Annamalai University

(Accredited with 'A' Grade by NAAC)

Faculty of Science

Department of Computer and Information Science

M.Sc. SOFTWARE ENGINEERING
(5-Year)

Programme Code: SCIS51

Regulations, Curricula and Syllabi

(2020-21)

Annamalai University

Faculty of Science

DEPARTMENT OF COMPUTER AND INFORMATION SCIENCE

M.Sc. SOFTWARE ENGINEERING

Programme Code: SCIS51

These rules and regulations shall govern the Five year post graduate studies leading to the award of degree of **Master of Science in Software Engineering** in the Faculty of Science. These academic Regulations shall be called "**Annamalai University, Faculty of Science, Five year M.Sc. Software Engineering (Integrated) Regulations 2019**". They shall come into force with effect from the academic year 2020 – 2021.

1. Definitions and Nomenclature

1.1 **University** refers to Annamalai University.

1.2 **Department** means any of the academic departments and academic centers at the University.

1.3 **Discipline** refers to the specialization or branch of knowledge taught and researched in higher education. For example, Computer Science is a discipline in the Mathematical Sciences, while Economics is a discipline in Social Sciences.

1.4 **Programme** encompasses the combination of courses and/or requirements leading to a Degree. For example, M.Sc., M.A.

1.5 **Course** is an individual subject in a programme. Each course may consist of Lectures/ Laboratory /Seminar/Project work/viva-voce etc. Each course has a course title and is identified by a course code.

1.6 **Curriculum** encompasses the totality of student experiences that occur during the educational process.

1.7 **Syllabus** is an academic document that contains the complete information about an academic programme and defines responsibilities and outcomes. This includes course information, course objectives, policies, evaluation, grading, learning resources and course calendar.

1.8 **Academic Year** refers to the annual period of sessions of the University that comprises two consecutive semesters.

1.9 **Semester** is a half-year term that lasts for a minimum duration of 90 days.

1.10 **Choice Based Credit System**: A mode of learning in higher education that enables a student to have the freedom to select his/her own choice of elective courses across various disciplines for completing the Degree programme.

1.11 **Core Course** is mandatory and an essential requirement to qualify for the Degree.

1.12 **Elective Course** is a course that a student can choose from a range of alternatives.

1.13 **Language Course** is a mandatory course includes Tamil/Hindi/French and English.

1.14 **Value-added Courses** are optional courses that complement the students' knowledge and skills and enhance their employability.

1.15 **Credit** refers to the quantum of course work in terms of number of class hours in a semester required for a programme. The credit value reflects the content and duration of

a particular course in the curriculum.

1.16 **Credit Hour** refers to the number of class hours per week required for a course in a semester. It is used to calculate the credit value of a particular course.

1.17 **Programme Outcomes** (POs) are statements that describe crucial and essential knowledge, skills and attitudes that students are expected to achieve and can reliably manifest at the end of a programme.

1.18 **Programme Specific Outcomes** (PSOs) are statements that list what the graduate of a specific programme should be able to do at the end of the programme.

1.19 **Learning Objectives** are statements that define the expected goal of a course in **Course Objectives** in terms of demonstrable skills or knowledge that will be acquired by a student.

1.20 **Course Outcomes** (COs) are statements that describe what students should be able to achieve/demonstrate at the end of a course. They allow follow-up and measurement of learning objectives.

1.21 **Grade Point Average** (GPA) is the average of the grades acquired in various courses that a student has taken in a semester. The formula for computing GPA is given in section 11.3

1.22 **Cumulative Grade Point Average** (CGPA) is a measure of overall cumulative performance of a student over all the semesters. Calculation of CGPA is given in section11.4.

1.23 **Letter Grade** is an index of the performance of a student in a particular course. Grades are denoted by the letters S, A, B, C, D, E, RA, and W.

2. **Programme Offered and Eligibility Criteria**:

The Department of Computer and Information Science offers a M.Sc. Software Engineering five year programme. A pass in H.S.E. (10+2 level) OR Equivalent thereto under academic stream with Mathematics as one of the subjects.

2.1 In the case of SC/ST and differently-abled candidates, a pass in minimum qualification for the above programme.

3. **Reservation Policy:** Admission to the various programmes will be strictly based on the reservation policy of the Government of Tamil Nadu.

4. Programme Duration

4.1 The Five Year Master's Programme consists of five academic years.

4.2 Each academic year is divided into two semesters, the first being from July to November and the second from December to April.

4.3 Each semester will have 90 working days (18 weeks).

5. Programme Structure

5.1 The Five Year Master's Programme consists of Language courses, Allied courses, Core Courses, Elective Courses (Departmental & Interdepartmental), and Project.

5.2 Language Courses

5.2.1 Each student shall take two languages of four courses each, one in each semester for the first two years of the programme.

5.2.2 Language-I shall be Tamil or another language such as Hindi or French.

5.2.3 Language-II shall be English.

5.3 **Core courses**

5.3.1 These are a set of compulsory courses essential for each programme.

5.3.2 The core courses include both Theory (Core Theory) and Practical (Core Practical) courses.

5.4 **Allied courses**

5.4.1 Each student shall take courses in mathematics discipline allied to the main subjects of the programme in the first four semesters..

5.5 **Elective courses**

5.5.1 Departmental Electives (DEs) are the Electives that students can choose from a range of Electives offered within the Department.

5.5.2 Interdepartmental Electives (IDEs) are Electives that students can choose from amongst the courses offered by other departments of the same faculty as well as by the departments of other faculties. IDEs are listed in the Handbook available in the University Website.

5.6 Soft Skills

5.6.1 Soft Skills are intended to enable students to acquire attributes that enhance their performance and achieve their goals with complementing hard skills.

5.6.2 Soft Skills include communication skills, computer skills among others.

5.7 Value Education

5.7.1 All students shall take a course on Value Education that includes human values, sustainable development, gender equity, ethics and human right.

5.7.2 **Value Education** is categorized as **Non-Credit Compulsory Course.**

5.8 Experiential Learning

5.8.1 Experiential learning provides opportunities to students to connect principles of the discipline with real-life situations.

5.8.2 In-plant training/field trips/internships/industrial visits fall under this category.

5.8.3 Experiential learning is categorized as Core.

5.9 Extension Activities

5.9.1 It is mandatory for every student to participate in extension activities.

5.9.2 All the students shall enrol under NSS/NCC/YRC/RRC or any other Service organisation in the University.

5.9.3 Students shall put in a minimum attendance of 40 hours in a year duly certified by the Programme Coordinator.

5.9.4 Extension activities shall be conducted outside the class hours

5.9.5 Extension activity is categorized as **Non-Credit Compulsory Course**

5.10 Project

5.10.1 Each student shall undertake a Project and submit a dissertation as per guidelines in the final semester.

5.10.2 The Head of the Department shall assign a Research Supervisor to the student.

5.10.3 The Research Supervisor shall assign a topic for research and monitor the progress of the student periodically.

5.10.4 Students who wish to undertake project work in recognized institutions/industry shall

obtain prior permission from the Department. The Research Supervisor will be from the host institute.

5.11 Value added Courses (VACs)

5.11.1 Students may also opt to take Value added Courses beyond the minimum credits required for award of the Degree. VACs are outside the normal credit paradigm.

5.11.2 These courses impart employable and life skills. VACs are listed in the University website.

5.11.3 Each VAC carries 2 credits with 30 hours of instruction. Classes for a VAC are conducted beyond the regular class hours and preferably in the in the VIII and IX Semester.

5.12 Online Courses

5.12.1 The Heads of Departments shall facilitate enrolment of students in Massive Open Online Courses (MOOCs) platform such as SWAYAM to provide academic flexibility and enhance the academic career of students.

5.12.2 Students who successfully complete a course in the MOOCs platform shall be exempted from one elective course of the programme.

5.13 Credit Distribution: The credit distribution is organized as follows:

	Credits
Semester I to VI	
Language-I (Tamil or any other Language)	12
Language-II (English)	12
Core Courses	89
Allied-I (1st Year- SEM I & II)	10
Allied-II (2nd Year- SEM III & IV)	10
Electives	09
Environmental studies (UGC mandated)	03
Experiential learning	02*
Extension activities	02*
Total Credits (Semester I to VI)	**145**
Semester VII to X	
Core Courses	66
Electives (DE)	12
Electives (IDE)	03
Project	09
Constitution of India	02*
Total Credits (Semester VII to X)	**90**
Total Credits (Semester I to X)	**235**

5.14 Credit Assignment

Each course is assigned credits and credit hours on the following basis:

1 Credit is defined as,

1 Lecture period of one hour duration per week over a semester

1 Tutorial period of one hour duration per week over a semester

1 Practical/Project period of two hours duration per week over a semester.

6 Attendance

6.1 Each faculty handling a course shall be responsible for the maintenance of Attendance and Assessment Record for candidates who have registered for the course.

6.2 The Record shall contain details of the students' attendance, marks obtained in the Continuous Internal Assessment (CIA) Tests, Assignments and Seminars. In addition the Record shall also contain the organization of lesson plan of the Course teacher.

6.3 The record shall be submitted to the Head of the Department and Dean once a month for monitoring the attendance and syllabus coverage.

6.4 At the end of the semester, the record shall be placed in safe custody for any future verification.

6.5 The Course teacher shall intimate to the Head of the Department at least seven calendar days before the last instruction day in the semester about the attendance particulars of all students.

6.6 Each student shall have a minimum of 75% attendance in all the courses of the particular semester failing which he or she will not be permitted to write the End-Semester Examination. The student has to redo the semester in the next year.

6.7 Relaxation of attendance requirement up to 10% may be granted for valid reasons such as illness, representing the University in extracurricular activities and participation in NCC/NSS/YRC/RRC.

7 Mentor-Mentee System

7.1 To help the students in planning their course of study and for general advice on the academic programme, the Head of the Department will attach certain number of students to a member of the faculty who shall function as a Mentor throughout their period of study.

7.2 The Mentors will guide their mentees with the curriculum, monitor their progress, and provide intellectual and emotional support.

7.3 The Mentors shall also help their mentees to choose appropriate electives and value-added courses, apply for scholarships, undertake projects, prepare for competitive examinations such as NET/SET, GATE etc., attend campus interviews and participate in extracurricular activities.

8 Examinations

8.1 The examination system of the University is designed to systematically test the student's progress in class, laboratory and field work through Continuous Internal Assessment (CIA) Tests and End-Semester Examination (ESE).

8.2 There will be two CIA Tests and one ESE in each semester.

8.3 The Question Papers will be framed to test different levels of learning based on Bloom's taxonomy viz. Knowledge, Comprehension, Application, Analysis, Synthesis and Evaluation/Creativity.

8.4 Continuous Internal Assessment Tests

8.4.1 The CIA Tests shall be a combination of a variety of tools such as class tests, assignments and seminars. This requires an element of openness.

8.4.2 The students are to be informed in advance about the assessment procedures.

8.4.3 The question paper will be set by the respective faculty using Blooms Taxonomy.

8.4.4 CIA Tests will be for one or two hours duration depending on the quantum of syllabus.

8.4.5 A student cannot repeat the CIA Test-I and CIA Test-II. However, if for any valid reason, the student is unable to attend the test, the prerogative of arranging a special test lies with the teacher in consultation with the Head of the Department.

8.4.6 For the CIA Tests, the assessment will be done by the Course teacher

8.5 **End Semester Examinations (ESE)**

8.5.1 The ESE for the first and third semester will be conducted in November and for the second and fourth semester in May.

8.6 Candidates who failed in any course will be permitted to reappear in failed course in the subsequent examinations.

8.7 The ESE will be of three hours duration and will cover the entire syllabus of the course.

9 Evaluation

9.1 Marks Distribution

9.1.1 For each course, the Theory and Practical shall be evaluated for a maximum of 100 marks.

9.1.2 For the theory courses, CIA Tests will carry 25% and the ESE 75% of the marks.

9.1.3 For the Practical courses, the CIA Tests will carry 40% and the ESE 60% of the marks.

9.2 Assessment of CIA Tests

9.2.1 For the Theory Courses, the break-up of marks shall be as follows

CIA for Theory Courses	Marks
Test-I & Test-II	15
Seminar	5
Assignment	5
Total	25

9.2.2 For the Practical Courses (wherever applicable), the break-up of marks shall be as follows:

CIA for Practical	Marks
Test-I	15
Test-II	15
Viva-voce and Record	10
Total	40

9.3 Assessment of End-Semester Examinations

9.3.1 Evaluation for the ESE is done by Internal examiner.

9.4 Assessment of Project/Dissertation

9.4.1 The Project Report/Dissertation shall be submitted as per the guidelines.

9.4.2 The Project Work/Dissertation shall carry a maximum of 100 marks.

9.4.3 CIA for Project work/dissertation will carry 25% and ESE 75%.

9.4.4 The Project Report evaluation and viva-voce will be conducted by a committee constituted by the Head of the Department.

9.4.5 The Project Evaluation Committee will comprise the Head of the Department, Project Supervisor, and a senior faculty.

Continuous Internal Assessment (25 Marks)		End Semester Examination (75 Marks)	
Review-I – 10	Review-II -15	Project / Dissertation Evaluation	Viva-voce
		50	25

9.4.6 The Marks shall be distributed as follows

9.5 Assessment of Value-added Courses

9.5.1 Assessment of VACs shall be internal. Two CIA Tests shall be conducted during the semester by the Department(s) offering VAC.

9.5.2 The grades obtained in VACs will not be included for calculating the GPA/CGPA.

9.6 Passing Minimum

9.6.1 A student is declared to have passed in each course if he/she secures not less than 50% marks in the ESE and not less than 50% marks in aggregate taking CIA and ESE marks together.

9.6.2 A candidate who has not secured a minimum of 50% of marks in a course (CIA + ESE) shall reappear for the course in the next semester/year.

10. Conferment of the Master's Degree

A candidate who has secured a minimum of 50% marks in all courses prescribed in the programme and earned the minimum required credits shall be considered to have passed the Master's Programme.

11. Marks and Grading

11.1 The performance of students in each course is evaluated in terms Grade Point (GP).

11.2 The sum total performance in each semester is rated by Grade Point Average (GPA) while Cumulative Grade Point Average (CGPA) indicates the Average Grade Point obtained for all the courses completed.

11.3 **The GPA** is calculated by the formula

$$GPA = \frac{\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{n} C_i}$$

where, $\boldsymbol{C_i}$ is the Credit earned for the Course $\boldsymbol{i}$ in any semester;

$\boldsymbol{G_i}$is the Grade Point obtained by the student for the Course $\boldsymbol{i}$ and

$\boldsymbol{n}$ is the number of Courses passed in that semester.

11.4 **CGPA** is the Weighted Average Grade Point of all the Courses passed starting from the first semester to the current semester.

$$\text{CGPA} = \frac{\sum_{i=1}^{m}\sum_{i=1}^{n} C_i G_i}{\sum_{i=1}^{m}\sum_{i=1}^{n} C_i}$$

Where, C_i is the Credit earned for the Course i in any semester;

G_i is the Grade Point obtained by the student for the Course i

n is the number of Courses passed in that semester.

m is the number of semesters.

11.5 **Evaluation :**

11.5.1 **Performance of the student for each course will be rated as shown in the Table.**

Range of Marks	Grade Points	Letter Grade
90 and above	10	S
80-89	9	A
70-79	8	B
60-69	7	C
55-59	6	D
50-54	5	E
Less than 50	0	RA
Withdrawn from the examination	0	W

11.5.2 A ten point rating scale is used for evaluation of the performance of the student to provide overall grade for the Master's Programme.

CGPA	CLASSIFICATION OF FINAL RESULT
8.25 and above	First Class with Distinction
6.5 and above but below 8.25	First Class
5.0 and above but below 6.5	Second Class
0.0 and above but below 5.0	Re-appear

11.6 **Classification of Results**. The successful candidates are classified as follows:

11.6.1 **For First Class with Distinction:** Candidates who have passed all the courses prescribed in the Programme in the first attempt with a CGPA of 8.25and above within the programme duration. Candidates who have withdrawn from the End Semester Examinations are still eligible for First Class with Distinction (See Section 12 for details).

11.6.2 **For First Class:** Candidates who have passed all the courses with a CGPA of 6.5and above.

11.6.3 **For Second Class:** Candidates who have passed all the courses with a CGPA between 5.0 and less than 6.5.

11.6.4 Candidates who obtain highest marks in all examinations at the first appearance alone will be considered for University Rank.

11.7 Course-Wise Letter Grades

11.7.1 The percentage of marks obtained by a candidate in a course will be indicated in a letter grade.

11.7.2 A student is considered to have completed a course successfully and earned the credits if he/she secures an overall letter grade other than RA.

11.7.3 A course successfully completed cannot be repeated for the purpose of improving the Grade Point.

11.7.4 A letter grade RA indicates that the candidate shall reappear for that course. The RA Grade once awarded stays in the grade card of the student and is not deleted even when he/she completes the course successfully later. The grade acquired later by the student will be indicated in the grade sheet of the Odd/Even semester in which the candidate has appeared for clearance of the arrears.

11.7.5 If a student secures RA grade in the Project Work/Field Work/Practical Work/Dissertation, he/she shall improve it and resubmit if it involves only rewriting/ incorporating the clarifications suggested by the evaluators or he/she can re-register and carry out the same in the subsequent semesters for evaluation.

12. Provision for Withdrawal from the End Semester Examination

12.1 The letter grade W indicates that a candidate has withdrawn from the examination.

12.2 A candidate is permitted to withdraw from appearing in the ESE for one course or courses in ANY ONE of the semesters ONLY for exigencies deemed valid by the University authorities.

12.3 Permission for withdrawal from the examination shall be granted only once during the entire duration of the programme.

12.4 Application for withdrawal shall be considered only if the student has registered for the course(s), and fulfilled the requirements for attendance and CIA tests.

12.5 The application for withdrawal shall be made ten days prior to the commencement of the examination and duly approved by the Controller of Examinations. Notwithstanding the mandatory prerequisite of ten days notice, due consideration will be given under extraordinary circumstances.

12.6 Withdrawal will not be granted for arrear examinations of courses in previous semesters and for the final semester examinations.

12.7 Candidates who have been granted permission to withdraw from the examination shall reappear for the course(s) when the course(s) are offered next.

12.8 Withdrawal shall not be taken into account as an appearance for the examination when considering the eligibility of the candidate to qualify for First Class with Distinction.

13. **Academic misconduct:** Any action that results in an unfair academic advantage/interference with the functioning of the academic community constitutes academic misconduct. This includes but is not limited to cheating, plagiarism, altering academic documents, fabrication/falsification of data, submitting the work of another student, interfering with other students' work, removing/defacing library or computer

resources, stealing other students' notes/assignments, and electronically interfering with other students'/University's intellectual property. Since many of these acts may be committed unintentionally due to lack of awareness, students shall be sensitized on issues of academic integrity and ethics.

14. **Transitory Regulations:** Wherever there has been a change of syllabi, examinations based on the existing syllabus will be conducted for two consecutive years after implementation of the new syllabus in order to enable the students to clear the arrears. Beyond that, the students will have to take up their examinations in equivalent subjects, as per the new syllabus, on the recommendation of the Head of the Department concerned.

15. Notwithstanding anything contained in the above pages as Rules and Regulations governing the Five Year Master's Programmes at Annamalai University, the Syndicate is vested with the powers to revise them from time to time on the recommendations of the Academic Council.

M.Sc. Software Engineering (Five Year) Programme
Programme Code: SCIS51

CURRICULA AND SCHEME OF EXAMINATIONS
(For students admitted from the academic year 2020-2021)

Course Code	Course Title	Hours/Week			Credit	Marks		
		L	T	P	C	CIA	ESE	Total
Semester – I								
19ITAMC11	Language-I	3	0		3	25	75	100
19IENGC12	Language–II	3	0		3	25	75	100
19IENSC13	Environmental Studies	3	0		3	25	75	100
19IMATA01	Allied I: Mathematics – I	5	0		5	25	75	100
19ISOFC14	Core 1:Programming in C	4	0		4	25	75	100
19ISOFE1X	Department Elective – I	3	0		3	25	75	100
					21			
Semester – II								
19ITAMC21	Language – I	3	0		3	25	75	100
19IENGC22	Language – II	3	0		3	25	75	100
19IMATA02	Allied II: Mathematics-II	5	0		5	25	75	100
19ISOFC23	Core-2: Data Structures and Algorithms	5	0		5	25	75	100
19ISOFC24	Core-3: Digital Computer Fundamentals	4	0		4	25	75	100
19ISOFP25	Core-4: Practical-I: C Programming	0	0	4	2	40	60	100
19ISOFP26	Core-5: Practical-II: Data Structures using C	0	0	4	2	40	60	100
					24			
Semester – III								
19ITAMC31	Language – I	3	0		3	25	75	100
19IENGC32	Language – II	3	0		3	25	75	100
19IMATA03	Allied III: Discrete Mathematics	5	0		5	25	75	100
19ISOFC33	Core-6: Relational Database Management Systems	4	0		4	25	75	100
19ISOFC34	Core-7: Internet Programming	4	0		4	25	75	100
19ISOFP35	Core-8: Practical-III: SQL & PL/SQL			4	2	40	60	100
19ISOFE3X	Department Elective – II	3	0		3	25	75	100
					24			
Semester – IV								
19ITAMC41	Language – I	3	0		3	25	75	100
19IENGC42	Language – II	3	0		3	25	75	100
19IMATA04	Allied IV: Resource Management Techniques	5	0		5	25	75	100
19ISOFC43	Core-9: Object Oriented Programming Using C++	4	0		4	25	75	100
19ISOFC44	Core-10: Web Technology	3	0		3	25	75	100
19ISOFC45	Core-11: Computer Graphics	4	0		4	25	75	100
19ISOFP46	Core-12: Practical-IV: C++ Programming	0	0	4	2	40	60	100
19ISOFP47	Core-13: Practical-V : Web Technology Lab	0	0	4	2	40	60	100
19ICISF40	Extension Activities*	0	0	2	1*	40	60	100
					26			

Semester – V								
19ISOFC51	Core-14: Operating Systems	4	0		4	25	75	100
19ISOFC52	Core-15: Programming in Java	5	0		5	25	75	100
19ISOFC53	Core-16: Computer Networks	4	0		4	25	75	100
19ISOFC54	Core-17: Multimedia Systems	4	0		4	25	75	100
19ISOFP55	Core-18: Practical-VI : Java programming	0	0	4	2	40	60	100
19ISOFP56	Core-19: Practical-VII : Open Source Technology Lab	0	0	4	2	40	60	100
19ISOFE57	Department Elective – III	3			3	25	75	100
19ICISV50	Value Education*	2	0	0	2*	25	75	100
					24			
Semester – VI								
19ISOFC61	Core-20: Programming in Python	5			5	25	75	100
19ISOFC62	Core-21: Software Engineering	5			5	25	75	100
19ISOFC63	Core-22: Linux and Shell Programming	4			4	25	75	100
19ISOFC64	Core-23: Mobile Computing	4			4	25	75	100
19ISOFC65	Core-24: Wireless Network	4			4	25	75	100
19ISOFP66	Core-25: Practical-VIII : Python Programming			4	2	40	60	100
19ISOFP67	Core-26: Practical-IX: Shell Programming			4	2	40	60	100
19ICISF60	Experiential Learning*	0	0	4	2*	40	60	100
					26			
Semester – VII								
19ISOFC71	Core-27: Design and Analysis of Algorithm	4			4	25	75	100
19ISOFC72	Core-28: Advanced Web Technology	5			5	25	75	100
19ISOFC73	Core-29: Advanced Data Base Management Systems	5			5	25	75	100
19ISOFC74	Core-30: Software Project Management	4			4	25	75	100
19ISOFP76	Core-31: Practical-X: Advanced Web Technology Lab			4	2	40	60	100
19ISOFP77	Core-32: Practical-XI: Algorithm Lab			4	2	40	60	100
19XXXXXXX	Inter Departmental Elective – II Soft Skills	3			3	25	75	100
					25			
Semester – VIII								
19ISOFC81	Core-33: Distributed Operating System	5			5	25	75	100
19ISOFC82	Core-34: Advanced Java Programming	5			5	25	75	100
19ISOFC83	Core-35: Dot Net Programming	4			4	25	75	100
19ISOFP84	Core-36: Practical-XII: Advanced Java- Lab			4	2	40	60	100
19ISOFP85	Core-37: Practical-XIII: Dot Net Programming Lab			4	2	40	60	100
19ISOFE86	Department Elective – IV	3			3	25	75	100
19ISOFE87	Department Elective – V	3			3	25	75	100
					24			
Semester – IX								
19ISOFC91	Core-38: Digital Image Processing	4			4	25	75	100
19ISOFC92	Core-39: Machine Learning	4			4	25	75	100

19ISOFC93	Core-40: Internet of Things	4			4	25	75	100
19ISOFP94	Core-41: Practical-XIV: Image Processing- Lab			4	2	40	60	100
19ISOFP95	Core-42: Practical-XV: Machine Learning – Lab			4	2	40	60	100
19ISOFE96	Department Elective – VI	3			3	25	75	100
19ISOFE97	Department Elective – VII	3			3	25	75	100
19IPSCI06	Constitution of India*	2	0		2	25	75	100
					22			
Semester – X								
19ISOFCX1	Core-43: Software Testing and Quality Assurance	4			4	25	75	100
19ISOFCX2	Core-44: Data Science and Big Data Analytics	4			4	25	75	100
19ISOFPX3	Core-45: Practical-XVI: Software Testing Lab			4	2	40	60	100
19ISOFDX4	Dissertation and Viva-Voce / In-plant training			18	9	25	75	100
					19			
	Total Credits				**235**			
Value Added Courses								
Online Courses (SWAYAM or MOOC)								

L- Lectures; P- Practical; C- Credits; CIA- Continuous Internal Assessment; ESE- End-Semester Examination

***19ICISF40, 19ICISV50, 19ICISF60, 19IPSCI06 = NON CREDIT COMPULSORY COURSE**

Note:

1. Students shall take both Department Electives (DEs) and Interdepartmental Electives (IDEs) from a range of choices available. The details of interdepartmental electives are given in the "**Handbook of Interdepartmental Electives-Five Year Programme**" and listed in the University website.

2. Students may opt for any Value-added Courses listed in the University website. The details of Value Added Courses are given in the "**Handbook of Value Added Courses**" and listed in the University website.

ELECTIVE COURSES

DEPARTMENT ELECTIVE COURSES (DE)

S. No.	Course Code	Course Title	Hours/ week			C	Marks		
			L	T	P		CIA	ESE	Total
1	19ISOFE16	Computer Organization and Architecture	3			3	25	75	100
2	19ISOFE17	Microprocessor and Its Applications	3			3	25	75	100
3	19ISOFE36	System Software	3			3	25	75	100
4	19ISOFE37	Compiler Design	3			3	25	75	100
5	19ISOFE57	Open Source Technology	3			3	25	75	100
6	19ISOFE58	Cyber Security	3			3	25	75	100
7	19ISOFE86	Object Oriented System Development	3			3	25	75	100
8	19ISOFE87	Advanced Data Structure and algorithm	3			3	25	75	100
11	19ISOFE88	Cloud Computing	3			3	25	75	100
12	19ISOFE89	Distributed and parallel Computing	3			3	25	75	100
14	19ISOFE96	Cryptography and network security	3			3	25	75	100
16	19ISOFE97	Web database and information system	3			3	25	75	100
17	19ISOFE98	Business Intelligence	3			3	25	75	100
18	19ISOFE99	Advanced Computer Networks	3			3	25	75	100

VALUE ADDED COURSES (VAC)(For students of other departments)

To be offered in THIRD Semester

S. No.	Course Code	Course Title	Hours/ week			C	Marks		
			L	T	P		CIA	ESE	Total
1.	SCISVAC01	Web Development	3	0	0	3	25	75	100
2.	SCISVAC02	Fundamentals of Computing	3	0	0	3	25	75	100
3.	SCISVAC03	Advanced Web Development	3	0	0	3	25	75	100
4.	SCISVAC04	Internet and its Applications	3	0	0	3	25	75	100

ANNAMALAI UNIVERSITY

Department of Computer and Information Science

Pattern of question paper for END semester examinations

(Based on Revised Bloom's Taxonomy)

Programme: M.Sc. Five Year Integrated PG **Year: I/II** **Semester:**

Course Code: **Course Name:**

Time: 3 Hrs **Max.Marks:100**

Part-A (Level-K1) **Marks: (15x2=30)**

(Answer ALL of the questions)

1. Define……
2. What …….?
3. Choose/ Relate……
4. How ……?
5. Why ……?
6. Find……
7. Spell out……
8. Multiple Choices a. b. c. d.
9. Multiple Choices a. b. c. d.
10. Multiple Choices a. b. c. d.
11. Multiple Choices a. b. c. d.
12. Match the following i - a ii - b iii - c iv - d v - …..
13. Match the following i - a ii - b iii - c iv - d v - …..
14. Match the following i - a ii - b iii - c iv - d v - …..
15. Match the following i - a ii - b iii - c iv - d v - …..

Part-B (Level-K2) **Marks: (5x5=25)**

(Answer any FIVE of the questions)

16. Explain…..
17. Describe…..
18. Select……
19. Classify….
20. Compare….
21. Interpret…

Part-C (Level-K3/ Level-K4) **Marks: (5x7=35)**

(Answer any FIVE of the questions)

22. Apply….
23. Show…..
24. Solve….
25. Calculate….
26. Categorize…
27. Distinguish….
28. Test for…..

Part-D (Level-K5) **Marks: (1x10=10)**

(Answer any ONE of the questions)

29. Discuss….
30. Summarize….

ANNAMALAI UNIVERSITY

Department of Computer and Information Science

Pattern of question paper for END semester examinations

(Based on Revised Bloom's Taxonomy)

Programme: M.Sc. Five Year Integrated PG **Year: III** **Semester:**

Course Code: **Course Name:**

Time: 3 Hrs **Max.Marks:100**

Part-A (Level-K1) **Marks: (10x2=20)**

(Answer ALL of the questions)

1. Define……
2. What …….?
3. Multiple Choices a. b. c. d.
4. Multiple Choices a. b. c. d.
5. Multiple Choices a. b. c. d.
6. Multiple Choices a. b. c. d.
7. Match the following i - a ii - b iii - c iv - d v - …..
8. Match the following i - a ii - b iii - c iv - d v - …..
9. Match the following i - a ii - b iii - c iv - d v - …..
10. Match the following i - a ii - b iii - c iv - d v - …..

