார் திருமொழி: 3-ஆம் பத்து – பத்தாம் திருமொழி 'நெறிந்தகருங்குழல் மடவாய்' – சீதைக்கு அனுமன் தெரிவித்த அடையாளம்.

கவிதை - கவிஞர் வைரமுத்து - வித்தியாசமான தாலாட்டு

சிற்பி பாலசுப்பிரமணியன் - பாரதி எங்கள் கண்மணி

அரங்க பாரி - கண்ணீர்! கண்ணீர்!

தமிழலங்காரம் – வண்ணச்சரபம் தண்டபாணி சுவாமிகள் - 10 பாடல்கள்

1. கடல் நீரில் கல்மிதக்கும், 2. வண்டமிழ் ஆற்றுதி, 3. கோளத்தை முட்டி
4. எக்காலம்என்று, 5. கடவூர் மயானத்தொர், 6. தேவாதிதேவன், 7. விண்மாரி,
8. தேவர்முனிவர், 9. அழுதேங்கிநஞ்சிட்ட, 10. 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 **(10 மணிநேரம்)**

புதுக்கவிதை - தோற்றமும் வளர்ச்சியும்

சிற்றிலக்கியம் -தோற்றமும்வளர்ச்சியும்

மதுரைசொக்கநாதர் - தமிழ்விடுதூது – தமிழின் சிறப்பு பாடியருள பத்துப்பாட்டும் - விளம்பக்கேள்.

கவிதை- ஈரோடுதமிழன்பன் – இன்னொரு சுதந்திரம்

சிறுகதை - கு. அழகிரிசாமி - இருவர் கண்ட ஒரேகனவு

கட்டுரை - ஔவைதுரைசாமி - ஏட்டில் இல்லாத இலக்கியம்

படைப்பிலக்கியப் பயிற்சிகள் - மரபுக்கவிதை, புதுக்கவிதை, சிறுகதை, கட்டுரை படைப்பாக்க உத்திகள் –பயிற்சிகள்

அலகு – 4 **(10 மணிநேரம்)**

சிறுகதை - தோற்றமும் வளர்ச்சியும்

கலிங்கத்துப்பரணி – தேவாசுரம், உடலின்மேல், நெடுங்குதிரை மிசைக்கலணை, விருந்தினரும் வறியவரும், தரைமகள் தன்கொழுநன்றன், பொருதடக்கை வாளெங்கே, வெயில்தாரை.

அருள்தரும் பூங்கோதையன்னை அந்தாதி - 11பாடல்கள்

1. பகவன்பெயரை, 2.மெல்லியல்மேலை,3.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 - வல்லூறுகள்

கட்டுரை- முனைவர் ப. தமிழரசி - நொய்யல்,

சொல்லின் செல்வர் ரா.பி.சேதுப்பிள்ளை - காளத்திவேடனும் கங்கைவேடனும்

மொழிபெயர்ப்புப் பயிற்சிகள் : தமிழ்-ஆங்கில மொழிபெயர்ப்புப் பயிற்சிகள் -2.

அலகு – 5 **(8 மணிநேரம்)**

நாட்டுப்புற இலக்கியங்கள் – அறிமுகம்

கவிதை – புரட்சிக்கவிஞர் பாரதிதாசன் - தமிழின் இனிமை

கவிதை - கவிஞர் அறிவுமதி - நட்புக்காலம்

சிறுகதை - நாஞ்சில்நாடன் - இந்நாட்டு மன்னர்

கீழடி - வைகை நதிக்கரையில் சங்ககால நகரநாகரிகம்

மொழிபெயர்ப்புப் பயிற்சிகள் : ஆங்கிலம் - தமிழ் மொழிபெயர்ப்புப் பயிற்சிகள்-2.

பார்வை நூல்கள்

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

இணையதளம்

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

இதழ்கள்

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

SEMESTER-II
ENGLISH II

3H -3C

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

End Semester Exam:3 Hours

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.
- Introducing 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.
4. Ellis, R.(1990) Instructed second language acquisition. Oxford: oxford university Press

SEMESTER-II

COMPUTER NETWORKS

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 the Fundamentals of software defined networks and the OSI Reference Models.
- To gain the knowledge in protocol, topology, wired and wireless communications.
- Be familiar with IP Addressing and Subnetting with Advanced versions
- To learn the functions of network layer and the various routing Algorithms.
- To introduce the protocols of Monitoring Network Devices.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Summarize the fundamentals of networking and OSI Reference Models.	Understand
CO2	Relate basic knowledge about the topologies, protocols and types of communications available in networking	Remember
CO3	Bulid IP addressing and explain its functions	Apply
CO4	Design a routing Algorithm in a network and demonstrate how data packet will reach to the intended destination.	Create
CO5	Develop various protocols of Monitoring Network Devices	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I NEED OF NETWORK **7 HOURS**

Network classifications LAN, MAN, WAN, Data and signals analog and digital, periodic analog signals, digital signals, bit rate, baud rate, bandwidth, Transmission impairments - attenuation, distortion and noise, Data Communication protocols & standards, Network models - OSI model layers and their functions, TCP/IP protocol suite.

UNIT II BANDWIDTH UTILIZATION AND MULTIPLEXING 6 HOURS

Multiplexing - FDM, TDM, Spread spectrum - Frequency hopping spread spectrum, Direct sequence spread spectrum, Transmission media - guided and unguided media, Switching message, circuit and packet switched networks, Datagram networks and virtual circuit networks.

UNIT III IP ADDRESSING 6 HOURS

IP Addressing Version 4 – IP Addressing Version 6 – Subnetting- Advanced VLSM - Switch Basic - VLAN - VTP / CDP - Subnetting Basic Version 4 - Routing Static.

UNIT IV ROUTING ALGORITHMS 6 HOURS

Routing algorithms – Congestion Control Algorithms, CISCO IOS / Managing / Password recovery, Routing Dynamic Routing protocols OSPF RIP EIGRP, Network Advanced Routing Dynamic Routing protocols – OSPF RIP EIGRP.

UNIT V MONITORING 5 HOURS

Monitoring Network Devices - Overview of ACL\NAT\WAN\Wireless

SUGGESTED READINGS

1. David J.Wetherall, Andrew S.Tanenbaum,(2018). Computer Networks, 7th Edition, Pearson Education.
2. Behrouz A. Forouzan,(2016).Data Communication and Networking", 8th Edition, Tata McGraw Hill.
3. SilviuAngelescu, (2016). CCNA Certification All-In-One for Dummies, Wiley Publishing. Inc.

WEBSITES

1. https://www.geeksforgeeks.org/basics-computer-networking/
2. https://www.cisco.com/c/en_in/solutions/small-business/resource-center/networking/networking-basics.html
3. http://ecomputernotes.com/computernetworkingnotes/communication-networks/describe-the-different-transmission-media
4. https://www.tutorialspoint.com/ipv4/ipv4_addressing.htm
5. https://en.wikipedia.org/wiki/IPv6_address
6. https://en.wikipedia.org/wiki/Cisco_IOS

SEMESTER-II

PROBABILITY AND STATISTICS

4H -4C

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

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 and 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 Regressionfor two variables.	Analyze
CO5	To understand the basic concept of test of significance and make inferences from statisticaltests and also to develop an ability to analyze, demonstrate to provide meaningful information in fromthe 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 Basics of Probability **8 HOURS**

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

UNIT II Discrete and Continuous Probability Distributions **8 HOURS**

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

UNIT III Basics of Statistics and Uni Variate Analysis **8 HOURS**

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

UNIT IV Bivariate Analysis **8 HOURS**

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

UNIT V Index Numbers **8 HOURS**

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

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 HillEducation, 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 withApplication, 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-II

DATA STRUCTURES

3H -3C

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

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	S	M	S	L	L	S	M	S	S	S	S	S
CO2	L	L	S	M	S	S	S	M	S	M	M	S
CO3	M	S	L	S	L	M	S	M	S	S	S	M
CO4	S	M	S	S	M	S	M	L	M	S	S	M
CO5	S	M	M	S	S	M	L	S	M	M	M	S

S-Strong; M-Medium; L-Low

UNIT I ARRAYS AND STACKS **7 HOURS**

Definition, Structure and properties of algorithm – Development of an algorithm – data structures and algorithms – Data Structure definition and classification – **Arrays:** Introduction – array operations – Number of elements in an array – Representation of arrays in memory – Applications

of arrays. **Stacks:** Introduction- Stack Operations - Applications of stacks: Evaluations of postfix expressions.

UNIT II QUEUES AND LINKED LISTS 6 HOURS

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

UNIT III TREES 6 HOURS

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

UNIT IV GRAPHS 5 HOURS

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

UNIT V SORTING, SEARCHING AND HASHING 6 HOURS

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

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.
5 Seymour Lipschutz, Data Structures McGraw Hill Publications, 2014, 1st Edition

WEBSITES

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

SEMESTER-II

COMPUTER NETWORKS- 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 Understand the Fundamentals of software defined networks and the OSI Reference Models.
- To gain the knowledge in protocol, topology, wired and wireless communications.
- Be familiar with IP Addressing and Subnetting with Advanced versions
- To learn the functions of network layer and the various routing Algorithms.
- To introduce the protocols of Monitoring Network Devices.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Summarize the fundamentals of networking and OSI Reference Models.	Understand
CO2	Relate basic knowledge about the topologies, protocols and types of communications available in networking	Remember
CO3	Bulid IP addressing and explain its functions	Apply
CO4	Design a routing Algorithm in a network and demonstrate how data packet will reach to the intended destination.	Create
CO5	Develop various protocols of Monitoring Network Devices	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

Requirements:

Cisco packet tracer software (Freeware)

List of Programs

1. Installation of Cisco Packet Tracer
2. Configuration of Cisco Packet Tracer
3. Basic Switch Setup
4. Configuring Switch Interfaces
5. VLAN and VTP Configuration
6. Basic Router Setup
7. Configuration of Static Routes
8. Configuration of IP Routing using RIP

SUGGESTED READINGS

1. David J.Wetherall, Andrew S.Tanenbaum,(2018). Computer Networks, 7th Edition, Pearson Education.
2. Behrouz A. Forouzan,(2016).Data Communication and Networking", 8th Edition, Tata McGraw Hill.
3. SilviuAngelescu, (2016). CCNA Certification All-In-One for Dummies, Wiley Publishing. Inc.

WEBSITES

1. https://www.geeksforgeeks.org/basics-computer-networking/
2. https://www.cisco.com/c/en_in/solutions/small-business/resource-center/networking/networking-basics.html
3. http://ecomputernotes.com/computernetworkingnotes/communication-networks/describe-the-different-transmission-media
4. https://www.tutorialspoint.com/ipv4/ipv4_addressing.htm
5. https://en.wikipedia.org/wiki/IPv6_address
6. https://en.wikipedia.org/wiki/Cisco_IOS
7. http://ecomputernotes.com/computernetworkingnotes/communication-networks/describe-the-different-transmission-media
8. https://www.tutorialspoint.com/ipv4/ipv4_addressing.htm
9. https://en.wikipedia.org/wiki/IPv6_address
10. https://en.wikipedia.org/wiki/Cisco_IOS

SEMESTER-II

OBJECT ORIENTED PROGRAMMING USING C++ - 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 understand how C++ improves C with object-oriented feature.
- To learn the syntax and semantics of classes in C++ programming language.
- To learn how to perform operator overloading and inheritance.
- To learn how to design C++ using pointers.
- To learn file handling in C++.

Course Outcomes

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

COs	Course Outcomes	Blooms Level
CO1	Understand the difference between top-down and bottom-up approach.	Understand
CO2	Apply the concepts of object-oriented programming in constructor and destructor.	Apply
CO3	Understand how to apply the major object-oriented concepts to implement inheritance and polymorphism.	Understand
CO4	Apply pointer concepts in C++.	Apply
CO5	Understand the concepts of file handling.	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Write a C++ program to print sum of digits.
2. Write a C++ program to check palindrome number.
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. Implement array using pointers.
6. Write a program which takes the radius of a circle as input from the user, passes it to another function that computes the area and the circumference of the circle and displays the value of area and circumference from the main() function.
7. Create the Person class. Create some objects of this class (by taking information from the user). Inherit the class Person to create two classes Teacher and Student class. Maintain the respective information in the classes and create, display and delete objects of these two classes (Use Runtime Polymorphism).
8. Write a C++ Program to store GPA of n number of students and display it where n is the number of students entered by user (Memory Management).
9. Write a program to demonstrate the try, catch block in C++
10. Write a C++ 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. Joel Murach, Mary Delamater. (2018). C++ Programming ,MikeMurach& Associates Inc.
3. Stefan Bjornander. (2016). C++ Windows Programming, Published byPacktPublishingLtd.
4. Richard L. Stegman. (2016). Focus on Object-oriented Programming with C++,6th Edition, CreateSpace Independent Publishing Platform.
5. Bjarne Stroustroup. (2014). Programming - Principles and Practice using C++, 2nd Edition,Addison-Wesley.
6. Harry, H. Chaudhary. (2014). Head First C++ Programming: The Definitive Beginner's Guide, First Create space Inc, O-D Publishing, LLC USA.
7. Debasish Jana. (2014). C++ And Object-Oriented Programming Paradigm,PublishedbyPHI Learning Pvt. Ltd.

WEBSITES

1. www.programmingsimplified.com
2. www.programiz.com / cpp-programming
3. www.cplusplus.com
4. www.learncpp.com
5. www.udemy.com
6. https://nptel.ac.in/courses/106101208/
7. http://172.16.13.33/course/view.php?id=599

SEMESTER-II

WEB PROGRAMMING- PRACTICAL

5H -3C

Instruction Hours / Week: L: 0 T: 0 P: 5 **Marks:** Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives

- To understand the principles of creating an effective web page.
- To understand the basics of HTML, DHTML, XML and JavaScript.
- To understand the principles XML documents.
- To Design tables and frames in HTML.
- To provide a calculations and validations using JavaScript.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Infer the principles of web languages to create effective web page.	Understand
CO2	Model a simple static webpage using the web languages likes HTML, DHTML and XML.	Apply
CO3	Bulid the web page with XML document	Apply
CO4	Design a tables and frames using HTML List Tags	Create
CO5	Distinguish the validations and calculations in JavaScript	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Using Formatting Tag
2. Implementation of Table Tags
3. Using List Tags
4. Implementation of frames and frame sets

5. XML and XML documents
6. Java script to perform validations
7. Java script to perform calculations

SUGGESTED READINGS

1. Akshi Kumar. (2018). Web Technology Theory and Practice. Chapman and Hall/CRC
2. M.Srinivasan. (2012). Web Technology: Theory and Practice, Pearson Publishers.
2. P. K. Yuen, V. Lau . (2003). Practical Web Technologies Pearson Publishers.

