SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

[An Autonomous College Affiliated to Periyar University, Salem, Tamil Nadu]

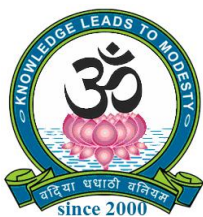[Accredited by NAAC with 'A' Grade with CGPA of 3.27]

[Recognized 2(f) & 12(B) Status under UGC Act of 1956]

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DEGREE OF BACHELOR OF SCIENCE IN
INFORMATION TECHNOLOGY
OUTCOME BASED EDUCATION WITH
CHOICE BASED CREDIT SYSTEM (CBCS)

PROGRAMME CODE: UIT

REGULATIONS AND SYLLABUS FOR
B.Sc. INFORMATION TECHNOLOGY PROGRAMME
(SEMESTER PATTERN)

(For Students Admitted in the College from the Academic Year 2024-2025 Onwards)

REGULATIONS AND SYLLABUS FOR B.Sc. INFORMATION TECHNOLOGY PROGRAMME

(For Students Admitted in the College from the Academic Year 2024-2025 Onwards)

1. Vision of the Department

To uplift the economically and educationally backward students by developing the personality of the individual, instilling high levels of discipline and preparing them to strive, to set global standards that contributes to the development of the society.

2. Mission of the Department

Impart the knowledge of recent technologies and equip the students with essential skills, technologically make them updated by creating intellectually inspiring environment for Learning, Research, Creativity, Innovation and Professional activities, enable them to become knowledgeable, motivated and resourceful IT professionals.

3. Definitions

(i) Programme: Programme means a course of study leading to the award of the degree in a discipline.

(ii) Course: Course refers to the subject offered under the Degree Programme.

4. Aim of the Programme

1. Take on leadership positions and embark on a research career in the field.

2. Collaborate in diverse team environments to make positive contributions in the IT field.

3. The Core subjects include latest developments in the education and scientific front, advanced programming packages allied with the discipline topics.

4. To produce graduates who can contribute professionally to the society and widely as IT professionals or entrepreneurs.

5. Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.

6. Communicate effectively in a variety of professional contexts.

7. Effectively communicating computing concepts and solutions to create and initiate innovation in Computer field.

8. Identify and analyze user needs and to take them into account in the selection, creation, integration, evaluation, and administration of computing based systems.

9. To instill Human, Moral and ethical values in the young minds of the students and thereby improving the total personality of the students.

5. Programme Outcomes (POs

PO1	**Disciplinary knowledge:** Capable of demonstrating comprehensive knowledge and understanding of one or more disciplines that form a part of an undergraduate Programme of study
PO2	**Communication Skills:** Ability to express thoughts and ideas effectively in writing and orally; Communicate with others using appropriate media; confidently share one's views and express herself/himself; demonstrate the ability to listen carefully, read and write analytically, and present complex information in a clear and concise manner to different groups.
PO3	**Critical thinking:** Capability to apply analytic thought to a body of knowledge; analyse and evaluate evidence, arguments, claims, beliefs on the basis of empirical evidence; identify relevant assumptions or implications; formulate coherent arguments; critically evaluate practices, policies and theories by following scientific approach to knowledge development.
PO4	**Problem solving:** Capacity to extrapolate from what one has learned and apply their competencies to solve different kinds of non-familiar problems, rather than replicate curriculum content knowledge; and apply one's learning to real life situations
PO5	**Analytical reasoning**: Ability to evaluate the reliability and relevance of evidence; identify logical flaws and holes in the arguments of others; analyze and synthesize data from a variety of sources; draw valid conclusions and support them with evidence and examples, and addressing opposing viewpoints.
PO6	**Research-related skills:** A sense of inquiry and capability for asking relevant/appropriate questions, problem arising, synthesising and articulating; Ability to recognise cause-and-effect relationships, define problems, formulate hypotheses, test hypotheses, analyse, interpret and draw conclusions from data, establish hypotheses, predict cause-and-effect relationships; ability to plan, execute and report the results of an experiment or investigation.
PO7	**Cooperation/Team work:** Ability to work effectively and respectfully with diverse teams; facilitate cooperative or coordinated effort on the part of a group, and act together as a group or a team in the interests of a common cause and work efficiently as a member of a team
PO8	**Scientific reasoning:** Ability to analyse, interpret and draw conclusions from