Part-B (Level-K2) **Marks: (5x3=15)**

(Answer any FIVE of the questions)

11. Explain…..
12. Describe…..
13. Select……
14. Classify….
15. Compare….
16. Outline ….

Part-C (Level-K3/Level-K4) **Marks: (9x5=45)**

(Answer any NINE of the questions)

17. Apply….
18. Prepare….
19. Show…..
20. Solve….
21. Illustrate…..
22. Sketch….
23. Infer….
24. Categorize…
25. Analyze…
26. Distinguish….
27. Take part in…

Part-D (Level-K5/ Level-K6) **Marks: (2x10=20)**

(Answer any TWO of the questions)

28. Discuss….
29. Summarize….
30. Design….

ANNAMALAI UNIVERSITY

Department of Computer and Information Science
Pattern of question paper for END semester examinations

(Based on Revised Bloom's Taxonomy)

Programme: M.Sc. Five Year Integrated PG **Year: IV** **Semester:**

Course Code: **Course Name:**

Time: 3 Hrs **Max.Marks:100**

Part-A (Level-K1/ Level-K2) **Marks: (10x2=20)**

(Answer ALL of the questions)

1. Define……
2. Multiple Choices a. b. c. d.
3. Multiple Choices a. b. c. d.
4. Match the following i - a ii - b iii - c iv –d v - …..
5. Match the following i - a ii - b iii - c iv –d v - …..
6. Explain…….
7. Select…..
8. Describe……
9. Classify….
10. Elucidate….

Part-B (Level-K3/ Level-K4) **Marks: (8x5=40)**

(Answer any EIGHT of the questions)

11. Prepare…..
12. Solve…..
13. Apply……
14. Show…..
15. Categorize…
16. Analyze…
17. Distinguish….
18. Infer….
19. Compare….
20. Compute

Part-C (Level-K5) **Marks: (3x10=30)**

(Answer any THREE of the questions)

21. Discuss…
22. Summarize….
23. Evaluate…..
24. Disprove….

Part-D (Level-K6) * **Marks: (1x10=10)**

(Answer any ONE of the questions)

25. Design….
26. Develop…

ANNAMALAI UNIVERSITY

Department of Computer and Information Science
Pattern of question paper for END semester examinations

(Based on Revised Bloom's Taxonomy)

Programme: M.Sc. Five Year Integrated PG **Year: V** **Semester:**

Course Code: **Course Name:**

Time: 3 Hrs **Max.Marks:100**

Part-A (Level-K1/ Level-K2) **Marks: (10x2=20)**

(Answer ALL of the questions)

1. Define……
2. Multiple Choices a. b. c. d.
3. Multiple Choices a. b. c. d.
4. Match the following i - a ii - b iii - c iv –d v - …..
5. Match the following i - a ii - b iii - c iv –d v - …..
6. Explain…….
7. Select…..
8. Describe…..
9. Classify….
10. Elucidate….

Part-B (Level-K3/ Level-K4) **Marks: (6x5=30)**

(Answer any SIX of the questions)

11. Apply……
12. Show…..
13. Prepare
14. Make use of….
15. Categorize…
16. Analyze…
17. Distinguish….
18. Simplify…..

Part-C (Level-K5) **Marks: (3x10=30)**

(Answer any THREE of the questions)

19. Discuss…
20. Recommend with
21. Evaluate…..
22. Justify….
23. Optimize…

Part-D (Level-K6) * **Marks: (2x10=20)**

(Answer any TWO of the questions)

24. Design….
25. Formulate …
26. Modify …..

ANNAMALAI UNIVERSITY

Department of Computer and Information Science

[End Semester Examinations]

Bloom's Taxonomy - Questions Conforming to Levels K1 to K6

I Year(Five Year PG)				II Year (Five Year PG)				III Year(Five Year PG)			
Level	Part	Questions & Marks	Total Marks	Level	Part	Questions & Marks	Total Marks	Level	Part	Questions & Marks	Total Marks
K1	A	15 x 2	30	K1	A	15 x 2	30	K1	A	10 x 2	20
K2	B	5 x 5	25	K2	B	5 x 5	25	K2	B	5 x 3	15
K3	C	3 x 7	21	K3	C	3 x 7	21	K3	C	5 x 5	25
K4		2 x 7	14	K4		2 x 7	14	K4		4 x 5	20
K5	D	1 x 10	10	K5	D	1 x 10	10	K5	D	1 x 10	10
			100				100	K6		1 x 10	10
											100

IV Year (Five Year PG)				V Year (Five Year PG)			
Level	Part	Questions & Marks	Total Marks	Level	Part	Questions & Marks	Total Marks
K1	A	5 x 2	10	K1	A	5 x 2	10
K2		5 x 2	10	K2		5 x 2	10
K3	B	4 x5	20	K3	B	2 x 5	10
K4		4 x5	20	K4		4 x 5	20
K5	C	3 x 10	30	K5	C	3 x10	30
K6	D	1 x 10	10	K6	D	2x 10	20
			100				100

ANNAMALAI UNIVERSITY

PROGRAMME OUTCOMES (POs)

After the successful completion of the M.Sc. Software Engineering (5 year) Degree Programme, the graduates will be able to:

PO1:	Domain knowledge: Demonstrate knowledge of basic concepts, principles and applications of the specific science discipline.
PO2:	Resource Utilisation. Cultivate the skills to acquire and use appropriate learning resources including library, e-learning resources, ICT tools to enhance knowledge-base and stay abreast of recent developments.
PO3:	Analytical and Technical Skills: Ability to handle/use appropriate tools/techniques/equipment with an understanding of the standard operating procedures, safety aspects/limitations.
PO4:	Critical thinking and Problem solving: Identify and critically analyse pertinent problems in the relevant discipline using appropriate tools and techniques as well as approaches to arrive at viable conclusions/solutions.
PO5:	Project Management: Demonstrate knowledge and scientific understanding to identify research problems, design experiments, use appropriate methodologies, analyse and interpret data and provide solutions. Exhibit organisational skills and the ability to manage time and resources.
PO6:	Individual and team work: Exhibit the potential to effectively accomplish tasks independently and as a member or leader in diverse teams, and in multidisciplinary settings.
PO7:	Effective Communication: Communicate effectively in spoken and written form as well as through electronic media with the scientific community as well as with society at large. Demonstrate the ability to write dissertations, reports, make effective presentations and documentation.
PO8:	Environment and Society: Analyse the impact of scientific and technological advances on the environment and society and the need for sustainable development.
PO9:	Ethics: Commitment to professional ethics and responsibilities.
PO10:	Life-long learning: Ability to engage in life-long learning in the context of the rapid developments in the discipline.

PROGRAMME SPECIFIC OUTCOMES (PSOs)

At the end of the programme, the student will be able to

PSO1	Apply software engineering knowledge and methods including design, analysis and evolution of models to evolve the solution for complex issues in various disciplines.
PSO2	Formulate new solutions for social problems or improve the existing methodologies to cater the present needs of the society
PSO3	Design efficient algorithms using the concepts of mathematical and computer science for better outcome within the stipulated duration.
PSO4	Modernize business / social processes and systems to increase operating efficiency by adopting latest software engineering methodologies.
PSO5	Develop and deploy software systems with assured quality and efficiency.
PSO6	Demonstrate and apply software engineering principles in the projects developing in the multidisciplinary environment.
PSO7	Develop professional skills in students that prepare them for immediate employment and life-long learning in advanced areas of software engineering.
PSO8	Work independently by applying appropriate techniques, resources in modern software developments.

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Course Outcomes

At the end of the course, the student will be able to

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9. [illegible] - [illegible] [illegible] [illegible]
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10. [illegible] - [illegible]
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14. [illegible].[illegible].[illegible] -[illegible] [illegible] [illegible]
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1. [illegible] - [illegible] [illegible] [illegible]
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[illegible]- 2008

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3. [illegible] - [illegible] [illegible] [illegible]
[illegible], [illegible], [illegible],
[illegible]- 98, [illegible]- 2013

4. [illegible]. [illegible] - [illegible] [illegible] [illegible] [illegible]
[illegible] [illegible], [illegible], [illegible].[illegible]. 2011

5. [illegible]. [illegible] - [illegible] [illegible] [illegible] [illegible]

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Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3				2	2			2	2	2	3	3	3	2
CO2	3	3				2			3			2	2		
CO3		2	3		3	2					3			2	3
CO4	3		3			2				2	2	2	2		
CO5	3	2			2				2	2	2			3	2

Semester	19IHINC11 BASICHINDI-1	L	T	P	C
I		3	0	0	3

Learning Objectives:

LO1	To know the Hindi terms for various professions.
LO2	To gain knowledge of poem and prose
LO3	To help the student to learn the importance of the moral, spiritual and human values
LO4	To study short stories and imbibe morals
LO5	To know about national leaders

Course Outcomes

At the end of the course, the student will be able to:

CO1:	*Understand the basic structure of poems.*
CO2:	*Knowledge on various common hindi words.*
CO3:	*Describe the basic concepts of moral stories.*
CO4:	*Apply the concepts of in life.*
CO5:	*Analyze the difference between prose and poem.*

Unit - I: Introduction
Mathruvandana(poem) ,peshwar,chalo bazaar chalo, ahimsa kivijay

Unit - II:Poem ,Prose
Balwanbano, **,**Gandhiji keasheram me chor,

Unit - III:vani ka theer ,Bharth, daku se mahatma.

Unit - IV:chandhini,samaykipabandhi, vitamin.

Unit - V: Rajiv Gandhi, titiali(poem),Bangalore.

Current Streams of Thought: The Faculty will impart the current developments in the subject during the semester to the students and this component will not be a part of Examinations. Understanding on Hindi drama basis and concepts and nibandh.

Text Books

1. Adharshahindi reader I-DBHPsabha-Chennai.17.
2. ParichyaDBHPS **,**Trichi 17.

Supplementary Reading

1. Naveen Hindi Patamala: Part - I , D.B.H.P. Sabha, Chennai - 600 017.
2. Hindi prachar vahini.1,DHBS,sabha Chennai 17.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	2	3	2	2	3	2	3	3	3	3	3	-	-	-
CO2	3	-	2	-	3	-	2	2	-	3	-	-	-	-	-
CO3	3	2	-	-	2	3	-	2	3	-	-	-	2	-	-
CO4	3	3	3	3	3	-	3	-	2	2	2	-	-	2	-
CO5	-	-	3	3	3	3	3	2	2	2	2	-	-	-	3

Semester	**19IFREC11: Part-I Language French-I**	L	T	P	C
I		3	0	0	3

Learning Objective (LO):

LO1	Greet People
LO2	Introduce oneself (Basic 1)
LO3	Identify the things and the persons; spell a word
LO4	Ask about the day, the time and the date
LO5	Asking excuse

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Greet people appropriately, ask how they are, tell them how I am and ask how others are
CO2	Obtain another different culture, the sound of the French language, certain words in French, some famous French symbols/landmarks.
CO3	Understand basic classroom instructions
CO4	Can use different forms of address to speak to friends, teachers and people I do not know, using formal and informal modes of address and language.
CO5	Understand when the teacher is speaking to one or more persons in class and understand simple commands (mostly passive, receptive languagewith some active, productive language) and polite language. I can recognise'tu' and 'vous' forms and help phrases such as ***'Pardon', 's'ilvousplaît','excusez-moi', 'merci'.***

Unit I

Aborderquelqu'un; Dire son nom
Identifier une langue, la nationalité et le nombre.
Identifier les choses et les personnes

Unit II
Remplirune fiche de renseignements.
Découvrir la carte postale, un message sur internet et le blog très simples.
Les pays francophones ; Les lieux de la ville
Dire si on comprend ;Saluer ; Prendre congé
Dire s'excuser ; Affirmer et nier ; Epeler son nom

Unit III
L'espacefrancophone ;Découvrir la France et les pays francophones
Exprimersesgouts ; Identifier les professions
Demander quelque chose à quelqu'un

Unit IV
Comprendre un article de presse sur un portrait d'unepersonne.
Première approche de la sociétéfrançaise (noms, âges, origines, lieux d'habitation)
Parler des loisirs ; Faire un projet

Unit V
Proposer-accepter ou refuser une proposition
Demander une explication
Ecrire les cartes et messages d'invitation, d'acceptationou de refus.
Découvrir la carte de France et les connaissances.

Text Book:

1. J. Girardet et J. Pecheur,(2012)**Echo A1** - méthode de français**,** Paris**:** Langers,

Reference Books / Supplementary Reading:

1. Marie-Noelle Cocton et Emilie Pommier, (2015) **Saison A1** - méthode de français, Les Editions Didier, Paris
2. Angels Campa, Claude Mestreit, Julio Murillo et ManuelTost,(2001)**FORUM** – Méthodedefrançais, HACHETTE LIVRE
3. Mauger Bleu, **Le Cours de langue et de la civilisation française**, - Méthode de français, Paris
4. Michele Boulares et Jean-Louis Frerot,(1997)**GrammmaireProgressive du Français avec 400 exerices**, CLE International.

Semester	19IENGC12 ENGLISH THROUGH LITERATURE I: PROSE	L	T	P	C
I		3			3

LEARNING OBJECTIVE (LO):

By introducing the course, it is intended to:

LO1	Develop the Language ability of the students
LO2	Enable students to understand the passage, to read fluently, to enrich their vocabulary, and to enjoy reading and writing
LO3	Make the students proficient in the four language skills
LO4	Make the students read with correct pronunciation, stress, intonation, pause, and articulation of voice.
LO5	Develop their inquiry skills.

COURSE OUTCOMES (CO)

At the end of the course, the student will be able to

CO1:	Obtain competency in communication, both in written and oral skills
CO2:	Acquire fluency in English language
CO3:	Become knowledgeable about construction of sentence structures
CO4:	Develop English vocabulary to use the English language effectively
CO5:	Exhibit profic19IENCy in the four communication skills

Unit I

Stephen Leacock "With the Photographer"

Winston S. Churchill "Examinations"

Grammar: Parts of Speech: Nouns, Verbs, Adjectives, and Adverbs

Unit II

G.B. Shaw "Spoken English and Broken English"

M.K. Gandhi "Voluntary Poverty"

Grammar: Articles

Unit III

Robert Lynd "On Forgetting"

Virginia Woolf "Professions for Woman"

Grammar: Pronouns

Unit IV

A. G. Gardiner "On Umbrella Morals"

R.K. Narayan "A Snake in the Grass"

Grammar: Prepositions

Unit V

Martin Luther King (Jr.) "I Have a Dream"

George Orwell "The Sporting Spirit"

Grammar: Conjunctions & Interjections

Text Book:

1. Ayyappa Raja, S T. Deivasigamani. N. Saravana Prabhakar, B .Karthikeyan. *English through Literature: Prose, Chidambharam, Manibharathi Publishers, 2010.*
2. David Green: *Contemporary English Grammar: Structures and Composition*, Macmillan, 2012.

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1				3			3	3		3	3	3			3			
CO2				3			3	3		3	3	3			3			
CO3	3			2			2	2		2	2	2			3			
CO4	3			3			3	3		3	3	3			3			
CO5	2			2			2	2		2	2	2			2			

***1-Low *2-Medium *3-Strong**

Semester	19IENSC13 ENVIRONMENTAL STUDIES	L	T	P	C
I		3			3

LEARNING OBJECTIVES:

LO1	To make the student aware of World Environmental System
LO2	To make the student aware of the fundamental Concepts and Principles of Eco- system and energy-flow

COURSE OUTCOMES

At the end of the course, the student will be able to

CO1	To evaluate the present condition of environmental pollution
CO2	To understand the nature of the atmosphere
CO3	To be aware of causes of pollution and precautionary measure

UNIT: I ENVIRONMENTAL SYSTEM

(1.1)The Services provided by the Environmental System

(1.2)Ecosystems: Food Chains, Food Webs, Ecological Pyramids

(1.3)Biochemical Cycles: Hydrological Cycle, Carbon Cycle

UNIT: II ENVIRONMENTAL DAMAGE –POLLUTION

Sources and impact of

(2.1) Air Pollution

(2.2) Water Pollution

(2.3) Land Pollution

(2.4) Municipal Solid Waste (2.5) Noise Pollution

UNIT: III RESOURCE DEPLETION

(3.1) Importance of Forests: Causes and Consequences of Deforestations

(3.2) Bio Diversity: Meaning and Importance – Reasons and Consequences of Biodiversity Decline

(3.3) Consequences of overdrawing Water Resources.

UNIT: IV GLOBAL CLIMATE CHANGE

(4.1) The Science of Climate Change The Green House Effect (4.2) Sources and Impact of Climate Change (4.3) Coping with Climate Change

UNIT:V SUSTAINABLE DEVELOPMENT

(5.1) Concept and Definition of Sustainable Development (Brundtland Commission Definition)

(5.2) Poverty, Population Growth and Environmental Damage

(5.3) Policies for Sustainable Development

❖ **CURRENT STREAM OF THOUGHTS**

For Knowledge Purpose and not for Examinations

Current issues in environmental eco system Effects, Climate Change and Global Warming.

TEXT BOOKS

1. Erach Bharucha, *Environmental Studies*, New Delhi: UGC, 2004
2. Richard Wright and Dorothy F. Boorse, *Environmental Science: Toward a Sustainable Future,* New Delhi: Prentice-Hall India, 2010

SUPPLEMENTARY READINGS

1. Kumarasamy, K., A. Alagappa Moses and M. Vasanthy, *Environmental Studies*, Trichy: Bharathidasan University Publications,2004
2. Rajamannar, *Environmental Studies*, Trichy: EVR College Publications, 2004,

3. Kalavathy, S. (Ed), *Environmental Studies,* Trichy: Bishop Heber College Publication, 2004

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1		3					3	2	2	3					3	2	3	
CO2		3					2	2	2	3					3	2	3	
CO3		3					2	2	2	3					3	2	3	

***1-Low *2-Medium *3-Strong**

Semester		L	T	P	C
I	**19ISOFC14: Programming in C**	4	0	0	4

Learning Objective (LO):

LO1	To impart adequate knowledge on the need of programming languages and problem involving techniques
LO2	To develop programming skills using the fundamentals and constructs.
LO3	To enable effective usage of arrays, attributes, functions, pointers and to implement the memory management concepts.
LO4	To teach the issues in file organization and the usage of file systems.
LO5	To develop logics which will help them to create programs, applications in C.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Develop programs using the basic elements like control statements, arrays and strings
CO2	Understand about the code reusability with the help of user defined functions.
CO3	Develop advanced applications using enumerated data types, function pointer, nested structures, pre-processors and various header file directories.
CO4	Learn the basics of the handling mechanism that is essential for understanding the concepts in systems develop applications.
CO5	Describe the arrays, structures, pointers and more importantly files.

Unit-1

C fundamentals Character set - Identifier and keywords - data types - constants - Variables - Declarations - Expressions - Statements - Arithmetic, Unary, Relational and logical, Assignment and Conditional Operators - Library functions.

Unit-2

Data input output functions - Simple C programs - Flow of control - if, if-else, while, do-while, for loop, Nested control structures - Switch, break and continue, go to statements - Comma operator.

Unit-3

Functions -Definition - proto-types - Passing arguments - Recursions. Storage Classes - Automatic, External, Static, Register Variables - Multi-file programs.

Unit-4

Arrays - Defining and Processing - Passing arrays to functions - Multi-dimension arrays - Arrays and String. Structures - User defined data types - Passing structures to functions - Self-referential structures - Unions - Bit wise operations.

Unit-5

Pointers - Declarations - Passing pointers to Functions - Operation in Pointers - Pointer and Arrays - Arrays of Pointers - Structures and Pointers - Files: Creating Processing, Opening and Closing a data file.

Current Streams of thought: File Management and Pre-processors.

Text Book

1. Balagurusamy E, (2019), "*Programming in ANSI C"*, Tata McGraw Hill. Eighth Edition,

Reference Books

1. Kanetkar Y., (2020), "Let us C", BPB Pub. Seventh Edition.
2. Gottfried B.S, .(2018), "*Programming with C"*, TMH Pub. Co. Ltd), Fourth Edition.
3. C Programming tutorial for Begineners [Video online] Available at: https://youtu.be/KJgsSFOSQv0
4. https://www.learn-c.org

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3	3	3						3	2	3	3	2	3	3	
CO2	3	2	1	2	3	2	1					1	3	1	2	1	2	
CO3	2		2	3	3	2	2			2		2	2	3	3	2	1	
CO4	3		3	3	3	3	3			3	3	3	3	2	2	2	2	1
CO5	3		2	1	1					1		3	2	3	3	2	3	

Semester	19IMATA01: Allied I: Mathematics–I	L	T	P	C
I		5	0	0	5

Learning Objective (LO)

LO1	To learn the basic knowledge on series and matrices .
LO2	To learn about concepts of differentiation.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Study the series of number system.
CO2	Understand the various the matrix operations and differentiations methods.
CO3	Study the trigonometric and hyperbolic functions.

Unit–1

Series, Comparison test, Integral test, Comparison of ratios, D"Alembert"s ratio test, Cauchy"s root test, Alternating series, Convergence of exponential series, Uniform convergence.

Unit–2

Matrix operations, Rank of a matrix, Normal form of a matrix, Inverse of a matrix, Eigen values and Eigen vectors, Caley-Hamilton theorem, Reduction to a diagonal form.

Unit–3

Expansion of sin n□, cos n□, tan n□ in powers of sin □, cos □ and tan □, Exponential function of a complex variable, circular function of a complex variable, Hyperbolic functions, Inverse hyperbolic functions.

Unit–4

Differentiation, Successive differentiation, Meaning of derivative.

Unit–5

Maxima and minima, Rolle"s theorem and Mean value theorem, Expansions of functions, Partial differentiation.

Text Books

1. Grewal B.S, (2008), "*Higher Engineering Mathematics*" by Khanna Publishers,New Dehi.
2. Narayanan S.and Manicavachogam T.K. (2009), "*Calculus"* Vol. I Pillay, S. Viswanathan Printers, Chennai.

Supplementary Reading

1. Thomas G.B.and.FinneyR.L. (1998),*Calculus and Analytic Geometry*, Addison Wesley(9 th Edn), Mass. (Indian Print).
2. Venkataraman M.K..(1992),*Engineering Mathematics*-Part B. National PublishingCompany, Chennai.

Outcome Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7
CO1	**3**	**2**	**3**	**2**	**2**	**3**				**3**	**2**	**2**	**3**	**2**			
CO2	**3**	**2**	**3**	**2**	**2**	**3**				**3**	**2**	**2**	**3**	**2**			
CO3	**3**	**2**	**3**	**2**	**2**	**3**				**3**	**2**	**2**	**3**	**2**			
CO4	**3**	**2**	**3**	**2**	**2**	**3**				**3**	**2**	**2**	**3**	**2**			

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II		**3**			**3**

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Course Outcomes

At the end of the course, the student will be able to

CO1:	□□□□□ □□□□□□□□□□ □□□□□□□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□□□□□□□ □□□□□□□□ □□□□□.
CO2:	□□□□□□□□□□□□□□□□□□□□ □□□□□□□□ □□□□□□□□ □□□□□□□□.
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CO4:	□□□□□□□□□□□ □□□□□□ □□□□□□ □□□□□□□□□□□ □□□□□□□□ □□□□□□□
CO5:	□□□□□□□□□ □□□□□□□ □□□□ □□□□□□□□□□□□□□□ □□□□□□□□□□□□□□□□ □□□□□□□□ □□□□□□□□□□□□□□□□□□□.

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Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3				2	2			2	2	2	3	3	3	2
CO2	3	3				2			3			2	2		
CO3		2	3		3	2					3			2	3
CO4	3		3			2				2	2	2	2		
CO5	3	2			2				2	2	2			3	2

Semester	19IHINC21 BASIC HINDI-II	L	T	P	C
II		3	0	0	3

Learning Objectives:

LO1	To know the life of National leaders.
LO2	To introduce the Gandhijji's thought.
LO3	To understand the concepts of teaching and learning from Dr.Sarvapalli Radhakrishnan's life.

Course Outcomes

At the end of the course, the student will be able to:

CO1	Understand the basic structure of poem and prose
CO2	Classify and compare various poems
CO3	Describe the basic concepts of moral stories
CO4	Apply the teachings of various national leaders.
CO5	Understand the spirit of spirituality.

Unit - I: Introduction: man ki shakti dena ,prathighnapalan, hamaraRajchinga,adhbhudmaya..

Unit - II:Poem ,Prose: sarvapalliradhakrishnan,amedkar, mahaveer, sadakkeniyam,sanghi ka phal(poem),

Unit - III:Stories. Tyog ka such,bhavansabkaekhai,chirjivan ka jharna, , lob ka parinam.

Unit - IV:dadhakimoorkatha, kuthekipoonchandebarabardhana.

Unit - V:bakri do ghav kha gayi, ,Dhankimagima,

Current Streams of Thought: The Faculty will impart the current developments in the subject during the semester to the students and this component will not be a part of Examinations.

Text Books

1.Naveen Hindi Patamala: Part - II D.B.H.P. Sabha, Chennai - 600 017.
2. Manohar Kahaniyam , Part – II D.B.H.P. Sabha, Chennai - 600 017.

Supplementary Reading

1.Naveen Hindi Patamala: Part - I , D.B.H.P. Sabha, Chennai - 600 017.
2.Hindipracharbodhini-DHBS, Chennai 17

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	-	3	3	2	2	3	2	3	3	3	3	3	-	-	-
CO2	3	-	3	-	3	-	2	2	-	3	-	-	-	-	-
CO3	3	3	-	-	2	3	-	2	3	-	-	-	2	-	-
CO4	3	3	3	3	3	-	3	-	2	2	2	-	-	2	-
CO5	-	-	3	3	3	3	3	2	2	2	2	-	-	-	3

Semester	19IFREC21: FRENCH – II (Option)	L	T	P	C
II		3	0	0	3

Learning Objective (LO):

LO1	Talk about their family members
LO2	Engage a simple conversation about family members.
LO3	Talk about your likes and dislikes
LO4	Fill in a simple form
LO5	Read simple notices, posters and catalogues

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand simple texts providing personal details of others
CO2	State how many people are in my family and who they are, using vocabulary including family members, possessive adjectives and negatives such as 'je n'ai pas de frères/sœurs'.
CO3	Write a short text to inform others of my likes and dislikes and provide reasons. Ask others about their likes and dislikes, showing that I appreciate diverse viewpoints and personalities e.g. 'Quelest ton … favori/préféré?'
CO4	Understand in filling up a simple form
CO5	Write a short introduction about myself, providing personal details and use simple connectors, such as *'et' , 'mais' and 'aussi'.*

Unit I

Demander /donner des précisions sur le temps

Demander / indiquer l'heure et la date

Demander / dire ce qu'on a fait

Féliciter

Unit II

Comprendre et écrire un journal personnel en français.

Comprendre l'agenda de quelqu'un

Les rythmes de vie en France

Evaluez-vous

Unit III

Evasion en français par l'Internet, la télévision, la radio et la presse.

Découvrir la France dans votre pays

Unit IV

Les voyages et les transports

Comparer les choses ; Montrer ; Indiquer une appartenance

Demander / donner une explication

Unit V

Voyager en France ; Situations pratiques relatives au voyage.

Parler d'un repas.

Situations pratiques à l'hôtel et au restaurant

Les habitudes des Français sur un repas.

TextBook:

- J. Girardet et J. Pecheur, **Echo A1** - méthode de français**,** Paris**:**Langers, (2012)

Reference :

- Marie-Noelle Cocton et Emilie Pommier, **Saison A1** - méthode de français, Les Editions Didier, Paris (2015)
- Angels Campa, Claude Mestreit, Julio Murillo et ManuelTost, **FORUM** – Méthode de français, HACHETTE LIVRE (2001)
- Mauger Bleu, **Le Cours de langue et de la civilisation française**, - Méthode de français, Paris
- Michele Boulares et Jean-Louis Frerot, GrammmaireProgressive du Français avec 400 exerices, CLE International, (1997)

Semester	19IENGC22 English Through Literature II: Poetry	L	T	P	C
II		3			3

LEARNING OBJECTIVE (LO)

By introducing the course, it is intended to:

LO1	Develop the ability of the learner to comprehend and appreciate poems in English
LO2	Enhance the competence of the learner in using the English language

LO3	Improve the interest of the learner in human values and perceptions
LO4	Enable students to study and analyze the use of language in poetry
LO5	Provide learners with the theoretical and practical understanding of grammar

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1	Become competent in communication, both in written and oral skills
CO2	Gain fluency in English language
CO3	Attain knowledge about construction of sentence structures
CO4	Acquire the vocabulary to use the English language effectively
CO5	Acquire the aesthetic sense for appreciating poetry

Unit I

William Shakespeare	"Sonnet 116"
William Blake	"Lamb"
Robert Burns	"A Red, Red Rose"
Grammar	Finite & Non-finite verbs

Unit II

PB Shelley	"To Wordsworth"
John Keats	"Sonnet to Sleep"
Thomas Hardy	"Neutral Tones"
Grammar	Strong and Weak Verbs, Auxiliaries and Modals

Unit III

Robert Frost	"Stopping By Woods on a Snowy Evening"
Wilfred Owen	"Anthem for Doomed Youth"
Emily Dickinson	"A Narrow Fellow in the Grass"
Grammar	Transitive, Intransitive Verbs, Active and Passive Voice

Unit IV

Sri Aurobindo	"The Tiger and the Deer"
AK Ramanujan	"Obituary"
Sarojini Naidu	"Queen's Rival"
Grammar	Concord

Unit V

Roger Mc Gough	"My Bus Conductor"
Maya Angelou	"Still I Rise"
Langston Hughes	"The Negro Speaks of Rivers"
Grammar	Tenses and their forms

TEXT BOOKS

1. Jack.Hydes, *Touched With Fire.* London: Cambridge UP, 1985.
2. C. D Narasimhaiah, *An Anthology of Common Wealth Literature*. New Delhi: Macmillan, 2006.

SUPPLEMENTARY READING

1. Thomas, C.T. *Twentieth Century Verse: An Anglo-American Anthology*. New Delhi: Macmillan, 2006.
2. Henry Louis, and Y. Nellie McKay.*The Norton Anthology of African American Literature.* New York: W.W. Norton & Co, 2004.
3. Ramachandran, C.N. and Radha Achar. *Five Centuries of Poetry.* New Delhi: Laxmi, 1998.

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3			3			3	3		3	3	3			3			
CO2	2			3			3	3		3	3	3			3			
CO3	3			2			2	2		2	2	2			2			
CO4	3			3			3	3		3	3	3			3			
CO5	2			2			2	2		2	2	2			2			

***1-Low *2-Medium *3-Strong**

Semester	19ISOFC23: Data Structures and Algorithms	L	T	P	C
II		5	0	0	5

Learning Objective (LO):

LO1	To impart the basic concepts of data structures and algorithms.

LO2	To understand the concepts of about stacks, queues, lists trees and graphs.
LO3	To gain knowledge on hashing/symbol tables and study various sorting algorithms
LO4	To Study various sorting algorithms
LO5	To develop applications using data structures

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Analyse suitable data structures for various applications.
CO2	Learn sorting techniques.
CO3	Understand the different file organizations.
CO4	Familiarize with the usage of symbol tables.
CO5	Analyse suitable data structures for various applications.