WEBSITES

1. www.w3schools.com
2. www.javatpoint.com

SEMESTER-II

INDIAN KNOWLEDGE SYSTEM

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

1. To understand the Indian knowledge systems about origin, evolution and ontological approach
2. To comprehend the Indian knowledge approaches with respect to time and language
3. To obtain key knowledge on life and mind of Indian knowledge system
4. To acquire key information on torchbearers of Indian knowledge system
5. 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/

BACHELOR OF COMPUTER SCIENCE (COGNITIVE SYSTEM) 23VAC202	2023-2024
SEMESTER-II	
VALUE ADDED COURSE - YOGA FOR YOUTH EMPOWERMENT	
	2H - 2C
Instruction Hours/week: L:0 T:0 P:2	Marks: Internal:100 Total: 100

End Semester Exam: 3 Hours

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	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: 1 **(4 HOURS)**

Yoga and Physical Health

Manavalakalai (SKY) Yoga: Introduction Education as a means for youth empowerment-Greatress of Education Yoga for youth Empowerment. Simplified Physical Exercises Hand, Leg, Breathing, Eye exercises Kapalabathi, Makarasana Part I, Makarasana Part II, Body Massage, Acupressure, Relaxation exercises Benefits Yogasanas 1: Pranamasana Hastha Uttanasana Pada Hasthasana - Aswa Sanjalana Asana Thuvipatha asva 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 **(4 HOURS)**

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 **(4 HOURS)**

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, Enviorment) Physica purity- Mental purity-Spiritualpurity. Social Values: Nonviolence-Service Patriotism-Equality Respect for parents and elders care and protection Respect for teacher Punctuality-Time Management

UNIT: 4 **(4 HOURS)**

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)

UNIT: 5 **(4 HOURS)**

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. lyenger
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

SEMESTER-III
LANGUAGE -III

4H -4C

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

தமிழ் இலக்கிய வரலாறு- தாள் 3,

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 குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில் விருப்பப் பாடமாக இடம்பெறுகின்ற தமிழ் நாகரிகமும் பண்பாடும் குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.

பாடத்திட்டப் பொது நோக்கம்

1. இந்தியக் குடியுரிமைப்பணி 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 பன்நோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல்
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்புத்திறன் 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 சங்க இலக்கியம்

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

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

அலகு:3 திருமுறைகளும் திவ்யப்பிரபந்தமும்

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

அலகு: 4 சிற்றிலக்கியங்களும் இக்கால இலக்கியங்களும்

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

அலகு: 5 தமிழின் ஐந்திலக்கணம்

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

பாடநூல்:

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.

இணையதளம்

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

இதழ்கள்

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

BACHELOR OF COMPUTER SCIENCE(COGNITIVE SYSTEMS)
23ENU301

2023-2024

SEMESTER-III
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 Universiity 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

INFRASTRUCTURE MANAGEMENT

3H -2C

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

Course Objectives

- To learn the installation and configuration process for System Center 2012 R2 Operations Manager standard and DataCenter features,
- To acquire knowledge on monitor services, devices, and operations for many computers in a single console by showing state, health, and performance information, as well as alerts generated for availability, performance, configuration and security situations.
- To design and provision custom views to relevant support teams.
- To understand how to deploy agents
- To Create dashboards and custom visualizations

Course Outcomes (**COs)**

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

COs	Course Outcomes	Blooms Level
CO1	Bulid the Operations Manager Standard and Data Center Features using installation and Process Configurations.	Apply
CO2	Develop the knowledge of configuration for Cloud-Based Client Management.	Apply
CO3	Design the SCOM with client Deployment.	Create
CO4	Inference the concepts of security manual agents	Analyze
CO5	Demonstrate the Role Based Security on SQL Reporting services.	understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I WINDOWS 10 CLIENT OS **8 HOURS**

Introducing Windows 10, Overview of Deploying Windows 10, Configure Devices and Drivers, Perform Post installation Configuration Tasks, Managing Apps in Windows

UNIT II INTRODUCTION TO SCCM **8 HOURS**

System Center Configuration Manager Overview, SCCM Features and Capabilities, SCCM Setup & Installation, Configuration Manager Basics, Deploying SCCM Client, User and Device Collections in SCCM

UNIT III MANAGING SYSTEMS WITH SCCM **7 HOURS**

Application Management using SCCM, Operating System Deployment using SCCM, Endpoint Protection using SCCM, Troubleshooting SCCM Server, Troubleshooting SCCM Clients, Creating Reports using SCCM Reports

UNIT IV - INTRODUCTION TO SCOM **7 HOURS**

System Center Operations Manager Overview, SCOM Features and Capabilities, SCOM Setup & Installation, Operations Manager Basics, Deploying SCOM Clients, Management Packs in SCOM

UNIT V- MONITORING SYSTEMS WITH SCOM **6 HOURS**

Managing & Administering SCOM Environment, Managing Alerts using SCOM, Creating Custom Management Packs and Alerts, Troubleshooting SCOM Server, Troubleshooting SCOM Clients, Creating Reports using SCOM Reporting

SUGGESTED READINGS

1. Kerrie Meyler, Gerry Hampson. (2018). System Center Configuration Manager Current Branch Unleashed System" 1st Edition.
2. SlawekLigus. (2012).,Effective Monitoring and Alerting: For Web Operations" 1st Edition.

WEBSITES

1. http://systemcentermvp.com/2017/05/10/operations-manager-basic-concepts-nutshell/
2. http://techgenix.com/introduction-system-center-operations-manager-2012-part1/
3. https://www.business.com/articles/microsoft-scom-for-beginners/
4. https://docs.microsoft.com/en-us/system-center/scom/manage-agentless-monitoring

SEMESTER-III

PYTHON PROGRAMMING

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 Describe the core syntax, semantics and Algorithms of Python programming language.
- To understand the basic process of structuring the data, Expressions and statements.
- To Discover the need for working with the control statements and functions.
- To Illustrate the process of structuring the data using lists, dictionaries, and tuples.
- To Infer the File handling concepts in Python

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Algorithmic problem solving	Understand
CO2	Examine proficiency in the handling basic process of structuring the data, Expressions and Statements.	Analyze
CO3	Bulid the Python Programming using Control Statements.	Apply
CO4	Create Python programs by utilizing the data structures like lists, dictionaries, tuples and sets	Create
CO5	Design program using File Handling Functions like Open, Read and write	Create

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I - ALGORITHMIC PROBLEM SOLVING **8 HOURS**

Algorithms, building blocks of algorithms (statements, state, control flow, functions), notation (pseudo code, flow chart, programming language), algorithmic problem solving, simple strategies for developing algorithms (iteration, recursion). Illustrative problems: find minimum in a list, insert a card in a list of sorted cards, and guess an integer number in a range, Towers of Hanoi.

UNIT II - DATA, EXPRESSIONS, STATEMENTS **7 HOURS**

Python interpreter and interactive mode; values and types: int, float, Boolean, string, and list; variables, expressions, statements, tuple assignment, precedence of operators, comments; modules and functions, function definition and use, flow of execution, parameters and arguments; Illustrative programs: exchange the values of two variables, circulate the values of n variables, distance between two points.

UNIT III - CONTROL FLOW, FUNCTIONS: CONDITIONALS **7 HOURS**

Boolean values and operators, conditional (if), alternative (if-else), chained-conditional (if-else if-else); Iteration: state, while, for, break, continue, pass; Fruitful functions: return values, parameters, local and global scope, function composition, recursion; Strings: string slices, immutability, string functions and methods, string module; Lists as arrays. Illustrative programs: square root, gcd, exponentiation, sum an array of numbers, linear search, binary search.

UNIT IV - LISTS, TUPLES, DICTIONARIES **7 HOURS**

Lists: list operations, list slices, list methods, list loop, mutability, aliasing, cloning lists, list parameters; Tuples: tuple assignment, tuple as return value; Dictionaries: operationsandmethods; advanced list processing - list comprehension; Illustrative programs: selection sort, insertion sort, merge sort, histogram.

UNIT V - FILES, MODULES, PACKAGES **7 HOURS**

Files and exception: text files, reading and writing files, format operator; command line arguments, errors and exceptions, handling exceptions, modules, packages; Illustrative programs: word count, copy file.

SUGGESTED READINGS

1. Kenneth A. Lambert, Martin Osborne. (2018). Fundamentals of Python: First Programs, Cengage Learning, 2nd edition.
2. Karl Beecher. (2017). Computational Thinking: A Beginner's Guide to Problem Solving and Programming, 1st Edition, BCS Learning & Development Limited.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero. (2016). Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd.
4. Allen B. Downey. (2016). Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers.
5. Timothy A. Budd. (2015). Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.
6. John V Guttag. (2013). Introduction to Computation and Programming Using Python, Revised and expanded Edition, MIT Press.

WEBSITES

1. http://docs.python.org/3/tutorial/index.html.
2. http://interactivepython.org/courselib/static/pythonds.
3. http://www.ibiblio.org/g2swap/byteofpython/read/.

SEMESTER-III
VIRTUALIZATION AND CLOUD

3H -2C

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

Course Objectives

The objective of this course is

- To understand basic concepts of distributed computing,
- To Provide a good understanding of the concepts, standards in Cloud computing,
- To introduce the concept of Virtualization with Resource Monitoring and Management.
- To provide the concept of Virtual Machine using DRS.
- To acquire Knowledge about the data racks, centers and also extends with need of data centers.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Inference the Concepts of Distributed Computing.	Analyze
CO2	Demonstrate the Data Center Architecture with Real time applications like CISCO	Apply
CO3	Design the Virtualization systems with Host operating systems and Guest Operating systems.	Create
CO4	Bulid the Model based on cloud computing services like AWS, GAE	understand
CO5	Interpret the concepts of Virtual Machines like vSphere HA and DRS with Host Maintenance.	understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I DISTRIBUTED SYSTEMS **8 HOURS**

Distribute a system - Distributed algorithm - Distributed Data Stores - Distributed Computing - File Systems - Distributed Messaging - Distributed Applications – Distributed Transaction - Parallel and distributed computing - Applications.

UNIT II DATA CENTER **7 HOURS**

Data Center Overview, Data Center Evolution, Modern Business Requirements for Data Center, Making Agile Datacenter, Data Center Transformations, Future of Data Centers

UNIT III VIRTUALIZATION **7 HOURS**

Define Virtualization, Need of Virtualization, Virtualization Technologies, Uses of Virtualization, Planning for Virtualization, Virtualization Pitfalls

UNIT IV CLOUD **7 HOURS**

Cloud Fundamentals, Benefits of Cloud Computing, Type of Clouds, Cloud Computing Services, Cloud Computing Architecture, Virtualization and Cloud Computing, Grid Computing vs Cloud Computing, Security Concerns

UNIT V HYBRID CLOUD **7 HOURS**

Hybrid Cloud Fundamentals, Benefits of a Hybrid Cloud, Key Considerations for Hybrid Cloud, Components of Hybrid Cloud, Hybrid Cloud Deployment Models, Managing Hybrid Cloud Environments

SUGGESTED READINGS

1. Jean Dollimore formerly of Queen Mary, Tim Kindberg. (2017) Distributed Systems Concepts and Design, 5th Edition Cambridge University, University of London
2. VenkataJosyula, Malcolm Orr, Greg Page. (2016). Cloud Computing: Automating the Virtualized Data Center, 1st Edition.
3. Brian J.S. Chee, Curtis Franklin Jr. (2014). Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center", 1st Edition.

WEBSITES

1. https://www.ibm.com/support/knowledgecenter/en/SSAL2T_8.2.0/com.ibm.cics.tx.doc/concepts/c_wht_is_distd_comptg.html
2. https://www.w3schools.in/cloud-computing/cloud-virtualization/
3. http://www.vmwarearena.com/what-is-vmware-vsphere-beginners-guide-to-vmware-virtualization/
4. https://aws.amazon.com/getting-started/tutorials/

SEMESTER-III

INFORMATION TECHNOLOGY INFRASTRUCTURE LIBRARY

3H -2C

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 Key concepts of IT service management using ITIL service Models.
- To Acquire Knowledge about the Four dimensions of Service Design in ITIL.
- To understand the process management and risk management
- To know the Evolution and Challenges in providing IT Infrastructure Services
- To understand the event management and SNOC concepts.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Interpret the fundamental Knowledge about the IT service Management and Service Models.	Evaluate
CO2	Examine proficiency in the Four Dimensions of Service Design.	Analyze
CO3	Elaborate the Exposure with the process and risk Management.	Create
CO4	Inference the Evolution and Challenges in the IT Infrastructure Services.	Analyze
CO5	Summarize the Event Management, scope of Event Management and the value of organization	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO ITIL 4 **8 HOURS**

IT Service Management in the modern world, About ITIL v4, The structure and benefits of the ITIL v4 Framework

UNIT II KEY CONCEPTS OF SERVICE MANAGEMENT 7 HOURS

Value and Value Co-Creation, Stakeholders, Products and Services, Service Relationships and Value

UNIT III ITIL 4 DIMENSION MODEL OF IT SERVICE MANAGEMENT 7 HOURS

Organization & People; Information & Technology; Partners & Suppliers; Value Streams & Processes, External factors

UNIT IV ITIL SERVICE VALUE SYSTEM 7 HOURS

Service Value System (SVS) Overview; Opportunity, demand, and Value; Guiding Principles; Governance; Service Value Chain (SVC); Continual Improvement; Practices

UNIT V ITIL MANAGEMENT PRACTICES 7 HOURS

General Management Practices; Service Management Practices; Technical Management Practice

SUGGESTED READINGS

1. Service Support (CCTA): Part 15 (IT Infrastructure Library)
2. NwabuezeOhia, (2018). IT Infrastructure Risk & Vulnerability Library: A Consolidated Register of Operational & Technology Infrastructure Vulnerabilities for IT Assurance Professionals
3. IT Infrastructure Risk and Vulnerability Library: A Consolidated Register of Operational and Technology Infrastructure Vulnerabilities for IT Assurance Professionals (Japanese Edition)

WEBSITES

1. https://www.cio.com/article/272361/infrastructure-it-infrastructure-library-itil-definition-and-solutions.html
2. https://www.ibm.com/in-en/cloud/learn/it-infrastructure-library

SEMESTER-III

INFRASTRUCTURE MANAGEMENT- 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 the installation and configuration process for System Center 2012 R2 Operations Manager standard and DataCenter features,
- To acquire knowledge on monitor services, devices, and operations for many computers in a single console by showing state, health, and performance information, as well as alerts generated for availability, performance, configuration and security situations.
- To design and provision custom views to relevant support teams.
- To understand how to deploy agents
- To Create dashboards and custom visualizations

Course Outcomes (**COs)**

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

COs	Course Outcomes	Blooms Level
CO1	Bulid the Operations Manager Standard and Data Center Features using installation and Process Configurations.	Apply
CO2	Develop the knowledge of configuration for Cloud-Based Client Management.	Apply
CO3	Design the SCOM with client Deployment.	Create
CO4	Inference the concepts of security manual agents	Analyze
CO5	Demonstrate the Role Based Security on SQL Reporting services.	understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Working with SCCM
2. Working with SCOM

SUGGESTED READINGS

1. Kerrie Meyler, Gerry Hampson. (2018). System Center Configuration Manager Current Branch Unleashed System" 1st Edition.
2. SlawekLigus. (2012).,Effective Monitoring and Alerting: For Web Operations" 1st Edition.