Unit-1

Introduction of algorithms, analyzing algorithms, Arrays : Representation of Arrays, Implementation of Stacks and queues, Application of Stack: Evaluation of Expression - Infix to postfix Conversion - Multiple stacks and Queues, Sparse Matrices.

Unit-2

Linked list: Singly Linked list - Linked stacks and queues - polynomial addition - More on linked Lists - Doubly linked List and Dynamic Storage Management - Garbage collection and compaction.

Unit-3

Trees: Basic Terminology - Binary Trees - Binary Tree representations - Binary trees - Traversal - More on Binary Trees - Threaded Binary trees - counting Binary trees. Graphs: Terminology and Representations - Traversals, connected components and spanning Trees, Single Source Shortest path problem.

Unit-4

Symbol Tables: Static Tree Tables - Dynamic Tree Tables - Hash Tables : Hashing Functions - overflow Handling. External sorting : Storage Devices - sorting with Disks : K-way merging - sorting with tapes.

Unit-5

Internal sorting: Insertion sort - Quick sort - 2 way Merge sort - Heap sort - shell sort - sorting on keys. Files: Files, Queries and sequential organizations - Index Techniques - File organization.

Current Streams of thought: Dynamic Programming, Backtracking Strategy

Text Book

1. Ellis Horowitz, Sartaj Shani, *Data Structures*, Galgotia publication.

Reference Books

1. Tenenbaum M, YedidyahLangsam, Moshe J. Augenstein, *Data structures Using C* Aaron Kindersley (India) Pvt. Ltd.,
2. Alfred V. Aho, John E. Hopcroft, Jeffrey D. Ullman, *Data structure and Algorithms,* Pearson Education Pvt. Ltd.
3. *Algorithms and Data Structures :*

   https://www.syncfusion.com/ebooks/datastructurespart1/algorithms-and-data-structures
4. https://www.programiz.com/dsa
5. https://www.tutorialspoint.com/data_structures_algorithms/index.htm

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3	2	3							3	2	1	3	3	2	
CO2	3		3	2	1	1						3	2					
CO3	3	1	3	2	3	3						3	2		2	3		
CO4	3	2	2	3						2		2	3	1	2	2		

Semester	19ISOFC24: Digital Computer Fundamentals	L	T	P	C
II		4	0	0	4

Learning Objective (LO):

LO1	It aims to train the student to the basic concepts of Digital Computer Fundamentals
LO2	To impart the in-depth knowledge of logic gates, Boolean algebra,
LO3	To provide basic ideas about combinational circuits and sequential circuits.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Analysis different type of codes and number systems which are used in digital communication and computer systems.
CO2	Form different digital circuits and analyse different types of digital electronic circuit
CO3	Implement logical operations using combinational logic circuits.
CO4	Understand the counters
CO5	Learn the basic terms and ideas of ROM and RAM

Unit-1

Number Systems and Codes: Number System – Base Conversion – Binary Codes – Code Conversion. Digital Logic: Logic Gates – Truth Tables – Universal Gates.

Unit-2

Boolean Algebra: Laws and Theorems – SOP, POS Methods – Simplification of Boolean Functions – Using Theorems, K-Map, Prime – Implicant Method – Binary Arithmetic: Binary Addition – Subtraction – Various Representations of Binary Numbers – Arithmetic Building Blocks – Adder – Subtractor.

Unit-3

Combinational Logic: Multiplexers – Demultiplexers – Decoders – Encoders – Code Converters – Parity Generators and Checkers.

Unit-4

Sequential Logic: RS, JK, D, and T Flip-Flops – Master-Slave Flip-Flops. Registers: Shift Registers – Types of Shift Registers.

Unit-5

Counters: Asynchronous and Synchronous Counters - Ripple, Mod, Up-Down Counters– Ring Counters. Memory: Basic Terms and Ideas –Types of ROMs – Types of RAMs.

Current Streams of thought: Microprocessors, Microcomputers and Assembly Language

Text Books

1. Rajaraman V and Radhakrishnan T, (2008) "*Digital Computer Design"*, PHI Learning Pvt.Ltd, Fifth Edition.
2. Moris Mano M, (2017)"*Digital Logic and Computer Design"*, PHI.
3. Bartee T.C, (1991) "*Digital Computer Fundamentals"*, 6th Edition, Tata McGraw Hill.

Reference Book:

1. Leach D.P, Malvino A.P and Goutam Saha, (2014), "*Digital Principles and Applications",*Mc-GrawHill Eight Edition.
2. An Introduction to Logic Gates [Video online] Available at: <https://youtu.be/95kv5BF2Z9E>
3. Logic Gates, Truth Tables, Boolean Algebra - AND, OR, NOT, NAND & NOR, https://youtu.be/RhS-AL2ZcyE

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		3			3			3	2	2	1		3	2	3
CO2	2		3	3	3						2	2	1	3	1		1	2
CO3	3	1	1		1						2		3	2			3	2
CO4	2										3							
CO5	3	1									3	3				1		

Semester	19ISOFP25: Practical – I: C Programming Lab	L	T	P	C
II		0	0	4	2

Learning Objective (LO):

LO1	The course is oriented to those who want to advance structured and procedural programming understating and to improve C programming skills.
LO2	The course is designed to provide complete knowledge of C language.
LO3	Students will be able to develop logics which will help them to create programs, applications in C.
LO4	Also by learning the basic programming constructs they can easily switch over to any other language in future.
LO5	The major objective is to provide students with understanding of code organization and functional hierarchical decomposition with using complex data types

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Learn concepts in problem solving and understand the fundamentals of C programming.
CO2	Analyse the loops and decision making statements to solve the problem.
CO3	Implement different Operations on arrays.
CO4	Ability to work with textual information, characters and strings.
CO5	Understand the different sorting algorithm and their complexity

List of Exercises

I Summation of Series

1. Sin(x), Cos(x), and Exp(x) (Comparison with built in functions)

II String Manipulation

1. Counting the number of vowels, consonants, words, white spaces in a line of text and array of lines.
2. Reverse a string and check for palindrome.
3. Sub string detection, count and removal.
4. Finding and replacing substrings.

III Recursion

1. ${}^{n}P_{r}$, ${}^{n}C_{r}$
2. GCD of two numbers
3. Fibonacci sequence
4. Maximum & Minimum

IV Matrix Manipulation

1. Addition and Subtraction
2. Multiplication
3. Transpose, and trace of a matrix
4. Determinant of a Matrix

V Sorting and Searching

1. Insertion Sort
2. Bubble Sort
3. Linear Search
4. Binary Search

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8

CO1	3		3	3	3							2	2	3	3	3	2	
CO2	3		3	2	3							2	1		3	3		
CO3	3		3	3	3	1						2	2	2	2	3		
CO4	3		2	1	2	1					3	2	1	2	2	3		
CO5	3		2	1	3	1					3		3	3	3	3		

Semester	19ISOFP26: Practical – II: Data Structures Using C Lab	L	T	P	C
II		0	0	4	2

Learning Objective (LO):

LO1	To develop skills to design and analyse simple linear and non-linear data structures.
LO2	It enables them to gain knowledge in practical application of data structures.
LO3	To Understand concepts about searching and sorting techniques
LO4	To understand basic concepts about Stacks, Queues, List, Tree and Graphs.
LO5	To understanding about writing algorithm and step by step approach in solving with the help of fundamental data structures.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Learn and develop the mathematical logic and algorithm.
CO2	Describe the dynamic memory concepts.
CO3	Analyse the problem and should have the implementation of the non-linear data structures like Tree and Graph.
CO4	Implement the various Searching and Sorting Techniques with Time complexity.
CO5	Understand and implement the appropriate data structures with optimized memory and computational time complexity.

List of Exercises

- Write a C program to create two array list of integers. Sort and store the elements of both of them in third list.

- Write a C program to multiply two matrices A and B and store the resultant matrix in C using arrays.
- Write a C program to experiment the operation of STACK using array.
- Write a C program to create menu driven options to implement QUEUE to perform the following
    - (i) Insertion (ii) Deletion (iii) Modification (iv) Listing of elements
- Write a C program to create Linked list representations of employee records and do the following operations using pointers.
    - To add a new record.
    - To delete an existing record.
    - To print the details about an employee.
    - To find the number of employees in the structure.
- Write a C Program to count the total nodes of the linked list.
- Write a C program to insert an element at the end of the linked list.
- Write a C program to insert an element at the beginning of a doubly linked list.
- Write a C program to display the hash table, using the mid square method.
- Write a program to demonstrate Binary Search.
- Write a C program to insert nodes into a Binary tree and to traverse in pre order.
- Write a C program to traverse the given binary tree using all traversal methods.
- Write a C program to arrange a set of numbers in ascending order using QUICK SORT.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3						3				3		3	3				3
CO2			2			2		1				3	3			2		
CO3					1						2		2	1	1		3	2
CO4	3		2							3	2					3		2
CO5	3									3	1			3				

Semester	19IMATA02: MATHEMATICS – II	L	T	P	C
II		5	0	0	5

Learning Objective (LO):

LO1	To learn the idea of integration.
LO2	To learn the basic theorems of vector calculus.

Course Outcomes (CO):

At the end of the course, the student will be able to

CO1	To learn the basic mathematical concepts related to the science field.
CO2	To learn about notion of vector and its derivative.
CO3	To understand the Green‟s theorem, Gauss divergence theorem and Stoke‟s theorem.

Unit-1: Integration

Introduction, Definite integral, Methods of integration, Integrals of the form

$$\int \frac{f'(x)}{f(x)}\,dx$$

$$\int \mathrm{F\{f(x)\}f'(x)\,dx}$$

$$\int \frac{dx}{ax^2+bx+c}\,dx$$

$$\int \frac{lx+m}{ax^2+bx+c}\,dx$$

$$\int \frac{1}{\sqrt{a}x^2+bx+c}$$

$$\int \frac{px+q}{\sqrt{ax^2}+bx+c}\,dx$$

Unit-2: Integration

Properties of definite integrals, Integration by parts, Reduction formula for the following types

$I_n = \int x^n\, e^{ax}$ S n→+ve integer

$I_n = \int \cos^n x\, dx$ n, positive integer

$$I_n = \int sin^n x\, dx$$

$I_{m,n} = \int sin^m x cos^n x dx$ Bernoulli's formula.

Unit-3:

Area under plane curves, Area of a closed curves, Area between two intersecting curves, Areas in polar coordinates, Volume of the solid of revolution, Length of a curve, Area of surface of revolution.

Unit-4:

Vector differentiation, Scalar functions, Vector functions, Differentiation of a vector, Differentaitions formulas, Differentation of dot and cross products, The Vector differential operator Del, Gradient of a scalar function, Directional derivatives, Divergence of a vector, Curl of a vector, Expansion formulae, Second order differential operators, Solenoidal and irrotational fields.

Unit-5:

Vector integration, The line integral, Green's theorem in two dimesions-verification, Gauss divergence theorem (without proof)-verification and evaluation of integrals, Stoke's theorem (without proof)-verification and evaluation of integrals.

Text Book:

1. Content and treatment as in the book "Calculus (Major)" Vol. II by S. Narayanan and T.K. Manicavachogam Pillay, S. Viswanathan Printers, 2003.
   - Unit I — Chapter 1 Sections 1 to 8
   - Unit II — Chapter 1 Sections 11 to 15.1
   - Unit III — Chapter 2 Sections 1.1 to 1.4, Sections 3 to 5
2. Content and treatment as in the book "Vector Calculus and Fourier Series" by M.K. Venkataraman and Manorama Sridhar, by The National Publishing Company, 2002.
   - Unit IV — Chapter 2 Sections 2.2 to 2.4, 2.6, 2.7.
     Chapter 3 Sections 3.2, 3.3, 3.4, 3.7, 3.9, 3.11, 3.12, 3.15.
   - Unit V — Chapter 4 Sections 4.1, 4.3, 4.9 and 4.12

Supplementary Reading:

1. G.B.Thomas and R.L.Finney. (1998) Calculus and Analytic Geometry, Addison Wesley (9th Edn), Mass. (Indian Print).
2. M.K.Venkataraman. (1992) Engineering Mathematics-Part B. National Publishing Company, Chennai.
3. P.R.Vittal. (2004) Vector Calculus, Fourier series and Fourier Transform. Margham Publications, Chennai.
4. B.S. Grewal (2008) Higher Engineering Mathematics, Khanna Publishers, (2008).

Outcome Mapping:

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	2	3	2	2	3				3	2	2	3	2	3	2	3	2
CO2	3	2	3	2	2	3				3	2	2	3	2	3	2	3	2
CO3	3	2	3	2	2	3				3	2	2	3	2	3	2	3	2
CO4	3	2	3	2	2	3				3	2	2	3	2	3	2	3	2
CO5																		

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Course Outcomes

At the end of the course, the student will be able to

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Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3				2	2			2	2	2	3	3	3	2
CO2	3	3				2			3			2	2		
CO3		2	3		3	2					3			2	3
CO4	3		3			2				2	2	2	2		
CO5	3	2			2				2	2	2			3	2

Semester	19IHINC31 BASIC HINDI-III	L	T	P	C
III		3	0	0	3

Learning Objectives:

LO1	To study various comedy stories.
LO2	To introduce Indian epics.
LO3	To understand the concepts of drama

Course Outcomes

At the end of the course, the student will be able to:

CO1:	Understand the basic structure of short stories.
CO2:	Knowledge on Mahabharath.
CO3:	Describe the basic concepts of human feelings.
CO4:	Apply the concepts of comedy in stories.
CO5:	Describe the effects of western culture.

Unit - I: Introduction,ekanki.

. Andher Nagari - Bharathendhoo Harishchandra

Unit - II: Mahabharath Ki EkSanj - Bharath BhoosahnAgrwal [Full]

Unit - III: Drama.
3.Ladai - SarveswarDayalSaxeena [Full]

Unit - IV:stories,Tatava-vyanghya

Unit - V: Upstick Ki Muskhan - Vishnu Prabakar [Full]

Current Streams of Thought: The Faculty will impart the current developments in the subject during the semester to the students and this component will not be a part of Examinations.

Text Books

1Andher Nagari - Bharathendhoo Harishchandra, VinodhPustak Mandir, Agra-2
2. PrathinidhiEkanaki - Dr. Dashrath Oojaa, Jawahar Pustakalya, Mathura
3. EkanakiManach - Dr.V.P. Abhithap, Jawahar Pustakalya, Mathura
4. Ladai - SarveswarDayalSaxeena, RajkamalPrakashan, New Delhi

Supplementary Reading

1.Hindi natakuthbhavaurvikas-dashrath ojha-rajpal and saons, new Delhi.7.
2.hindi natakaurrangmanch-pahachanaurparak-Dr. Indranathmadan, newdelhi.7.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	-	3	3	2	2	3	2	3	3	3	3	3	-	-	-	-	3	3
CO2	3	-	3	-	3	-	2	2	-	3	-	-	-	-	-	3	-	3
CO3	3	3	-	-	2	3	-	2	3	-	-	-	2	-	-	3	3	-
CO4	3	3	3	3	3	-	3	-	2	2	2	-	-	2	-	3	3	3
CO5	-	-	3	3	3	3	3	2	2	2	2	-	-	-	3	-	-	3

Semester	19IFREC31: FRENCH – III (Option)	L	T	P	C
III		3	0	0	3

Learning Objective (LO):

LO1	Buy some products in a shop
LO2	Ask the news of someone
LO3	Talk about the climate
LO4	Introduce their family

LO5	Talk about their accommodation

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Ask the price of the product, pay the product
CO2	Ask about their daily activities
CO3	To give and ask information about the climate
CO4	Describe their family
CO5	Describetheir accommodation wherethey live

Unit I

Demander des nouvelles de quelqu'un(les activités de la journée)

Choisir, acheter, payer un objet

Unit II

S'informer sur la présence ou l'existence d'une personne ou d'un objet (Parler d'un logement ; s'orienter, Décrire un trajet, Exprimer un besoin)

S'informer sur l'état physique de quelqu'un

Le temps en France et parler du temps

Unit III

Evaluez-vous

Evasion dans la Poésie

Unit IV

Souvenez-vous (Les moments de la vie)

Demander /donner des informations sur la biographie d'une personne (enchainer les idées)

Unit V

Demander /donner des informations sur ses relations amicales ou familiales.

Présenter sa famille.

TextBook:

- J. Girardet et J. Pecheur, **Echo A1** - méthode de français**,** Paris**:**Langers, (2012)

Reference :

- Marie-Noelle Cocton et Emilie Pommier, **Saison A1** - méthode de français, Les Editions Didier, Paris (2015)

- Angels Campa, Claude Mestreit, Julio Murillo et ManuelTost, **FORUM** – Méthode de français, HACHETTE LIVRE (2001)
- Mauger Bleu, **Le Cours de langue et de la civilisation française**, - Méthode de français, Paris
- Michele Boulares et Jean-Louis Frerot, **GrammmaireProgressive du Français avec 400 exercices**, CLE International, (1997)

Semester	19IENGC32 ENGLISH THROUGH LITERATURE III: DRAMA	L	T	P	C
III		3			3

LEARNING OBJECTIVE (LO):

By introducing the course, it is intended to:

LO1	Enhance the conversational competence of the learners by introducing drama in English.
LO2	Make the students the understand characteristics of the Elizabethan Age
LO3	Make them appreciate Shakespearean drama
LO4	Make them learn the key elements of sentence structures
LO5	Make the students master the mechanics of writing

COURSE OUTCOMES (CO):

At the end of the course, the student will be able to:

CO1:	Obtain a literary acumen to answer MCQs of NET/SET examinations and other competitive examination
CO2:	Appreciate conversational English
CO3:	Recognize the dramatic elements of Shakespearean dramas
CO4:	Use punctuations and capitals effectively in their composition
CO5:	Recognize the elements of the spoken discourses

Unit I

William Shakespeare — *The Tempest* (Act I)

Grammar — "Phrases and Clauses"

Unit II

William Shakespeare — *The Tempest* (Act II)

Grammar — "Simple, Compound, and Complex Sentences"

Unit III

William Shakespeare — *The Tempest* (Act III)

Grammar — "Transformation of Sentences"

Unit IV

William Shakespeare — *The Tempest* (Act IV)

Grammar — "Sequence of Tenses and Reported Speech"

Unit V

William Shakespeare — *The Tempest* (Act V)

Grammar — "Punctuation and Capitals"

Text Books:

1. Shakespeare, William. *The Tempest*, New Delhi: S. Chand & Co., 2008.
2. Green, David. *Contemporary English Grammar, Structures, and Composition*. Chennai: MacMillan, 2010.

Supplementary Reading:

1. Cahn. L Victor. *Shakespeare the Playwright: A Companion to the Complete Tragedies Histories, Comedies, and Romances*. London: Praeger, 1996.
2. Crystal, David. *Shakespeare's Words: A Glossary and Language Companion*. London: Penguin, 2009.
3. Greenbaum , Sidney. *Oxford English Grammar.* London: Oxford UP, 2005.
4. McCarthy. *Cambridge Grammar of English*. London: Cambridge UP, 2018.
5. Quirk, Randolph. *A Comprehensive Grammar of the English Language*. London: Pearson, 2010.

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3			3			3	3		3	3	3			3			
CO2	2			3			3	3		3	3	3			3			
CO3	3			2			2	2		2	2	2			2			
CO4	3			3			3	3		3	3	3			3			
CO5	2			2			2	2		2	2	2			2			

***1-Low *2-Medium *3-Strong**

Semester	19ISOFC33: Relational Data Base Management System	L	T	P	C
III		4	0	0	4

Learning Objective (LO):

LO1	Understand the basic database concepts, including the database languages, Structure, Architecture and operations of the Relational database.
LO2	Construct simple and moderately advanced database queries using Structured Query Language (SQL).
LO3	To apply Relational Database design principles
LO4	To Understand the concepts of Indexing and Hashing,
LO5	To understand the concepts of serializability, concurrency and Deadlock handling.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Learned the concepts like Database, Database languages, Architecture and operations of the relational database.
CO2	Able to construct simple and advanced queries using SQL.
CO3	Acquire knowledge on design principles of Relational Databases.
CO4	Learned the Indexing and Hashing concepts.
CO5	Apply the concepts of serializability, concurrency and Deadlock handling in Database applications.

Unit-1

Introduction: Database System Applications-DBMS Vs. File System - View of Data-Data Model Database Languages - Database users and Administrators - Transaction Management - Database System Structure - Application Architecture. Data Models: Basic Concepts - Constraint- Keys- ER Diagram - Weak Entity - Extended ER Features - UML; Relational Model: Structure of Relational Databases - Relational Algebra - Views.

Unit-2

SQL: Background-Basic Structure-Set Operation-Aggregate Function-Null Values-Nested Sub Queries - Views - Modification of the Database - Data Definition Language - Embedded SQL - Dynamic SQL.

Unit-3

Advance SQL : Integrity and Security: Domain - Constraint - Referential Integrity - assertions - Triggers - Security and Authorization - Authorization in SQL - Encryption and Authentication.

Unit-4

Relational Database Design: First Normal Form - Pitfalls in Relational Database Design- Functional Dependencies (Second Normal Form) - Boyce-Codd Normal Form - Third Normal Form - Fourth Normal Form - Overall Database Design Process.

Unit-5

Transaction Management: Transaction concepts - States - Serializability. Lock based concurrency control: Locks - Granting - Two-Phase Locking protocol. Time stamp-based protocol: Timestamps - Timestamp ordering protocol - Dead lock handling.

Current Streams of thought

Current Streams of thought: Databases that bridge SQL/NoSQL – Databases in the cloud as a service

Text Book

1. A Silberschatz, H Korth, S Sudarshan, "*Database System and Concepts*", McGraw-Hill, (2005), 5th Edition

Reference Books

1. ElmasriRamez, and NavatheShamkant, "*Fundamentals of Database System*", Pearson, (2017), 7th Edition.
2. Alexix Leon & Mathews Leon, "*Essential of DBMS*", Vijay Nicole Publications, (2009), 2nd Edition.
3. Alexix Leon & Mathews Leon, "Fundamentals of DBMS", 2nd Edition, Vijay Nicole Publications, (2014).

E-Resources

1. http://engineeringppt.net/database-management-system-ppt-pdf-lecture-notes

2. https://opentextbc.ca/dbdesign01/

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8

CO1			1	2		3			3		3	3	3	3	2	2	2	
CO2		2						3		2		3		2	3	3	3	
CO3			2			1	2			1		3		2	3	3	3	
CO4	3			3					1			3		1	3	2	1	

Semester	19ISOFC34 Internet Programming	L	T	P	C
III		4	0	0	4

Learning Objective (LO):

LO1	To understand different Internet Technologies.
LO2	To learn java scripts.
LO3	To learn web applications

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the concepts of elements in the web.
CO2	Write programs in Javascript
CO3	Design and implement webpages.
CO4	Understand the XML basics.

Unit-1

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5 – Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls.

Unit -2

Cascading Style Sheets: CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

Unit-3

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling- DHTML with JavaScript- JSON introduction – Syntax – Function Files – Http Request – SQL.

Unit-4

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions- Form Validation- Regular Expressions – File handling – Cookies – Connecting to Database.

Unit-5

XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

Text Book

1. Deitel and Deitel and Nieto, Internet and World Wide Web – How to Program‖, Prentice Hall, 5th Edition, (2011).

References Books

1. Stephen Wynkoop and John Burke —Running a Perfect Website‖, QUE, 2nd Edition,(1999).
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, Wiley Publications, (2009).
3. Jeffrey C and Jackson, —Web Technologies A Computer Science Perspective‖, Pearson Education, (2011).
4. Gopalan N.P. and Akilandeswari J., —Web Technology‖, Prentice Hall of India, (2011).

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		2			2			3	3	3	2		2	3	3
CO2	3		3	2	3							3	3	3	1		1	3
CO3	3	3	1		1								2	3			3	3
CO4	3			1							3			3				

Semester	19ISOFP35: Practical – III: SQL and PL/SQL Lab	L	T	P	C
III		0	0	4	2

Learning Objective (LO):

LO1	To describe a sound introduction to the discipline of database management systems.
LO2	To give a good formal foundation on the relational model of data and usage

	of Relational Algebra.
LO3	To introduce the concepts of basic SQL as a universal Database language.
LO4	To enhance knowledge in DDL, DML and DCL commands
LO5	To design the effective database models.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Identify the data types, draw appropriate conceptual models, design database structure, and forms.
CO2	Implement simple database systems using relational database concepts.
CO3	Understand the needs of Structured Query Language.
CO4	Acquire knowledge in DDL, DML and DCL methods in Business data models.
CO5	Able to develop database models which implements normalization and decomposition techniques.

List of Exercise

- Data Definition of Base Tables.
- DL with Primary key constraints
- DDL with constraints and verification by insert command
- Data Manipulation of Base Tables and Views
- Demonstrate the Query commands
- Write a PL/SQL code block that will accept an account number from the user and debit an amount of Rs. 2000 from the account if the account has a minimum balance of 500after the amount is debited. The Process is to fired on the Accounts table.
- Write a PL/SQL code block to calculate the area of the circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in a table Areas. Areas – radius, area.
- Write a PL/SQL block of code for reversing a number. (Example : 1234 as 4321).
- Create a transparent audit system for a table Client_master (client_no, name, address, Bal_due). The system must keep track of the records that are being deleted or updated. The functionality being when a record is deleted or modified the original record details and the date of operation are stored in the auditclient(client_no, name, bal_due, operation, userid, opdate) table, then the delete or update is allowed to go through.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		3	2	2		3		2	3		3		2	3	

CO2	3		3	3		2		2		3		2		2		3	3	
CO3		2		1				3				3	2	2		3		
CO4			1	3		1		3	3	1		3		2		2	3	
CO5	3		1	3	3	3	3	1										1

Semester	19IMATA03: Allied – III: Discrete Mathematics	L	T	P	C
III		5	0	0	5

Learning Objective (LO):

LO1	To study various finite structures of mathematics.
LO2	To understand the concepts of sets, functions and groups.
LO3	To understand the relations and digraphs

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Acquire the basic concepts in mathematical logic and theory of inferences.
CO2	Understand the concepts of set theory, relations and equivalence classes with matrix representation
CO3	Formalities lattice theory, Boolean algebra and group theory
CO4	Understand the basic concepts of graph theory, Eulerian and Hamiltonian graphs
CO5	Acquire the basic concepts in mathematical logic and theory of inferences.

Unit–1

Fundamentals: Sets and Subsets – Operations on Sets – Sequences – Division in the integers – Matrices – Mathematical Structures – Logic: Propositions and Logical Operations – Conditional Statements – Methods of Proof – Mathematical Induction Counting: Permutations – Combinations – The Pigeonhole Principle – Elements of Probability – Recurrence Relations.

Unit–2

Relations and Digraphs: Product Sets and Partitions – Relations and Digraphs – Paths in Relations and Digraphs – Properties of Relations – Equivalence Relations – Computer Representation of Relations and Digraphs – Manipulation of Relations – Transitive Closure and Warshall's Algorithm.

Unit–3

Functions: Functions – Functions for Computer Science – Permutation Functions – Growth of Functions Topics in Graph Theory: Graphs – Euler Paths and Circuits – Hamiltonian Paths and Circuits – Coloring Graphs.

Unit–4

Order Relations and Structures: Partially Ordered Sets – External Elements of Partially Ordered Sets – Lattices – Finite Boolean Algebras – Functions on Boolean Algebras – Boolean Functions as Boolean Polynomials Trees: Trees – Labelled Trees – Tree Searching – Undirected Trees – Minimal Spanning Trees.

Unit–5

Semigroups and Groups: Binary Operations Revisited – semigroups – Products and Quotients of Semigroups – Groups – Products and Quotients of Groups, Groups and coding: Coding of Binary Information and Error Detection – Decoding and Error Correction.

Text Book

1. Bernard Kolman, Robert C. Busby and Sharon Ross, "*Discrete Mathematical Structures"*, Prentice Hall of India Pvt. Ltd., 1997.

References

1. Trembley, J.P. and R.P. Manohar, "*Discrete Mathematical Structures with Applications to Computer Science"*, Tata McGraw Hill, 1975.
2. Preparata, F.P., R.T. Yeh, "*Introduction to Discrete Structures"*, Addison–Wesley, 1973. Korthage, R.R., "*Discrete Computational Structures"*, Academic Press, 1974.

Semester-IV □□□□□□□□□□□□□ **–** □□□□□□□□□□□□□□

Semester	19ITAMC41 □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□□	L	T	P	C
IV		3			3

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Course Outcomes

At the end of the course, the student will be able to

CO1:	□□□□□ □□ □□□□□□□□□□□□□□□□ □□□□□ □□□□□□□□□□□□□□ □□□□□□□□□□ □□□□□□□□ □□□□□□.
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CO4:	□□□□□ □□□□□□□□□□□□□□□□□ □□□□□□, □□□□□□□, □□□□□□□□□□□□ □□□□□□□□ □□□□□□□□ □□□□□□□□□□□□□□□□
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3.	□□□□□□□□□□□□□	-	17, 18, 71, 75, 96,	(□□□□□□□)
4.	□□□□□□□□□	-	147, 303, 371	(□□□□□)
5.	□□□□□□□□□□	-	104, 105	(□□□□□□□)

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Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3				3	3			3	3	3	3	3	3	2
CO2	3	3				3			3			3	2		
CO3		2	3		3	3					3			3	3
CO4	3		3			2				3	2	2	3		
CO5	3	2			2				2	3	2			3	2

Semester	19IHINC41 BASIC HINDI-- IV	L	T	P	C
IV		4	0	0	4

Learning Objectives:

LO1	To learn the important poems of famous Hindi poets.
LO2	To imbibe the knowledge of writing in Premchand stories.
LO3	To understand the relation between poems and stories.
LO4	To gain knowledge on stories of BeeshmaSahini

Course Outcomes

At the end of the course, the student will be able to:

CO1:	Understand the concepts of Hindi poems.
CO2:	Knowledge on stories of Premchand.
CO3:	Describe the basic concepts of hindi stories.
CO4:	Apply the concepts of writings of Jai sankar Prasad.
CO5:	Understand the writing style of BeeshmaSahini.

Unit - I: Introduction, Poem

.Kabeer - 1 To 10 DohasTulasi - 1 To 10 Dohas.

Unit - II: Rahim - 1 To 10 Dohas

Unit – III: Edgaah - Premchand. Madhuva -Jayashankar Prasad.

Unit - IV:stories,

Chief Ki Daavat - BeeshmaSahinI

Unit - V:7. HANUMAN JI ADHALATH ME - HARISHAKNA PARSAYE

Current Streams of Thought: The Faculty will impart the current developments in the subject during the semester to the students and this component will not be a part of Examinations.

Text Books

1PADHYA MANJARI - DR. T.NIRMALA & DR.S.MOHANRajkamalPrakashan, New Delhi
2.premchand kipradhinikahaniya,rajkamalprakshan,new Delhi.7.
3.kahani:nayikahani: namvirsingh,RajkamalPrakashan, New Delhi.
4.bihari-ompraksh.vaniprakshan,newdelhi 110002.

Supplementary Reading

1. Nayikahani:prakrutiaurpaat:surendrachowdari.
2. Naveen ekanki , D.B.H.P. SABHA, madras17.
3. Bihari ki kavya sruti:jayapraksh.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	-	3	3	2	2	3	2	3	3	3	3	3	-	-	-	-	3	3
CO2	3	-	3	-	3	-	2	2	-	3	-	-	-	-	-	3	-	3
CO3	3	3	-	-	2	3	-	2	3	-	-	-	2	-	-	3	3	-
CO4	3	3	3	3	3	-	3	-	2	2	2	-	-	2	-	3	3	3
CO5	-	-	3	3	3	3	3	2	2	2	2	-	-	-	3	-	-	3

Semester	19IFREC41: FRENCH – IV (Option)	L	T	P	C
IV		3	0	0	3

Learning Objective (LO):

LO1	Draw a France map and name its regions and cites.
LO2	Fix an appointment
LO3	Draw a person physically and name its parts.
LO4	Talk about the qualities and defects of the person
LO5	Talk about their health problems.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Describe a country
CO2	Take an appointment with a doctor or with friends, etc.
CO3	Express in which part of the body they have pain
CO4	Describe a person physically and mentally
CO5	Ask others about how they are feeling using expressions such as 'Qu'est-ce que tu as? Oùest-ce que tu as mal?'

Unit I

Faire un bilan du sondage

Aborder quelqu'un (Parler de moyens de communication)

Unit II

Faire valoir son droit

Exprimer une opinion sur la vérité d'un fait.

Savoir-vivre en France

Unit III

Donner un conseil

Téléphoner /Prendre rendez-vous

Unit IV

Exposer un problème/ réagir

Parler du corps et des problèmes de santé

Unit V

Parler des qualités et des défauts des personnes

Demander / donner une explication

décrire une personne

Evaluez-vous

TextBook:

1. J. Girardet et J. Pecheur, **Echo A1** - méthode de français**,** Paris**:**Langers, (2012)

Reference :

1. Marie-Noelle Cocton et Emilie Pommier, **Saison A1** - méthode de français, Les Editions Didier, Paris (2015)
2. Angels Campa, Claude Mestreit, Julio Murillo et ManuelTost, **FORUM** – Méthode de français, HACHETTE LIVRE (2001)
3. Mauger Bleu, **Le Cours de langue et de la civilisation française**, - Méthode de français, Paris
4. Michele Boulares et Jean-Louis Frerot, **GrammmaireProgressive du Français avec 400 exerices**, CLE International, (1997)

Semester	19IENGC42 - ENGLISH THROUGH LITERATURE IV: SHORT STORY	L	T	P	C
IV		3			3

LEARNING OBJECTIVE

By introducing the course, it is intended to:

LO1:	Develop the communicative competence of learners in the English Language through training them in the skills of listening, speaking, reading, and writing
LO2:	Enable the students to know about the origin and development of short story
LO3:	Write objectively, avoiding vagueness, prejudice, and exaggeration
LO4:	Enable the learner to function through the written mode of English language in all situations including classroom, library, laboratory etc
LO5:	Discover an author's purpose, and draw conclusions about certain events, evaluating cause and effect, and understanding point of view

COURSE OUTCOMES

At the end of the course, the student will be able to:

CO1:	Use more vocabularies while writing
CO2:	Ensure about the history and development
CO3:	Develop a flow in writing
CO4:	Come up with new ideas while reading stories from different perspectives
CO5:	Write in a style appropriate for communicative purposes

Unit I

1. O' Henry — "The Gift of The Magi"
2. Ken Liu — "The Paper Menagerie"

Grammar — Synonyms and Antonyms

Unit II

1. Flora Annie Steel — "Valiant Vicky"
2. Oscar Wilde — "Happy Prince"

Grammar — Words often confused

Unit III

1. R. K. Narayan — "The Martyr's Corner"
2. Mahasweta Devi — "Draupati"

Grammar — Paragraph-Writing

Unit IV

1. Leo Tolstoy — "How much Land Does a Man Need?"
2. Somerset Maugham — "The Verger"

Grammar — Letter-Writing

Unit V

1. Langston Hughes — "On the Road"
2. Premchand — "Bakthi Marg"

Grammar — Precis-Writing

TEXT BOOKS

1. Srinivasa Iyengar, K.R.. *Indian Writing in English*. New Delhi: Sterling Pub., 1996.
2. Michael Swan, *Practical English Usage*, New Delhi: Oxford University Press, 2016.

SUPPLEMENTARY READING:

1. Frank Robert Palmer,. *Grammar: (by) Frank Palmer*. New Delhi: Penguin Books, 1975.
2. Browns, Julie, ed., *Ethnicity and the American Short Story*, New York: Garland, 1997.
3. Patea, Viorica. *Short Story Theories: A Twenty-First-Century Perspective*. Amsterdam [etc.]: Rodopi, 2012.

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3			3			3	3		3	3	3			3			
CO2	2			3			3	3		3	3	3			3			
CO3	3			2			2	2		2	2	2			2			
CO4	3			3			3	3		3	3	3			3			
CO5	2			2			2	2		2	2	2			2			

***1-Low *2-Medium *3-Strong**

Semester	19ISOFC43: Object Oriented Programming Using C++	L	T	P	C
IV		4	0	0	4

Learning Objective (LO):

LO1	To explain the advantages of object oriented programming over procedure oriented programming.
LO2	Understand how to apply the major object-oriented concepts to implement object oriented programs in C++, encapsulation, inheritance and polymorphism.
LO3	To learn how to implement constructors, function, pointes and class member functions.
LO4	Explain array handing, function overloading, operator overloading and virtual functions.
LO5	Helps in implementing some important features of C++ including templates, utilizing the I/O classes in C++ and exception handling.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Describe the principles of object-oriented problem solving and programming.

CO2	Understand the programming fundamentals, including statement and control flow.
CO3	Apply the concepts of class, method, constructor, pointers, data abstraction, function abstraction, inheritance, overriding, overloading, polymorphism, IO streams, Templates.
CO4	Develop program with basic data structure like array.
CO5	Describe the principles of object-oriented problem solving and programming.

Unit-1

Principles of Object- Oriented Programming – Beginning with C++ - Tokens, Expressions and Control Structures – Functions in C++

Unit-2

Classes and Objects – Constructors and Destructors – New Operator – Operator Overloading and Type Conversions.

Unit-3

Inheritance: Extending Classes – Pointers- Virtual Functions and Polymorphism

Unit-4

Managing Console I/O Operations – Working with Files – Templates – Exception Handling

Unit-5

Standard Template Library – Manipulating Strings – Object Oriented Systems Development

Current Streams of thought:

Current Streams of thought: Streams - formatted I/O with its class functions and manipulators

Text Book

1. Balagursamy E, *Object Oriented Programming with C++,* Tata McGraw Hill Publications(2020),Eight Edition

Reference Book

1. YashavantKanetkar, *Let Us C++*, bpb, (2020)
2. http://www.learncpp.com
3. http://www.nptel.ac.in

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8

CO1	3			2					3		3	2					3	
CO2			3				1			3				2	1			
CO3	3			2					2		2		3	3				3
CO4						1				3						1		
CO5																		

Semester	19ISOFC44: Web Technology	L	T	P	C
IV		3	0	0	3

Learning Objective (LO):

LO1	To learn about HTML, DHTML concepts.
LO2	To implement a variety of presentation effects in HTML.
LO3	To understand the concepts of client-side applications.
LO4	To gain the Knowledge of XML and its applications.
LO5	To know about java scripts and create adaptive web pages

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Acquire knowledge on the concepts of HTML and DHTML.
CO2	Able to create web documents by implementing various presentation effects using HTML.
CO3	Able to develop applications using client-side scripting
CO4	Understand the uses of XML and able to develop applications which uses XML to store and transfer the data.
CO5	Develop websites which contains adaptive web pages

Unit-1

Structuring Documents for the Web: Introducing HTML and XHTML, Basic Text Formatting, Presentational Elements, Phrase Elements, Lists, Editing Text, Core Elements and Attributes, Attribute Groups. Links and Navigation: Basic Links, Creating Links with the <a> Element, Advanced E- mail Links. Images, Audio, and Video: Adding Images Using the <img> Element,

Using Images as Links Image Maps, Choosing the Right Image Format, Adding Flash, Video and Audio to your web pages.

Unit-2

Tables: Introducing Tables, Grouping Section of a Table, Nested Tables, Accessing Tables. Forms: Introducing Forms, Form Controls, Sending Form Data to the Server. Frames: Introducing Frameset, <frame> Element, Creating Links Between Frames, Setting a Default Target Frame Using <base> Element, Nested Framesets, Inline or Floating Frames with <iframe>.

Unit-3

Cascading Style Sheets: Introducing CSS, Where you can Add CSS Rules. CSS Properties: Controlling Text, Text Formatting, Text Pseudo Classes, Selectors, Lengths, Introducing the Box Model. More Cascading Style Sheets: Links, Lists, Tables, Outlines, The :focus and :activate Pseudo classes Generated Content, Miscellaneous Properties, Additional Rules, Positioning and Layout wit, Page Layout CSS , Design Issues.

Unit-4

Java Script: How to Add Script to Your Pages, Variables and Data Types – Statements and Operators, Control Structures, Conditional Statements, Loop Statements – Functions - Message box, Dialog Boxes, Alert Boxes, Confirm Boxes, Prompt Boxes.

Unit-5

Working with JavaScript: Practical Tips for Writing Scripts, JavaScript Objects: Window Object - Document object - Browser Object - Form Object - Navigator object Screen object - Events, Event Handlers, Forms – Validations, Form Enhancements, JavaScript Libraries.

Current Streams of thought:Progressive web apps (PWA) and accelerated mobile pages (AMP), WebAssembly

Text Book

1. Jon Duckett, "*Beginning HTML, XTML, CSS and Java script*"**,** Wiley Publishing, (2010)

References Books

1.MarijinHaverbeke,"*Eloquent JavaScript*", (2018), 3rd Edition.

2. Chris Bates, "Web Programming", Wiley Publishing, 3d Edition.

3. M. Srinivasan, "*Web Technology: Theory and Practice*", Pearson Publication, 1st Edition

E-Reosources:

4. https://open.umn.edu/opentextbooks/formats/177

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3					3		1		3	3	3	2	3		1	1	2
CO2			3	2		3	2		3		2	2	1	3		2	3	3
CO3				1	1		2	2		3		2		3		3		
CO4	3	3				3		3			2	3	3	3			3	3
CO5	3					3		1		3	3	3	2	3		1	1	2

Semester	19ISOFC45: Computer Graphics	L	T	P	C
IV		4	0	0	4

Learning Objective (LO):

LO1	To understand the basic concepts of Computer Graphics
LO2	To apply geometric transformations, viewing and clipping on graphical objects
LO3	To understand visible surface detection techniques and illumination models
LO4	To familiarize input and output devices of computer graphics system.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the concepts of computer graphics system.
CO2	Handle the devices relates to computer graphics.
CO3	Develop algorithms for geometric transformation.
CO4	Detect visible surfaces using various techniques.

Unit-1

Overview of graphics Systems: Video Display Device - Refresh Cathode-Ray tubes Raster - Scan Displays Random - Scan Displays - Color CRT Monitors - Direct view Storage tubes Flat -

Panel Displays Three - Dimensional Viewing Devices, Stereoscopic and Virtual - Reality Systems.

Unit-2

Raster - Scan Systems Video Controller - Random - Scan Systems Video Controller - Random-Scan Systems - Input device – Keyboard- Mouse - Trackball - Space ball and Joysticks - Data Glove – Digitizers Image Scanners - Touch Panels - Light pens. Voice Systems - Hard-Copy Devices - Line Drawing Algorithms-DDA Algorithms - Circle generating Algorithm Properties of Ellipses.

Unit-3

Two Dimensional Geometric Transformation: Basic Transformations - Translation - Rotation - Scaling - Matrix Representations and Homogeneous Coordinates - Other Transformations Reflections Two Dimensional Viewing : Windows to view point coordinate Transformations - Clipping Operations - Point Clipping - Line Clipping - Curve Clipping - Text Clipping - Exterior Clipping.

Unit-4

Three Dimensional Concepts: Three Dimensional Display method - Parallel projection - Depth cueing visible line and surface - Three Dimensional Geometric and modelling Transformations: Translation - Rotation - Scaling - Composite Transformations. Three Dimensional Viewing: Viewing pipeline - Viewing Coordinates - Projections - Parallel Projections - Perspective Projections.

Unit-5

Visible Surface Detection Methods : Classification Visible Surface Detection Algorithms - Back Face Detection - Depth - Buffer Method - A-Buffer Method - Scan line method - Depth sorting method - BSP tree method - Area Subdivision Method.

Text Book

Donald Hearn and M. Pauline Baker , "Computer Graphics", 2nd Edition, 1996.

Reference Book

1. John f. Hughes, Andries Van Dam, Morgan Mcguire, David F. Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, "Computer Graphics Principles and Practice" 3rd Edition, Pearson Education,2014.
2. https://www.youtube.com/watch?v=fwzYuhduME4

https://www.youtube.com/watch?v=01YSK5gIEYQ

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8

CO1	3		3							3	3	3		2	2			2
CO2	3		2		3		3	3	2		3	2			3	3		2
CO3		3		1			2			3	3	3		1	1	3		3
CO4	1				3		2					3	2	3	1		1	
CO5																		

Semester	19ISOFP46: Practical – III: C++ Programming Lab	L	T	P	C
IV		0	0	4	2

Learning Objective (LO):

LO1	To develop solutions to problems demonstrating usage of control structures, modularity, I/O. and other standard language constructs.
LO2	To demonstrate the usage of data abstraction, encapsulation, and inheritance.
LO3	To implement the abstract interface and polymorphism
LO4	To learn syntax, features of, and how to utilize the Standard Template Library.
LO5	To learn other features of the C++ language including templates, exceptions, forms of casting, conversions, covering all features of the language.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Demonstrate the procedural and object oriented paradigm with concepts of streams, classes, functions, data and objects.
CO2	Implement dynamic memory management techniques using pointers, constructors, destructors, etc.
CO3	Learn the concept of function overloading, operator overloading, virtual functions and polymorphism.
CO4	Implement early and late binding, usage of exception handling and generic programming.
CO5	Understand the use of various OOPs concepts with the help of program.

List of Exercises

1. Write a program in C++ to swap two numbers?
2. Write a C++ program to find the largest three elements in an array?
3. Write a program in C++ to calculate the series?
   (1) + (1+2) + (1+2+3) + (1+2+3+4) + ... + (1+2+3+4+...+n)?
4. Write a C++ program to find the Transpose of a Matrix?
5. Write a C++ program to convert binary number to decimal?
6. Write a C++ program to calculate area of a circle,a rectangle or a triangle depending upon user's choice?
7. Write a C++ program to do Addition, subtraction and multiplication of two numbers using function?
8. Write a C++ program to overload unary operators that is increment and decrement.
9. Write a C++ program to read and print student's information using two classes and simple inheritance?

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1						3				3	2			3				2
CO2	3		3								3				3	2	2	
CO3			3			3				3		3		1		3		2
CO4		2						3							1		3	
CO5				1			2			2		3						3

Semester	19ISOFP47: Practical-V: Web Technology Lab	L	T	P	C
IV		0	0	4	2

Learning Objective (LO):

LO1	To design web pages using various HTML tags
LO2	To write simple programs in Java Script to create forms.
LO3	To understand the importance of cascade style sheets in creating a web application.
LO4	To understand the use of XML in web applications.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Develop to build a complete website using HTML
CO2	Create web pages which implements client side scripting.
CO3	Able to implement various styles for the web page using CSS.
CO4	Develop a simple web application using XML which used to store and transmit the data over the network

List of Exercises

1. Create a form having number of elements (Textboxes, Radio buttons, Checkboxes,and so on). Write JavaScript code to count the number of elements in a form.
2. Create a HTML form that has number of Textboxes. When the form runs in the Browser fill the textboxes with data. Write JavaScript code that verifies that all textboxes has been filled. If a textboxes has been left empty, popup an alert indicating which textbox has been left empty.
3. Develop a HTML Form, which accepts any Mathematical expression. Write JavaScript code to Evaluates the expression and Displays the result.
4. Create a page with dynamic effects. Write the code to include layers and basic animation.
5. Write a JavaScript code to find the sum of N natural Numbers. (Use user-defined function)
6. Write a JavaScript code block using arrays and generate the current date in words, this should include the day, month and year.
7. Create a form for Student information. Write JavaScript code to find Total, Average, Result and Grade.
8. Create a form for Employee information. Write JavaScript code to find DA, HRA, PF, TAX, Gross pay, Deduction and Net pay.
9. Create a form consists of a two Multiple choice lists and one single choice list
   (a)The first multiple choice list, displays the Major dishes available
   (b)The second multiple choice list, displays the Starters available.
   (c)The single choice list, displays the Soft drinks available.
10. Create a web page using two image files, which switch between one another as the mouse pointer moves over the image. Use the on Mouse Over and on Mouse Out event handlers.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3			2	2						3	3				3	3
CO2	3	3		1			3			2		3	3	2		2	2	3
CO3	2		2		2	3						3	3			2	3	3
CO4	3	2	3				3				2	3					1	1

Semester	19IMATA04: Allied IV: Resource Management Techniques	L	T	P	C
IV		5	0	0	5

Learning Objective (LO):

LO1	Resource management techniques to finds applications in diverse fields including Engineering, Management Science, Computer Science and Economics.
LO2	In this course, the general linear programming problem, simplex computation procedure, revised simplex method, duality problems in linear programming and some nonlinear programming problems, Integer programming problem, transportation and assignment problems, PERT and CPM are also covered. The main objective is to solve varieties of problems.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Model any real life situation into a mathematical model,
CO2	Solve the problem for the required demand,
CO3	Optimize the transportation and assignment of jobs,
CO4	Upgrade their ability in production management through project scheduling and allocation of resources,
CO5	Develop their personnel management through manpower planning and salary administration.

Unit–1:

Linear programming (LP) – principle components of decision problem – operations research (OR) modelling – phases of OR study – LP formulation and graphical solution – resource allocation problem – the simplex method – sensitivity analysis – revised simplex method.

Unit–2:

Duality and networks – definition of dual problem – primal – dual relationships – dual simplex method – post optimality analysis – transportation and assignment models – transhipment models – network minimization – shortest route problems – maximal flow problem.

Unit–3:

Integer programming – cutting plane algorithm, branch and bound method – multistage (dynamic) – programming solution of LP by dynamic programming.

Unit–4:

Classical optimization theory: unconstrained external problem – newton Raphson method – equality constraints – Jacobian method – Lagrangian method – Kuhn tucker conditions – simple problems.

Unit–5:

Project scheduling. network diagram representation – critical path method – time charts and resources levelling – PERT.

Text Book:

1. Taha, A.H., "*Operations Research an Introduction"*, Macmillan Publishing Company, Newyork, 1997.

Supplementary Reading:

1. Billey E. Gillet, "*Introduction to Operations Research A Computer Oriented Algorithmic Approach"*, Tata McGraw Hill, New Delhi, 1979.

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3				3		3				2		3	3	2	2		
CO2	3		3	2		2		1		3		3		2	3	2	3	
CO3			3		2								3	1	1			2
CO4	3			2			3				2	2	2			3	3	
CO5				2			3										1	

Semester	19ISOFC51: Operating System	L	T	P	C
V		4	0	0	4

Learning Objective (LO):

LO1	To understand the concepts, operation, design, implementation and services of an operating system.

LO2	To understand the structure and computing environment of the system.
LO3	To understand the concepts of process and its operations and how to synchronize and schedule the process. The methods of deadlock and its characterization were taught.
LO4	To understand the different approaches to memory management.
LO5	To understand the mass storage structure and how to schedule the disk. The structure and organization of the file

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the structure the OS and basic architectural components involved in OS design.
CO2	Understands the concepts of operating structure and how to design and implement the computing environment of the system.
CO3	Understands the concept of scheduling for process and how to avoid the dead lock situations for the process.
CO4	Finding the ways to manage the memory and how to utilize the memory effectively.
CO5	Learned about mass storage structure, disk scheduling and file organization.

Unit-1

Introduction - History of operating system- Different kinds of operating system –Operating system concepts - System calls-Operating system structure.

Unit-2

Processes and Threads: Processes - threads - thread model and usage - inter process communication.

Unit-3

Scheduling - Memory Management: Memory Abstraction - Virtual Memory - Page replacement algorithms.

Unit-4

Deadlocks: Resources- introduction to deadlocks - deadlock detection and recovery - deadlocks avoidance - deadlock prevention. Multiple processor system: multiprocessors - multi computers.

Unit-5

Input / Output: principles of I/O hardware - principles of I/O software. Files systems: Files - directories - files systems implementation - File System Management and Optimization.

Current Streams of thought: Real-Time Operating System Trends (RTOS) – Open Source RTOSs

Text Book

1. Andrew S. Tanenbaum, "*Modern Operating Systems*", PHI private Limited, (2008), 2nd Edition.

Reference Books

1. William Stallings, "*Operating Systems - Internals & Design Principles*", Prentice - Hall of India private Ltd, (2004), 5thEdition,.
2. Sridhar Vaidyanathan, "*Operating System*", Vijay Nicole Publications, (2014), 1st Edition.

E-Resources

https://www.kopykitab.com/Operating-System-Concepts-8th-Edition-CS-by-PUBLIC-DOMAIN

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3		3		3			2			2				3	3	
CO2	2		3		2							3	2	3	2	3		
CO3	3						1					2			3			1
CO4	3	2			3						3	3	3	2		1		
CO5																		

Semester	19ISOFC52: Programming in Java	L	T	P	C
V		5	0	0	5

Learning Objective (LO):

LO1	To introduce the basic features of Java
LO2	To educate JAVA Programming structure, Virtual Machine concept etc.,
LO3	To introduce java classes and java applets
LO4	To educate inheritance, exception handlings and Threads.
LO5	To educate the design of web pages.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Learn declare and define the data type with scope of the variables and methods.
CO2	Understand and define the modules, classes, subclasses and methods.
CO3	Describe a package using inheritance and interface.
CO4	Analyse and divide the system into various subsystems and apply the multithreading concepts. Also the student can be able to operate file handling mechanisms.
CO5	Develop GUI based applications using Applet and Swing.

Unit-1

Genesis of Java: Creation of Java – why java is important to internet – The Java Buzz words – An overview of Java Object Oriented Programming. Data types – Variables – Type conversion and casting – Automatic type promotion in Expressions – Strings. Arrays: One Dimensional Array – Multi Dimensional Array – Operators – Control statements.

Unit-2

Class Fundamentals – Declaring objects – Assigning object Reference variables – Introducing Methods – Constructors – Garbage collection – Finalize () Method – Stack class. A Closer Look at Methods and classes: Overloading Methods – Argument passing – Nested and Inner classes – String class – Using command line arguments. Inheritance Basics & Types - Method overriding – Dynamic Method Dispatch – Using Abstract class – Using final with inheritance.

Unit-3

Packages & Interface - Exception Handling - Creating your own Exception subclasses. Multithreaded Programming: Java Thread Model – Main Thread – Creating a Thread - Creating Multiple Threads–Using is Alive () and join () – Thread priorities – Synchronization – Inter thread Communication.

Unit-4

I/O &Applets : I/O Basics Reading console Input – writing console output – The Print Writer class – Reading and Writing Files. The Applet class: - Applet Architecture – Applet Skeleton – Applet Display method – Requesting Repainting – HTML APPLET tag- Passing Parameters to Applet – Audio Clip Interface. Event Handling Mechanisms – Delegation Event Model – Event classes – Sources of Events – Event Listener Interfaces – Adapter Classes.

Unit-5

AWT Classes – Window fundamentals – working with Frame Windows - working with Graphic Using AWT controls: Controls fundamentals – Labels – using Buttons – Applying check Boxes – Check Box group – Choice controls – Using a Text field – Using a Text Area – Understanding Layout Managers (Flow Layout only) – Menu Bars and Menus.

Current Streams of thought: Networks basics - Socket Programming - Proxy Servers - TCP/IP Sockets - Net Address - URL - Datagrams - Working with windows using AWT Classes - AWT Controls - Layout Managers and Menus.

Text Book

1. Herbert Schildt, “Java - The Complete Reference”, Ninth Edition, McGraw-Hill Education, (2014)

Reference Books

2. Balagurusamy E, “Programming with Java”, Tata McGraw-Hill Education India, (2014).
3. Sachin Malhotra & Saurabh Choudhary, “Programming in JAVA”, 2nd Ed, Oxford Press.
4. Sagayaraj, Denis, Karthik and Gajalakshmi, “JAVA Programming for Core and Advanced Learners”, (2018).

4.https://www.google.com/search?sxsrf=ALeKk03EgB8TbwU27VqZHrf2F9mOW9n4CQ%3A1605179000822&ei=eBatX5DpMYuO4-EP8OC1iAk&q=programming+with+java+balagurusamy+e&oq=programming+with+java+&gs_lcp=CgZwc3ktYWIQARgBMgQIIxAnMgQIIxAnMgUILhDJAzICCAAyAggAMgIIADICCAA6BAgAEE (ebook)

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1			2			1				3		3		3	2	3		1
CO2	3	3		2				3	3			3		2	3	1		
CO3				2			2		3			2		3	2	3		2
CO4		3				2				2	3	1	3	2	3	1		
CO5		3		3			1				3	2		3	3	2		

Semester	19ISOFC53: Computer Networks	L	T	P	C
V		4	0	0	4

LEARNING OBJECTIVES (LO):

LO1	Study the basic taxonomy and terminology of the computer networking and enumerate the layers of OSI model and TCP/IP model.

LO2	Acquire knowledge of Application layer and Presentation layer paradigms and protocols.
LO3	Study Session layer design issues, Transport layer services, and protocols.
LO4	Gain core knowledge of Network layer routing protocols and IP addressing.
LO5	Study data link layer concepts, design issues, and protocols.

COURSE OUTCOMES (COs):

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

CO1	To master the terminology and concepts of the OSI reference model and the TCP- IP reference model.
CO2	To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area networks.
CO3	To be familiar with wireless networking concepts.
CO4	To be familiar with contemporary issues in networking technologies.
CO5	Discuss the elements and protocols of transport layer

UNIT-I

Introduction: The uses of computer networks-Network hardware-Network software-Reference models-Example of networks-Network standardization.

The physical layer: The theoretical basis for data communication–Guided Transmission media –Wireless transmission– PSTN-Mobile telephone-Communication satellite.

UNIT-II

The Data Link Layer: Data link layer design issues-Error detection and correction – Elementary data link protocols- Sliding window protocols- Example of data link protocols-ETHERNET–802.11-802.16-Bluetooth-Data link layer Switching.

UNIT-III

The network layer: Network layer design issues- Routing algorithms- Congestion control algorithms-Internetworking-Network layer in Internet. Network Services BOOTP and DHCP-Domain Name Service-WINS-Web Serving and Surfing Web servers-Web clients (browsers).

UNIT-IV

The transport layer: Transport layer design issues-Transport protocols-Simple transport protocol-Internet transport protocols UDP-TCP.

UNIT-V

The application layer: Domain name system- Electronic mail- World wide web– Multimedia–Cryptography-Digital signature-Communication Security.

Current Streams of thought:

Routing Algorithms: The Optimality Principle, Shortest Path, Routing, Flooding, Distance Vector Routing, Link State Routing, Hierarchical Routing, Broadcast Routing, Multicast Routing, Routing for Mobile Hosts.

Text Book:

1. Andrew S.Tanenbaum, "Computer networks", PHI, 4thedition,(2002).

Supplementary Books:

1. William Stallings," Data and computercommunications",PHI-(2001).
2. DouglasE. comer,"Internet working with TCP/IP-Volume-I",PHI,(1997).
3. Larry L. Peterson and Bruce S. Davie, "Computer Networks: A Systems Approach", Fifth Edition, Morgan Kaufmann Publishers, (2012).
4. William Stallings, "Data and Computer Communications", Tenth Edition, Pearson, (2013).
5. James F. Kurose, Keith W. Ross, "Computer Networking: A Top-DownApproach", Fifth Edition, Pearson Education,(2012)
6. Teresa C.Piliouras, "Network Design Management and Technical Perspectives, Second Edition", Auerbach Publishers, (2015).

Website- E-Learning Resources

https://theswissbay.ch/pdf/Gentoomen%20Library/Networking/Prentice%20Hall%20-%20Computer%20Networks%20Tanenbaum%204ed.pdf

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1			3		3	2			2	1		3	3		3	2	2	3
CO2				3	2	3		1		2		3	3	3	3	2	3	
CO3	3			3		1		3		1		3	3	3		3	2	1

CO4	3		3	3	3	3		2		2	1	3	3	1		3	2	
CO5																		

Semester	19ISOFC54 Multimedia Systems	L	T	P	C
V		4	0	0	4

Learning Objective (LO):

LO1	To understand the standards available for different audio, video and text applications
LO2	To learn various multimedia authoring systems in multimedia production team

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Work on multimedia.
CO2	Handle various multimedia software
CO3	Develop multimedia projects.
CO4	Deploy multimedia projects.

Unit-1

Multimedia Definition - Use Of Multimedia - Delivering Multimedia - Text: About Fonts and Faces - Using Text in Multimedia - Computers and Text - Font Editing and Design Tools - Hypermedia and Hypertext.

Unit-2

Images: Plan Approach - Organize Tools - Configure Computer Workspace - Making Still Images - Color - Image File Formats. Sound: The Power of Sound - Digital Audio - Midi Audio - Midi vs. Digital Audio - Multimedia System Sounds - Audio File Formats -Vaughan's Law of Multimedia Minimums - Adding Sound to Multimedia Project.

Unit-3

Animation: The Power of Motion - Principles of Animation - Animation by Computer - Making Animations that Work. Video: Using Video - Working with Video and Displays - Digital Video Containers - Obtaining Video Clips - Shooting and Editing Video.

Unit-4

Making Multimedia: The Stage of Multimedia Project - The Intangible Needs - The Hardware Needs - The Software Needs - An Authoring Systems Needs- Multimedia Production Team.

Unit-5

Planning and Costing: The Process of Making Multimedia - Scheduling - Estimating - RFPs and Bid Proposals. Designing and Producing - Content and Talent: Acquiring Content - Ownership of Content Created for Project - Acquiring Talent.