WEBSITES

1. http://systemcentermvp.com/2017/05/10/operations-manager-basic-concepts-nutshell/
2. http://techgenix.com/introduction-system-center-operations-manager-2012-part1/
3. https://www.business.com/articles/microsoft-scom-for-beginners/
4. https://docs.microsoft.com/en-us/system-center/scom/manage-agentless-monitoring

SEMESTER-III

PYTHON PROGRAMMING- 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 Describe the core syntax, semantics and Algorithms of Python programming language.
- To understand the basic process of structuring the data, Expressions and statements.
- To Discover the need for working with the control statements and functions.
- To Illustrate the process of structuring the data using lists, dictionaries, and tuples.
- To Infer the File handling concepts in Python

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Interpret the fundamental Python syntax and semantics and be fluent in the use of Algorithmic problem solving	Understand
CO2	Examine proficiency in the handling basic process of structuring the data, Expressions and Statements.	Analyze
CO3	Bulid the Python Programming using Control Statements.	Apply
CO4	Create Python programs by utilizing the data structures like lists, dictionaries, tuples and sets	Create
CO5	Design program using File Handling Functions like Open, Read and write	Create

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Find the maximum of a list of numbers
2. Linear search and Binary search
3. Selection sort, Insertion sort
4. Merge sort
5. First n prime numbers
6. Multiply matrices
7. Programs that take command line arguments (word count)
8. Find the most frequent words in a text read from a file
9. Simulate elliptical orbits in Pygame
10. Simulate bouncing ball using Pygame

SUGGESTED READINGS

1. Kenneth A. Lambert, Martin Osborne. (2018). Fundamentals of Python: First Programs, Cengage Learning, 2nd edition.
2. Karl Beecher. (2017). Computational Thinking: A Beginner's Guide to Problem Solving and Programming, 1st Edition, BCS Learning & Development Limited.
3. Robert Sedgewick, Kevin Wayne, Robert Dondero. (2016). Introduction to Programming in Python: An Inter-disciplinary Approach, Pearson India Education Services Pvt. Ltd..
4. Allen B. Downey. (2016). Think Python: How to Think Like a Computer Scientist, 2nd edition, Updated for Python 3, Shroff/O'Reilly Publishers.
5. Timothy A. Budd. (2015). Exploring Python‖, Mc-Graw Hill Education (India) Private Ltd.
6. John V Guttag. (2013). Introduction to Computation and Programming Using Python, Revised and expanded Edition, MIT Press.

WEBSITES

1. http://docs.python.org/3/tutorial/index.html.
2. http://interactivepython.org/courselib/static/pythonds.
3. http://www.ibiblio.org/g2swap/byteofpython/read/.

SEMESTER-III

VIRTUALIZATION AND CLOUD - 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 objective of this course is

- To understand basic concepts of distributed computing,
- To Provide a good understanding of the concepts, standards in Cloud computing,
- To introduce the concept of Virtualization with Resource Monitoring and Management.
- To provide the concept of Virtual Machine using DRS.
- To acquire Knowledge about the data racks, centers and also extends with need of data centers.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Inference the Concepts of Distributed Computing.	Analyze
CO2	Bulid the Model based on cloud computing services like AWS, GAE	Apply
CO3	Design the Virtualization systems with Host operating systems and Guest Operating systems.	Create
CO4	Interpret the concepts of Virtual Machines like vSphere HA and DRS with Host Maintenance.	understand
CO5	Demonstrate the Data Center Architecture with Real time applications like CISCO	understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Working with hypervisors
2. Creating account in AWS
3. Exploring AWS services like storage, machine image, pricing models, data bases

SUGGESTED READINGS

1. Jean Dollimore formerly of Queen Mary, Tim Kindberg. (2017) Distributed Systems Concepts and Design, 5th Edition Cambridge University, University of London
2. VenkataJosyula, Malcolm Orr, Greg Page. (2016). Cloud Computing: Automating the Virtualized Data Center, 1st Edition.
3. Brian J.S. Chee, Curtis Franklin Jr. (2014). Cloud Computing: Technologies and Strategies of the Ubiquitous Data Center", 1st Edition.

WEBSITES

1. https://www.ibm.com/support/knowledgecenter/en/SSAL2T_8.2.0/com.ibm.cics.tx.doc/concepts/c_wht_is_distd_comptg.html
2. https://www.w3schools.in/cloud-computing/cloud-virtualization/
3. http://www.vmwarearena.com/what-is-vmware-vsphere-beginners-guide-to-vmware-virtualization/
4. https://aws.amazon.com/getting-started/tutorials/

SEMESTER-III
HEALTH AND WELLNESS

2H -2C

Instruction Hours / Wweek: L: 2 T: 0 P: 0 **Marks:** Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objective

- To introduce the fundamental concepts of physical education, health and wellness.
- 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

After successful completion of the course, the student will be

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

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

S-Strong; M-Medium; L-Low

UNIT I **06 HOURS**

Definition and concept of health -biomedical concept, ecological concept, psycosocial 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 **06 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 **06 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 **06 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 **06 HOURS**

Benefits and Importance of yoga in our life – Pranayama – Surya Namaskar-Padmasana- Pachimothasana- Bhujangasana- Dhanurasana - Sarvangasana -Matsyasana- SalabhasanHalasana- 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

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SEMESTER-III

INTERNSHIP*

0H -2C

Instruction Hours / Week: L: 0 T: 0 P: 0 Total: **100**

End Semester Exam: 3 Hours

SEMESTER-IV
LANGUAGE -IV

4H -4C

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

தமிழர் நாகரிகமும் பண்பாடும் - தாள் 4

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 குடியுரிமைப் பணி முதலான போட்டித் தேர்வுகளில் விருப்பப் பாடமாக இடம்பெறுகின்ற தமிழ் நாகரிகமும் பண்பாடும் குறித்த முழுமையான அறிமுகம் பெற்றிருத்தல்.

பாடத்திட்டப் பொது நோக்கம்

1. இந்தியக் குடியுரிமைப்பணி 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 பன்நோக்கு அணுகுமுறையிலான ஆய்வுச்சிந்தனை மேம்பாடு.
4. வேலைவாய்ப்புக்குரிய சுயதிறன் மேம்பாட்டுடன், படைப்பாக்கத்திறன் மேம்பாடும் பெற்றிருத்தல் .
5. சமுதாய மற்றும் வாழ்வியல் மதிப்புகளைப் பேணுவதற்குக் கருவியாக இலக்கியங்களை நாடுகின்ற மனப்பான்மை வளர்ச்சி. மொழிபெயப்புத் துறைசார்ந்த வேலைவாய்புத்திறன் 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 – I 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

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

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

அலகு – 4 கட்டடக்கலையும் தமிழர் பண்பாடும்

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

அலகு – 5 ஆற்றங்கரை நாகரிகம்

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

Part I TAMIL 2024. Even Sem Science Karpagam Academy of Higher Education, Coimbatore –21.

பார்வை நூல்கள்

1. முனைவர் அரங்க இராமலிங்கம் (பதிப்பாசிரியர்), தமிழர் நாகரிகமும் தமிழ் மொழிவரலாறும் (தொகுதி -1, 6, 2, 5, 10), வர்த்தமானன் பதிப்பகம், தியாகராயநகர், சென்னை-17.

2. கே.கே.பிள்ளை, தமிழக வரலாறு மக்களும் பண்பாடும், உலகத்தமிழ் ஆராய்ச்சி நிறுவனம் தரமணி, சென்னை-13.
3. நா.வானமாமலை, தமிழர் வரலாறும் பண்பாடும், நியூசெஞ்சுரி புக்ஹவுஸ், சென்னை -98.

இணையதளம்

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

இதழ்கள்

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

SEMESTER-IV
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 JAVA

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 the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the structure and model of the Java programming language	Understand
CO2	Anlayse the class variables and methods.	Analyze
CO3	Apply the inheritance usage.	Apply
CO4	Understand the database connectivity.	Understand
CO5	Apply the GUI programming and swing	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO JAVA **6 HOURS**

Java Architecture and Features, Understanding the semantic and syntax differences between C++ and Java, Compiling and Executing a Java Program, Variables, Constants, Keywords Data Types, Operators (Arithmetic, Logical and Bitwise) and Expressions, Comments, Doing Basic Program Output, Decision Making Constructs (conditional statements and loops) and Nesting.

UNIT II ARRAYS, STRINGS AND I/O **6 HOURS**

Object-Oriented Programming Overview Principles of Object-Oriented Programming, Defining & Using Classes, Controlling Access to Class Members, Class Constructors, Method Overloading, Class Variables & Methods, Objects as parameters, final classes, Object class, Garbage Collection- Creating & Using Arrays (One Dimension and Multi-dimensional), Referencing Arrays Dynamically, Java Strings: The Java String class, Creating & Using String Objects, Manipulating Strings, String Immutability & Equality, Passing Strings To & From Methods, String Buffer Classes. Simple I/O using System.out and the Scanner class, Byte and Character streams, Reading/Writing from console and files.

UNIT III INHERITANCE **6 HOURS**

Inheritance: (Single Level and Multilevel, Method Overriding, Dynamic Method Dispatch, Abstract Classes), Interfaces and Packages, Extending interfaces and packages, Package and Class Visibility, Using Standard Java Packages (util, lang, io, net), Wrapper Classes.

UNIT IV EXCEPTION HANDLING AND DATABASE CONNECTIVITY **6 HOURS**

Exception types, uncaught exceptions, throw, built-in exceptions, creating your own exceptions; Multi-threading: The Thread class and Runnable interface, creating single and multiple threads, Thread prioritization, synchronization and communication, suspending/resuming threads. Accessing and manipulating databases using JDBC.

UNIT V JAVA GUI PROGRAMMING USING SWING **6 HOURS**

Working with Graphics, Incorporating Images & Sounds. Event Handling Mechanisms, Listener Interfaces, Adapter and Inner Classes. The design and Implementation of GUIs using Swing components of Java Foundation Classes such as labels, buttons, text fields, layout managers, menus, events and listeners; Graphic objects for drawing figures such as lines, rectangles, ovals, using different fonts.

SUGGESTED READINGS

1. Herbert Schildt. (2017). Java the Complete Reference, 8th Edition, Mc Graw Hill ,Oracle Press.
2. James Gosling, Bill Joy, Guy L Steele Jr, Gilad Bracha, Alex Buckley. (2015). The Java Language Specification, Java SE 8th Edition (Java Series), Addison Wesley Publishers.
3. Cay S. Horstmann, Gary Cornell. (2018). Core Java 2 Volume 1 ,11th Edition, Prentice Hall.
4. Cay S. Horstmann, Gary Cornell. (2019). Core Java 2 Volume 2 - Advanced Features, 9th Edition, Pearson.
5. E. Balaguruswamy. (2019). Programming with Java, 6th Edition, McGraw Hill.
6. Paul Deitel, Harvey Deitel. (2018). Java: How to Program (Early Objects), 11th Edition, Prentice Hall.
7. David J. Eck, 2015, Introduction to Programming Using Java 8th Edition, Published by CreateSpace Independent Publishing Platform.
8. Ben Evans and David Flanagan, 2019, Java in a Nutshell, Seventh Edition. O'Reilly Media, Inc.

WEBSITES

1. https://docs.oracle.com/java
2. https://www.tutorialspoint.com/java/index.htm
3. https://www.w3schools.com/java/
4. https://www.javatpoint.com/java-tutorial
5. https://docs.oracle.com/javase/tutorial/java/index.html
6. https://www.geeksforgeeks.org/java-tutorials/
7. https://nptel.ac.in/courses/106105191/
8. http://172.16.25.76/course/view.php?id=1827

SEMESTER-IV

DATABASE MANAGEMENT SYSTEM

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 the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- To provide a strong formal foundation in database concepts, technology and Structured Query Language.
- To give systematic database approaches covering DML, Function & Groupings and Joins&views.
- Be familiar with the basic issues of transaction processing and concurrency control.
- To learn and understand various Cursors, Exceptions and Types of Exceptions.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Ability to understand and design data modelling using Entity-Relationship model.	Understand
CO2	Inference SQL to a broad range of query and data update problems.	Analyze
CO3	Make Use of the DML, DDL, DCL To work with Tables.	Apply
CO4	Explain transaction Management in relational database System.	Understand
CO5	Apply different database architecture like Cursors and Exceptions to analyses the use of appropriate architecture in real time environment.	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I DATABASE CONCEPTS-A RELATIONAL APPROACH 6 HOURS

Database - Relationships - DBMS - Relational data model - Integrity rules - Theoretical relational languages. **Database Design**: Data modeling -Dependency - Database design -Normal forms - Dependency diagrams - Denormalization

UNIT II STRUCTURED QUERY LANGUAGE (SQL) 6 HOURS

Introduction – DDL - Naming rulesandconventions - D a t a t ypes-Constraints-C reatinga table-Displaying t able information - Altering an existing table – Dropping, renaming, and truncating table - Table types

UNIT III WORKING WITH TABLES 6 HOURS

DML - Adding a new Row/Record - Customized prompts - Updating and deleting an existing rows/records - Retrieving data from table - Arithmetic operations - Restricting data with WHERE clause - Sorting - Substitution variables - DEFINE command - CASE structure. **Functions and Grouping**: Built-in functions - Grouping data. **Joins and Views**: Join - join types-**Views:** Views - Creating a view - Removing a view - Altering a view

UNIT IV PL/SQL 6 HOURS

Fundamentals - Block structure - comments - Data types – Other data types - Variable declaration - Assignment operation - Bind variables - Substitution variables - Printing. **Control Structures and Embedded SQL**: Control structures - Nested blocks - SQL in PL/SQL - Data manipulation - Transaction control statements

UNIT V PL/SQL CURSORS AND EXCEPTIONS 6 HOURS

Cursors - Implicit & explicit cursors and attributes - cursor FOR loops - SELECT…FOR UPDATE - WHERE CURRENT OF Clause - cursor with parameters - Cursor variables - Exceptions - Types of exceptions - Records - Tables -Procedures -Functions-Triggers

SUGGESTED READINGS

1. ElmasriRamez and Navathe Shaman. (2019). Fundamentals of Database System', Pearson Education , Sixth Edition.
2. Abraham Silberschatz, Henry F.Korth and S.Sudarshan. (2018). Database System Concepts', Tata Mc Graw Hill,Sixth Edition.
3. Ivan Bayross. (2018). SQL, PL/SQL the Programming Language of Oracle Paperback. BPB Publication, Fifth Edition.
4. Nilesh Shah, "Database Systems Using ORACLE", PHI, 2nd Edition, 2011

WEBSITES

1. https://www.datanamic.com/support/lt-dez005-introduction-db-modeling.html
2. https://docs.oracle.com/cd/B12037_01/server.101/b10759/statements_1001.htm
3. https://www.geeksforgeeks.org/sql-ddl-dml-dcl-tcl-commands/
4. https://www.javatpoint.com/oracle-create-table
5. https://www.tutorialspoint.com/plsql/

SEMESTER-IV

CYBER SECURITY

3H -2C

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

Course Objectives

- To state the basic concepts in Cyberspace, Cybersecurity issues and challenges
- To provide an exposure to the classification of Cybercrimes and, Remedial and mitigation
- To understand principles of Social Media Overview and Security
- To gain knowledge about E-Commerce and Digital Payments
- To understand key terms and concepts Digital Device Security tools

Course Outcomes (COs)

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

S-Strong; M-Medium; L-Low

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

UNIT I

Introduction to Cyber Security **6 HOURS**

Defining Cyberspace and Overview of Computer and Web-Technology-Architecture of cyberspace- Communication and web technology, Internet, World wide web, Advent of internet-Internet infrastructure for data transfer and governance- Internet society- Regulation of cyberspace- Concept of cyber security-Issues and challenges of cyber security.