Text Book

1. Tay Vaughan, "Multimedia: Making It Work", 8th Edition, Osborne/McGraw-Hill, (2001).

Reference Book

1. Ralf Steinmetz & Klara Nahrstedt "Multimedia Computing, Communication & Applications", Pearson Education, (2012).

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		3			2			3	3	3	3		2		2
CO2	3		3	1	3		2						3		3	3		1
CO3			3		2	1							2	3	3		2	3
CO4	3			2							3	3		3				
CO5																		

Semester	19ISOFP55 Java Programming Lab	L	T	P	C
V		0	0	4	2

Learning Objective (LO):

LO1	To teach the basics of JAVA programs and its execution.
LO2	To teach the differences between C++ and Java programming.
LO3	To educate learn concepts like packages, applets and interfaces.

LO4	To understand the life cycle of the applets and its functionality.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand Android platform, Architecture and features.
CO2	Design User Interface and develop activity for Android App.
CO3	Describe Use Intent, Broadcast receivers and Internet services in Android App.
CO4	Design and implement Database Application and Content providers.

List of Exercises

1. Define a class called Student with the attributes name, reg_number and marks obtained in four subjects(m1,m2,m3,m4).Write a suitable constructor and methods to find the total mark obtained by the student and display the details of the student.
2. Write a Java program to find the area of a square, rectangle and triangle by

   (i) Overloading Constructor (ii) Overloading Method.

3. Write a java program to add two complex numbers. [Use passing object as argument and return object].
4. Define a class called Student_super with data members name, roll number and age.
5. Write a suitable constructor and a method output () to display the details.
6. Derive another class Student from Student_super with data members height and weight.
7. Write a constructor and a method output () to display the details which overrides the super class method output().[Apply method Overriding concept].
8. Write a java program to create an interface called Demo, which contains a double type constant, and a method called area () with one double type argument. Implement the interface to find the area of a circle.
9. Write a java program to create a thread using Thread class.
10. Demonstrate Java inheritance using extends keyword.
11. Create an applet with four Checkboxes with labels MARUTI-800, ZEN, ALTO and ESTEEM and a Text area object. The program must display the details of the car while clicking a particular Checkbox.
12. Write a Java program to throw the following exception,

    1) Negative Array Size 2) Array Index out of Bounds

13. Write a java program to create a file menu with option New, Save and Close, Edit menu with option cut, copy, and paste.
14. Write a java programming to illustrate Mouse Event Handling
15. Write a Java program to practice String class and its methods

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3			3				3	3	3		2			3	
CO2	3	2		3				2	2			2					3	3
CO3	3			2					1			3	2				2	3
CO4		3				2				1	1	2	3	3		1	2	2
CO5																		

Semester	19ISOFP56 Open Source Technology Lab	L	T	P	C
V		0	0	4	2

Learning Objective (LO):

LO1	To develop technical solutions for problems using the open source software readily available at free of cost.
LO2	To install WAMP Server.
LO3	Learn programming in PHP.
LO4	To develop application which uses databases for storing the data.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Develop systems for the problems using open source technologies.
CO2	Know the installation procedure for WAMP server.
CO3	Create programs for solving business logic using PHP
CO4	Implement the database models in the web applications..

List of Exercises

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement.
2. Write a PHP script to redirect a user to a different page.
3. Write a PHP function to test whether a number is greater than 30, 20 or 10 using ternary operator.

4. Create a PHP script which display the capital and country name from the given array. Sort the list by the name of the country
5. Write a PHP script to calculate and display average temperature, five lowest and highest temperatures.
6. Create a script using a for loop to add all the integers between 0 and 30 and display the total**.**
7. Write a PHP script using nested for loop that creates a chess board.
8. Write a PHP function that checks if a string is all lower case.
9. Write a PHP script to calculate the difference between two dates**.**
10. Write a PHP script to display time in a specified time zone.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3		2	2	2	2	3	3	3	3		1		3		
CO2	3	3	3	2	2		2			1		3	3		1		2	1
CO3	3	3			3		2			3		3	3	2	1	3		
CO4	2	2	3		3		3			1		3		3	2	1		1
CO5																		

Semester	19ISOFC61 Programming in Python	L	T	P	C
VI		5	0	0	5

Learning Objective (LO):

LO1	To introduce the programming concepts and techniques.
LO2	To introduce the Python language syntax.
LO3	To learn control statements, loops, functions, and lists.
LO4	To write programs for wide variety problems in maths, science, finance, and games.
LO5	To develop the ability to write database applications in python.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Analyze and design strategies for solving basic programming problems.
CO2	Use primitive data types and statement syntaxes
CO3	Create programs using conditional statements, loops and functions.
CO4	Develop programs to solve a variety of problems in math, science, business, and games.
CO5	Implement database applications using python.

Unit-1

Introduction to Python - Why Python - Installing in various Operating Systems - Executing Python Programs - Basic Programming concepts - Variables, expressions and statements - Input/ Output – Operators.

Unit-2

Conditions - Functions - Arguments - Return values - Iteration - Loops - Strings -Data Structures - Lists - Dictionaries - Tuples - Sequences - Exception Handling.

Unit-3

File Handling - Modules - Regular Expressions - Text handling -Object Oriented Programming - Classes - Objects - Inheritance - Overloading - Polymorphism Interacting with Databases - Introduction to MySQL - interacting with MySQL - Building a address book with add/edit/delete/search features.

Unit-4

Introduction to Graphics programming - Introduction to GTK - PyGTK - Developing GUI applications using pyGTK - Scientific Programming using NumPy / SciPy - Image Processing - Processing multimedia files -Network Programming, Web services using SOAP, Introduction to Graphics programming -PyGame

Unit-5

Introduction to Version Control Systems - Subversion/Git, Writing Unit Tests, Creating Documentation, Contributing to Open Source Projects

Current Streams of thought: Python for data analysis and automation – Django development.

Text Book

1. Allen B. Downey,"*Think Python: How to Think Like a Computer Scientist*", O'Reilly, (2012), 1st Edition

Reference Books

1. Jeff McNeil ,"*Python 2.6 Text Processing: Beginners Guide*", Packet Publications, (2010),

2. Mark Pilgrim ,"*Dive Into Python* " , Apress, (2009), 2nd Edition.

E-Resources

1. **https://www.oreilly.com/library/view/functional-programming-in/9781492048633/**

2. https://www.kopykitab.com/Python-Scripting-For-Computational-Science-by-PUBLIC-DOMAIN

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	3	3	2			2		2	3	3	3	2		3
CO2	3	3										3	2	2	2	3	3	
CO3	3	2	3	2	2			2				3		1				1
CO4	3	2									1	3		3	3	1		3
CO5	3	3		1	2													

Semester	19ISOFC62 Software Engineering	L	T	P	C
V		5	0	0	5

Learning Objective (LO):

LO1	To understand the various software engineering models.
LO2	To understand the approaches of developing software.
LO3	To identify the risks in software development.
LO4	To understand and collect the requirements of software engineering.
LO5	To understand the design concepts, testing methods and strategies.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Learned the various software engineering models.
CO2	Analyze the various approaches of software development.
CO3	Understand the risks in the software development.
CO4	Analyze the requirements of software engineering.
CO5	Implement the design concepts, testing methods and strategies

Unit-1

Introduction - Software Engineering Discipline - Evolution and Impact - Programs vs Software Products. Software Life Cycle Models: Use of a Life Cycle Models - Classical Waterfall Model - Iterative Waterfall Model - Prototyping Model - Evolutionary Model - Spiral Model. Software Project Management: Responsibilities of a Software Project Manager - Project Planning - Metrics for Project Size Estimation - Project Estimation Techniques -Risk Management.

Unit-2

Requirements Analysis and Specification: Requirements Gathering and Analysis -Software Requirements Specification (SRS) - Formal System Development Techniques. Software Design: Characteristics of a Good Software Design - Cohesion and Coupling -Neat Arrangement - Software Design Approaches.

Unit-3

Function-Oriented Software Design: Overview of SA/SD Methodology - Structured Analysis - Data Flow Diagrams (DFDs).Object Modeling Using UML: Overview of Object-Oriented Concepts - UML Diagrams - Use Case Model - Class Diagrams - Interaction Diagrams - Activity Diagrams - State Chart Diagram.

Unit-4

User Interface Design: Characteristics of a Good User Interface - Basic Concepts - Types of User Interfaces - Component-Based GUI Development; Coding and Testing: Coding - Testing - UNIT Testing - Black-Box Testing - White-Box Testing - Debugging -Integration Testing - System Testing.

Unit-5

Software Reliability and Quality Management: Software Reliability - Statistical Testing -Software Quality - Software Quality Management System - ISO 9000.Computer Aided Software Engineering: CASE Environment - CASE support in Software Life Cycle - Characteristics of CASE Tools - Architecture of a CASE Environment. Software Maintenance: Characteristics of Software Maintenance - Software Reverse Engineering - Software Maintenance Process Models - Estimation of Maintenance Cost. Software Reuse: Issues in any Reuse Program - Reuse Approach

Current Streams of thought:Continuous Delivery and Deployment – Low-Code Development

Text Book

1. Rajib Mall, "*Fundamentals of Software Engineering*",Prentice Hall of India Private Limited, (2014), 4th Edition.

Reference Books

1. Bruce R. Maxim and Roger S. Pressman, "*Software Engineering – A Practiotioners approach*", Mc Graw Hill Publication, (2019), 8th Edition.
2. Richard Fairley, "*Software Engineering Concepts*", TMGH Publications, (2004).

E-Resources

1. https://www.kopykitab.com/The-Essence-Of-Software-Engineering-Engg-by-PUBLIC-DOMAIN

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3			3						2	3	3	3	2	2	2	3	3
CO2			3		2		3				3	3	2			2	3	2
CO3	2	3			1				3			1				3	3	1
CO4				3						1		3				2	3	
CO5																		

Semester	19ISOFC63 Linux and Shell Programming	L	T	P	C
VI		4	0	0	4

Learning Objective (LO):

LO1	To understand the Linux OS
LO2	To Study shell programming.
LO3	To learn text formatting.
LO4	To handle files.
LO5	To write scripts

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Have good knowledge in script writing.
CO2	Process the text in the Linux environment.
CO3	Solve the practical issues in Linux shell scripting.
CO4	Able to write scripts with functions.

Unit-1

Introduction to Linux: operating system and Linux - History of Linux and Unix - Linux overview - Linux Distributions - Vi editors.

Unit-2

Shell - comparison of Shells - working in the shell - Learning Basic Commands - Compiler and interpreter differences - various directories - Drilling deep into process management, job control and Automation.

Unit-3

Text processing - Text filtering Tools - working with commands. - Logical operators. - local variables and its scope - working with arrays.

Unit-4

Tricks with shell scripting - interactive shell scripts - The here document and << operator - sort command - WC command - file handling – Debugging.

Unit-5

Automating Decision - Making in scripts - Automating repetitive tasks - working with Functions.

Current Streams of thought: Recent trends in signals and kernels in Linux

Text Books

1. The Complete Reference LINUX - Richard L. Petersen, McGraw Hill, (2008).

2. LINUX shell scripting by Ganesh Naik, Packt Publishing Ltd., (2015).

Reference Books

1. Behrouz A. Forouzan, Richard F. Gilberg, “UNIX and Shell Programming “, 9th Edition, Cengage Learning, (2009).

2. SumitabhaDas,“UNIX Concepts and Applications”,8th Edition, Tata McGraw Hill, (2008).

3. Maurice J. Bach, “The Design of the Unix Operating System”, Indian Edition, PHI Learning Private Limited, (2011).

4. https://www.youtube.com/watch?v=hwrnmQumtPw

5.https://www.youtube.com/watch?v=GtovwKDemnI

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2				2			3	3			2	2		
CO2	3				3							3	3		3			1
CO3	1	3			3					2		3	3	3	1		1	2
CO4	3	3	1	2	1	3			2	3		1	3	2	3	2	1	
CO5																		

Semester	19ISOFC64 Mobile Computing	L	T	P	C
VI		4	0	0	4

Learning Objective (LO):

LO1	To understand of mobile computer systems particularly in the context of wireless network systems
LO2	To emphasizes how to interface hardware to mobile computing devices
LO3	To learn the concepts of Mobile computing
LO4	To explore theoretical issues of Mobile computing
LO5	To develop skills of finding solutions and build software for Mobile computing applications.
LO6	To study the specifications and functionalities of various protocols/standards of mobile networks
LO7	To learn Android and IOS platform and its architecture

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Have knowledge on the concepts and features of mobile computing technologies and applications.
CO2	Have a good understanding of wireless and mobile communication networks and their applications.

CO3	Identify the important issues of developing mobile computing systems and applications.
CO4	Possess good knowledge on Android platform and Architecture designing User Interface and developing Android App.
CO5	Have knowledge on the concepts and features of mobile computing technologies and applications.

Unit-1

Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications and Impediments and Architecture; Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.GSM – Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS.

Unit-2

Motivation for a specialized MAC (Hidden and exposed terminals, Near and far terminals), SDMA, FDMA, TDMA, CDMA, Wireless LAN/(IEEE 802.11)-Mobile Network Layer IP and Mobile IP Network Layers, Packet Delivery and Handover Management, Location Management, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Unit-3

Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP, Mobile TCP, Other Transport Layer Protocols for Mobile Networks. Database Issues: Database Hoarding and Caching Techniques, Client-Server Computing & Adaptation, Transactional Models, Query processing, Data Recovery Process & QoS Issues.

Unit-4

Communications Asymmetry, Classification of Data Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning and Indexing Methods, Data Synchronization.

Unit-5

Introduction, Applications & Challenges of a MANET, Routing, Classification of Routing Algorithms, Algorithms such as DSR, AODV, DSDV, Mobile Agents, Service Discovery. Protocols and Platforms for Mobile Computing: WAP, Bluetooth, J2ME, iOS/Windows CE, Android-Security.

Current Streams of thought: Mobile Platforms and Applications, Mobile Device Operating Systems ,M-Commerce–Structure,Pros& Cons–Mobile Payment System–Security Issues.

Text Books

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley, Second Edition, (2009).

2. Raj Kamal, “Mobile Computing”, Oxford University Press, (2007).

Reference Books

1. Reto Meier, “Professional Android 2 Application Development”, Wrox Wiley, (2010).

2. Neil Smyth, “iPhone iOS 4 Development Essentials – Xcode”, 4 Edition, Payload media, (2011).

3. Ben Shneiderman and Catherine Plaisant, “Designing the User Interface: strategies for Effective Human Computer Interaction”, Addison– Wesley, 5th Edition, (2009).

4. http://www.nettech.in/e-books/Wireless-networks-and-mobile-computing.pdf

5. http://ebooks.cambridge.org/ebook.jsf?bid=CBO9780511546969

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		3	2	2	3	3			2	3	3		3	2	1
CO2	3	3		3		2		1		2		3	3			1	3	2
CO3	3		3	3		1		1		3		2	3	2		3	1	3
CO4	2		3		3	3	1	2		1	2	3				1	3	2
CO5																		

Semester	19ISOFC65 Wireless Networks	L	T	P	C
VI		4	0	0	4

Learning Objective (LO):

LO1	To Study about Wireless Networks, Protocol Stack and Standards.
LO2	To Study about Fundamentals of 3G Services, Its Protocols and Applications.
LO3	To Study about Evolution of 4G Networks, its Architecture and Applications.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Conversant With The Latest 3G/4G And WiMAX Networks And Its Architecture.
CO2	Design and Implement Wireless Network Environment For Any Application Using Latest Wireless Protocols And Standards.
CO3	Implement Different Type of Applications For Smart Phones And Mobile

	Devices With Latest Network Strategies.

Unit-1

Wireless LAN - Introduction-WLAN Technologies: Infrared, UHF Narrowband, Spread Spectrum -IEEE802.11: System Architecture, Protocol Architecture, Physical Layer, MAC Layer, 802.11b, 802.11a – Hiper LAN: WATM, BRAN, HiperLAN2 – Bluetooth: Architecture, Radio Layer, Baseband Layer, Link Manager Protocol, Security – IEEE802.16-WIMAX: Physical Layer, MAC, Spectrum Allocation For WIMAX

Unit-2

Mobile Network Layer - Introduction – Mobile IP: IP Packet Delivery, Agent Discovery, Tunneling And Encapsulation, IPV6-Network Layer In The Internet- Mobile IP Session Initiation Protocol – Mobile Ad-Hoc Network: Routing, Destination Sequence Distance Vector, Dynamic Source Routing.

Unit-3

Mobile Transport Layer - TCP Enhancements For Wireless Protocols – Traditional TCP: Congestion Control, Fast Retransmit/Fast Recovery, Implications Of Mobility – Classical TCP Improvements: Indirect TCP, Snooping TCP, Mobile TCP, Time Out Freezing, Selective Retransmission, Transaction Oriented TCP – TCP Over 3G Wireless Networks.

Unit-4

Wireless Wide Area Network - Overview Of UTMS Terrestrial Radio Access Network-UMTS Core Network Architecture: 3G-MSC, 3G-SGSN, 3G-GGSN, SMS-GMSC/SMS-IWMSC, Firewall, DNS/DHCP-High Speed Downlink Packet Access (HSDPA)- LTE Network Architecture And Protocol.

Unit-5

4G Networks - Introduction – 4G Vision – 4G Features And Challenges – Applications Of 4G – 4G Technologies: Multicarrier Modulation, Smart Antenna Techniques, OFDM-MIMO Systems, Adaptive Modulation And Coding With Time Slot Scheduler, Cognitive Radio.

Text Books

1. Jochen Schiller, ”Mobile Communications”, Second Edition, Pearson Education (2012).(Unit-1,2,3)
2. Vijay Garg , “Wireless Communications And Networking”, First Edition, Elsevier (2014).(Unit-4 and 5)

Reference Books

1. Erik Dahlman, Stefan Parkvall, Johan Skold And Per Beming, “3G Evolution HSPA And LTE For Mobile Broadband”, Second Edition, Academic Press, (2008).
2. Anurag Kumar, D.Manjunath, Joy Kuri, “Wireless Networking”, First Edition, Elsevier (2011).
3. Simon Haykin , Michael Moher, David Koilpillai, “Modern Wireless Communications”, First Edition, Pearson Education (2013).

4. David G. Messerschmitt, “Understanding Networked Applications”, Elsevier, (2010).

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1			3		3	3	3	2					2		3			
CO2	3	3		3		3		3		1		3		2	3	3	1	
CO3	3	3		3		1		3		3		2	3	3			3	2
CO4																		
CO5																		

Semester	19ISOFP66 Python Programming Lab	L	T	P	C
VI		0	0	4	2

Learning Objective (LO):

LO1	To understandthe programming basics in Python Programming
LO2	To understand the object-oriented program design and development in Python Programming
LO3	To understand and be able to use the basic programming principles such as data types, variable, conditionals, loops, array, recursion and function calls.
LO4	To understand file handling in Python.
LO5	To learn the Databases operations in Python

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the basics of programming using PYTHON.
CO2	Acquire knowledge on object-oriented program design anddevelopmentusing Python.
CO3	Develop Python programs using conditional statements, loops, array and functions.

CO4	Develop applications which implements file handling operations.
CO5	Design and develop applications using database operations

List of Exercises

1. Create a simple calculator to do all the arithmetic operations
2. Write a program to use control flow tools like if.
3. Write a program to use for loop
4. Data structures

   use list as stack
   use list as queue
   tuple, sequence

5. Create new module for mathematical operations and use in your program
6. Write a program to read and write files, create and delete directories
7. Write a program with exception handling
8. Write a program using classes
9. Connect with MySQL and create address book
10. Write a program using string handling and regular expressions
11. Program to parse apache log file
12. Create a GUI program using pyGTK

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2	2	2		3	2		2		2	3	3	3	1		
CO2	2					3	3					3				3		
CO3	3	3	3		1						3	2				3		
CO4	3				1		3	2			1	3	3			2		
CO5	3	3	2	2	2		3	2		2		2	3	3	3	1		

Semester	19ISOFP67 Shell Programming Lab	L	T	P	C
VI		0	0	4	2

Learning Objective (LO):

LO1	To Simulate the file commands
LO2	To write shell program for handling files.

LO3	To write programs for familiarising control statements.
LO4	To write programs for handling strings.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Write shell script for implementing control structures.
CO2	Write shell script for handling strings.
CO3	Write shell script for simulating file commands.
CO4	Write shell script for solving various problems.

List of Exercises

1. Write a shell script to stimulate the file commands: rm, cp, cat, mv, cmp, wc, split, diff.
2. Write a shell script to show the following system configuration:
    a. currently logged user and his log name.
    b. current shell, home directory, Operating System type, current Path setting, current working directory.
    c. show currently logged number of users, show all available shells
    d. show CPU information like processor type, speed
    e. show memory information.
3. Write a Shell Script to implement the following: pipes, Redirection and tee commands.
4. Write a shell script for displaying current date, user name, file listing and directories by getting user choice.
5. Write a shell script to implement the filter commands.
6. Write a shell script to remove the files which has file size as zero bytes.
7. Write a shell script to find the sum of the individual digits of a given number.
8. Write a shell script to find the greatest among the given set of numbers using command line arguments.
9. Write a shell script for palindrome checking.
10. Write a shell script to print the multiplication table of the given argument using for-loop.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2			2	2			3	3	3		2	2		
CO2	3	3	2		2							3	3		2		1	3
CO3	2	3			3	3				1		3	2	3		1	3	1
CO4	2	3	3	1	1	3			3	3		1	1	1	3	1	1	3
CO5																		

Semester	19ISOFC71 Design and Analysis of Algorithms	L	T	P	C
VII		4	0	0	4

Learning Objective (LO):

LO1	To teach paradigms and approaches used to analyze and design algorithms and to appreciate the impact of algorithm design in practice
LO2	To make students understand how the worst-case time complexity of an algorithm is defined, how asymptotic notation is used to provide a rough classification of algorithms
LO3	To explain different computational models (e.g., divide-and-conquer), order notation and various complexity measures (e.g., running time, disk space) to analyse the complexity/performance of different algorithms.
LO4	To teach various advanced design and analysis techniques such as greedy algorithms, dynamic programming & Know the concepts of tractable and intractable problems and the classes P, NP and NP-complete problems

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Analyze the asymptotic performance of algorithms.
CO2	Write rigorous correctness proofs for algorithms.
CO3	Demonstrate a familiarity with major algorithms and data structures.
CO4	Apply important algorithmic design paradigms and methods of analysis.
CO5	Synthesize efficient algorithms in common engineering design situations

Unit-1

Introduction: Algorithm Definition – Algorithm Specification – Performance Analysis-Asymptotic Notations. Elementary Data Structures: Stacks and Queues – Trees – Dictionaries – Priority Queues – Sets and Disjoint Set Union – Graphs

Unit-2

Divide and Conquer: The General Method – Defective Chessboard – Binary Search – Finding The Maximum And Minimum – Merge Sort – Quick Sort – Selection - Strassen's Matrix Multiplication.

Unit-3

The Greedy Method: General Method - Container Loading - Knapsack Problem - Tree Vertex Splitting – Job Sequencing With Deadlines - Minimum Cost Spanning Trees - Optimal Storage On Tapes – Optimal Merge Patterns - Single Source Shortest Paths.

Unit-4

Dynamic Programming: The General Method – Multistage Graphs – All-Pairs Shortest Paths – Single-Source Shortest Paths - Optimal Binary Search Trees - String Editing - 0/1 Knapsack - Reliability Design - The Traveling Salesperson Problem - Flow Shop Scheduling. Basic Traversal and Search Techniques: Techniques for Binary Trees – Techniques for Graphs – Connected Components and Spanning Trees – Biconnected Components and DFS.

Unit-5

Backtracking: The General Method – The 8-Queens Problem – Sum of Subsets – Graph Coloring – Hamiltonian Cycles – Knapsack Problem Branch and Bound: Least Cost searchhod - 0/1 Knapsack Problem.

Current Streams of thought:Hashing-Divide and Conquer- Minimum Spanning Tree

Text Book

1. Ellis Horowitz, SatrajSahni and SanguthevarRajasekaran, Fundamentals of Computer Algorithms, Universities Press, Second Edition, Reprint 2009.

Reference Books

1. Data Structures Using C - Langsam, Augenstien, Tenenbaum, PHI
2. Data structures and Algorithms, V.Aho, Hopcropft, Ullman , LPE
3. Introduction to design and Analysis of Algorithms - S.E. Goodman, ST. Hedetniem- TMH.
4. Carlos A.CoelloCoello, Gary B.Lamont, David A.VanVeldhuizen, “Evolutionary Algorithms for Solving Multi-Objective Problems”, Springer 2nd Edition, (2007).
5. website
   https://www.javatpoint.com/daa-tutorial

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	3	2	2			2	2	3	3		3	3	2	2	3
CO2			2	3			2	2	3	2		1		3	3		2	1
CO3	3	3	3	2		3	1	3		2	3	3	1		2	3	1	1
CO4			3	1		1	1	2	1			3	3		1	3	1	2
CO5	3	3	3	2	1	1		1	2	2								

Semester	19ISOFC72 Advanced Web Technology	L	T	P	C
VII		5	0	0	5

Learning Objective (LO):

LO1	Explore the backbone of web page creation by developing .NET skill.
LO2	Enrich knowledge about HTML control and web control classes
LO3	Provide depth knowledge about ADO.NET
LO4	Understand the need of usability, evaluation methods for web services

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Design the web page using .NET frame work
CO2	Recognize the importance of ASP.NET applications
CO3	Apply the knowledge of ADO.NET data management and SQL to develop a client server model
CO4	Know about the component based programming effectively

Unit-1

Overview of ASP.NET - The .NET framework – Learning the .NET languages : Data types – Declaring variables- Scope and Accessibility- Variable operations- Object Based manipulation- Conditional Structures- Loop Structures- Functions and Subroutines. Types, Objects and Namespaces : The Basics about Classes- Value types and Reference types- Advanced class programming- Understanding name spaces and assemblies. Setting Up ASP.NET and IIS

.

Unit-2

Developing ASP.NET Applications - ASP.NET Applications: ASP.NET applications– Code behind- The Global.asax application file- Understanding ASP.NET Classes- ASP.NET Configuration. Web Form fundamentals: A simple page applet- Improving the currency converter- HTML control classes- The page class- Accessing HTML server controls. Web controls: Web Control Classes – Auto PostBack and Web Control events- Accessing web controls. Using Visual Studio.NET: Starting a Visual Studio.NET Project- Web form Designer- Writing code- Visual studio.NET debugging. Validation and Rich Controls: Validation- A simple Validation example- Understanding regular expressions- A validated customer form. State management - Tracing, Logging, and Error Handling.

Unit-3

Working with Data - Overview of ADO.NET - ADO.NET and data management- Characteristics of ADO.NET-ADO.NET object model. ADO.NET data access : SQL basics– Select , Update, Insert, Delete statements- Accessing data- Creating a connection- Using a command with a DataReader - Accessing Disconnected data - Selecting multiple tables – Updating Disconnected data. Data binding: Single value Data Binding- Repeated value data binding- Data binding with data bases. Data list – Data grid – Repeater – Files, Streams and Email – Using XML

Unit-4

Web Services - Web services Architecture : Internet programming then and now- WSDL– SOAP- Communicating with a web service-Web service discovery and UDDI. Creating Web services : Web service basics- The StockQuote web service – Documenting the web service- Testing the web service- Web service Data types- ASP.NET intrinsic objects. Using web services: Consuming a web service- Using the proxy class- An example with TerraService.

Unit–5

Advanced ASP.NET - Component Based Programming: Creating a simple component – Properties and state- Database components- Using COM components. Custom controls: User Controls- Deriving Custom controls. Caching and Performance Tuning: Designing and scalability– Profiling- Catching- Output catching- Data catching. Implementing security: Determining security requirements- The ASP.NET security model- Forms authentication- Windows authentication.

Current Streams of thought: Web Standards, Progressive Web Apps (PWA), Single Page Application (SPA)

Text Book

1. Mathew MacDonald, *ASP.NET Complete Reference*, Tata Mc-GrawHill (2005), 4th Edition.

References:

1. Dino Esposito, *Programming ASP.NET Core*, Microsoft Press (2018), 1stEdition.
2. Adam Freeman, *Pro ASP.NET Core MVC2*, Apress (2017), 7th Edition.
3. https://www.pdfdrive.com/aspnet-core-in-action-d55896174.html (E-book)

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	2	2			2	3	3	3			2			1

CO2				3			1	1	3	2		2	3	3		1		
CO3	2	3	1	3		2	1	3		2		3		3	1	2	3	1
CO4			3				2	3			2	3	3	2	1	1		2
CO5	3	3	3	2	2	2			2	3	3	3			2			1

Semester	19ISOFC73 Advanced Database Management Systems	L	T	P	C
VII		5	0	0	5

Learning Objective (LO):

LO1	To acquire knowledge of database models.
LO2	To understand distributed database architecture.
LO3	To learn the concepts of spatial database.
LO4	To familiar with temporal database

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the concepts of the various database models
CO2	Create code to work on Database Architecture
CO3	Understand the facts and behaviorsof various data patterns
CO4	Efficiently handle the object oriented databases

Unit-1

Relational and parallel Database Design: Basics, Entity Types, Relationship Types, ER Model, ER-to-Relational Mapping algorithm. Normalization: Functional Dependency, 1NF, 2NF, 3NF, BCNF,4NF and 5NF. Architecture, I/O Parallelism, Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Interoperation Parallelism.

Unit-2

Distributed and Object based Databases: Architecture, Distributed data storage, Distributed transactions, Commit protocols, Concurrency control, Query Processing. Complex Data Types, Structured Types and Inheritance, Table Inheritance, array and Multiset, Object Identity and Reference Types, Object Oriented versus Object Relational.

Unit-3

Spatial Database: Spatial Database Characteristics, Spatial Data Model, Spatial Database Queries, Techniques of Spatial Database Query, Logic based Databases: Introduction, Overview, Propositional Calculus, Predicate Calculus, Deductive Database Systems, Recursive Query Processing.

Unit-4

XML Databases: XML Hierarchical data model, XML Documents, DTD, XML Schema, XML Querying, XHTML, Illustrative Experiments.

Unit-5

Temporal Databases: Introduction, Intervals, Packing and Unpacking Relations, Generalizing the relational Operators, Database Design, Integrity Constraints, Multimedia Databases: Multimedia Sources, Multimedia Database Queries, Multimedia Database Applications.

Current Streams of thought: Parallel Database Architectures, Parallel query evaluation Interquery Parallelism, Intraquery Parallelism, Intraoperation Parallelism, Design of Parallel System.

Text Books

1. Abraham Silberschatz, Henry F Korth , S Sudarshan, "*Database System Concepts",* McGraw-Hill International Edition (2019),7th Edition.
2. C.J.Date, A.Kannan, S.Swamynathan, *"An Introduction to Database Systems",* Pearson Education Reprint (2016), 8th Edition.

Reference Books

1. RamezElmasri, Shamkant B Navathe, *"Fundamental of Database Systems"*, Pearson (2016),7th edition.
2. Thomas Connolly, Carolyn Begg., *"Database Systems a practical approach to Design, Implementation and Management ",* Pearson Education (2019), 6th Edition.

E-Books

https://www.tutorialspoint.com/dbms/dbms_tutorial.pdf

https://www.pdfdrive.com/database-system-concepts-6th-edition-d156846614.html

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3				3		3		2		3	3		3		3	2	

CO2	3	3	2				1			3		3		3		1	2	
CO3	3			3		2		3		3		3	3	1		3		
CO4		3		2		3	1	2	1			3		3		3	1	
CO5																		

Semester	19ISOFC74 SOFTWARE PROJECT MANAGEMENT	L	T	P	C
VII		4	0	0	4

LEARNING OBJECTIVES (LO):

This course will enable students to

LO1	Understand the framework of project management.
LO2	Learn to monitor and control the project.
LO3	Know the sound knowledge in Agile method.
LO4	Know the team, cost, quality and resource management.
LO5	Identify and control the risk in the projects.

COURSE OUTCOMES (COs):

CO1	Analyze the scope, cost, timing, and quality of the project, at all times focused on project success as defined by project stakeholders.
CO2	Align the project to the organization's strategic plans and business justification throughout its lifecycle.
CO3	Identify project goals, constraints, deliverables, performance criteria, control needs, and resource requirements in consultation with stakeholders.
CO4	Implement project management knowledge, processes, lifecycle and the embodied concepts, tools and techniques in order to achieve project success.
CO5	Adapt projects in response to issues that arise internally and externally.

UNIT I

Project Management Framework: Introduction: Project - Project management - Relationship among Project, Program and Portfolio management - Project and operations management- Role of project manager - Project management body of knowledge - Enterprise Environmental factors. Project life cycle and Organization: Overview of project life cycle - Projects vs Operational Work - Stakeholders - Organizational influences on project management. The Standard for Project Management of a Project: Project

management processes for a project: Common project management process interactions - Projects management process groups - Initiating process group - planning process group - Executing process group - Monitoring and controlling process group - Closing process group.

UNIT II

Choosing Methodologies and Technologies – Software Processes and Process Models – Choice of Process Models – The Waterfall Model– Prototyping – other ways of categorizing prototype - Agile Methods – Extreme Programming Selecting the Most Appropriate Process Model- Need of Agile - Iterative vs Incremental-Agile Manifesto and Mindset – Lean, Scrum and Kanban methods-uncertainty, Risk, and lifecycle selection-Scrum Elements overview-5 levels of planning-Scrum Process overview-Agile Team-roles and responsibilities- Epic-feature-User Stories-PBI-The Sprint.

UNIT III

The Project Management Knowledge Areas: Project integration management: Develop project charter - Develop project management plan - Direct and manage project execution - Monitor and control project work - Perform integrated change control - Close project or phase. Project scope management: Collect requirements - Define Scope - Create WBS - Verify Scope - Control Scope. Project team management: Define activities - Sequence activities - Estimate activity resources - Estimate Activity Durations - Develop Schedule - Control Schedule.

UNIT IV

Project cost management: Estimate costs - Determine budget - Control costs. Project Quality Management: Plan quality - perform quality assurance - Perform quality control. Project Human Resource Management: Develop human resource plan - Acquire project team - Develop project team - Manage project team. Project Communications Management: Identify stakeholders - Plan communications - Distribute information - Manage stakeholder expectations - report performance.

UNIT V

Project Risk Management: Plan risk management - Identify risks - Perform qualitative risk analysis - Perform quantitative risk analysis - plan risk responses - Monitor and control risks. Project Procurement Management: Plan - Conduct - Administer - Close procurements.

Current Streams of thought:

STAFFING IN SOFTWARE PROJECTS

Managing people – Organizational behavior – Best methods of staff selection – Motivation – The Oldham – Hackman job characteristic model – Stress – Health and Safety – Ethical and Professional concerns – Working in teams – Decision making – Organizational structures – Dispersed and Virtual teams – Communications genres – Communication plans – Leadership.

Text Book:

"A guide to the Project management Body of Knowledge (PMBOK Guide)" Fouth Edition, Project Management Institute, Pennsylvania, (2008)

1. BOB Huges, Mike Cotterell, Rajib Mall “Software Project Management”, McGraw Hill, Fifth Edition,(2011).
2. Emerson, "Agile Handbook," Philosophie

Supplementary Books:

1. Futrell, “Quality Software Project Management”, Pearson Education India.
2. Royce, “Software Project Management”, Pearson Education India.
3. C.Ravindranath Pandian, “Applied Software Risk Management-A Guide for Software Project Managers”, Auerbach Publications,(2015).
4. Benjamin A. Lieberman, “The Art of Software Modeling”, Auerbach Publications, (2010).

Website- E-Learning Resources

https://book.akij.net/eBooks/2018/March/5abcc35b666f7/a%20guide%20to%20the%20project%20management%20body%20of%20knowledge%206e.pdf

https://www.works.gov.bh/English/ourstrategy/Project%20Management/Documents/Other%20PM%20Resources/PMBOKGuideFourthEdition_protected.pdf

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3				3		3		2		3	3		3		3	2	3
CO2	3	3	2				1			3		3		3		1	2	3
CO3	3			3		2		3		3		3	3	1		3		3
CO4		3		2		3	1	2	1			3		3		3	1	2
CO5	3				3		3		2		3	3		3		3	2	3

Semester	19ISOFP76 Advanced Web Technology Lab	L	T	P	C
VII		0	0	4	2

Learning Objective (LO):

LO1	To design web pages using ASP.NET
LO2	To write scripting to validate the webpages.
LO3	To connect with databases using LINQ.
LO4	To create web services

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Design and develop a complete web application using .NET Framework
CO2	Create interactive web pages using web controls.
CO3	Connect with databases using ADO.NET and ASP.NET.
CO4	Develop a simple web application using server side PHP programming and Database connectivity using MySQL.
CO5	Implement the components using advanced ASP.NET wherever it is required.

List of Exercises

1.Create a welcome Cookie (Hit for a page) and display different image and text content each time when the user hit the page
2.List a table of content and navigate within the pages.
3.Demonstrate Request and Response object using HTML Form.
4.Database Connection to display all the values in the table in a webpage using ADO.NET.
5.Query textbox and Displaying records & Display records by using database
6.Write LINQ queries to access the database.
7.Create a web service using ASP.NET
8.Write a component based programming using advanced ASP.NET

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		3				3	3		3	3				2	2
CO2			3	2	2	1	3	3		3		3	3	3		3	3	3
CO3	3	3		3		2		2				3	3	1		2	2	3
CO4			2	3		1		3	2			3		3		1	2	
CO5						3		2	1			3				1	3	2

Semester	19ISOFP77 Algorithm Lab	L	T	P	C
VII		0	0	4	2

Learning Objective (LO):

LO1	To learn the importance of designing an algorithm in an effective way by considering space and time complexity
LO2	To learn graph search algorithms.
LO3	To study network flow and linear programming problems
LO4	To learn the dynamic programming design techniques.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Design an algorithm in a effective manner
CO2	Design and apply iterative and recursive algorithms.
CO3	Design and implement optimization algorithms in specific applications.

List of Exercises

1. A. Create a Java class called Student with the following details as variables within it.

(i) USN(ii)Name(iii)Branch(iv)Phone

Write a Java program to create nStudent objects and print the USN, Name, Branch, and Phoneof these objects with suitable headings.

B. Write a Java program to implement the Stack using arrays. Write Push(), Pop(), and Display() methods to demonstrate its working.

2. A. Design a superclass called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a Java program to read and display at least 3 staff objects of all three categories.

B. Write a Java class called Customer to store their name and date_of_birth. The date_of_birth format should be dd/mm/yyyy. Write methods to read customer data as <name, dd/mm/yyyy> and display as <name, dd, mm, yyyy> using StringTokenizer class considering the delimiter character as "/".

3. A. Write a Java program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero.

B. Write a Java program that implements a multi-thread application that has three threads. First thread generates a random integer for every 1 second; second thread computes the square of the number and prints; third thread will print the value of cube of the number.

4. Sort a given set of n integer elements using Quick Sort method and compute its time complexity. Run the program for varied values of n> 5000 and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the random number generator. Demonstrate using Java how the divide and-conquer method works along with its time complexity analysis: worst case, average case and best case.

5. Sort a given set of n integer elements using Merge Sort method and compute its time complexity. Run the program for varied values of n> 5000, and record the time taken to sort. Plot a graph of the time taken versus non graph sheet. The elements can be read from a file or can be generated using the Random number generator. Demonstrate using Java how the divide and- conquer method works along with its time complexity analysis: worst case, average case and best case.

6. Implement in Java, the 0/1 Knapsack problem using (a) Dynamic Programming method (b) Greedy method.

7 .From a given vertex in a weighted connected graph, find shortest paths to other vertices using Dijkstra's algorithm. Write the program in Java.

8. Find Minimum Cost Spanning Tree of a given connected undirected graph using Kruskal's algorithm. Use Union-Find algorithms in your program.

9. Find Minimum Cost Spanning Tree of a given undirected graph using Prim's algorithm.

10. Write Java programs to (a) Implement All-Pairs Shortest Paths problem using Floyd's algorithm.

(b) Implement Travelling Sales Person problem using Dynamic programming.

11. Design and implement in Java to find a subset of a given set S = {Sl, S2,.....,Sn} of n positive integers whose SUM is equal to a given positive integer d. For example, if S ={1, 2, 5, 6, 8} and d= 9, there are two solutions {1,2,6}and {1,8}. Display a suitable message, if the given problem instance doesn't have a solution.

12. Design and implement in Java to find all Hamiltonian Cycles in a connected undirected Graph G of n vertices using backtracking principle

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		3				2	2		3	3			2	2	
CO2			3	3	1	1	2	3		2		2		3		1	1	
CO3	3	3		1		2	3	1			3	2	3	1	2	2	2	
CO4				3		1		2	1	1			1		2			
CO5	3		3		3				2	2		3	3			2	2	

Semester	19ISOFC81 Distributed Operating System	L	T	P	C
VIII		5	0	0	5

Learning Objective (LO):

LO1	To provide hardware and software issues in modern distributed systems.
LO2	To get knowledge in distributed architecture, naming, synchronization, consistency and Replication,tolerance, security, and distributed file systems.
LO3	To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	To provide hardware and software issues in modern distributed systems
CO2	To get knowledge in distributed architecture, naming, synchronization, consistency and replication, fault tolerance, security, and distributed file systems.
CO3	To analyze the current popular distributed systems such as peer-to-peer (P2P) systems will also be analyzed
CO4	To know about Shared Memory Techniques.
CO5	Have Sufficient knowledge about file access
CO6	Have knowledge of Synchronization and Deadlock

Unit-1

Introduction – Operating System Definition – Functions of Operating System – Types of Advanced Operating System – Design Approaches – Synchronization Mechanisms – concepts of a Process – Critical Section Problem – Process Deadlock – Models of Deadlock – Conditions for Deadlock – System with single-unit requests, Consumable Resources , Reusable Resources.

Unit-2

Distributed Operating Systems: Introduction- Issues – Communication Primitives – Inherent Limitations –Lamport's Logical Clock , Vector Clock, Global State , Cuts – Termination Detection – Distributed Mutual Exclusion – Non Token Based Algorithms – Lamport's Algorithm - Token Based Algorithms –Distributed Deadlock Detection – Distributed Deadlock Detection Algorithms – Agreement Protocols

Unit-3

Distributed Resource Management – Distributed File Systems – Architecture – Mechanisms – Design Issues – Distributed shared Memory – Architecture – Algorithm – Protocols – Design Issues – Distributed Scheduling – Issues – Components – Algorithms.

Unit-4

Failure Recovery and Fault Tolerance – Concepts – Failure Classifications – Approaches to Recovery – Recovery in Concurrent Systems – Synchronous and Asynchronous Check pointing and Recovery –Check pointing in Distributed Database Systems – Fault Tolerance Issues – Two-Phase and Nonblocking Commit Protocols – Voting Protocols – Dynamic Voting Protocols.

Unit-5

Multiprocessor and Database Operating Systems –Structures – Design Issues – Threads – Process Synchronization – Processor Scheduling – Memory management – Reliability/Fault Tolerance – Database Operating Systems – concepts – Features of Android OS, Ubuntu, Google Chrome OS and Linux operating systems.

Current Streams of thought: Types – disk scheduling examples- Network operating systems - Design issues.

Text Books

1. MukeshSinghalN.G.Shivaratri, “Advanced Concepts in Operating Systems”, McGraw Hill (2000).

2. Distributed Operating System – Andrew S. Tanenbaum, PHI.

Reference Books

1. Abraham Silberschatz, Peter B.Galvin, G.Gagne, “Operating Concepts”, 6th Edition Addison Wesley publications (2003).

2. Andrew S.Tanenbaum, “Modern Operating Systems”, 2nd Edition Addison Wesley (2001)

Website

https://www.cs.swarthmore.edu/~newhall/readings/p419-tanenbaum.pdf

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3		2		2		2	2		3	3			3	3	
CO2			2		3	2	3			2		3		3		3		
CO3	2	3		3		3		3		2	2	3	3	3		1	3	
CO4			1	1		2		2	3			1		3		1	2	
CO5	3	2	3			1		3	2					1		3	2	

Semester	19ISOFC82 Advanced Java Programming	L	T	P	C
VIII		5	0	0	5

Learning Objective (LO):

LO1	Design/Develop Program
LO2	Develop appropriate data model and database scheme
LO3	Create and test prototypes
LO4	Develop Structure

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Students will learn to create and access arrays and array lists, including those with references to generalized objects types
CO2	Students will develop linked data structures such as lists and trees.
CO3	Students will learn how to handle exceptions and errors
CO4	Students will design and implement custom checked and unchecked exception types.

Unit-1

Design Patterns: Introduction to Design patterns - Catalogue for Design Pattern - Factory Method Pattern, Prototype Pattern, Singleton Pattern- Adapter Pattern- Proxy Pattern-Decorator Pattern- Command Pattern- Template Pattern- Mediator Pattern-Collection Framework – Array List class – Linked List class – Array List vs. Linked List - List Iterator interface - Hash Set class-Linked Hash Set class-Tree Set class Priority Queue class - Map interface-Hash Map class-Linked Hash Map class –Tree Map class - Comparable interface -Comparator interface-Comparable vs. Comparator

Unit-2

Applet Fundamentals- Applet Class - Applet lifecycle- Steps for Developing Applet Programs-Passing Values through Parameters- Graphics in Applets- GUI Application - Dialog Boxes - Creating Windows - Layout Managers – AWT Component classes – Swing component classes-Borders – Event handling with AWT components - AWT Graphics classes - File Choosers - Color Choosers – Tree – Table –Tabbed panels–Progressive bar - Sliders.

Unit-3

JDBC -Introduction - JDBC Architecture - JDBC Classes and Interfaces – Database Access with MySQL -Steps in Developing JDBC application - Creating a New Database and Table with JDBC - Working with Database Metadata; Java Networking Basics of Networking - Networking in Java- Socket Program using TCP/IP - Socket Program using UDP- URL and Inet address classes.

Unit-4

Servlet: Advantages over Applets - Servlet Alternatives - Servlet Strengths - Servlet Architecture - Servlet Life Cycle – Generic Servlet, Http Servlet - First Servlet - Invoking Servlet - Passing Parameters to Servlets - Retrieving Parameters - Server-Side Include – Cookies- JSP Engines - Working with JSP - JSP and Servlet - Anatomy of a JSP Page- Database Connectivity using Servlets and JSP.

Unit-5

Lambda Expressions- Method Reference- Functional Interface- Streams API, Filters- Optional Class- Nashorn- Base 64 Encode Decode- JShell(RPEL)- Collection Factory Methods- Private Interface Methods- Inner Class Diamond Operator- Multiresolution Image API.

Current Streams of thought:Graphics multithreading, internet networking, and JDBC database connectivity (time permitting).

Textbooks:

1. Bert Bates, KarthySierra , Eric Freeman, Elisabeth Robson, “Head First Design Patterns”, O’REILLY Media Publishers.(1st-Unit).
2. Herbert Schildt, “Java: A Beginner Guide”, Oracle Pres-Seventh Edition. (2nd and 3rd Unit).
3. Murach’s, “Java Servlets and JSP”, 2ndEdition,MikeMurach& Associates Publishers; 3rd Edition. (4th Unit).
4. Warburton Richard, “Java 8 Lambdas”, ShroffPublishers& Distributors Pvt Ltd. (5th Unit).

Reference Books

1. Paul Deitel and Harvey Deitel, “Java: How to Program”, Prentice Hall Publishers; 9th Edition.
2. Jan Graba, “An Introduction to Network Programming with Java-Java 7 Compatible”, 3rd Edition, Springer.

Website

3. https://www.kobo.com/in/en/ebook/advanced-java

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	2	2			2	2		3	3	3		2	2	3
CO2			2	3			3	3		2	3	2	3	2		2	3	2
CO3	3	3		1		3	1	1			3	2					1	3
CO4			1	3		3		1	1			3	1			1	3	1
CO5	3	3	3	2	2	2			2	2		3	3	3		2	2	3

Semester	19ISOFC83 Dot NET Programming	L	T	P	C
VIII		4	0	0	4

Learning Objective (LO):

LO1	To explore the backbone of web page creation by developing .NET skill.
LO2	To Familiar with Application, session and view state management
LO3	To Provide depth knowledge about ADO.NET.
LO4	To Understand the need of usability, evaluation methods for web services
LO5	To acquire knowledge on the usage of recent platforms in developing web applications

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Learn major programming paradigms and techniques involved in design and implementation of modern programming languages.
CO2	Learn about Microsoft .NET framework
CO3	By the end students can develop, implement and creating Applications with C#. VB.NET and ASP.NET
CO4	Creating ASP.Net applications using standard .net controls.
CO5	An ability to use current techniques, skills, and tools necessary for computing practice

Unit-1 - The .NET Framework - Learning the .NET languages - Introduction - Net revolution - .Net framework and its architecture – CLR – What is Assembly – Components of Assembly – DLL hell and Assembly Versioning- O Objects and Namespaces - Setting Up ASP.NET and IIS

Unit-2 - Developing VB.NET Applications - Introduction to VB.Net, The .Net Frame work and Common language runtime, Building VB. Net Application, VB IDE, forms, properties, events, VB language-console application and windows application, data type, declaring variable, scope of variable, operators and statements - Windows Applications-forms, adding controls to forms, handling events, MsgBox, Input Box, multiple forms, handling mouse and Keyboard events, object oriented programming creating and using classes and objects, Handling Exceptions- on Error Goto

Unit-3 - Developin - ASP.NET Applications - ASP.NET Applications – Understanding ASP.NET Controls - Overview of ASP.NET framework, Web Form fundamentals - Web control classes – Using Visual Stdio.NET - Validation and Rich Controls -State management – Tracing, Logging, and Error Handling.

Unit-4 - Developing C#.NET Applications - Introducing C# - overview of C# - Literals,Variables- Data Types, -Operators, -checked and unchecked operators – Expressions – Branching -Looping-*Object Oriented Aspects Of C#:* Class – Objects - Constructors and its types- inheritance, properties, indexers, index overloading – polymorphism - sealed class and methods - interface, - abstract class, operator overloading, - delegates, events, errors and exception - Threading.

Unit-5 - ADO.NET - Overview of ADO.NET - ADO.NET data access – Connected and Disconnected Database, Create Connection using ADO.NET Object Model, Connection Class, Command Class Data binding – Data list – Data grid – Repeater – Files, Streams and Email – Using XML.

Text Books

1. Struts: The Complete Reference,James Holmes 2nd Edition (2007) McGraw Hill Professional
2. Mathew Mac Donald, “ASP.NET Complete Reference”, TMH (2005)
3. Herbert Schildt, “The Complete Reference: C# 4.0”, Tata McGraw Hill, (2012).
4. Christian Nagel et al. “Professional C# 2012 with .NET 4.5”, Wiley India, 2012
5. ASP.NET Unleashed, C# programming – Wrox publication
6. Visual Basic. NET Black Book, by Steven Holzner

Reference Books

1. Jesse Liberty , ‘Programming C#, “ , 4th Edition, O'Reilly Media
2. Mario Szpuszta, Matthew MacDonald , “Pro ASP.NET 4 in C# 2010: Includes Silverlight 2, “Apress, Third Edition
3. J.Liberty, D.Hurwitz, “Programming ASP.NET”, Third Edition, O’REILLY, (2006).
4. Visual Basic. Net programming in easy steps by Tim Anderson, Dreamtech Press

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1			3		3		3		3	3			3					2
CO2			3		2		3			3	3	3		3	1			
CO3	3			1		1		2		1		3	3	3		3	3	1
CO4		3		3		2		1	2		3	3		3		3	3	2
CO5	3		3		3	1		2	1					3				

Semester	19ISOFP84 Advanced Java Lab	L	T	P	C
VIII		0	0	4	2

Learning Objective (LO):

LO1	Using Graphics, Animations and Multithreading for designing Simulation and Game based applications.
LO2	Design and develop GUI applications using Abstract Windowing Toolkit
LO3	(AWT), Swing and Event Handling

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	learn the random numbers, fileoperations,two-way communication using Java Applets
CO2	apply event handling on AWT and Swing components.Java Servlet using NetBeans IDE.
CO3	learn to access RMI concepts using NetBeans IDE. through Java programs
CO4	Develop EJB using NetBeans IDE

List of Exercises

- Generation of random numbers using Java utilities.

- Implementation of file operations using I/O streams.
- Implementation of two way communication between client and server.
- Creation of animation and playing audio clip using Applet.
- Demonstrating the mouse events in event handling using Frame.
- Implementation of database handling using MySql and JDBC.
- Demonstrating cookies in Java Servlet using NetBeans IDE.
- Reading and Displaying the parameters in JSP using NetBeans IDE.
- Designing a simple calculator using JavaScript.
- Demonstrating the frames and web page validation using JavaScript.
- Implementing RMI concepts using NetBeans IDE.
- Adding two variables by Session Bean in EJB using NetBeans IDE

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	2	3	2	2			3	3	3	2		2	3	1
CO2	3	3	1		3	2	2		1	1	3	3		3		2	2	1
CO3	3	3		3	2	1	2				1	3		2		3	1	1
CO4	3	3	2	1	3	2	3			1		1	2	2		1		
CO5																		

Semester	19ISOFP85 DOT NET PROGRAMMING LAB	L	T	P	C
VIII		0	0	4	2

LEARNING OBJECTIVES

LO1	To impart basic knowledge of different control statements and array associated with C # programming.
LO2	To learn various C# elements and OOPS concepts.
LO3	To learn interface, delegates, event and error handling concepts in C#.
LO4	To impart knowledge on networking including socket programming and reflection.
LO5	To acquire a working knowledge of windows and web based applications.

COURSE OUTCOMES

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

CO1	Develop correct, well-documented C# programs using control statements.
CO2	Develop object oriented programming using C# classes and objects.
CO3	Handle the exception and event-driven programs.
CO4	Perform network based programming including chat applications.
CO5	Develop windows and web based applications.

LIST OF EXERCISE

1. Finding Prime number using Classes and Objects
2. Separating Odd/Even Number into Different Arrays
3. String Manipulations
4. Jagged Array manipulation
5. Implementing 'ref' and 'out' keywords
6. Implementing 'Params ' keyword
7. Boxing and Unboxing
8. Constructor Overloading
9. Implementing property
10. Implementing indexer
11. Implementing Multiple inheritance using Interface
12. Implementing Abstract Class
13. Exception Handling Using Try, Catch, and Finally
14. Demonstrating multicast Delegates
15. Implementing the Concept of Reflection
16. Socket Programming
17. Simple Calculator-A Window Application
18. Student Profile-A Window Application
19. Palindrome-A Web Application
20. Formatting Text-A Web Application

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1			3		3		3		3	3			3					2
CO2			3		2		3			3	3	3		3	1			
CO3	3			1		1		2		1		3	3	3		3	3	1
CO4		3		3		2		1	2		3	3		3		3	3	2
CO5	3		3		3	1		2	1					3				

Semester	19ISOFC91 Digital Image Processing	L	T	P	C
IX		4	0	0	4

Learning Objective (LO):

LO1	To know the basic concepts of Digital Image Processing
LO2	To understand the Digital Image Processing methods such as Spatial domain and Frequency domain
LO3	Knowing the features and applications of Edge detection
LO4	To have an idea about Image Compression and its models
LO5	Understanding the Segmentation and Morphological concepts

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Know about the general concept of digital image processing.
CO2	Examine various types of images, color models, intensity transformations and spatial filtering.
CO3	Analyze images in the frequency domain using various transforms.
CO4	Evaluate the methodologies for image compression and segmentation techniques

Unit–1

Fundamentals: Image Sensing and Acquisition, Image Sampling and Quantization, relationship between Pixels; Random noise; Gaussian Markov Random Field, σ-field, Linear and Non-linear Operations; Image processing models: Causal, Semi-causal, Non-causal models.

ColorModels: Color Fundamentals, Color Models, Pseudo-color Image Processing, Full Color Image Processing, Color Transformation, Noise in Color Images.

Unit–2

Spatial Domain: Enhancement in spatial domain: Point processing; Mask processing; Smoothing Spatial Filters; Sharpening Spatial Filters; Combining Spatial Enhancement Methods.

Frequency Domain: Image transforms: FFT, DCT, Karhunen-Loevetransform,Hotlling's T^2 transform, Wavelet transforms and their properties. Image filtering in frequency domain.

Unit–3

Edge Detection: Types of edges; threshold; zero-crossing; Gradient operators: Roberts, Prewitt, and Sobel operators; residual analysis based technique; Canny edge detection. Edge features and their applications.

Unit–4

Image Compression: Fundamentals, Image Compression Models, Elements of Information Theory. Error Free Compression: Huff-man coding; Arithmetic coding; Wavelet transform basedcoding; Lossy Compression: FFT; DCT; KLT; DPCM; MRFM based compression; Wavelet transform based; Image Compression standards.

Unit–5

Image Segmentation: Detection and Discontinuities: Edge Linking and Boundary Deduction; Threshold; Region-Based Segmentation. Segmentation by Morphological watersheds. The use of motion in segmentation, Image Segmentation based on Color.

Morphological Image Processing: Erosion and Dilation, Opening and Closing, Hit-Or-Miss Transformation, Basic Morphological Algorithms, Gray-Scale Morphology.

Current Streams of thought: Image Recognition, Artificial Intelligence, Content Based Image Retrieval (CBIR)

Text Books

1. Rafael Gonzalez, Richard E. Woods, *Digital Image Processing*, PHI/Pearson Education (2013), 4th Edition.
2. K. Jain, *Fundamentals of Image Processing*, PHI, New Delhi (2015), 2nd Edition.

Reference Books

1. Bernd Jahne, *Digital Image Processing*, Springer (2019), 7th Edition.
2. Scott E Umbaugh, *Digital Image Processing andAnalysis,* Tyalor& Francis Group: CRC Press (2017), 3rd Edition.
3. https://www.pdfdrive.com/digital-image-processing-d166706128.html (E-Book)

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1			3		3	3	2		2			3	3		2	3	3	
CO2			3	2		3		3		2		3				3		
CO3		3		3				3				3			3	2	3	1
CO4			3	2		3		1	2	2		3	1		3	1	1	
CO5			3		3	3	2		2			3	3		2	3	3	

Semester	19ISOFC92 Machine Learning	L	T	P	C
IX		4	0	0	4

Learning Objective (LO):

LO1	To Learn about Machine Intelligence and Machine Learning applications
LO2	To implement and apply machine learning algorithms to real-world applications.
LO3	To identify and apply the appropriate machine learning techniquesfor classification, pattern recognition, optimization and decision problems.
LO4	To understand how to perform evaluation of learning algorithms and model selection.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Have a good understanding of the fundamental issues and challenges of

	machine learning: data, model selection, model complexity, etc.
CO2	Have an understanding of the strengths and weaknesses of many popular machine learning approaches.
CO3	Appreciate the underlying mathematical relationships within and across Machine Learning algorithms and the paradigms of supervised and un-supervised learning.
CO4	Design and implement various machine learning algorithms in a range of real-world applications.

Unit-1

INTRODUCTION Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Unit-2

NEURAL NETWORKS AND GENETIC ALGORITHMS : Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evaluation and Learning.

Unit-3

BAYESIAN AND COMPUTATIONAL LEARNING : Bayes Theorem – Concept Learning – Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier – Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Unit-4

INSTANT BASED LEARNING :K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

Unit-5

ADVANCED LEARNING : Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted *Deduction* – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q-Learning – Temporal Difference Learning.

Current Streams of thought: Convergence of AI and IoT,Cloud Computing Optimization, Improved Cyber Security

Text Book

1. Tom M. Mitchell, *Machine Learning*, McGraw-Hill Education (India) Private Limited (2013), Indian Edition.

REFERENCES

1. Kalita, J., Balas, V.E., Borah, S., Pradhan, R. (Eds.), Recent Developments in Machine Learning and Data Analytics, Springer (2018), Kindle Edition.
2. https://www.cs.huji.ac.il/~shais/UnderstandingMachineLearning/copy.html (E-book)

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	2	2	1			3	3	3	2	3	3	1		
CO2	3	3	2		3		1	2			3		3	3	3	1	2	3
CO3	3	3	3		2	2		1					3	2	2		1	
CO4	3	3	3		2			3			1	3	3	2	3	2		
CO5	3	3	3	2	2	2	1			3	3	3	2	3	3	1		

Semester	19ISOFC93 Internet of Things	L	T	P	C
IX		4	0	0	4

Learning Objective (LO):

LO1	To provide an understanding of the technologies and the standards relating to the Internet of Things.
LO2	To develop skills on IoT technical planning.
LO3	To Implement Data and Knowledge Management and use of Devices in IoT Technology.
LO4	To Understand State of the Art IoT Architecture.
LO5	To study Real World IoT Design Constraints, Industrial Automations in IoT.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the technology and standards relating to IoT.
CO2	Know about the critical parts of the ICT ecosystem required to mainstream

	IoT.
CO3	Acquire skills on developing their own national and enterprise level technical strategies.
CO4	Interpret the vision of IoT from a global context.
CO5	Determine the Market perspectives of IoT.

Unit-1

INTRODUCTION TO IoT: Internet of Things - Physical Design- Logical Design- IoT Enabling Technologies - IoT Levels & Deployment Templates - Domain Specific IoTs - IoT and M2M - IoT System Management with NETCONF-YANG- IoT Platforms Design Methodology.