UNIT II

Cybercrime and Cyber law **6 HOURS**

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

UNIT III

Social Media Overview and Security **6 HOURS**

Introduction to Social networks- Types of Social Media-Social Media Platforms-Social media monitoring, Hashtag, Viral content, Social media Marketing-Social media privacy, Challenges, opportunities and pitfalls in online social Network-Security issues related to social media-Flagging and reporting of inappropriate Content-Laws regarding posting of inappropriate content, Best practices for the use of Social media- Case studies.

UNIT IV

E-Commerce and Digital Payments **6 HOURS**

Definition of E- Commerce-Main components of E-Commerce- Elements of E-Commerce security- E-Commerce threats-E-Commerce security best practices-Introduction to digital payments- Components of digital payment and stake holders-Modes of digital payments-Banking Cards, Unified Payment Interface (UPI), e-Wallets, Unstructured Supplementary Service Data (USSD), Aadhar enabled payments, Digital payments related common frauds and preventive measures- RBI guidelines on digital payments and customer protection in unauthorized banking transactions- Relevant provisions of Payment Settlement Act,2007.

UNIT V

Digital Devices Security, Tools and Technologies for Cyber Security **6 HOURS**

End Point device and Mobile phone security- Password policy- Security patch management- Data Backup-Downloading and management of third party software- Device security policy- Cyber Security best practices- Significance of host firewall and Ant-virus- Management of host firewall and Anti-Virus-Wi-Fi security- Configuration of basic security policy and permissions.

SUGGESTED READINGS

1. Nina Godbole & SUNIT Belapure. (2013). CYBER SECURITY. Wiley India Pvt. Ltd. New Delhi
2. Godbole, N. (2009). Information Systems Security: Metrics Frameworks and Best Practices. Wiley India. New Delhi
3. Cyber Crime Impact in the New Millennium, by R. C Mishra , Auther Press. Edition 2010.
4. Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives by Sumit Belapure and Nina Godbole, Wiley India Pvt. Ltd. (First Edition, 2011).
5. Security in the Digital Age: Social Media Security Threats and Vulnerabilities by Henry A. Oliver, Create Space Independent Publishing Platform. (Pearson, 13th November, 2001).
6. Electronic Commerce by Elias M. Awad, Prentice Hall of India Pvt Ltd.
7. Cyber Laws: Intellectual Property & E-Commerce Security by Kumar K, Dominant Publishers.
8. Network Security Bible, Eric Cole, Ronald Krutz, James W. Conley, 2nd Edition, Wiley India Pvt. Ltd.
9. Fundamentals of Network Security by E. Maiwald, McGraw Hill.

WEBSITES

1. www.Cybercrime.gov.in
2. https://gac.gov.in/
3. https://www.india.gov.in/password-policy-ministry-electronics-and-information-technology?page=3
4. https://mahe.gov.in/mobile-app-policy/
5. https://www.dsci.in/

SEMESTER-IV

PROCESS MANAGEMENT

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 Understand software engineering and software process models.
- To acquireKnowledge on Agile Process Model, Scrum and Sprint.
- To Recognize the need of DevOps Tools
- To Gain knowledge on Lean Ux and Agile Anti patterns
- To Design and develop a quality software product

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Ability to understand software engineering and software process models.	Understand
CO2	Inference Knowledge on Agile Process Model, Scrum and Sprint.	Analyze
CO3	Experiment with the need of DevOps Tools	Apply
CO4	Infer knowledge on Lean Ux and Agile Anti patterns	Understand
CO5	Design and develop a quality software product	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I SOFTWARE AND SOFTWARE ENGINEERING 4 HOURS

The Nature of Software, The Unique Nature of WebApps, Software Engineering- Software Process, Software Engineering Practice-Software Myths. Software Process Model: A Generic Process Model,

Process Assessment and Improvement, Perspective Process Models, Specialized Process Model, The Unified Process. Software Engineering Code of Ethics.

UNIT II AGILE **4 HOURS**

What Is Agile, Understanding Agile Value, Agile Manifesto, Principles of Agile, Agile Methodologies, Advantages and Disadvantages of Agile - Agile anti-patterns, Scaled Agile Framework, Why Lean UX, The Three Foundations of Lean UX, Principles of Lean UX.

UNIT III SCRUM **4 HOURS**

Definition of Scrum, Uses of Scrum, Scrum Theory, Scrum Values, The Scrum Team, Scrum Events, Scrum Artifacts, Artifact Transparency.

UNIT IV DEVOPS **4 HOURS**

Introduction to DevOps, methodologies, principles, strategies, Automation, Performance Measurement through KPIS and Metrics, Agile and DevOps, Agile Infrastructure, Velocity, Lean Startup UPS.

UNIT V DESIGN THINKING **4 HOURS**

Introduction to Design Thinking – Lean thinking, Actionable Strategy, The Problem with Complexity, Vision and Strategy, Defining Actionable Strategy Act to Learn, Leading Teams to Win.

SUGGESTED READINGS

1. Jonny Schneider. (2017). Understanding Design Thinking, Lean, and Agile. O'Reilly Media.
2. Jeff Gothelf . (2017). Lean vs. Agile vs. Design Thinking. Sense and Respond Press
3. Jeff Gothelf, Josh Seiden.(2016).Lean UX. 2nd Edition.
4. Stephen Haunts. (2012). Essential of Scrum.Addison-Wesley Professional. 1st Edition.
5. Roger S Pressman. (2010). Software Engineering APractioners Approach. 7th Edition.
6. KalloriVikraman. (2016). Introduction to Devops. 1st Edition.

WEBSITES

1. https://www.tutorialspoint.com/sdlc/sdlc_overview.htm
2. https://existek.com/blog/sdlc-models/
3. https://www.agilealliance.org/agile101/
4. https://devops.com/
5. http://theleanstartup.com/principles

SEMESTER-IV

CAMPUS TO CORPORATE

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 understand the Fundamental Concepts of Corporates and Industry
- To Recall about the change management and about the culture.
- To Understand the need of corporate etiquettes and the skills.
- To Apply the basic level of English communication skills.
- To understand the reading, writing, listening comprehension.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Ability to learn the concepts of industry relations.	Understand
CO2	Remember the differences between the campus and corporate	Remember
CO3	Inspect the need of skills required for an industry.	Analyze
CO4	Make use of phonetics and the communication skills.	Apply
CO5	Examine the writing of short stories and the interview skills	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I OVERVIEW OF CORPORATE & BPS INDUSTRY 4 HOURS

Overview of Corporate: Ice-breaker Session, What is Corporate, History of Corporate. Overview of BPS Industry: What is BPS, History of BPS, Benefits of BPS, BPS Industry in World, BPS Industry in India, TCS BPS

UNIT II DIFFERENCE BETWEEN CAMPUS AND CORPORATE 4 HOURS

Change Management (Understand the difference between campus and corporate life and prepare themselves for the same). Learn the Culture, Impact of your attitude and behavior, Consider the language, Establish and maintain relationship, Respect others, Be Confident, Keep on learning & Consider the body language

UNIT III GROOMING FOR CORPORATES 4 HOURS

Corporate Etiquettes: Dressing and Grooming Skills, Workplace Etiquette, Business Etiquette, Email Etiquette, Telephone Etiquette, Meeting Etiquette & Presentation Skills . Professional Competencies: Analytical Thinking, Listening Skills, Time Management, Team Skills, Assertiveness, Stress Management, Participating in Group Discussion, Interview Facing,Ownership and Attention to detail

UNIT IV ELEMENTARY AND INTERMEDIATE LEVEL ENGLISH COMMUNICATION

4HOURS

Grammar, Phonetics, One on One basic conversation skill practice. Reading Comprehension, Listening Comprehension, Improving Vocabulary, Improving Writing Skills and Comprehension while interacting face to face

UNIT V ADVANCED LEVEL ENGLISH COMMUNICATION 4 HOURS

Recitation of short stories, Interview Skills, Group Discussion, Social Conversation Skills, Presentation & One Act Plays.

SUGGESTED READINGS

1. TCS study material

WEBSITES

1. NPTEL : https://youtu.be/bl9YSiH4ujQ
2. NPTEL :https://youtu.be/JIKU_WT0Bls
3. NPTEL :https://youtu.be/QSLIttMmaLk
4. NPTEL :https://youtu.be/R6wZsNLOORI
5. NPTEL :https://youtu.be/45uNWLmAZR8

SEMESTER-IV

OPERATIONS RESEARCH

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 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 10 HOURS

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

UNIT II 10 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 – HungarianMethod – 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 Revisededition, S. Chand & Sons Education Publications, New Delhi.
2. Sharma S.D.,(2017). Operations Research Theory, Methods & Applications, Kedar NathRam 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 & CompanyLtd, 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/ItOuvM2KmD4

SEMESTER-IV

PROGRAMMING IN JAVA-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 understand the fundamentals of programming such as variables, conditional and iterative execution, methods, etc.
- To understand fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries, etc.
- To use the Java SDK environment to create, debug and run simple Java programs.
- To use Java in various technologies in different platforms.
- To understand the fundamental of Packages and access modifiers and interface in java.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the structure and model of the Java programming language	Understand
CO2	Anlayse the class variables and methods.	Analyze
CO3	Apply the inheritance usage.	Apply
CO4	Understand the database connectivity.	Understand
CO5	Apply the GUI programming and swing	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. To convert a decimal to binary number
2. Write a program to find the sum of series $1+x+x^2+x^3+$……..
3. To find the sum of any number of integers entered as command line arguments

4. To learn use of single dimensional array by defining the array dynamically.
5. Write a program to find maximum and sum of an array
6. Write a Program to generate Fibonacci Series and Factorial for a number
7. Write a program to show that during function overloading, if no matching argument is found, then java will apply automatic type conversions (from lower to higher data type)
8. Write a program to an exception out of bounds, if mark is greater than 100 throw an exception
9. Write a program ―DivideByZero‖ that takes two numbers a and b as input, computes a/b, and invokes Arithmetic Exception to generate a message when the denominator is zero.
10. Write a program to generate multiplication table by multithreading
11. Write a program to demonstrate priorities among multiple threads
12. Write a program to perform string operations

SUGGESTED READINGS

1. Herbert Schildt. (2017). Java the Complete Reference, 8th Edition, Mc Graw Hill , Oracle Press.
2. James Gosling, Bill Joy, Guy L Steele Jr, Gilad Bracha, Alex Buckley. (2015). The Java Language Specification, Java SE 8th Edition (Java Series), Addison Wesley Publishers.
3. Cay S. Horstmann, Gary Cornell. (2018). Core Java 2 Volume 1 ,11th Edition, Prentice Hall.
4. Cay S. Horstmann, Gary Cornell. (2019). Core Java 2 Volume 2 - Advanced Features, 9th Edition, Pearson.
5. E. Balaguruswamy. (2019). Programming with Java, 6th Edition, McGraw Hill.
6. Paul Deitel, Harvey Deitel. (2018). Java: How to Program (Early Objects), 11th Edition, Prentice Hall.
7. David J. Eck. (2015). Introduction to Programming Using Java 8th Edition, Published by CreateSpace Independent Publishing Platform.
8. Ben Evans and David Flanagan. (2019). Java in a Nutshell, Seventh Edition. O'Reilly Media, Inc.

WEBSITES

1. www.java.sun.com
2. www.knking.com
3. www.webdeveloper.com
4. www.forums.sun.com
5. www.netbeans.com
6. java.sun.com/docs/books/tutorial/
7. www.java.net/

SEMESTER-IV

DATABASE MANAGEMENT SYSTEM – PRACTICAL

2H -1C

Instruction Hours / Week: L: 0 T: 0 P:2 **Marks:** Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives

- To understand the fundamental concepts of database management. These concepts include aspects of database design, database languages, and database-system implementation.
- To provide a strong formal foundation in database concepts, technology and Structured Query Language.
- To give systematic database approaches covering DML, Function & Groupings and Joins&views.
- Be familiar with the basic issues of transaction processing and concurrency control.
- To learn and understand various Cursors, Exceptions and Types of Exceptions.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Ability to understand and design data modelling using Entity-Relationship model.	Understand
CO2	Inference SQL to a broad range of query and data update problems.	Analyze
CO3	Make Use of the DML, DDL, DCL To work with Tables.	Apply
CO4	Explain transaction Management in relational database System.	Understand
CO5	Develop different database architecture like Cursors and Exceptions to analyses the use of appropriate architecture in real time environment.	Create

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Using Differentoperators
2. Using ControlStructures
3. Implement Built-infunctions
4. Implement update and Altertable
5. Implementing PL/SQLBlock
6. Implement PL/SQL table and record
7. Using Functions
8. Using Cursors
9. Using Triggers

SUGGESTED READINGS

1. ElmasriRamez and Navathe Shaman. (2019). Fundamentals of Database System', Pearson Education , Sixth Edition.
2. Abraham Silberschatz, Henry F.Korth and S.Sudarshan. (2018). Database System Concepts', Tata Mc Graw Hill,Sixth Edition.
3. Ivan Bayross. (2018). SQL, PL/SQL the Programming Language of Oracle Paperback. BPB Publication, Fifth Edition.
4. Nilesh Shah, "Database Systems Using ORACLE", PHI, 2nd Edition, 2011

WEBSITES

1. https://www.datanamic.com/support/lt-dez005-introduction-db-modeling.html
2. https://docs.oracle.com/cd/B12037_01/server.101/b10759/statements_1001.htm
3. https://www.geeksforgeeks.org/sql-ddl-dml-dcl-tcl-commands/
4. https://www.javatpoint.com/oracle-create-table
5. https://www.tutorialspoint.com/plsql/

SEMESTER-V

CLIENT RELATIONSHIP MANAGEMENT

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 acquire Knowledge about the ITSM, ITIL, ServiceNow basics, scripting, UI policies and business rules.
- To Understand basic and system administration using ServiceNow.
- To Apply ServiceNow APIs for problem, incident, change and service request management.
- To Analyze SLAs and business rules to streamline and automate routine work tasks using ServiceNow.
- To use various script types used throughout the platform.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Infer Knowledge about the ITSM, ITIL, ServiceNow basics, scripting, UI policies and business rules.	Understand
CO2	Analyze the basic system administration using ServiceNow.	Analyze
CO3	Apply ServiceNow APIs for problem, incident, change and service request management.	Apply
CO4	Analyze SLAs and business rules to streamline and automate routine work tasks using ServiceNow.	Analyze
CO5	Make use of various script types used throughout the platform.	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I SERVICE NOW INTERMEDIATE LEVEL 10 HOURS

Administrator-ServiceNow Introduction-ServiceNow Platform UI ServiceNow ITSM overview-Managing Users, Groups and Roles, departments, companies and Assignment Rules-Tables, Columns,Attributes,Dictionary Entries,Schema Map-Managing Forms, Layouts and Lists-Dictionary Overrides and Simple Reference Qualifiers.