Unit-2

IoT ARCHITECTURE: M2M high-level ETSI architecture - IETF architecture for IoT - OGC architecture - IoT reference model - Domain model - information model - functional model - communication model - IoT reference architecture

Unit-3

IoT PROTOCOLS: Protocol Standardization for IoT – Efforts – M2M and WSN Protocols – SCADA and RFID Protocols – Unified Data Standards – Protocols – IEEE 802.15.4 – BACNet Protocol – Modbus– Zigbee Architecture – Network layer – 6LowPAN - CoAP - Security

Unit-4

WEB OF THINGS: Web of Things versus Internet of Things – Two Pillars of the Web – Architecture Standardization for WoT– Platform Middleware for WoT – Unified Multitier WoT Architecture – WoT Portals and Business Intelligence. Cloud of Things: Grid/SOA and Cloud Computing – Cloud Middleware – Cloud Standards – Cloud Providers and Systems – Mobile Cloud Computing – The Cloud of Things Architecture.

Unit-5

APPLICATIONS: The Role of the Internet of Things for Increased Autonomy and Agility in Collaborative Production Environments - Resource Management in the Internet of Things: Clustering, Synchronisation and Software Agents. Applications - Smart Grid – Electrical Vehicle Charging.

Current Streams of thought: IOT in the real world situations, IOT Security,Blockchain for IOT Security

Reference Books

1. Dr Kamlesh Lakhwani, Dr Hemant Kumar Gianey, *Internet of Things (IOT): Principles, Paradigms & Applications of IOT*, Bpb publications (2019).
2. Cuno Pfister, Getting Started with Internet of Things, O'Reilly (2018), 1st Edition.
3. ArshdeepBahga, Vijay Madisetti, *Internet of Things – A hands-on approach*, Universities Press(2015).

4. Dieter Uckelmann, Mark Harrison, Michahelles, Florian (Eds), *Architecting the Internet of Things*, Springer(2011).
5. Jan Ho¨ ller, VlasiosTsiatsis , Catherine Mulligan, Stamatis , Karnouskos, Stefan Avesand. David Boyle, *From Machine-to-Machine to the Internet of Things - Introduction to a New Age of Intelligence*, Elsevier(2014).
6. David Easley and Jon Kleinberg, *Networks, Crowds, and Markets: Reasoning About a Highly Connected World*, Cambridge University Press(2010).
7. Olivier Hersent, David Boswarthick, Omar Elloumi ,*The Internet of Things – Key applications and Protocols*, Wiley (2012).
8. https://www.pdfdrive.com/internet-of-things-iot-technologies-applications-challenges-and-solutions-e158467863.html (E-book)

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1		3			3	3			3	2		3	3	2		3	1	1
CO2			3	2		2		2			3	3	3	3		3	3	2
CO3	3	3		3				2			3	3	3	2			3	2
CO4				3		2		3	2	1		3	3	3		3	2	2
CO5	3	3	3			1			2	1	3	3	3	3		2	2	1

Semester	19ISOFP94 Image Processing Lab	L	T	P	C
IX		0	0	4	2

Learning Objective (LO):

LO1	To impart skills on the processing of digital images.
LO2	To learn the transformation of images from spatial domain to frequency domain.
LO3	To perform the edge deduction techniques.
LO4	To gain knowledge about compressing the images using suitable techniques.
LO5	To know the segmentation methods.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Retrieve and display the image.
CO2	Transform the domain from spatial to frequency.
CO3	Apply suitable operators to detect the edge.
CO4	Perform the process of compression and segmentation using certain methods

List of Exercises

1. Perform the linear and non linear operations on images.
2. Perform smoothing operations on an image in spatial domain.
3. Perform sharpening operations on an image in spatial domain.
4. Transform the image into DCT, FFT and wavelet.
5. Implement the canny edge deduction.
6. Evaluate the performance of gradiant operators.
7. Implement the huff-man coding technique.
8. Perform DCT compression method.
9. Implement the image segmentation based on color.
10. Implement the concepts of erosion and dilation.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3		3	2			2			3			3		2	
CO2	3		2			3		2		2	3	3	3	3	1	3		1
CO3	3			2	2	3		2				3		3	1	2	3	2
CO4	3			2		3		3		1	3	3	3			2	1	1
CO5	3	3	3		3	2			2			3			3		2	

Semester	19ISOFP95 Machine Learning Lab	L	T	P	C
IX		0	0	4	2

Learning Objective (LO):

LO1	To know about the emerging technologies in the areas of machine learning and implement the machine learning concepts and algorithms.
LO2	To make use of Data sets in implementing the machine learning algorithms.
LO3	To develop a basic understanding of the principles of machine learning.
LO4	To derive practical solutions using predictive analytics.
LO5	To understand the techniques which are more appropriate for the problems.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Understand the concepts of machine learning algorithms.
CO2	Apply machine learning tools to build and evaluate predictors.
CO3	Comprehend how machine learning uses computer algorithms to search for patterns in data.
CO4	Familiarize in using data patterns to make decisions and predictions with real-world examples.

List of Exercises

1. Reading and writing into .csv files
2. Implement the Find –S algorithm.
3. Implement the Candidate-Elimination algorithm.
4. Classify a sample using ID3 algorithm.
5. Build an artificial neural network by implementing backpropagation algorithm.
6. Construct the naïve Bayesian classifier for classification.
7. Construct a naïve Bayesian classifier and evaluate the classifier with accuracy, precision, and recall metrics
8. Applying EM algorithm for clustering using K-means algorithm.
9. Implement the k-Nearest Neighbour algorithm to classify the data set.

- Implement the non-parametric Locally Weighted Regression algorithm.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3		2	2			2	2		3	3	3	2	2		
CO2	3		3			2		2		2	3	3	3	3	1	2		
CO3	3			2	2	1		2				3	3	3	2	1	1	
CO4	3		2	2		3		1	1	2		3	3	2	3	3		
CO5																		

Semester	19IPSCI06 CONSTITUTION OF INDIA	L	T	P	C
IX		2	0	0	2

Learning Objectives:

Students will be able to:

LO1	To understand the basic features of Indian Constitution.
LO2	To grasp about the basic Rights & duties of Indian Citizenry
LO3	To ponder over the form of Indian Political System.
LO4	To have broad understanding about the pivotal provisions related with liberty, Equality and fraternity.

Course Outcomes:

After the successful completion of the course, the students will be able to:

CO1	Imbibed about the basic features of Indian Political System.
CO2	Enlighten with the rights & duties of Indian Citizens.
CO3	Understand the significance of rule of law.
CO4	Inculcated with basic liberties.

Unit I : Introduction

Meaning of the Constructional law and Constitutionalism – Historical Perspective of the Constitution of India – Salient features Characteristics of the Constitution of India

.**Unit II : Rights and Duties**

Scheme of the Fundamental Rights – The scheme of the Fundamental Duties and its legal status – The Directive Principles of State Policy-Its importance and implementation

Unit III : Centre State Relationship

Federal Structure and distribution of legislative and financial powers between the union and the states- Parliamentary form of Government in India – The Constitution powers and status of the president of India.

Unit IV : Amendments and Provisions

The Historical perspectives of the constitutional amendments in India – Emergency Provision: National Emergency, President Rule. Financial Emergency

Unit V: Institutions

Judiciary –Judiciary Activism – Amending Procedures- Recent Trends –Rights to Information- Lokpal and LokAyukta

Text Books :

1. Bipan Chandra, Mridula Mukherjee, Adility Makherjee 2016., India after Independence (1947-2000), Penguin Publishers, New Delhi.

2. Durga Das Basu,(2018)., Introduction to the Constitution of India Prentice Hall, New Delhi.

3. Jogendra Yadav (2000), Transforming India: Dynamics of Democracy, Oxford University Press New Delhi

Supplementary Readings:

1. The Constitution of India 1950 (Bare Act), Government Publications.

2. Busi S.N Ambedkar B.R 2015 Framing of Indian Constitution

3. Jain M.P 2014 Indian Constitution Law Lexis Nexis

4. Paul R.Brass 1999 The politics of India Since Independence Cambridge University Press

5. Granvila Austin 2006 The Indian Constitution: Cornerstone of a Nation, Oxford University Press, New Delhi

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1		3	3		2					2	3	3						
CO2		3	2		3	2					3			3	2			
CO3	3	2		3	2					2			3	2	2			
CO4																		
CO5																		

***1-Low *2-Medium *3-Strong**

Semester	19ISOFCX1SOFTWARE TESTING AND QUALITY ASSURANCE	L	T	P	C
X		4	0	0	4

LEARNING OBJECTIVES:

LO1	Develop methods and procedures for software development that can scale up for large systems.
LO2	It can be used to consistently produce high-quality software at low cost and with a small cycle time.
LO3	Student learns systematic approach to the development, operation, maintenance, and retirement of software.
LO4	Student learns how to use available resources to develop software, reduce cost of software and how to maintain quality of software.
LO5	Methods and tools of testing and maintenance of software's

COURSE OUTCOMES:

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

CO1	Apply modern software testing processes in relation to software development and project management.
CO2	Create test strategies and plans, design test cases, prioritize and execute them.
CO3	Manage incidents and risks within a project.
CO4	Contribute to efficient delivery of software solutions and implement improvements in the software development processes.

UNIT- I

Testing Environment and Test Processes: World-Class Software Testing Model – Building a Software Testing Environment - Overview of Software Testing Process – Organizing for Testing – Developing the Test Plan – Verification Testing –Analyzing and Reporting Test Results – Acceptance Testing – Operational Testing – Post Implementation Analysis

UNIT-II

Testing Techniques and Levels of testing: Using White Box Approach to Test design - Static Testing Vs. Structural Testing – Code Functional Testing – Coverage and Control Flow Graphs –Using Black Box Approaches to Test Case Design – Random Testing – Requirements based testing –Decision tables –State-based testing – Cause-effect graphing – Error guessing – Compatibility testing – Levels of Testing - Unit Testing – Integration Testing - Defect Bash Elimination. System Testing - Usability and Accessibility Testing – Configuration Testing - Compatibility Testing - Case study for White box testing and Black box testing Techniques.

UNIT- III

Incorporating Specialized Testing Responsibilities: Testing Client/Server Systems – Rapid Application Development Testing – Testing in a Multiplatform Environment – Testing Software System Security - Testing Object-Oriented Software – Object Oriented Testing – Testing Web based systems – Web based system – Web Technology Evolution – Traditional Software and Web based Software – Challenges in Testing for Web-based Software – Testing a Data Warehouse - Case Study for Web Application Testing.

UNIT-IV

Test Automation: Selecting and Installing Software Testing Tools - Software Test Automation – Skills needed for Automation – Scope of Automation – Design and Architecture for Automation – Requirements for a Test Tool – Challenges in Automation – Tracking the Bug – Debugging – Case study using Bug Tracking Tool.

UNIT-V

Software Testing and Quality Metrics: Testing Software System Security - Six-Sigma – TQM - Complexity Metrics and Models – Quality Management Metrics - Availability Metrics - Defect Removal Effectiveness - FMEA - Quality Function Deployment – Taguchi Quality Loss Function – Cost of Quality. Case Study for Complexity and Object Oriented Metrics.

TEXT BOOKS:

1. William Perry, “Effective Methods of Software Testing”, Third Edition, Wiley Publishing (2007).

2.Srinivasan Desikan and Gopalaswamy Ramesh, “Software Testing – Principles and Practices”, Pearson Education, (2007).

3. Naresh Chauhan , “Software Testing Principles and Practices ” Oxford University Press , New Delhi , (2010).

4. Dale H. Besterfiled et al., “Total Quality Management”, Pearson Education Asia, Third Edition, Indian Reprint (2006).

5. Stephen Kan, “Metrics and Models in Software Quality”, Addison – Wesley, Second Edition, (2004).

REFERENCE BOOKS

1. Llene Burnstein, “Practical Software Testing”, Springer International Edition, Chennai, (2003)

2. Renu Rajani,Pradeep Oak, “Software Testing – Effective Methods, Tools and Techniques”, Tata McGraw Hill,(2004).

3. Edward Kit, “Software Testing in the Real World – Improving the Process”, Pearson Education,(1995).

4. Boris Beizer, “Software Testing Techniques” – 2nd Edition, Van Nostrand Reinhold, New York,(1990).

5. Adithya P. Mathur, “Foundations of Software Testing – Fundamentals algorithms and Techniques”, Dorling Kindersley (India) Pvt. Ltd., Pearson Education, (2008).

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3			3		3		3		3		3		3			3	
CO2	3		3		3			3	3			3	3	3		3		3
CO3		3		2			3			2	2		2		3		2	
CO4	3	2			3		2		1			1		3	2			3
CO5																		

Semester	19ISOFCX2 Data Science and Big Data Analytics	L	T	P	C
X		4	0	0	4

Learning Objective (LO):

LO1	To understand the basic and advanced methods to big data technology and tools.
LO2	To learn MapReduce and Hadoop and its ecosystem.
LO3	To acquire skills on R programming.
LO4	To analyse different classification methods.
LO5	To study data visualization tools.

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Identify the characteristics of datasets for various applications.
CO2	Understand the Select environment for the applications.
CO3	Solve problems associated with big data characteristics.
CO4	Analyze the mathematical and statistical tools with modern technologies like Hadoop and Mapreduce thereby provide better solution.

Unit-1

Introduction to Big Data Analytics : Big Data Overview – Data Structures – Analyst Perspective on Data Repositories - State of the Practice in Analytics – BI Versus Data Science - Current Analytical Architecture – Drivers of Big Data – Big Data Ecosystem - Data Ana lytics Lifecycle – Data Discovery – Data Preparation – Model Planning – Model Building – Communicate Results – Operationalize.

Unit-2

Basic Data Analytic Methods Using R : Introduction to R programming – R Graphical User Interfaces – Data Import and Export – Attribute and Data Types – Descriptive Statistics Exploratory Data Analysis : Visualization Before Analysis – Dirty Data – Visualizing a Single Variable – Examining Multiple Variables Data Exploration Versus Presentation — Statistical Methods of Evaluation : Hypothesis Testing – Difference of Means – Wilcoxon Rank-Sum Test – Type I and Type II Errors – Power and Sample Size – ANOVA..

Unit-3

Advanced Analytical Theory and Methods: Clustering – K Means – Use Cases – Overview – Determining number of clusters – Diagnostics – Reasons to choose and cautions – Additional Algorithms - Association Rules : A Priori Algorithm – Evaluation of Candidate Rules – Applications of Association Rules – Validation and Testing – Diagnostics. Regression : Linear Regrression and Logistic Regression :– Use cases – Model Description – Diagnostics - Additional Regression Models.

Unit-4

Classification : Decision Trees – Overview – Genetic Algorithm – Decision Tree Algorithms – Evaluating Decision Tree – Decision Trees in R - Na'ive Bayes – Bayes Theorem – Naïve Bayes Clasifier – Smoothing – Diagnostics – Naïve Bayes in R – Diagnostics of Classifiers – Additional Classification Methods - Time Series Analysis : : Overview – Box – Jenkins Methodology – ARIMA Model – Autocorrelation Function – Autoregressive Models – Moving Average Models – ARMA and ARIMA Models – Building and Evaluating and ARIMA Model - Text Analysis : Text Analysis Steps – Example – Collecting – Representing Term Frequency – Categorizing – Determining Sentiments – Gaining Insights.

Unit-5

Advanced Analytics-Technology and Tools: MapReduce and Hadoop : Analytics for Unstructured Data .- *UseCases* - *MapReduce* - Apache Hadoop – The Hadoop Ecosystem – pig – Hive – Hbase – Manout – NoSQL - Tools in Database Analytics : SQL Essentials – Joins – Set operations – Grouping Extensions – In Database Text Analysis - Advanced SQL – Windows Functions – User Defined Functions and Aggregates – ordered aggregates- MADiib - Analytics

Reports Consolidation – Communicating and operationalizing and Analytics Project – Creating the Final Deliverables : Developing Core Material for Multiple Audiences – Project Goals – Main Findings – Approach Model Description – Key points support with Data - Model details – Recommendations – Data Visualization.

Current Streams of thought: Real time Analytics Platform(RTAP) applications – Case Studies – Real Time Sentiment Analysis, Stock Market Predictions,Using Graph Analytics for Big Data: Graph Analytics

Text Book

1. *"Data Science & Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data",* EMC Education Services, Published by John Wiley & Sons, Inc. (2015)

Reference Books

1. Noreen Burlingame ,*"The little book on Big Data",* New Street publishers, (2012).
2. Anil Maheshwari, *" Data Analytics",* McGraw Hill Education, (2017).

3. Norman Matloff, *"The Art of R Programming: A Tour of Statistical Software Design",* Starch Press,(2011) 1st edition.
4. SandipRakshit, *"R for Beginners",* McGraw Hill Education, (2017).

Websites

1. http://www.johndcook.com/R_language_for_programmers.html.
2. http://bigdatauniversity.com/.
3. http://home.ubalt.edu/ntsbarsh/stat-data/topics.htm#rintroduction.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1		3	3	3	2		2	2		2		3	3	3	1	3		
CO2	3		3	3		3		2		3	1	2	3	3	2	1	1	
CO3		3		3	3	2	3			2		3	3	3	2	1		
CO4		3		2		3		2				3	3	3	2	1	1	
CO5		3	3	3	2		2	2		2		3	3	3	1	3		

Semester	19ISOFPX3 SOFTWARE TESTING LAB	L	T	P	C
X		0	0	4	2

LEARNING OBJECTIVES:

LO1	Testing is a process of executing a program with the intent of finding an error.
LO2	A good test case is one that has a high probability of finding an as yet undiscovered error.
LO3	A successful test is one that uncovers an as yet undiscovered error.
LO4	Documenting user requirements using the UML notation.
LO5	Description of the various types of the Use Cases.

COURSE OUTCOMES:

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

CO1	Apply modern software testing processes in relation to software development and project management.
CO2	Create test strategies and plans, design test cases, prioritize and execute them.
CO3	Manage incidents and risks within a project.
CO4	Contribute to efficient delivery of software solutions and implement improvements in the software development processes.

LIST OF EXERCISES

1. Understand the automation testing approach
2. Using Selenium IDE, Write a test suite containing minimum 4 test cases
3. Write and test a program to login a specific web page
4. Write the test cases for any known application (e.g. Banking application)
5. Create a test plan document for any application (e.g. Library Management System)
6. Study of any testing tool (e.g. Win runner)
7. Study of any web testing tool (e.g. Selenium)
8. Study of any bug tracking tool (e.g. Bugzilla, bugbit)
9. Study of any test management tool (e.g. Test Director)
10. Study of any open source-testing tool (e.g. Test Link)

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	2					2					3		1	3			2
CO2			3		2			3		1							3	
CO3	3					2					3				1			
CO4				3				3	2				3					1
CO5																		

Semester	19ISOFDX4 Project Work/ In-Plant Training	L	T	P	C
X		0	0	18	9

Learning Objective (LO):

LO1	To provide insights into real world challenges and problem those required IT related solutions.
LO2	To empower the students to bring out the IT related solutions for the requirements.
LO3	To expose the students to have a broad idea of literature related to the project domain.
LO4	To enable students to use all concepts of IT in creating a solution for a problem.
LO5	To improve the team building, communication and management skills of the students

Course Outcomes (CO)

At the end of the course, the student will be able to

CO1	Discover the most thrust areas in the field of Information Technology.
CO2	Develop a complete project for a particular problem domain.
CO3	Identify, analyse, design and implement any IT related projects.
CO4	Compare and contrast existing solutions for developing a project.
CO5	Demonstrate an ability to work in a teams and manage with good communication skill.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	2		3		3	2		1		3			3		2	3
CO2	3	3		2	3		1			2		3	3	3	3	3	3	
CO3	3	3		3	2		2			2		3	3	3		3	3	2
CO4	3		2			3	3				1	3	3	2		3	2	
CO5	3	3	2			3	3				2	3	3	2		3	1	2

DEPARTMENT ELECTIVE COURSES

19ISOFE16 Computer Organization and Architecture	L	T	P	C
	3	0	0	3

Learning Objectives

To understand the Computer Functional Units and the Design Procedure of Computer System.

LO1	To understand the Architecture and Organization of the Computer System.
LO2	To understand what a process is going on the Address modes and Programs.
LO3	To understand different approaches to Memory management Systems.
LO4	Students should be able to how to process going on Input and Output Organizations.
LO5	Students should understand the Computer Instruction, Arithmetic Instruction and Logical Instruction.

Course Outcomes

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

CO1	Understand the Organization of Computer and Basic Architecture Components involved in Computer Designs.
CO2	Explain the Central Processing Units system and Address, Arithmetic and Logical Instructions.
CO3	Analyse the various devices and Input / Output Organization Systems.
CO4	Understand the Addressing methods and Programs of Bus Structure in Computer Systems.

Unit-1

Basic of Computer, Von Neumann Architecture, Generation of Computer, Classification of Computers, Instruction Execution. Register Transfer and Micro operations: Register Transfer, Bus and Memory Transfers, Three-State Bus Buffers, Memory Transfer, Micro-Operations, Register Transfer Micro-Operations, Arithmetic Micro-Operations, Logic Micro-Operations, Shift Micro-Operations.

Unit-2

Stack Organization, Register Stack, Memory Stack, Reverse Polish Notation. Instruction Formats, Three- Address Instructions, Two – Address Instructions, One - Address Instructions, Zero - Address Instructions, RISC Instructions, Addressing Modes. RISC & CISC and their characteristics.

Unit-3

Addition And Subtraction With Signed-Magnitude, Multiplication Algorithm, Booth Multiplication Algorithm, Array Multiplier, Division Algorithm, Hardware Algorithm, Divide Overflow, Floating-Point Arithmetic Operations, Decimal Arithmetic Operations, BCD Adder, BCD Subtraction.

Unit-4

Modes Of Transfer, Priority Interrupt, DMA, Input-Output Processor (IOP), CPU-IOP Communication. Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Cache Memory, Virtual Memory, Associative Memory.-

Unit-5

Control memory – Address sequencing – Design of Control unit. Pipelining: Parallel Processing, Pipelining - Arithmetic Pipeline, Instruction Pipeline. Multiprocessors: Characteristics of Multiprocessors, Interconnection Structure: Time-Shared Common Bus, Multi-Port Memory, Crossbar Switch, Multistage Switching Network, Hypercube Interconnection.

Text and Reference Books

1. “Computer System Architecture”, M.Morris Mano.

2. “Computer System Architecture”, John. P. Hayes.

3. “Computer Organization, C. Hamacher, Z. Vranesic, S.Zaky.

4. “Computer Architecture and parallel Processing “, Hwang K. Briggs.

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		2									3	3					
CO2					3				3		2	3		3	2	1	3	3
CO3	3							3				3	2			2	2	
CO4			3			2						2	1			1		
CO5																		

19ISOFE17 MICROPROCESSOR AND ITS APPLICATIONS	L	T	P	C
	3	0	0	3

Learning Objectives

To understand the Computer Functional Units and the Design Procedure of Computer System.

LO1	To introduce basic concepts of interfacing memory and peripheral device of a microprocessor.
LO2	To introduce 8085 Architecture.
LO3	To introduce 8051 Microcontroller.
LO4	To understand and device techniques for faster execution of instructions, improve speed of operations and enhance performance of
LO5	To introduce serial and parallel bus standards.

Course Outcomes

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

CO1	Understand basic architecture of 8085,8051 microcontroller and 8086 microprocessor.
CO2	Understand interfacing of 8 bit,16 bit,32 bit and 64 bit microprocessor with memory and peripheral device.
CO3	Understand the concept of Pentium processor.
CO4	Distinguish between Microprocessor and Microcontroller.

Unit–I

Microcomputer – microprocessor architecture and its operations – memory input/output – addressing modes – instruction classification, format and timings.

Unit–II

Instruction set – Data Transfer instructions: Arithmetic operations – logic and Branch operation – Looping, counting and indexing – 16 bit arithmetic operations related to memory – logic operations – time delays.

Unit–III

Stack – subroutine – call and Return instruction – parallel input/output – 8255 programmable peripheral interface – 8253 Programmable timer – The 8085 Interrupts: 8259 programmable interrupt controller – Direct Memory Access – 8257 DMA controller.

Unit–IV

Advanced microprocessors – 80 x 87 architecture – Concepts of arithmetic coprocessor – introduction to 80386, 80486 – memory paging mechanism.

Unit–V

Introduction to the Pentium and Pentium pro microprocessor – Applications – Temperature monitoring and Control – Traffic light Control.

Text and Reference Books

1. RameshS. Gaonkar, "Microprocessor Architecture Programming and Applications with 8085", Fourth Edition, Penram International Publishing (2000).
2. Barry B. Brey, "The Intel Microprocessors 8086/8088, 80186/80188, 80286, 80386,80486, Pentium and Pentium Pro Processor Architecture, Programming and Interfacing", 4th Edition, Prentice Hall of India Private Limited, (1997).

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3									2	1					
CO2					3				3		3	2		2	1	3	2	1
CO3	3							3				3	2			2	1	
CO4			3			3						3	2			1		
CO5																		

19ISOFE36 SYSTEM SOFTWARE	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To introduce software systems with an emphasis on operating system.
LO2	To identify and understand different phases and passes of Assembler and their functioning.
LO3	To understand the basic concepts of linker, loader, interpreter, editor and debugger.

LO4	To understand the basic macro processor functions, Machine-independent macro processor features, macro expansion and MASM macro processor.
LO5	To study System Software Tools.
LO6	To view some of the major tasks of the system software of a computer system
LO7	To focus on internal working of the hardware

COURSE OUTCOMES

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

CO1	Develop the system and program in assembler and lexical analyser.
CO2	Develop SIC assembler functions and algorithm, Program relocation and Machine independent assembler features.
CO3	Understand how linker and loader create an executable program from an object module created by assembler and compiler.
CO4	Understand macro processor functions, definition and expansion, macro processor algorithm, Macro within Macro-Implementation and ANSI C Macro language.

UNIT I

The Simplified Instructional Computer (SIC) - Machine architecture - Data and instruction formats - addressing modes - instruction sets - I/O and programming.

UNIT II

A simple SIC assembler – Assembler algorithm and data structures - Machine dependent assembler features - Instruction formats and addressing modes – Program relocation - Machine independent assembler features - Literals – Symbol-defining statements – Expressions - One pass assemblers and Multi pass assemblers - Implementation example - MASM assembler.

UNIT III

Design of an Absolute Loader – A Simple Bootstrap Loader - Machine dependent loader features - Relocation – Program Linking – Algorithm and Data Structures for Linking Loader - Machine-independent loader features - Automatic Library Search – Loader Options - Loader design options - Linkage Editors – Dynamic Linking – Bootstrap Loaders - Implementation example - MSDOS linker

UNIT IV

Macro Definition and Expansion – Macro Processor Algorithm and data structures - Machine-independent macro processor features - Concatenation of Macro Parameters – Generation of Unique Labels – Conditional Macro Expansion – Keyword Macro Parameters-

Macro within Macro-Implementation example - MASM Macro Processor – ANSI C Macro language.

UNIT V

Overview of the Editing Process - User Interface – Editor Structure - Interactive debugging systems - Debugging functions and capabilities – Relationship with other parts of the system – User-Interface Criteria.

TEXT BOOK

1. Leland L. Beck, "System Software – An Introduction to Systems Programming", 4 th Edition, Pearson Education Asia, (2010).

REFERENCES BOOKS

1. D. M. Dhamdhere, "Systems Programming and Operating Systems", Second Revised Edition, Tata McGraw-Hill, (2009).
2. John J. Donovan, "Systems Programming", Tata McGraw-Hill Edition, (2009).
3. John R. Levine, Linkers & Loaders – Harcourt India Pvt. Ltd., Morgan Kaufmann Publishers, (2009).

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3									2	3		3	3	2	3	1
CO2	3	3					2			1		3				2	1	
CO3	3	3	2		2	1						2	3	3	3	2	2	1
CO4	3	2	1				2					1			3	3	3	1
CO5																		

19ISOFE37 COMPILER DESIGN	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	Discover principles, algorithms and techniques that can be used to construct various phases of compiler.
LO2	Acquire knowledge about finite automata and regular expressions

LO3	Learn context free grammars, compiler parsing techniques.
LO4	Explore knowledge about Syntax Directed definitions and translation scheme
LO5	Understand intermediate machine representations and actual code generation

COURSE OUTCOMES

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

CO1	Use the knowledge of patterns, tokens & regular expressions
CO2	Have the knowledge in semantic analysis and syntax directed translation.
CO3	Design a code generator with a knowledge in code optimization.
CO4	Learn the new code optimization techniques to improve the performance of a program in terms of speed and space.

Unit-1 - Lexical analysis - Language Processors, The Structure of a Compiler, Parameter passing mechanism – Symbol table - The role of the lexical analyzer - Input buffering - Specification of tokens - Recognition of tokens – Finite automata - Regular expression to automata.

Unit-2 - Syntax Analysis - The role of the parser - Context-free grammars - Writing a grammar - Top down Parsing - Bottom-up Parsing - LR parsers- LALR parsers.

Unit-3 - Semantic Analysis - Inherited and Synthesized attributes – Dependency graphs – Ordering the evaluation of attributes – S-attributed definitions – L-attributed definitions – Applications of Syntax Directed translation – Syntax Directed translations schemes - Storage organization – Stack allocation of space.

Unit-4 - Intermediate Code Generation - Variants of Syntax trees – Three Address code – Types and Declarations - Translation of Expressions – Type checking - Control flow - Back patching - Switch Statements - Procedure calls.

Unit-5 - Code Generation and Code Optimization - Issues in the design of a code generator - The target language – Address in the Target Code – Basic Block and Flow graphs – Optimization of Basic Blocks - A simple code generator – Peephole Optimization.

Text Book

1. Alfred V. Aho, Monica S.Lam, Ravi Sethi and Jeffrey D. Ullman, “Compilers- Principles, Techniques and Tools”, Second Edition, Pearson Education Asia, (2009).

Reference Books

1. A.V. Aho, Ravi Sethi, J.D. Ullman, Compilers - Principles, Techniques and Tools, Addison- Wesley, (2003).
2. Fischer Leblanc, Crafting Compiler, Benjamin Cummings, Menlo Park, (1988).
3. Kennath C.Louden, Compiler Construction Principles and Practice, Vikas publishing House, (2004).
4. Allen I. Holub, Compiler Design in C, Prentice Hall of India, (2001).
5. S.Godfrey Winster, S.Aruna Devi, R.Sujatha, "Compiler Design", yesdee Publishers, Third Reprint (2019).

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3		3	3	3	3		2	2	1				2	3			
CO2				3			2			2		3	3	3	2	3		1
CO3	3	3	2	3		3	2	2		1	3	3	3				2	
CO4			2		3	1	3	2				3		3	1	1	1	2
CO5																		

19ISOFE57 OPEN SOURCE TECHNOLOGY	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To Introduces Open Source methodologies.
LO2	To make the students to gain experience using open source tools, languages and frameworks to prepare for careers in software
LO3	To understand common open source licenses and the impact of choosing a license.
LO4	To understand concepts, strategies, and methodologies related to open source software development.

LO5	To be familiar with open source software products and development tools currently available on the market.

COURSE OUTCOMES

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

CO1	Access the open source software.
CO2	Handle open source project.
CO3	Operate on different platform.
CO4	Learn receive and process form submission data.

UNIT I

Introduction: Open Source, Free Software, Free Software vs. Open Source software, Public Domain Software, FOSS does not mean no cost. History : BSD, The Free Software Foundation and the GNU Project.

UNIT II

Open Source History, Initiatives, Principle and methodologies. Philosophy : Software Freedom, Open Source Development Model Licences and Patents: What Is A License, Important FOSS Licenses (Apache,BSD,GPL, LGPL), copyrights and copylefts, Patents Economics of FOSS : Zero Marginal Cost, Income-generation opportunities, Problems with traditional commercial software, Internationalization

UNIT III

Community Building: Importance of Communities in Open Source Movement-JBoss Community- Starting and Maintaining an Open Source Project - Open Source Hardware

UNIT IV

Apache HTTP Server and its flavors- WAMP server (Windows, Apache, MySQL, PHP)-Apache, MySQL, PHP, JAVA as development platform.

UNIT V

Open source vs. closed source Open source government, Open source ethics. Social and Financial impacts of open source technology, Shared software, Shared source.

TEXT BOOKS

1. Sumitabha Das “Unix Concepts and Applications, Tata McGraw Hill Education 006

2. The Official Ubuntu Book, 8th Edition

3. Kailash Vedera, Bhavyesh Gandhi, “Open Source Technology”, University Science press, ker

REFERENCE BOOKS

1. Paul Kavanagh, “Open Source Software: Implementation and Management”, Elsevier Digital Press.

2. The Linux Documentation Project : http://www.tldp.org

3. Docker Project Home : http://www.docker.com

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3				3			3			3	3		2	2	3		2
CO2	3	3		3	3		2			2	3	3	3	2			2	
CO3			3		1			1				3		3	1			1
CO4	3	3					2			2								
CO5																		

19ISOFE58 Cyber Security	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To understand the key terms and concepts in cyber law, intellectual property and cyber-crimes, trademarks and domain theft.
LO2	To acquire knowledge about securing both clean and corrupted systems and protection of personal data and computer networks.
LO3	To understand the fundamentals of cryptography, and some key encryption techniques used today.
LO4	To develop an understanding of security policies and protocols to implement such policies.
LO5	To examine secure software development practices and able to incorporate approaches for risk management and best practices.

COURSE OUTCOMES

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

CO1	Assess cyber security risk management policies in order to adequately protect an organizations critical information and assets.
CO2	Measure the performance of security systems within an enterprise-level information system.
CO3	Troubleshoot, maintain and update an enterprise-level information security system.
CO4	Implement continuous network monitoring and provide real-time security solutions.
CO5	Formulate, update and communicate short- and long-term organizational cyber security strategies and policies.

Unit-1

Introduction to Cyber Security - Introduction -Computer Security - Threats -Harm - Vulnerabilities - Controls - Authentication -Access Control and Cryptography - Web—User Side - Browser Attacks - Web Attacks Targeting Users - Obtaining User or Website Data - Email Attacks.

Unit-2

Risk Management & Planning - Introduction – An overview of Risk Management – Risk Identification – Risk Assessment – Risk control Strategies – Selecting a Risk control Strategy – Quantitative versus qualitative risk control practices - Risk Management Discussion Points – Recommended Risk Control Practices. Planning for Security: Introduction – Information Security Policy, Standards and Practices – The Information Security Blueprint – Security Education, Training and Awareness Program – Continuity Strategies. Security Technology: Firewalls and VPNs: Introduction – Physical Design – Firewalls – Protecting Remote Connections.

Unit-3

Security Technology - INTRUSION DETECTION, ACCESS CONTROL AND OTHER SECURITY TOOLS Introduction – Intrusion Detection and Prevention System (IDS and IPSs) – Honey Pots, Honey Nets and Padded Cell Systems – Scanning and Analysis Tools – Access Control Devices. Cryptography: Introduction – Foundations of Cryptology – Cipher Methods – Cryptographic Algorithms – Cryptographic Tools.

Unit-4

Security Implementation -Physical Security: Introduction – Physical Access Controls – Fire Security and Safety – Failure of Supporting Utilities and Structural Collapse – Interception of Data – Mobile and Portable Systems – Special Considerations for Physical Security Threats. Implementing Information Security: Introduction – Information Security Project Management – Technical Topics of Implementation – Non technical Aspects of Implementation – Information Systems Security Certification and Accreditation.

Unit-5

Information and Human Security- Fundamentals-Employee responsibilities- information classification-Information handling- Tools of information security- Information processing-secure program administration. Organizational and Human Security: Adoption of Information Security Management Standards, Human Factors in Security- Role of information security professionals.

Reference Books

1. Principles and Practices of Information Security – Dr Michael E.Whitman, CISM, CISSP Herbert J.Mattord, CISM, CISSP – Cengage Learning India Private Limited Indian fourth edition Reprint (2010).
2. Charles P. Pfleeger Shari Lawrence Pfleeger Jonathan Margulies, Security in Computing, 5th Edition , Pearson Education , (2015)
3. Thomas R. Peltier, “Information Security policies and procedures: A Practitioner’s Reference”, 2nd Edition Prentice Hall, (2004).

Outcome Mapping

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	3	3	2		1	1	3		3	3	3		2	1

CO2		3		1	2		1			2	3	3					3	
CO3	3		3			3				3							3	
CO4		3		3		3			3			3					1	
CO5	3		3		3	3	3		2				2					

19ISOFE86 OBJECT ORIENTED SYSTEM DEVELOPMENT	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	Introduce the concept of Object-oriented design and understand the fundamentals of OOSD life cycle.
LO2	Familiar with evolution of object-oriented model, classes and it notations
LO3	Practice UML in order to express the design of software projects.
LO4	Specify, analyze and design the use case driven requirements for a particular system.
LO5	Enrich knowledge about DBMS, designing classes and object oriented testing.

COURSE OUTCOMES

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

CO1	Show how the object-oriented approach differs from the traditional approach to systems analysis and design.
CO2	Analyze, design, document the requirements through use case driven approach
CO3	Explain the importance of modeling and how the Unified Modeling Language (UML) represents an object-oriented system using a number of
CO4	Recognize the difference between various object relationships: inheritance, association and aggregation.
CO5	Show the role and function of test cases, testing strategies and test plans in developing object- oriented software.

UNIT – I - Fundamentals of OOSD - Overview of Object Oriented Systems Development : Two orthogonal view of the software - OOSD methodology - Why an object Object orientation. Object basics: Object Oriented Philosophy- Objects – Attributes – Object respond to messages – Encapsulation and information hiding – class hierarchy – Polymorphism – Object relationship and associations. OOSD life cycle : Software development process – OOSD Use case Driven Approach – Reusability.

UNIT – II - Methodology, Modeling and UML - Object Oriented Methodologies: Rumbaugh et al.'s object modeling technique – The Booch methodology – The Jacobson et al. methodology – Patterns – Frameworks - The Unified approach. Unified Modeling Language : Static and dynamic models – Why modeling - UML diagrams – UML class diagram – Use case diagram - UML dynamic modeling – packages and model organization.

UNIT – III - Object Oriented Analysis - Object Oriented Analysis process : Business Object Analysis - Use case driven object oriented analysis – Business process modeling – Use-Case model – Developing effective documentation . Classification : Classifications theory – Approaches for identifying classes – Noun phrase approach – Common class patterns approach – Use-Case Driven approach – Classes, Responsibilities, and Collaborators - Naming classes. Identifying object relationships, attributes, and methods : Association – Super-Sub class relationship – Aggregation – Class responsibility – Object responsibility.

UNIT – IV - Object Oriented Design - Object Oriented Design Process and Design Axioms - OOD process- OOD axioms – Corollaries – Design patterns. Designing classes : Designing classes – Class visibility – Refining attributes – Designing methods and protocols – Packages and managing classes. Access layer: Object Store and persistence – DBMS – Logical and physical Database Organization and access control – Distributed Databases and Client Server Computing — Multidatabase Systems – Designing Access layer classes. View Layer : Designing view layer classes – Macro level process – Micro level process – The purpose of view layer interface – Prototyping the user interface.

UNIT – V - Software Quality - Software Quality Assurance : Quality assurance tests – Testing strategies – Impact of Object Orientation on Testing - Test Cases- Test Plan – Continuous testing. System Usability and Measuring User satisfaction: Usability Testing – User satisfaction test – A tool for analyzing user satisfaction. System Usability and Measuring User satisfaction : Introduction – Usability Testing.

TEXT BOOK

1. Ali Bahrami, "Object Oriented Systems Development using UML", McGraw-Hill, (2008).

REFERENCE BOOKS

1. Booch Grady, Rumbaugh James, Jacobson Ivar, "The Unified modeling Language – User Guide, Pearson Education, (2006)
2. Brahma Dathan, Sarnath Ramnath, "Object Oriented Analysis, Design and Implementation", Universities Press, (2010).
3. Mahesh P.Matha, "Object-Oriented Analysis and Design Using UML", PHI Learning Private Limited, (2012).
4. Rachita Misra, Chhabi Rani Panigrahi, Bijayalaxmi Panda, "Principles of Software Engineering and System Design", Yesdee Publishing (2019).

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3			2							2		3	3		2
CO2	3			1			2	2		2			3					
CO3			1							1		3			3	3	3	2
CO4		3			1	2					3			3	3			
CO5	3				3			1		2	3			3	3		3	1

19ISOFE87 ADVANCED DATA STRUCTURE AND ALGORITHM	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To teach efficient storage mechanisms of data for an easy access.
LO2	To design and implementation of various basic and advanced data structures.
LO3	To introduce various techniques for representation of the data in the real world.
LO4	To develop application using data structures.
LO5	To teach the concept of protection and management of data.

COURSE OUTCOMES

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

CO1	Appropriate data structure as applied to specified problem definition.
CO2	Handle operations like searching, insertion, deletion, traversing mechanism etc. on various data structures
CO3	Apply concepts learned in various domains like DBMS, compiler construction etc.
CO4	Analyse the data structures and their implementation algorithm.

UNIT-I

Elementary Data Structures - Stacks and Queues - Linked Lists - Implementing pointers and objects - Hash tables - Direct-address tables - Hash functions - Open addressing - Perfect hashing - Binary search trees - Querying binary search trees - Insertion and deletion - Red-Black trees -Properties - Rotations - Insertion - Deletion.

UNIT-II

The Role of algorithm in computing - Analyzing algorithm - Designing algorithm – Divide and Conquer - Maximum-sub array problem - Analyzing the divide-and-conquer algorithm - Strasen's algorithm for matrix multiplication - Substitution method for solving recurrences.

UNIT-III

Sorting and order statistics - Heap sort - Maintaining the heap priority - Building a heap - Heap sort algorithm - Priority queues - Quick sort - Description of quick sort - Performance of quick sort - A randomized version of quick sort - Analysis of quick sort - Sorting in Linear Time – Lower bounds for sorting - Radix sort - Medians and order statistics - Minimum and Maximum

UNIT-IV

Advanced Design and Analysis Techniques - Dynamic Programming - Rod cutting - Elements of dynamic programming - Optimal binary search trees - Greedy algorithms - An activity- selection algorithm - Elements of greedy strategy – Huffman codes - Graph Algorithms – Elementary Graph algorithms – Minimum spanning trees - Single source shortest path – All Pairs shortest path .

UNIT-V

Advanced Data Structures - B- trees - Definition - Basic Operations on B-trees – Deleting a key from B-tree - Fibonacci heaps - Structure of Fibonacci heap - Data structure for disjoint sets - Disjoint set operations - Linked list representation of disjoint sets. NP-

Completeness –Basic concept of P and NP – NP-Hard Problem – Polynomial type – NP completeness – approximation and algorithm for some NP complete problems.

TEXT BOOKS

1. Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest and Cliford Stein, Introduction to Algorithms, Third Edition, The MIT press, (2009).

Reference Books:

1. Timothy Budd, An Introduction to Object Oriented Programming, Pearson Education, Second Edition, (1996).

2. Jean Paul Tremblay and Paul G. Sorenson, An Introduction to Data Structures with Applications, Tata McGraw Hill, Second Edition, (2010).

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3				3			2			3			3	2		3	
CO2		3				2						3		3	3			2
CO3				3					1						3		1	
CO4	3	3	3	2					1	1			3	3	3		2	
CO5																		

19ISOFE88 CLOUD COMPUTING	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To Acquire the Knowledge of Cloud and computing services
LO2	To learn the basics of Cloud Architecture and storage technologies.
LO3	To gain knowledge about the concept of Cloud Deployment Models
LO4	To Build Cloud based various applications
LO5	To gain Knowledge on security issues in cloud Environment.

COURSE OUTCOMES

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

CO1	Apply different cloud programming model as per need.
CO2	Introduce the broad perceptive of cloud architecture
CO3	Learn the economics of outsourcing IT to the Cloud.
CO4	Explore some important cloud computing driven commercial systems such as Google Apps, Microsoft Azure and Amazon Web Services and other businesses cloud applications.
CO5	Learn how DNS works, and how it can be used for service discovery using Cloud

UNIT - I:

Cloud computing definition- Characteristics- Benefit-Challenges- Distributed Systems- Virtualization-Service-oriented computing- Utility-oriented computing- Building Cloud Computing environments- computing platforms & technologies - Cloud Models – Cloud Service Examples - Cloud Based Services & Applications - Cloud concepts and Technologies.

UNIT - II:

Virtualization: Virtualization- Characteristics- taxonomy-types- Pros and Cons- Examples Architecture: Reference model- types of clouds- Compute Service - Storage Services - Cloud Database Services - Application Services - Content Delivery Services - Analytics Services - Deployment And Management Service - Identity And Access Management Services - Open Source Private Cloud Software.

UNIT – III:

Design consideration- Reference Architecture for Cloud Application - Cloud Application Design Methodologies - Data Storage Approaches- Development in Python: Design Approaches – Application: Image Processing - Document Storage - Map Reduce - Social Media Analytics.

UNIT – IV:

Introduction- Installing Python- Data types & Data Structures- Control Flow- Functions- Modules- Packages- File Handling-Date/Time Operations – Classes- Python for Cloud: Amazon Web Services –Google Cloud Platform - Windows Azure –Map Reduced – Packages of Interest – Designing a RESTful Web API.

UNIT – V:

Big Data Analytics: Clustering Big data - Classification of Big Data – Recommendation systems. Multimedia Cloud: Case Study: Live Video Stream App - Streaming Protocols –

Case Study: Video Transcoding App-Cloud Security: CSA Cloud Security Architecture - Authentication - Authorization - Identity and Access management - Data Security - Key Management- Auditing- Cloud for Industry, Healthcare & Education.

TEXT BOOKS:

1. Buyya, Vecciola and Selvi, Mastering Cloud Computing: Foundations and Applications Programming, Tata McGraw Hill, (2013).
2. ArshdeepBahga, Vijay Madisetti, "Cloud Computing: A Hands – On Approach"
3. Universities press (India) Pvt. limited (2016).

REFERENCE BOOKS:

1. Rittinghouse and Ransome, Cloud Computing: Implementation, Management, and Security, CRC Press, (2016).
2. Michael Miller "Cloud Computing Web based application that change the way you work and collaborate online". Pearson edition, (2008).
3. Kris Jamsa, Cloud Computing: SaaS, PaaS, IaaS, Virtualization, Business Models, Mobile,Security and More, Jones & Bartlett Learning, (2012).

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	2	2		3	2		2		3	3	3		2	3	1
CO2	3	3	3	2		3		1	3	3		3	3	1		3	3	2
CO3		3		2				3		2		3				2	3	2
CO4		3		3		2		2			3	3				3	3	1
CO5	3	3	3	3	2		3	2	2	1		3	3			3	1	2

19ISOFE89 DISTRIBUTED AND PARALLEL COMPUTING	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To learn core ideas behind parallel and distributed computing.
LO2	To explore the methodologies adopted for concurrent and distributed environment.

LO3	To understand the networking aspects of parallel and distributed computing.
LO4	To provide an overview of the computational aspects of parallel and distributed computing.
LO5	To learn parallel and distributed computing models.

COURSE OUTCOMES

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

CO1	Explore the methodologies adopted for concurrent and distributed environment.
CO2	Analyse the networking aspects of Distributed and Parallel Computing.
CO3	Design high performance computing.
CO4	Establish effective communication among the network.

UNIT I

Parallel and Distributed Computing — Introduction- Benefits and Needs- Parallel and Distributed Systems- Programming Environment- Theoretical Foundations- Parallel Algorithms— Introduction- Parallel Models and Algorithms- Sorting- Matrix Multiplication- Convex Hull- Pointer Based Data Structures.

UNIT II

Synchronization: Process Parallel Languages- Architecture of Parallel and Distributed Systems- Consistency and Replication- Security- Parallel Operating Systems.

UNIT III

Management of Resources in Parallel Systems: Tools for Parallel Computing- Parallel Database Systems and Multimedia Object Servers.

UNIT IV

Networking Aspects of Distributed and Parallel Computing - Process- Parallel and Distributed Scientific Computing.

UNIT V

High-Performance Computing: Molecular Sciences- Communication- Multimedia Applications for Parallel and Distributed Systems- Distributed File Systems.

TEXTBOOK

1. Jacek Błażewicz, et al., “Handbook on parallel and distributed processing”, Springer Science & Business Media, (2013).

REFERENCE BOOKS

1. Andrew S. Tanenbaum, and Maarten Van Steen, “Distributed Systems: Principles and Paradigms”. Prentice-Hall, (2007).
2. George F.Coulouris, Jean Dollimore, and Tim Kindberg, “Distributed systems: concepts and design”, Pearson Education, (2005).
3. Gregor Kosec and Roman Trobec, “Parallel Scientific Computing: Theory, Algorithms, and Applications of Mesh Based and Meshless Methods”, Springer, (2015).

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3	3	3	3	2	2	2	1		1	2	3	3	3	3	3		
CO2	3			3			3						3	3	3	3	3	3
CO3	3	3	3	3	3		3	3		3		3	3	3	3	3		3
CO4	3				3			1		2				3	3	2	2	
CO5																		
CO2	1	2	2	3		3		3		1			2	2		3	3	
CO3		3		3		3		2		2	1	3	3		3	2	2	1
CO4	3	3	3	2	2					1	3	3	3	2	2			1
CO5																		

19ISOFE96 CRYPTOGRAPHY AND NETWORK SECURITY	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To understand Cryptography Theories, Algorithms and Systems.
LO2	To understand necessary Approaches and Techniques to build protection mechanisms in order to secure computer networks.

LO3	To know about the malicious software & firewalls.

COURSE OUTCOMES

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

CO1	Understand the fundamentals of networks security, security architecture, threats and vulnerabilities
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms.
CO3	Apply the different cryptographic operations of public key cryptography.
CO4	Apply the various Authentication schemes to simulate different applications.
CO5	Understand various Security practices and System security standards.

UNIT I:

Introduction - Security trends – Legal, Ethical and Professional Aspects of Security, Need for Security at Multiple levels, Security Policies – Model of network security – Security attacks, services and mechanisms – OSI security architecture – Classical encryption techniques: substitution techniques, transposition techniques, steganography-Foundations of modern cryptography: perfect security – information theory – product cryptosystem – cryptanalysis.

UNIT II:

Symmetric Encryption and Message Confidentiality - Symmetric Encryption Principles, Symmetric Block Encryption Algorithms, Stream Ciphers and RC4 , Chipher Block Modes of Operation, Location of Encryption Devices, Key Distribution. Public-key Cryptography and Message Authentication: Approaches to Message Authentication, Secure Hash Functions and HMAC, Public-Key Cryptography Principles, Public-Key Cryptography Algorithms, Digital Signatures, Key Management.

UNIT III:

Authentication Applications - Kerberos, x.509 Authentication Service, Public-Key Infrastructure. Electronic Mail Security: Pretty Good Privacy (PGP), S/MIME.

UNIT IV:

IP Security - IP Security Over view, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations. Web Security: Web Security Considerations, Secure Socket Layer(SSL) and Transport Layer Security(TLS),

Secure Electronic Transaction(SET).Network Management Security: Basic Concepts of SNMP, SNMPv1 Community Facility, SNMPv3.

UNIT V :

Intruders - Intruders, Intrusion Detection, Password Management. **Malicious Software:** Virus and Related Threats, Virus Countermeasures, Distributed Denial of Service Attacks. **Firewalls:** Firewall Design Principles, Trusted Systems, Common Criteria for Information Technology Security Evaluation.

TEXT BOOKS:

1. Behrouz A. Ferouzan, "Cryptography & Network Security", Tata Mc Graw Hill, 2007, Reprint 2015.
2. Stallings William, "Cryptography and Network Security - Principles and Practice 2017.
3. William Stallings, "Network Security Essentials Applications and Standards "Third Edition, Pearson Education, 2008.

REFERENCE BOOKS:

1. Man Young Rhee, "Internet Security: Cryptographic Principles", "Algorithms And Protocols", Wiley Publications, 2003.
2. Charles Pfleeger, "Security In Computing", 4th Edition, Prentice Hall Of India, 2006.
3. Ulysess Black, "Internet Security Protocols", Pearson Education Asia, 2000.
4. Charlie Kaufman And Radia Perlman, Mike Speciner, "Network Security, Second Edition, Private Communication In Public World", PHI 2002.
5. Bruce Schneier And Neils Ferguson, "Practical Cryptography", First Edition, Wiley Dreamtech India Pvt Ltd, 2003.
6. Douglas R Simson "Cryptography – Theory And Practice", First Edition, CRC Press, 1995.
7. Http://Nptel.Ac.In/.

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CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
CO1	3				3		3		2			2				3	2	
CO2			3		2		2			2		2	3		3	2		2
CO3	3			3		1		1		1		3			3	2		
CO4		3		3				2	1		1	3	3		2	1		1
CO5	3		3	2		1		3	1									

19ISOFE97 WEB DATABASE AND INFORMATION SYSTEM	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	Understand how n-tiered architectures can be used to implement secure, scalable systems
LO2	Design and develop database-driven websites and applications
LO3	Understanding XML as a messaging and data exchange mechanism
LO4	Understand Web "semantic systems," such as auctions, recommendation systems, and search ranking.
LO5	Understand critical components of the modern Web infrastructure: DNS, Content Delivery Networks, etc.

COURSE OUTCOMES

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

CO1	Know the concepts and terminologies related to web analytics.
CO2	Explore various parameters used for web analytics and their impact.
CO3	Explore the use of tools and techniques of web analytics.
CO4	Get experience on websites, web data insights and conversions.

UNIT I

Introduction: Web Overview, Introduction to Apache, MySQL, Networking : TCP/IP, HTTP, Introduction to PHP, Dynamic Page Generation, Sessions and Personalization.

UNIT II

Web Analytics: Basics – Traditional Ways – Expectations – Data Collection – Clickstream Data – Weblogs – Beacons – JavaScript Tags – Packet Sniffing – Outcomes data – Competitive data – Search Engine Data.

UNIT III

Qualitative Analysis: Customer Centricity – Site Visits – Surveys – Questionnaires – Website Surveys – Post visits – Creating and Running- Benefits of surveys – Critical components of successful strategy.

UNIT IV

Web Analytic concepts: URLS – Cookies – Time on site – Page views – Understand standard reports – Website content quality – Navigation reports (top pages, top destinations, site overlay). – Search Analytics – Internal search, SEO and PPC – Measuring Email and Multichannel Marketing - Competitive intelligence and Web 2.0 Analytics – Segmentation – Connectable reports.

UNIT V

Goals and Funnels: Filters - Ecommerce Tracking - Real Time Reports - Customer Data Alert - Adwords Linking - Adsense Linking -Attribution Modeling - Segmentation - Campaign Tracking - Multi-Channel Attribution.

TEXTBOOK

1. Avinash Kaushik, "Web Analytics 2.0: The Art of Online Accountability and Science Of Customer Centricity ", 1st edition, Sybex, (2009).

REFERENCE BOOKS

1. Michael Beasley, "Practical Web Analytics for User Experience: How Analytics can help you Understand your Users", Morgan Kaufmann, (2013).
2. Magy Seif El-Nasr, Anders Drachen, Alessandro Canossa, eds., "Game Analytics: Maximizing the Value of Player Data", Springer, (2013).
3. Bing Liu, "Web Data Mining: Exploring Hyperlinks, Content, and Usage Data", 2nd Edition, Springer, (2011).
4. Justin Cutroni, "Google Analytics", O'Reilly, (2010).

Eric Fettman, Shiraz Asif, Feras Alhlou , "Google Analytics Breakthrough", John Wiley & sons, (2016).

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CO1	3	3	3	3	2	2		1		2	3	3	3	3	1			
CO2	3	3	3	3	2	3				2	3	3	3	3	2	3	2	1
CO3	3			3		2	2	1			3	3	3	3	2		3	3
CO4	3	3	1		2		3			3	3	3		2	3			2
CO5																		

19ISOFE98 BUSINESS INTELLIGENCE	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

The student should be made to:

LO1	Be exposed with the basic rudiments of business intelligence system
LO2	Understand the modelling aspects behind Business Intelligence
LO3	Understand of the business intelligence life cycle and the techniques used in it
LO4	Be exposed with different data analysis tools and techniques

COURSE OUTCOMES

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

CO1	Explain the fundamentals of business intelligence.
CO2	Link data mining with business intelligence.
CO3	Apply various modelling techniques.
CO4	Explain the data analysis and knowledge delivery stages.
CO5	Apply business intelligence methods to various situations.
CO6	Decide on appropriate technique.

UNIT I

Business Intelligence: Effective and timely decisions – Data, information and knowledge – Role of mathematical models – Business intelligence architectures: Cycle of a business intelligence analysis – Enabling factors in business intelligence projects – Development of a business intelligence system – Ethics and business intelligence.

UNIT - II

Knowledge Delivery: The business intelligence user types, Standard reports, Interactive Analysis and Adhoc Querying, Parameterized Reports and Self-Service Reporting, dimensional analysis, Alerts/Notifications, Visualization: Charts, Graphs, Widgets,

Scorecards and Dashboards, Geographic Visualization, Integrated Analytics, Considerations: Optimizing the Presentation for the Right Message.

UNIT - III

Efficiency: Efficiency measures – The CCR model: Definition of target objectives- Peer groups – Identification of good operating practices; cross efficiency analysis – virtual inputs and outputs – Other models. Pattern matching – cluster analysis, outlier analysis

UNIT - IV

Business Intelligence Applications: Marketing models – Logistic and Production models – Case studies.

UNIT - V

Future of Business Intelligence: Future of business intelligence – Emerging Technologies, Machine Learning, Predicting the Future, BI Search & Text Analytics – Advanced Visualization – Rich Report, Future beyond Technology.

TEXT BOOK:

1. Efraim Turban, Ramesh Sharda, Dursun Delen, "Decision Support and Business Intelligence Systems", 9th Edition, Pearson 2013.

REFERENCE BOOKS:

1. Larissa T. Moss, S. Atre, "Business Intelligence Roadmap: The Complete Project Lifecycle of Decision Making", Addison Wesley, (2003).
2. Carlo Vercellis, "Business Intelligence: Data Mining and Optimization for Decision Making", Wiley Publications, (2009).
3. David Loshin Morgan, Kaufman, "Business Intelligence: The Savvy Manager‟s Guide", Second Edition, (2012).
4. Cindi Howson, "Successful Business Intelligence: Secrets to Making BI a Killer App", McGraw-Hill, (2007).
5. Ralph Kimball , Margy Ross , Warren Thornthwaite, Joy Mundy, Bob Becker, "The Data Warehouse Lifecycle Toolkit", Wiley Publication Inc.,(2007).

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CO2	3	3	3	1			3	2		1	3	3	3	2	3	1	3	3
CO3	3		3		2			3		3	3	3		1	1	3	3	3
CO4		2			3			3		3	3			3	3		2	1

CO5	3				3			2		2	2			3	3	3	3	2
CO6		3			3		2	1		3	3	3	3	3	3	2	1	1

19ISOFE99 ADVANCED COMPUTER NETWORKS	L	T	P	C
	3	0	0	3

LEARNING OBJECTIVES

LO1	To study communication network protocols, different communication layer structure
LO2	To learn security mechanism for data communication

COURSE OUTCOMES

After the completion of this course students will be able to

CO1	To master the terminology and concepts of the OSI reference model and the TCP-IP reference model.
CO2	To master the concepts of protocols, network interfaces, and design/performance issues in local area networks and wide area
CO3	To be familiar with wireless networking concepts, and be familiar with contemporary issues in networking technologies.
CO4	To be familiar with network tools and network programming

UNIT I - Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP models – Example networks: Internet, 3G Mobile phone networks, Wireless LANs – RFID and sensor networks - Physical layer – Theoretical basis for data communication - guided transmission media

UNIT-II -Wireless transmission - Communication Satellites – Digital modulation and multiplexing - Telephones network structure – local loop, trunks and multiplexing, switching. Data link layer: Design issues – error detection and correction.

UNIT-III-Elementary data link protocols - sliding window protocols – Example Data Link protocols – Packet over SONET, ADSL - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols.

UNIT-IV-Network layer - design issues - Routing algorithms - Congestion control algorithms – Quality of Service – Network layer of Internet- IP protocol – IP Address – Internet Control Protocol.

UNIT-V-Transport layer – transport service- Elements of transport protocol - Addressing, Establishing & Releasing a connection – Error control, flow control, multiplexing and crash recovery - Internet Transport Protocol – TCP - Network Security: Cryptography.

TEXT BOOK

1) A. S. Tanenbaum, 2011, Computer Networks, Fifth Edition, Pearson Education, Inc.

REFERENCE BOOKS

1) B. Forouzan, 1998, Introduction to Data Communications in Networking, Tata McGraw Hill, New Delhi.

2) F. Halsall, 1995, Data Communications, Computer Networks and Open Systems, Addison Wessley.

3) D. Bertsekas and R. Gallagher, 1992, Data Networks, Prentice hall of India, New Delhi.

4) Lamarca, 2002, Communication Networks, Tata McGraw Hill, New Delhi.

5) Teresa C.Piliouras, "Network Design Management and Technical Perspectives, Second Edition", Auerbach Publishers, 2015.

WEBSITE:

1) http://peasonhighered.com/tanenbaum

OUTCOME MAPPING

CO/ PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6	PSO7	PSO8
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CO2				3	2	3		1		2		3	3	3	3	2	3	
CO3	3			3		1		3		1		3	3	3		3	2	1
CO4	3		3	3	3	3		2		2	1	3	3	1		3	2	
CO5																		