UNIT II SYSTEM PROPERTIES 09 HOURS

Incident management - Problem management- - Change management- Overview of other ITSM Modules - Overview of other ITSM Modules- SLA Basics-Introduction to Client and Server Side Scripting-server-side scripting - Server Side Glide API -server-side scripting - Server Side Glide API -Server Side script Debugging-Server Side Scripting Best Practices-Business Rules-Client Side APIs-UI Policies and Data Policies-Client Scripts -Client Side script Debugging.

UNIT III CLIENT SCRIPTS & CLIENT GLIDE APIS-BEST PRACTICES 10 HOURS

Client-side scripting & policies (UI and Data)-Modularize programming using UI Actions (both Server and Client Side)-Script Include-Glide AJAX-UI Pages and UI Macros-Managing Update Sets-Custom Applications Automated Test Framework –Events-Inbound/Out Bound Notifications-Mail Templates and Scripts.

UNIT IV MANAGE WORKFLOWS 09 HOURS

Managing Stage Sets -Manage Workflows -Manage Workflows -Flow Designer (Over view)-Service Catalogs, Categories, Items and variables-Manage Execution Plans and workflows-Cart Layouts-Client scripts and UI policies-Record Producers-Order Guides & Scriptable Order Guides-Scheduled Jobs. VTB Agent Intelligence (Over View)-Restrict access to applications and application modules-Automatically create application Access Controls -Manually create, test, and debug Access Controls-Managing ServiceNow imports and exports-Managing Import Sets and Transform Map-Configure and run Reports and Dashboards Security Controls-Database Views.

UNIT V SERVICENOW SERVICE PORTALS OVERVIEW 10 HOURS

ServiceNow Service portals core components -Scripting in Service Portal-ITSM Virtual Agent –Overview-Performance Analytics Overview-Servicenow on Mobile-Servicenow Integration Overview.

SUGGESTED READINGS

1. Tim Woodruff. (2018). Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation", 2nd Edition, Packt Publishing Ltd..
2. Andrew Kindred. (2018). Mastering ServiceNow Scripting" Packt Publishing.
3. AshishRudraSrivastava. (2017). ServiceNow Cook Book" Packt Publishing Ltd.

WEBSITES

1. https://www.servicenow.com/products/it-service-management.html
2. https://www.servicenow.com/content/dam/servicenow-assets/public/en-us/doc-type/resource-center/data-sheet/ds-itsm.pdf
3. https://www.guru99.com/servicenow-tutorial.html

SEMESTER-V

INTRODUCTION TO DIGITAL TECHNOLOGY

3H-2C

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 the Fundamental Concepts of Digital Technologies in Marketing and AI Concepts
- To Recall robotic process automation basics, tools, UiPath basic constructs in bot development.
- To Understand the need of automation, UiPath sequence, activities and applications.
- To Apply various robotic process automation workflows for bot development.
- To Analyze the need of robotic process automation and automate real world business processes.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Ability to understand the fundamental concepts of Digital Technology in Marketing and AI Concepts.	Understand
CO2	Recall robotic process automation basics, tools, UiPath basic constructs in bot development.	Remember
CO3	Inspect the need of automation, UiPath sequence, activities and applications.	Analyze
CO4	Make use of robotic process automation and automate real world business processes.	Apply
CO5	Examine various robotic process automation workflows for bot development.	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I DIGITAL PRIMER **8 HOURS**

Why is Digital Different?- Digital Metaphors On Cloud 9-A Small Intro to Big Data-Social Media & Digital Marketing-Artificial Intelligence- Unchain the Block chain-Internet of Everything-Immersive Technology.

UNIT II DIGITAL FOR INDUSTRIES **7 HOURS**

Manufacturing and Hi-tech-Banking and Financial Services-Insurance and Healthcare-Retail-Travel & Hospitality-Communications, Media & Information Services-Government.

UNIT III AUTOMATIX **7 HOURS**

Art of RPA-Introduction - Setting the Context-RPA Prelude-RPA Demystified-RPA vs BPM RPA Implementations-RPA in Industries-RPA Tools

UNIT IV AUTOMATION ANYWHERE **7 HOURS**

Getting Started with AA Enterprise-Exploring AA Enterprise-AA Enterprise – Architecture.

UNIT V KNOWING THE BOTS **7 HOURS**

More AboutTaskBots-AA Enterprise - All About Recorders-Designers-MetaBots-Cognitive RPA.

SUGGESTED READINGS

1. Richard Murdoch. (2018). Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant. Kindle Edition
2. Kelly Wibbenmeyer. (2018). The Simple Implementation Guide to Robotic Process Automation (RPA): How to Best Implement RPA in an Organization

WEBSITES

1. https://en.wikipedia.org/wiki/Robotic_process_automation
2. https://en.wikipedia.org/wiki/Automatix_(software)
3. https://www.automationanywhereuniversity.com/
4. https://www.automationanywhere.com/in/products/iq-bot

SEMESTER-V

SOFTWARE TESTING

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

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand Selenium Architecture and its components.	Understand
CO2	Recall the concepts of basics of JAVA	Remember
CO3	Analyse the WebDriver advanced features.	Analyze
CO4	Make use of Data driven, Keyword driven and Hybrid test framework .	Apply
CO5	Record and importing tests with Selenium IDE and Analyse the Test cases using TestNG	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO AUTOMATION 8 HOURS

Planning before Automation - Introduction to Selenium - Installing Selenium Components.

UNIT II USING SELENIUM IDE 7 HOURS

Managing User Interface Controls - Basics of Java- Creating First Selenium Web Driver Script.

UNIT III SELENIUM METHODS 7 HOURS

Common Selenium Web Driver Methods - Verification Point in Selenium - Exploring the Features of Web Driver.

UNIT IV HANDLING POP-UP DIALOGS AND MULTIPLE WINDOWS 7 HOURS

Working with Dynamic UI Objects- Data driven testing using TestNG - Selenium Functions, Common Questions and Tips.

UNIT V REPORTING IN SELENIUM 7 HOURS

Batch Execution- Automation Frameworks - Understanding Selenium Grid.

SUGGESTED READINGS

1. Rex Allen Jones II. (2016). Selenium Web Driver for Functional Automation Testing, Test 4 Success, LLC
2. AdithyaGarg, Ashish Mishra. (2015). A Practitioner's Guide to Test Automation Using Selenium", Tata McGraw Hill Education.
3. NavneeshGarg, (2014). Test Automation Using Selenium WebDriver with Java", AdactIn Group Pvt Ltd..
4. SatyaAvasarala,(2014). Selenium Web Driver - PRACTICAL Guide, Packt Publishing.
5. David Burns. (2010). Selenium 1.0 Testing Tools, Packt Publishing.

WEBSITES

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

SEMESTER-V

BASICS OF ACCOUNTING

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 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 **15 HOURS**

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

UNIT II **15 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 **12 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

Note: Distribution of Marks between problems and theory shall be 75% and 25%.

SUGGESTED READINGS

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

SEMESTER-V

CLIENT RELATIONSHIP MANAGEMENT– 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 acquire Knowledge about the ITSM, ITIL, ServiceNow basics, scripting, UI policies and business rules.
- To Understand basic and system administration using ServiceNow.
- To Apply ServiceNow APIs for problem, incident, change and service request management.
- To Analyze SLAs and business rules to streamline and automate routine work tasks using ServiceNow.
- To use various script types used throughout the platform.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Infer Knowledge about the ITSM, ITIL, ServiceNow basics, scripting, UI policies and business rules.	Understand
CO2	Analyze the basic system administration using ServiceNow.	Analyze
CO3	Apply ServiceNow APIs for problem, incident, change and service request management.	Apply
CO4	Analyze SLAs and business rules to streamline and automate routine work tasks using ServiceNow.	Analyze
CO5	Make use of various script types used throughout the platform.	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Creating tickets for servicing requests from clients
2. Creating reports of status of client services

SUGGESTED READINGS

1. Tim Woodruff. (2018). Learning ServiceNow: Administration and development on the Now platform, for powerful IT automation", 2nd Edition, Packt Publishing Ltd..
2. Andrew Kindred. (2018). Mastering ServiceNow Scripting" Packt Publishing.
3. Ashish Rudra Srivastava. (2017). ServiceNow Cook Book" Packt Publishing Ltd.

WEBSITES

1. https://www.servicenow.com/products/it-service-management.html
2. https://www.servicenow.com/content/dam/servicenow-assets/public/en-us/doc-type/resource-center/data-sheet/ds-itsm.pdf
3. https://www.guru99.com/servicenow-tutorial.html

SEMESTER-V

INTRODUCTION TO DIGITAL TECHNOLOGY- 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 understand the Fundamental Concepts of Digital Technologies in Marketing and AI Concepts
- To Recall robotic process automation basics, tools, UiPath basic constructs in bot development.
- To Understand the need of automation, UiPath sequence, activities and applications.
- To Apply various robotic process automation workflows for bot development.
- To Analyze the need of robotic process automation and automate real world business processes.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Ability to understand the fundamental concepts of Digital Technology in Marketing and AI Concepts.	Understand
CO2	Recall robotic process automation basics, tools, UiPath basic constructs in bot development.	Remember
CO3	Inspect the need of automation, UiPath sequence, activities and applications.	Analyze
CO4	Make use of robotic process automation and automate real world business processes.	Apply
CO5	Examine various robotic process automation workflows for bot development.	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Creating bots for automatic software installation
2. Creating bots for automatic software patch installation
3. Creating bots for file transfer
4. Creating bots for automatic file backup

SUGGESTED READINGS

1. Richard Murdoch. (2018). Robotic Process Automation: Guide To Building Software Robots, Automate Repetitive Tasks & Become an RPA Consultant. Kindle Edition
2. Kelly Wibbenmeyer. (2018). The Simple Implementation Guide to Robotic Process Automation (RPA): How to Best Implement RPA in an Organization

WEBSITES

1. https://en.wikipedia.org/wiki/Robotic_process_automation
2. https://en.wikipedia.org/wiki/Automatix_(software)
3. https://www.automationanywhereuniversity.com/
4. https://www.automationanywhere.com/in/products/iq-bot

SEMESTER-V

SOFTWARE TESTING - PRACTICAL

5H-2C

Instruction Hours / Week: L: 0 T: 0 P: 5 Marks: Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives

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

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand Selenium Architecture and its components.	Understand
CO2	Recall the concepts of basics of JAVA	Remember
CO3	Analyse the WebDriver advanced features.	Analyze
CO4	Make use of Data driven, Keyword driven and Hybrid test framework .	Apply
CO5	Record and importing tests with Selenium IDE and Analyse the Test cases using TestNG .	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

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

SUGGESTED READINGS

1. Rex Allen Jones II. (2016). Selenium Web Driver for Functional Automation Testing, Test 4 Success, LLC
2. AdithyaGarg, Ashish Mishra. (2015). A Practitioner's Guide to Test Automation Using Selenium", Tata McGraw Hill Education.
3. NavneeshGarg, (2014). Test Automation Using Selenium WebDriver with Java", AdactIn Group Pvt Ltd..
4. SatyaAvasarala,(2014). Selenium Web Driver - PRACTICAL Guide, Packt Publishing.
5. David Burns. (2010). Selenium 1.0 Testing Tools, Packt Publishing.

WEBSITES

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

SEMESTER-V

INTERNSHIP*

0H-2C

Instruction Hours / Week: L: 0 T: 0 P: 0 Total: **100 End Semester Exam**: 3 Hours

SEMESTER-VI

IT COGNITION

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 critical thought and its interaction with knowledge
- To understand problem solving and how it uses critical thought to develop solutions to problems
- To explore project-based learning as a specific method of problem solving
- To examine design thinking as a sub-set of project-based learning and its scaffold process for learning
- To define argumentation and how it employs a critical though process

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand basic knowledge of cognitive psychology.	Understand
CO2	Recall how the cognition works from attention, sensation, perception, action, language processes.	Remember
CO3	Analyse the Problem Solving methods..	Analyze
CO4	Make use of decision making to solve the problems	Apply
CO5	Analyse the ability of critical thinking.	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO COGNITION **12 HOURS**

Meaning cognitive processes, Development of cognitive psychology: Structuralism, Functionalism, Behaviorism, Memory Research, Gestalt Psychology, Emergence of cognitive psychology, Information Processing, Connectionism, Alternate approaches to cognitive psychology, Research Methods in Cognitive Psychology.

UNIT II PERCEPTUAL PROCESSES 12 HOURS

Object Recognition- theories of object recognition, Bottom-Up and Top-Down Processing, Face Perception, Change Blindness. Attention: Divided attention, Selective Attentkon, Visual attention and Auditory attention. Consciousness: Varieties, Subliminal Perception. Visual Perception ¨Perceptual Organizational Processes, Multisensory interaction and Integration – Synesthesia, Comparing the senses, Perception and Action.

UNIT III MEMORY 12 HOURS

Working Memory: Research on Working Memory, Factors affecting the capacity of working Memory, Baddeley's Working Memory Approach. Long Term Memory: Encoding and Retrieval in Long Term Memory, Autobiographical Memory. MemoryStrategies: Practice, Mnemonics using Imagery, Mnemonics using organization, The Multimodal Approach, Improving Prospective Memory. Metacognition :Metamemory, TOT, Metacomprehension.

UNIT IV PROBLEM SOLVING, REASONING AND DECISION MAKING 12 HOURS

VUCA World Problem Solving – Types of problem, Understanding the problem, Problem-Solving Approaches, Factors that influence Problem Solving.crativity.Reasoning – Inductive and Deductive Reasoning Decision Making – Heuristics in decision making – representativeness, availability and Anchoring and adjustment.The framing effect, Overconfidence in decisions, The Hindsight Bias.

UNIT V FUTURE SKILLS 12 HOURS

Critical thinking, Adaptive thinking, Cognitive Load Management, Design thinking, Virtual Collaboration and Cultural Sensitivity

SUGGESTED READINGS

1. Matlin M.W. (2019) 'Cognition' 10th Edition, Wiley Publication.
2. Riegler, B.R., Reigler, G.L. (2008), Cognitive Psychology – Applying the Science of Mind. 2nd Edition, Pearson Education.
3. Benjafield J G (2007). 'Cognition' 3rd Edition. Oxford University Press.
4. Goldstein B.E.(2008) 'Cognitive Psychology' 2nd Edition, Wadsworth.

WEBSITES

1. https://nptel.ac.in/courses/109103134/23
2. https://lockwoodresource.com/problem-solving-in-a-vuca-world-what-kind-of-problem-are-you-solving-by-lisa-solomon/
3. https://www.instructionaldesign.org/theories/cognitive-load/

SEMESTER-VI

MACHINE LEARNING

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 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.
- To recognize the characteristics of machine learning that make it useful to real-world problems.
- To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.

Course Outcomes(COs)

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

COs	Course Outcomes	Blooms Level
CO1	Analyze theory of machine learning components and models	Understanding
CO2	Characterize the algorithms of machine learning to learn linear and non-linear models	Analyze
CO3	Implement data clustering algorithms for machine learning process	Understanding
CO4	Construct machine learning algorithms to learn tree and rule-based models	Applying
CO5	Apply reinforcement machine learning techniques for robotics	Applying

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I FOUNDATIONS OF LEARNING **12 HOURS**

Components of learning – learning models – geometric models – probabilistic models – logic models – grouping and grading – learning versus design – types of learning – supervised – unsupervised – reinforcement – theory of learning – feasibility of learning – error and noise –

training versus testing – theory of generalization – generalization bound –bias andvariance – learning curve

UNIT II LINEAR MODELS **12 HOURS**

Linear classification – univariate linear regression – multivariate linear regression – regularized regression – Logistic regression – perceptrons – multilayer neural networks – learning neural networks structures – support vector machines – soft margin SVM – generalization and over fitting – regularization – validation

UNIT III DISTANCE-BASED MODELS **12 HOURS**

Nearest neighbor models – K-means – clustering around medoids – silhouttes– hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta silhouttes – hierarchical clustering – k- d trees – locality sensitive hashing – non - parametric regression – ensemble learning – bagging and random forests – boosting – meta learning

UNIT IV TREE AND RULE MODELS **12 HOURS**

Decision trees – learning decision trees – ranking and probability estimation trees –Regression trees – clustering trees – learning ordered rule lists – learning unordered rule lists – descriptive rule learning – association rule mining – first -order rule learning

UNIT V REINFORCEMENT LEARNING **12 HOURS**

Passive reinforcement learning – direct utility estimation – adaptive dynamic programming – temporal - difference learning – active reinforcement learning – genetic algorithm for Reinforcement Learning - exploration – learning an action utility function – Generalization in reinforcement learning – policy search – applications in game playing – applications in robot control

SUGGESTED READINGS

1. Tom.M.Mitchell (2019), Machine Learning, Tata McGraw Hill Publications
2. Y. S. Abu - Mostafa, M. Magdon-Ismail, and H.-T. Lin. (2018).Learning from Data, AMLBook Publishers.
3. P. Flach. (2017). “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge University Press.
4. K. P. Murphy. (2017). Machine Learning: A probabilistic perspective, MIT Press,
5. D. Barber. (2015). Bayesian Reasoning and Machine Learning, Cambridge University Press.

WEBSITES

1. https://machinelearningmastery.com/linear-regression-for-machine-learning/
2. https://www.cambridge.org/core/books/machine-learning/distancebased-models/
3. https://dzone.com/articles/machine-learning-with-decision-trees
4. http://reinforcementlearning.ai-depot.com/
5. https://nptel.ac.in/courses/106106139/
6. https://swayam.gov.in/nd1_noc19_cs81/preview

SEMESTER-VI

NATURAL LANGUAGE PROCESSING

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 introduce the fundamental concepts and techniques of natural language processing (NLP)
- To understanding of the models and algorithms in the field of NLP.
- To demonstrate the computational properties of natural languages and
- To develop the commonly used algorithms for processing linguistic information.
- To understanding Lexical and syntactic levels of languages for processing
- To understanding semantics and pragmatics of languages for processing

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental concepts and techniques of natural language processing (NLP)	Understand
CO2	Recall the computational properties of natural languages**.**	Rememeber
CO3	Develop the commonly used algorithms for processing linguistic information.	Analyze
CO4	Make use of Lexical and syntactic levels of languages for processing	Apply
CO5	Analyse the semantics and pragmatics of languages for processing.	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO NLP **12 HOURS**

Introduction – Models -and Algorithms - The Turing Test -Regular ExpressionsBasic Regular Expression Patterns -Finite State Automata - Regular Languages and FSAs – Morphology - Inflectional Morphology - Derivational Morphology – Finite – State Morphological Parsing - Combining an FST Lexicon and Rules - Porter Stemmer

UNIT II N-GRAMS MODELS **12 HOURS**

N-grams Models of Syntax - Counting Words - Unsmoothed N-grams – Smoothing-Backoff - Deleted Interpolation – Entropy - English Word Classes - Tagsets for English -Part of Speech Tagging -Rule-Based Part of Speech Tagging - Stochastic Part ofSpeech Tagging – Transformation-Based Tagging

UNIT III CONTEXT FREE GRAMMARS **12 HOURS**

Context Free Grammars for English Syntax- Context-Free Rules and Trees – Sentence-Level Constructions –Agreement – Sub Categorization – Parsing – Top-down – EarleyParsing -Feature Structures - Probabilistic Context-Free Grammars

UNIT IV REPRESENTING MEANING **12 HOURS**

Representing Meaning - Meaning Structure of Language - First Order Predicate Calculus-Representing Linguistically Relevant Concepts -Syntax-Driven Semantic Analysis -Semantic Attachments - Syntax-Driven Analyzer - Robust Analysis - Lexemes and TheirSenses - Internal Structure - Word Sense Disambiguation -Information Retrieval

UNIT V DISCOURSE **12 HOURS**

Discourse -Reference Resolution - Text Coherence -Discourse Structure - Dialog andConversational Agents - Dialog Acts – Interpretation – Coherence –ConversationalAgents - Language Generation – Architecture -Surface Realizations – DiscoursePlanning – Machine Translation -Transfer Metaphor – Interlingua – StatisticalApproaches.

SUGGESTED READINGS

1. D. Jurafsky and J. Martin. (2020). Speech and Language Processing: An Introductionto Natural Language Processing, Computational Linguistics, and Speech Recognition.
2. Steven Bird, Ewan Klein, and Edward Loper.(2019). Natural Language Processing with Python, O'Reilly Publishers.
3. Ian H Written and Elbef, MarkA.Hall. (2013). Data mining: Practical Machine Learning Tools and Techniques,Morgan Kaufmann Publishers.

WEBSITES

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview
3. https://www.tutorialspoint.com/natural_language_processing/index.htm

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

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.

5 S Anil Kumar , S C Poornima , M K Abraham , K Jayshree ,"Entrepreneurship Development", New Age Publishers; First edition ,2021, NEW AGE International Pvt Ltd.

WEBSITES

1 https://www.udemy.com/topic/cyber-security/
2 https://www.coursera.org/courses?query=cybersecurity
3 https://www.simplilearn.com/cyber-security
4 https://onlinecourses.swayam2.ac.in/cec21_ge10/preview
5 https://onlinecourses.swayam2.ac.in/cec20_lb06/preview

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**.**
- To recognize the characteristics of machine learning that make it useful to real-world problems.
- To characterize machine learning algorithms as supervised, semi-supervised, and unsupervised.

Course Outcomes(COs)

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

COs	Course Outcomes	Blooms Level
CO1	Analyze theory of machine learning components and models	Understanding
CO2	Characterize the algorithms of machine learning to learn linear and non-linear models	Analyze
CO3	Implement data clustering algorithms for machine learning process	Understanding
CO4	Construct machine learning algorithms to learn tree and rule-based models	Applying
CO5	Apply reinforcement machine learning techniques for robotics	Applying

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Perform elementary mathematical operations in Octave/MATLAB like addition, multiplication, division and exponentiation.

2. Perform elementary logical operations in Octave/MATLAB (like OR, AND, Checking for Equality, NOT, XOR).
3. Create, initialize and display simple variables and simple strings and use simple formatting for variable.
4. Create/Define single dimension / multi-dimension arrays, and arrays with specific values like array of all ones, all zeros, array with random values within a range, or a diagonal matrix.
5. Use command to compute the size of a matrix, size/length of a particular row/column, load data from a text file, store matrix data to a text file, finding out variables and their features in the current Course Objectives.
6. Perform basic operations on matrices (like addition, subtraction, multiplication) and display specific rows or columns of the matrix.
7. Perform other matrix operations like converting matrix data to absolute values, taking the negative of matrix values, adding/removing rows/columns from a matrix, finding the maximum or minimum values in a matrix or in a row/column, and finding the sum of some/all elements in a matrix.
8. Create various type of plots/charts like histograms, plot based on sine/cosine function based on data from a matrix. Further label different axes in a plot and data in a plot.
9. Generate different subplots from a given plot and color plot data.
10. Use conditional statements and different type of loops based on simple example/s.
11. Perform vectorized implementation of simple matrix operation like finding the transpose of a matrix, adding, subtracting or multiplying two matrices.
12. Implement Linear Regression problem. For example, based on a dataset comprising of existing set of prices and area/size of the houses, predict the estimated price of a given house.
13. Based on multiple features/variables perform Linear Regression. For example, based on a number of additional features like number of bedrooms, servant room, number of balconies, number of houses of years a house has been built – predict the price of a house.
14. Implement a classification/ logistic regression problem. For example based on different features of students data, classify, whether a student is suitable for a particular activity. Based on the available dataset, a student can also implement another classification problem like checking whether an email is spam or not.
15. Use some function for regularization of dataset based on problem 14.
16. Use some function for neural networks, like Stochastic Gradient Descent or back propagation - algorithm to predict the value of a variable based on the dataset of problem

SUGGESTED READINGS

1. Tom.M.Mitchell (2019), Machine Learning, Tata McGraw Hill Publications
2. Y. S. Abu - Mostafa, M. Magdon-Ismail, and H.-T. Lin. (2018).Learning from Data, AMLBook Publishers.
3. P. Flach. (2017). “Machine Learning: The art and science of algorithms that make sense of data”, Cambridge University Press.
4. K. P. Murphy. (2017). Machine Learning: A probabilistic perspective, MIT Press,
5. D. Barber. (2015). Bayesian Reasoning and Machine Learning, Cambridge University Press.

WEBSITES

1. https://machinelearningmastery.com/linear-regression-for-machine-learning/
2. https://www.cambridge.org/core/books/machine-learning/distancebased-models/
3. https://dzone.com/articles/machine-learning-with-decision-trees
4. http://reinforcementlearning.ai-depot.com/
5. https://nptel.ac.in/courses/106106139/
6. https://swayam.gov.in/nd1_noc19_cs81/preview

SEMESTER-VI

NATURAL LANGUAGE PROCESSING- 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 the fundamental concepts and techniques of natural language processing (NLP)
- To understanding of the models and algorithms in the field of NLP.
- To demonstrate the computational properties of natural languages and
- To develop the commonly used algorithms for processing linguistic information.
- To understanding Lexical and syntactic levels of languages for processing
- To understanding semantics and pragmatics of languages for processing

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental concepts and techniques of natural language processing (NLP)	Understand
CO2	Recall the computational properties of natural languages**.**	Rememeber
CO3	Develop the commonly used algorithms for processing linguistic information.	Analyze
CO4	Make use of Lexical and syntactic levels of languages for processing	Apply
CO5	Analyse the semantics and pragmatics of languages for processing.	Analyze

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Implementing word similarity
2. Implementing simple problems related to word disambiguation
3. Simple demonstration of part of speech tagging
4. Lexical Analyzer
5. Semantic Analyzer
6. Sentiment Analysis

SUGGESTED READINGS

1. D. Jurafsky and J. Martin. (2020). Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics, and Speech Recognition.
2. Steven Bird, Ewan Klein, and Edward Loper.(2019). Natural Language Processing with Python, O'Reilly Publishers.
3. Ian H Written and Elbef, MarkA.Hall. (2013). Data mining: Practical Machine Learning Tools and Techniques,Morgan Kaufmann Publishers.

WEBSITES

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview
3. https://www.tutorialspoint.com/natural_language_processing/index.htm

SEMESTER-VI

PROJECT

8H-5C

Instruction Hours / Week: L: 0 T: 0 P:8 Marks: Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

SEMESTER-VII

DEEP LEARNING

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 Understanding the basics concepts of deep learning.
- To Emphasizing knowledge on various deep learning algorithms.
- To Provide Understanding of CNN and RNN to model for real world applications
- To Provide Understanding in the various challenges involved in designing deep learning algorithms for varied application using Image Classification Filters.
- To solve real world applications using Deep learning

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the basic ideas and principles of Neural Networks	Explain
CO2	Apply feed forward neural networks for real world problems.	Learn
CO3	Analyze different deep learning models in Image related projects.	Identify
CO4	Design and implement deep learning applications using RNN.	Apply
CO5	Understand the role of deep learning in machine learning applications and get familiar with the use of TensorFlow/Keras in deep learning applications.	Examine

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO NEURAL NETWORKS **15 HOURS**

Basic concept of Neurons – Perceptron Algorithm – Feed Forward and Back Propagation Networks.

UNIT II FEED FORWARD NEURAL NETWORKS **14 HOURS**

Feed Forward Neural Networks – Gradient Descent – Back Propagation Algorithm – Vanishing Gradient problem – Mitigation – RelU Heuristics for Avoiding Bad Local Minima – Heuristics for Faster Training.

UNIT III CONVOLUTION NEURAL NETWORKS **15 HOURS**

Nestors Accelerated Gradient Descent – Regularization – Dropout. CNN Architectures – Convolution – Pooling Layers – Transfer Learning – Image Classification using Transfer Learning

UNIT IV RECURRENT NEURAL NETWORKS **14 HOURS**

RNN, LSTM, GRU, Encoder/Decoder Architectures – Autoencoders – Standard- Sparse – Denoising – Contractive- Variational Autoencoders – Adversarial Generative Networks – Autoencoder and DBM- Image Segmentation – Object Detection – Automatic Image Captioning– Image generation with Generative Adversarial Networks – Video to Text with LSTM Models.

UNIT V CASE STUDIES USING CNN & RNN **14 HOURS**

Attention Models for Computer Vision – Case Study: Named Entity Recognition – Opinion Mining using Recurrent Neural Networks – Parsing and Sentiment Analysis using Recursive Neural Networks – Sentence Classification using Convolutional Neural Networks – Dialogue Generation with LSTMs.

SUGGESTED READINGS

1. Francois Chollet. (2018). Deep Learning with Python, Manning Publications, 1st Edition.
2. RagavVenkatesan,Baoxin Li. (2018). Convolutional Neural Networks in Visual Computing, CRC Press, 1st Edition
3. Phil Kim. (2017).Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence, APress, 3rd Edition.
4. NavinKumarManaswi. (2018). Deep Learning with Applications Using Python, Apress, 1st Edition.
5. Ian Good Fellow, YoshuaBengio and Aaron Courville. (2017). Deep Learning, MIT Press, 1st Edition.
6. Joshua F. Wiley. (2016). R Deep Learning Essentials, Packt Publications, 1st Edition.

WEBSITES

1. www.nptel.ac.in/courses/106/106/106106184/
2. www.nptel.ac.in/courses/106/106/106106201/
3. www.nptel.ac.in/courses/106/105/106105215/
4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s191-introduction-to-deep-learning-january-iap-2020/
5. www.kaggle.com/learn/intro-to-deep-learning

SEMESTER-VII

FULLSTACK DEVELOPMENT

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 (CO)

- To understand the various components of full stack development.
- To learn Node.js features and applications
- To develop applications with MongoDB.
- To understand the role of Angular and Express in web applications
- To develop simple web applications with React

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the various stacks available for web application development.	Understand
CO2	Use Node.js for application development	Apply
CO3	Develop applications with MongoDB	Create
CO4	Use the features of Angular and Express	Understand
CO5	Develop React applications	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I BASICS OF FULL STACK **14 HOURS**

Understanding the Basic Web Development Framework - User - Browser – Webserver - Backend Services – MVC Architecture - Understanding the different stacks –The role of Express – Angular – Node – Mongo DB – React

UNIT II NODE JS **14 HOURS**

Basics of Node JS – Installation – Working with Node packages – Using Node package manager – Creating a simple Node.js application – Using Events – Listeners –Timers - Callbacks – Handling Data I/O – Implementing HTTP services in Node.js

UNIT III MONGO DB **15 HOURS**

Understanding NoSQL and MongoDB – Building MongoDB Environment – User accounts – Access control – Administering databases – Managing collections – Connecting to MongoDB from Node.js – simple applications

UNIT IV EXPRESS AND ANGULAR **15 HOURS**

Implementing Express in Node.js - Configuring routes - Using Request and Response objects - Angular - Typescript - Angular Components - Expressions - Data binding - Built-in directives

UNIT V REACT **14 HOURS**

MERN STACK – Basic React applications – React Components – React State – Express REST APIs - Modularization and Webpack - Routing with React Router – Server-side rendering

SUGGESTED READINGS

1. Brad Dayley, Brendan Dayley, Caleb Dayley, 'Node.js, MongoDB and Angular Web Development', Addison-Wesley, Second Edition, 2018
2. Vasan Subramanian, 'Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node', Second Edition, Apress, 2019.
3. Chris Northwood, 'The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', Apress; 1st edition, 2018
4. Kirupa Chinnathambi, 'Learning React: A Hands-On Guide to Building Web Applications Using React and Redux', Addison-Wesley Professional, 2nd edition, 2018

WEBSITES

1. https://www.tutorialspoint.com/the_full_stack_web_development/index.asp
2. https://www.coursera.org/specializations/full-stack-react
3. https://www.udemy.com/course/the-full-stack-webdevelopment

SEMESTER-VII

STATISTICAL COMPUTING

6H-4C

Instruction Hours / Week: L: 6 T: 0 P: 0 Marks: Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

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 **15 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 **15 HOURS**

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

UNIT III **14 HOURS**

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

UNIT IV **14 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 **14 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 READING

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.

4 Pillai R.S.N., and Bagavathi V., (2002). Statistics, S. Chand & Company Ltd, New Delhi

5 Gupta S. C and Kapoor V. K., (2007), Fundamentals of Applied Statistics, Sultan Chand & Sons, New Delhi.
6 Montgomery D., (2011), Statistical Quality Control, Wiley India Pvt. Ltd, New Delhi.
7 Leavenworth G., (2015), Statistical Quality Control, Mc - Graw Hill Education Pvt. Ltd., New Delhi.

WEB SITES

1 http://www.ing.unipi.it/lanzetta/stat/Chapter20.pdf
2 https://www.statisticshowto.com/parametric-and-non-parametric-data/
3 http://onlinestatbook.com/2/introduction/inferential.html

SEMESTER-VII

DEEP LEARNING - 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 Understanding the basics concepts of deep learning.
- To Emphasizing knowledge on various deep learning algorithms.
- To Provide Understanding of CNN and RNN to model for real world applications
- To Provide Understanding in the various challenges involved in designing deep learning algorithms for varied application using Image Classification Filters.
- To solve real world applications using Deep learning

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the basic ideas and principles of Neural Networks	Explain
CO2	Apply feed forward neural networks for real world problems.	Learn
CO3	Analyze different deep learning models in Image related projects.	Identify
CO4	Design and implement deep learning applications using RNN.	Apply
CO5	Understand the role of deep learning in machine learning applications and get familiar with the use of TensorFlow/Keras in deep learning applications.	Examine

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Implement Simple Programs like vector addition in TensorFlow.
2. Implement a simple problem like regression model in Keras.
3. Implement a perceptron in TensorFlow/Keras Environment.
4. Implement a Feed-Forward Network in TensorFlow/Keras.
5. Implement an Image Classifier using CNN in TensorFlow/Keras.
6. Implement a Transfer Learning concept in Image Classification.
7. Implement an Autoencoder in TensorFlow/Keras.
8. Implement a Simple LSTM using TensorFlow/Keras.
9. Implement an Opinion Mining in Recurrent Neural network.
10. Implement an Object Detection using CNN.

SUGGESTED READINGS

1. Francois Chollet. (2018). Deep Learning with Python, Manning Publications, 1st Edition.
2. RagavVenkatesan,Baoxin Li. (2018). Convolutional Neural Networks in Visual Computing, CRC Press, 1st Edition
3. Phil Kim. (2017). Matlab Deep Learning: With Machine Learning, Neural Networks and Artificial Intelligence, APress, 3rd Edition.
4. Navin Kumar Manaswi. (2018). Deep Learning with Applications Using Python, Apress, 1st Edition.
5. Ian Good Fellow, YoshuaBengio and Aaron Courville. (2017). Deep Learning, MIT Press, 1st Edition.
6. Joshua F. Wiley. (2016). R Deep Learning Essentials, Packt Publications, 1st Edition.

WEBSITES

1. www.nptel.ac.in/courses/106/106/106106184/
2. www.nptel.ac.in/courses/106/106/106106201/
3. www.nptel.ac.in/courses/106/105/106105215/
4. www.ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-s191-introduction- to-deep-learning-january-iap-2020/
5. www.kaggle.com/learn/intro-to-deep-learning

SEMESTER-VII

FULLSTACK DEVELOPMENT- 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 (CO)

- To understand the various components of full stack development.
- To learn Node.js features and applications
- To develop applications with MongoDB.
- To understand the role of Angular and Express in web applications
- To develop simple web applications with React

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the various stacks available for web application development.	Understand
CO2	Use Node.js for application development	Apply
CO3	Develop applications with MongoDB	Create
CO4	Use the features of Angular and Express	Understand
CO5	Develop React applications	Understand

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Develop a portfolio website for yourself which gives details about yourself for a potential recruiter.
2. Create a web application to manage the TO-DO list of users, where users can login and manage their to-do items

3. Create a simple micro blogging application (like twitter) that allows people to post their content which can be viewed by people who follow them.
4. Create a food delivery website where users can order food from a particular restaurant listed in the website.
5. Develop a classifieds web application to buy and sell used products.
6. Develop a leave management system for an organization where users can apply different types of leaves such as casual leave and medical leave. They also can view the available number of days.
7. Develop a simple dashboard for project management where the statuses of various tasks are available. New tasks can be added and the status of existing tasks can be changed among Pending, InProgress or Completed.
8. Develop an online survey application where a collection of questions is available and users are asked to answer any random 5 questions

SUGGESTED READINGS

1. Brad Dayley, Brendan Dayley, Caleb Dayley, 'Node.js, MongoDB and Angular Web Development', Addison-Wesley, Second Edition, 2018
2. Vasan Subramanian, 'Pro MERN Stack, Full Stack Web App Development with Mongo, Express, React, and Node', Second Edition, Apress, 2019.
3. Chris Northwood, 'The Full Stack Developer: Your Essential Guide to the Everyday Skills Expected of a Modern Full Stack Web Developer', Apress; 1st edition, 2018
4. Kirupa Chinnathambi, 'Learning React: A Hands-On Guide to Building Web Applications Using React and Redux', Addison-Wesley Professional, 2nd edition, 2018

WEBSITES

1.https://www.tutorialspoint.com/the_full_stack_web_development/index.asp

2. https://www.coursera.org/specializations/full-stack-react

3.https://www.udemy.com/course/the-full-stack-webdevelopment

SEMESTER-VIII-A

DATA SCIENCE

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

The goal of this course is for the students

- To study the basic concepts of Data Science and data lifecycle.
- To understand the theoretical and mathematical aspects of Data Science models.
- To learn common random variables and their uses, and with the use of empirical distributions.
- To obtain the knowledge in data management tools.
- To explore the major techniques for data science.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the key concepts in datascience, including tools and approaches	Understand
CO2	Identify and apply the concepts in data collection, sampling and probabilistic models.	Apply
CO3	Understand the various techniques in datascience	Understand
CO4	Apply the mathematical formulation of machine learning and statistical models to visualize the data in various methods.	Apply
CO5	Apply a suitable datascience technique to solve an information analytics problem	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION **12 HOURS**

The Big Picture: What is Data Science? –The data life cycle: pre-processing, analysis, post-processing

Preprocessing: Data gathering, cleansing, visualization, and understanding (Mean, Variance, StandardDeviation. Percentiles)–Data Storage (Relational databases,e.g. MySQL)

UNIT II SAMPLING **12 HOURS**

Sampling – Probability Models for Statistical Methods: Discrete and continuous probability distributions, density functions. Random variables, expected values, variance, correlation.

UNIT III DATA NORMALIZATION **12 HOURS**

Data Normalization (z-values, transforms) –Random processes –Data Management: Tools for Data Analysis, Case Study: Data analysis using Python-Arrays, Visualization.

UNIT IV MAJOR TECHNIQUES IN DATA SCIENCE **12 HOURS**

Major Techniques in Data Science: Data mining, Data warehousing, Data mining vs Data warehouse–Machine Learning-Supervised Learning, Unsupervised Learning.

UNIT V BUSINESS INTELLIGENCE **12 HOURS**

Business Intelligence–Descriptive Analytics, Diagnostic Analytics, Predictive Analytics, Prescriptive Analytics–Cloud computing-definition, Cloud services, types of clouds, some of commercial and non-commercial cloud service providers.

SUGGESTED READINGS

1. Glenn J. Myatt, Wayne P. Johnson. (2014). Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining, John Wiley&Son Publication, Second Edition.
2. SaltzJeffreyS. (2019). An Introduction to DataScience, SagePublicationsInc, Second Edition.
3. Murtaza Haider. (2015). Getting Started with Data Science: Making Sense of Data with Analytics, IBM Press, First Edition.
4. Peter Bruce & Andrew Bruce. (2017). Practical Statistics for Data Scientists, O'Reilly Publication, FirstEdition.
5. DawnGriffiths. (2008). HeadFirstStatistics,O'ReillyPublication,FirstEdition.

WEBSITES

1. https://www.inferentialthinking.com/chapters/intro
2. https://www.openintro.org/stat/
3. https://swayam.gov.in/nd1_noc20_cs36/preview
4. https://swayam.gov.in/nd1_noc19_cs60/preview
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/

SEMESTER-VIII-A

BIG DATA ANALYTICS

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 know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.
- To perform analytics on data streams
- To learn NoSQL databases and management.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental concepts of big data and analytics	Understand
CO2	Work with big data tools and its analysis techniques	Apply
CO3	Analyze data by utilizing clustering and classification algorithms	Analyze
CO4	Learn and apply different mining algorithms and recommendation systems for large volumes of data	Apply
CO5	Perform analytics on data streams	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I INTRODUCTION TO BIG DATA 12 HOURS

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

UNIT II CLUSTERING AND CLASSIFICATION **12 HOURS**

Advanced Analytical Theory and Methods: Overview of Clustering - K-means - Use Cases - Overview of the Method - Determining the Number of Clusters - Diagnostics - Reasons to Choose and Cautions.

Classification: Decision Trees - Overview of a Decision Tree - The General Algorithm - Decision Tree Algorithms - Evaluating a Decision Tree - Decision Trees in R - Naïve Bayes - Bayes Theorem - Naïve Bayes Classifier.

UNIT III ASSOCIATION AND RECOMMENDATION SYSTEM **12 HOURS**

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

UNIT IV STREAM MEMORY **12 HOURS**

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

UNIT V NOSQL DATA MANAGEMENT FOR BIG DATA AND VISUALIZATION **12 HOURS**

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

SUGGESTED READINGS

1. David Loshin. (2019). Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph, Morgan Kaufmann/Elsevier Publishers.
2. EMC Education Services. (2018). Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. Wiley publishers.
3. Bart Baesens . (2017). Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Wiley Publishers.
4. Dietmar Jannach and Markus Zanker. (2017). Recommender Systems: An Introduction. Cambridge University Press.
5. Kim H. Pries and Robert Dunnigan. (2016). Big Data Analytics: A Practical Guide for Managers " CRC Press.
6. Jimmy Lin and Chris Dyer. (2015). Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers.

WEBSITES

1. https://www.ibm.com/analytics/big-data-analytics
2. https://www.simplilearn.com/what-is-big-data-analytics-article

SEMESTER-VIII-A

ORGANIZATIONAL BEHAVIOUR

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 basic concepts of organizational behavior.
- To analyze the individual behavior traits required for performing as an individual or group.
- To obtain the perceiving skills to judge the situation and communicate the thoughts and ideas.
- To understand how to perform in group and team and how to manage the power, politics and conflict.
- To recognize the importance of organizational culture and organizational change.

Course Outcomes (COs)

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

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

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 Organization Behaviour Introduction **12 HOURS**

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

UNIT II Behaviour and Personality **12 HOURS**

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

UNIT III Perception **12 HOURS**

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

UNIT IV Group and Stress Management **12 HOURS**

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

UNIT V Organization Culture and Change **12 HOURS**

Organizational culture- Characteristics of Culture- Types of Culture – Creating and Maintaining an Organizational Culture. Organizational change – Meaning - Forces for Change - Factors in Organizational Change - Resistance to change- Overcoming resistance to change.

SUGGESTED READINGS

1. Fred Luthans. (2017). Organizational Behavior: An Evidence – Based Approach, 12th edition,Mcgraw Hill Education, NewDelhi.
2. Steven Mcshane and Mary Ann VonGlinow (2017), Organizational Behavior, 6th edition, McGrawHill Education, NewDelhi
3. Robbins, S. P., and Judge, T.A. (2016). Organizational Behaviour.(16th edition).New Delhi: PrenticeHall of India.
4. Laurie J. Mullins (2016), Management and Organisationalbehaviour, 10th edition, PearsonEducation, NewDelhi
5. Robbins, S. P., and Judge, T.A. (2016). Essentials of Organizational Behavior.13 edition, PearsonEducation.

E- RESOURCES

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

SEMESTER-VIII-A

DATA SCIENCE-PRACTICAL

6H-4C

Instruction Hours / Week: L: 0 T: 0 P: 6 Marks: Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives

The goal of this course is for the students

- To study the basic concepts of Data Science and data lifecycle.
- To understand the theoretical and mathematical aspects of Data Science models.
- To learn common random variables and their uses, and with the use of empirical distributions.
- To obtain the knowledge in data management tools.
- To explore the major techniques for data science.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the key concepts in datascience, including tools and approaches	Understand
CO2	Identify and apply the concepts in data collection, sampling and probabilistic models.	Apply
CO3	Understand the various techniques in datascience	Understand
CO4	Apply the mathematical formulation of machine learning and statistical models to visualize the data in various methods.	Apply
CO5	Apply a suitable datascience technique to solve an information analytics problem	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Matrix manipulations.
2. Creating and manipulating a List and an Array.
3. Manipulation of vectors and matrix.
4. Operators on Factors in R
5. Working with looping statements.
6. Find subset of dataset by using subset (), aggregate () functions on iris dataset
7. Find the data distributions using box and scatter plot.
8. Find the correlation matrix and plot the correlation plot on dataset and visualize it

SUGGESTED READINGS

1. Glenn J. Myatt, Wayne P. Johnson. (2014). Making Sense of Data I: A Practical Guide to Exploratory Data Analysis and Data Mining, John Wiley & Son Publication, Second Edition.
2. Saltz JeffreyS. (2019). An Introduction to Data Science, Sage Publications Inc, Second Edition.
3. Murtaza Haider. (2015). Getting Started with Data Science: Making Sense of Data with Analytics, IBM Press, First Edition.
4. Peter Bruce & Andrew Bruce. (2017). Practical Statistics for Data Scientists, O'Reilly Publication, First Edition.
5. Dawn Griffiths. (2008). Head First Statistics, O'Reilly Publication,First Edition.

WEBSITES

1. https://www.inferentialthinking.com/chapters/intro
2. https://www.openintro.org/stat/
3. https://swayam.gov.in/nd1_noc20_cs36/preview
4. https://swayam.gov.in/nd1_noc19_cs60/preview
5. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-0002-introduction-to-computational-thinking-and-data-science-fall-2016/

SEMESTER-VIII-A

BIG DATA ANALYTICS-PRACTICAL

6H-4C

Instruction Hours / Week: L: 0 T: 0 P: 6 Marks: Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives

- To know the fundamental concepts of big data and analytics.
- To explore tools and practices for working with big data
- To learn about stream computing.
- To know about the research that requires the integration of large amounts of data.
- To perform analytics on data streams
- To learn NoSQL databases and management.

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand the fundamental concepts of big data and analytics	Understand
CO2	Work with big data tools and its analysis techniques	Apply
CO3	Analyze data by utilizing clustering and classification algorithms	Analyze
CO4	Learn and apply different mining algorithms and recommendation systems for large volumes of data	Apply
CO5	Perform analytics on data streams	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Set up a pseudo-distributed, single-node Hadoop cluster backed by the Hadoop Distributed File System, running on Ubuntu Linux. After successful installation on one node, configuration of a multi-node Hadoop cluster (one master and multiple slaves).
2. MapReduce application for word counting on Hadoop cluster
3. Unstructured data into NoSQL data and do all operations such as NoSQL query with API.
4. K-means clustering using map reduce
5. Page Rank Computation
6. Mahout machine learning library to facilitate the knowledge build up in big data analysis.
7. Application of Recommendation Systems using Hadoop/mahout libraries

SUGGESTED READINGS

1. David Loshin. (2019). Big Data Analytics: From Strategic Planning to Enterprise Integration with Tools, Techniques, NoSQL, and Graph, Morgan Kaufmann/Elsevier Publishers.
2. EMC Education Services. (2018). Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data. Wiley publishers.
3. Bart Baesens . (2017). Analytics in a Big Data World: The Essential Guide to Data Science and its Applications, Wiley Publishers.
4. Dietmar Jannach and Markus Zanker. (2017). Recommender Systems: An Introduction. Cambridge University Press.
5. Kim H. Pries and Robert Dunnigan. (2016). Big Data Analytics: A Practical Guide for Managers " CRC Press.
6. Jimmy Lin and Chris Dyer. (2015). Data-Intensive Text Processing with MapReduce", Synthesis Lectures on Human Language Technologies, Vol. 3, No. 1, Pages 1-177, Morgan Claypool publishers.

WEBSITES

1. https://www.ibm.com/analytics/big-data-analytics
2. https://www.simplilearn.com/what-is-big-data-analytics-article

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

Course Outcomes

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

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

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

UNIT I RESEARCH METHODOLOGY 12 HOURS

Objectives and motivation of research - Types of research - Research approaches – Significance of research - Research methods verses methodology - Research and scientific method - Importance of research methodology - Research process - Approaches of investigation of solutions for research

problem, data collection, analysis, interpretation, necessary instrumentations- Criteria of good research. Defining the research problem: Definition of research problem - Problem formulation - Necessity of defining the problem - Technique involved in defining a problem.

UNIT II LITERATURE SURVEY AND DATA COLLECTION 12 HOURS

Importance of literature survey - Sources of information - Assessment of quality of journals and articles -Information through interne. Effective literature studies approaches, analysis, plagiarism, and research ethics. Data - Preparing, Exploring, examining and displaying.

UNIT III RESEARCH DESIGN AND ANALYSIS 12 HOURS

Meaning of research design - Need of research design - Different research designs - Basic principles of experimental design - Developing a research plan - Design of experimental set-up - Use of standards and codes. Overview of Multivariate analysis, Hypotheses testing and Measures of Association. Presenting Insights and findings using written reports and oral presentation.

UNIT IV INTELLECTUAL PROPERTY RIGHTS (IPR) 12 HOURS

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. Role of WIPO and WTO in IPR establishments, Right of Property, Common rules of IPR practices, Types and Features of IPR Agreement, Trademark, Functions of UNESCO in IPR maintenance.

UNIT V PATENT RIGHTS (PR) 12 HOURS

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications. New Developments in IPR: Administration of Patent System, IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR and IITs. Licenses, Licensing of related patents, patent agents, Registration of patent agents.

SUGGESTED READINGS

1. Peter S. Menell ,Mark A. Lemley, Robert P. Merges, (2021) "Intellectual Property in the New Technological "Vol. I Perspectives.
2. Laura R. Ford, (2021), "The Intellectual Property of Nations: Sociological and Historical Perspectives on aModern Legal Institution Paperback.
3. R. Ganesan, (2011) "Research Methodology for Engineers", MJP Publishers, Chennai, 2011.
4. RatanKhananabis and SuvasisSaha, (2015) "Research Methodology", Universities Press, Hyderabad.
5. Cooper Donald R, Schindler Pamela S and Sharma JK,(2012) "Business Research Methods", Tata McGrawHill Education, 11Edition.
6. Catherine J. Holland, (2007) "Intellectual property: Patents, Trademarks, Copyrights, Trade Secrets", Entrepreneur Press.
7. David Hunt, Long Nguyen, Matthew Rodgers, (2007) "Patent searching: tools & techniques", Wiley.

8. The Institute of Company Secretaries of India, Statutory body under an Act of parliament,"Professional Programme Intellectual Property Rights, Law and practice", September 2013.
9. Ranjit Kumar, (2010), 2nd Edition, "Research Methodology: A Step by Step Guide for beginners".

WEBSITES

1. https://www.scribbr.com/dissertation/methodology/
2. https://www.educba.com/types-of-research-methodology/
3. https://www.wipo.int/about-ip/en/

SEMESTER-VIII-B

STATISTICAL ANALYSIS USING R PRACTICAL

6H-4C

Instruction Hours / Week: L: 0 T: 0 P: 6 Marks: Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

Course Objectives

Upon successful completion of this course, students will be able to:

- To acquire the computing tasks such as using conditional processing statements, loops, and writing one's own functions.
- To perform advanced graphing of data and statistical modeling of data.
- To use statistical distribution functions in R
- To read Structured Data into R from various sources
- To understand split-apply-combine (group-wise operations) in R
- To perform basic statistical modeling of data using R

Course Outcomes (COs)

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

COs	Course Outcomes	Blooms Level
CO1	Understand how to install and configure software necessary for a statistical programming environment	Understand
CO2	Work with generic programming language concepts	Apply
CO3	Analyze how reading data into R, accessing R packages, writing R functions, debugging, and organizing and commenting R code is done	Analyze
CO4	Import external data into R for data processing and statistical analysis	Apply
CO5	Design and develop R applications for data analytics	Apply

Mapping with Programme Outcomes

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

S-Strong; M-Medium; L-Low

List of Programs

1. Write a program to demonstrate functions and operators
2. **Vectors:** Grouping values into vectors, then doing arithmetic and graphs with them
3. **Matrices:** Creating and graphing two-dimensional data sets
4. **Summary Statistics:** Calculating and plotting some basic statistics: mean, median, and standard deviation
5. **Factors:** Creating and plotting categorized data
6. **Data Frames:** Organizing values into data frames, loading frames from files and merging them
7. Write a program to design R as a calculator
8. Write a program to demonstrate Probability distributions
9. Write a program to demonstrate Importing and exporting data
10. Write a program to Establish a Regression

SUGGESTED READINGS

1. Garrett Grolemund and Hadley Wickham (2016). R for Data Science
2. Roger.D.Peng, (2015).R Programming for Data Science
3. Hadley Wickham, (2014).Advanced R Programming,1st Edition.
4. Daniel Navarro. (2013). Learning Statistics with R. University of Adelaide Publications.
5. JeffreyStanton. (2013). Introduction to Data Science, with Introduction to R, Version3 ,

WEBSITES

1. https://www.r-project.org/
2. https://www.datamentor.io/r-programming/
3. https://www.datacamp.com/courses/free-introduction-to-r?utm_
4. https://www.coursera.org/learn/r-programming
5. https://172.16.25.76/Course/View.php?id = 2216
6. https://nptel.ac.in/courses/111104100/
7. https://nptel.ac.in/content/syllabus_pdf/111104100.pdf
8. https://www.edx.org/learn/r-programming

BACHELOR OF COMPUTER SCIENCE(COGNITIVE SYSTEMS) 2023-2024
23CGU891

SEMESTER-VIII-B

RESEARCH PROJECT/PREPARATION OF RESEARCH PROJECT

18H-12C

Instruction Hours / Week: L: 0 T: 0 P: 18 **Marks:** Internal: **40** External: **60** Total: **100**
End Semester Exam: 3 Hours

VALUE - ADDED COURSES

23BEMC551 MOBILE APPLICATION DEVELOPMENT 1H-0C

Instruction Hours/week: L:1 T:0 P:0 **Marks: Internal:100 External:0 Total:100**

End Semester Exam:3 Hours

PRE-REQUISITES: Java Programming

Course Objectives

The goal of this course for the students is to

- 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

Upon completion of this course the students will be able to

- Explain the overview of android with its states and lifecycle.
- Apply the mobile applications for e-marketing in Android and iPhone.
- Analyze mobile databases and various types of testing.
- Develop the simple android applications.
- Evaluate alternative mobile frameworks, and contrast different programming platforms.
- Implement the android applications in different field with modern tools.

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 onmobile 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, async task, services – States and lifecycle, Notifications, Broadcast receivers.

UNIT III

Telephony and SMS APIs – Native data handling – On-device file I/O – Shared preferences – Mobiledatabases 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 monkey talk. 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 map kit – 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 ofmobile app – Online ecommerce transaction – E-booking transaction.

SUGGESTED READINGS

1. Anubhav Pradhan and Anil V Deshpande, Composing Mobile Apps Wiley, First Edition 2014

REFERENCE BOOK

1. 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

23BECSOE01 INTERNET OF THINGS 1H-0C

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

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

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

- Explain about IoT architecture and its applications.
- Identify the feasibility and potential impact of IoT solutions in different industries.
- Apply a systematic and structured approach to designing IoT solutions.
- Summarize techniques to secure the elements of an IoT device.
- Illustrate security protocols in various domains of industrial applications.

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

REFERENCE BOOKS:

1. Olivier Hersent, Omar Elloumi and David Boswarthick,"The Internet of Things: Applications to the Smart Grid and Building Automation", Wiley, 2018
2. 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

23BTFTOE02 NUTRITION AND DIETETICS 1H-0C

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

End Semester Exam:3 Hours

Course Objectives

The goal of this course is for students,

- 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

- Explain the basics in the area of nutritional assessment in health and disease.
- Outline the biological functions of various macromolecules in terms of food and health.
- Discuss the balanced diet for healthy life to avoid or prevent the deficiency disorders.
- Infer an appropriate diet, products that prevent vitamin deficiency disorders.
- Identify the proper foods rich in minerals to live a healthy life.

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 age groups - 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 Carbohydrates, 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 FatSolubleVitamins: Vitamin A, Vitamin D, E & K. *f* Water soluble vitamins: Vitamin C,Thiamine,Riboflavin, Niacin, Pantothenic acid, Biotin, Folic acid, Vitamin B12, VitaminB6. Stability under different food processing conditions.

UNIT IV – MINERALS AND WATER

Physiological role, bio-availability, requirements, sources and deficiency of Macro minerals: Calcium, Phosphorus Magnesium, Sodium, Potassium chloride. Micro minerals: 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 humannutrition like nutrigenomics, nutraceuticals etc.

SUGGESTED READINGS:

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

23BTFTOE04 AGRICULTURAL WASTE AND BYPRODUCTS UTILIZATION 1H-0C

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

End Semester Exam:3 Hours

Course Objectives

The goal of this course is for students,

- 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 / byproducts.
- To summarize the overall aspects involved in the production of paperboards and particleboards from agricultural wastes.

Course Outcomes

Upon successful completion of this, students will be able to,

- Outline the types of agricultural wastes.
- Illustrate the collection and generation of value-added products from agricultural wastes
- Demonstrate the techniques involved in the production and utilization of biomass.
- Discuss the various parameters considered to be important in the designing of biogas units.
- Illustrate the various methods employed in the production of alcohol from the byproducts of agricultural wastes.
- Discuss the appropriate materials to produce paperboards and particleboards from agricultural wastes.

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 (thermochemical approach).

UNIT V – PRODUCTION OF PAPERBOARD AND PARTICLE BOARDS FROM AGRICULTURAL WASTE

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

SUGGESTED READINGS

1. Efthymia Alexopoulou. Bioenergy and Biomass from Industrial Crops on Marginal Lands. Elsevier, 1st Edition, 2020. (ISBN: 9780128188644).
2. Navanietha Krishnaraj Rathinam, Rajesh Sani. Biovalorisation of Wastes to Renewable chemicals and Biofuels. Elsevier, 1st Edition, 2019. (ISBN: 9780128179529).
3. Simona Ciuta, Demetra Tsiamis, Marco J. Castaldi. Gasification of Waste Materials.

Academic Press, 1st Edition, 2017. (ISBN: 9780128127162).

4. Nicholas E. Korres, Padraig 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).

23BEEEOE01 RENEWABLE ENERGY RESOURCES 1H-0C

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

End Semester Exam:3 Hours

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 powerplants 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 SOLAR ENERGY

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 WIND ENERGY

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 – Inter connected systems.

UNIT IV HYDRO ENERGY

Hydropower, classification of hydro power, 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-conventional sources of energy Khanna publishers,2011
2. Khan.B.H, Non-Conventional Energy Resources, The McGraw 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.