	quantitative/qualitative data; and critically evaluate ideas, evidence and experiences from an open-minded and reasoned perspective.
PO9	**Reflective thinking**: Critical sensibility to lived experiences, with self awareness and reflexivity of both self and society
PO10	**Information/digital literacy**: Capability to use ICT in a variety of learning situations, demonstrate ability to access, evaluate, and use a variety of relevant information sources; and use appropriate software for analysis of data.
PO11	**Self-directed learning:** Ability to work independently, identify appropriate resources required for a project, and manage a project through to completion.
PO12	**Multicultural competence:** Possess knowledge of the values and beliefs of multiple cultures and a global perspective; and capability to effectively engage in a multicultural society and interact respectfully with diverse groups.
PO13	**Moral and ethical awareness/reasoning:** Ability to embrace moral/ethical values in conducting one's life, formulate a position/argument about an ethical issue from multiple perspectives, and use ethical practices in all work. Capable of demon starting the ability to identify ethical issues related to one"s work, avoid unethical behaviour such as fabrication, falsification or misrepresentation of data or committing plagiarism, not adhering to intellectual property rights; appreciating environmental and sustainability issues; and adopting objective, unbiased and truthful actions in all aspects of work.
PO14	**Leadership readiness/qualities:** Capability for mapping out the tasks of a team or an organization, and setting direction, formulating an inspiring vision, building a team who can help achieve the vision, motivating and inspiring team members to engage with that vision, and using management skills to guide people to the right destination, in a smooth and efficient way.
PO15	**Lifelong learning:** Ability to acquire knowledge and skills, including „learning how to learn", that are necessary for participating in learning activities throughout life, through self-paced and self-directed learning aimed at personal development, meeting economic, social and cultural objectives, and adapting to changing trades and demands of work place through knowledge/skill development/reskilling.

6. Programme Specific Outcomes (PSOs)

PSO1	To enable students to apply basic microeconomic, macroeconomic and monetary concepts and theories in real life and decision making.
PSO2	To sensitize students to various economic issues related to Development, Growth, International Economics, Sustainable Development and Environment.
PSO3	To familiarize students to the concepts and theories related to Finance, Investments and Modern Marketing.
PSO4	Evaluate various social and economic problems in the society and develop answer to the problems as global citizens.
PSO5	Enhance skills of analytical and critical thinking to analyze effectiveness of economic policies.

7. Eligibility for Admission

A candidate who has passed in Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science or Computer Applications or Information Technology or Statistics (Academic stream or Vocational stream) as one of the subject under Higher Secondary Board of Examination, Tamilnadu as per norms set by the Government of Tamilnadu or an Examination accepted as equivalent there to by the syndicate, subject to such conditions as may be prescribed there to are permitted to appear and qualify for the B.Sc. degree examination in Information Technology of this Autonomous College affiliated to Periyar University after a course of study of three academic years.

8. Duration of the Programme

The course shall extend over a period of three years comprising of six semesters with two semesters in one academic year. There shall not be less than 90 working days (450 hours) for each semester. Examination shall be conducted at the end of every semester for the respective subjects.

9. Features of Choice Based Credit System

Under Choice Based Credit System (CBCS), a set of Courses consisting of Core Courses, Elective Courses, Skill Based Elective Courses and Non-Major Elective Courses are offered. Beside the Core Courses, which are totally related to the major subject, the students have the advantage of studying supportive papers and Non-Major Courses. This

provides enough opportunity to the students to learn not only the major courses but also inter disciplinary and application oriented courses.

10. Syllabus

The syllabus of the B.Sc. Information Technology Degree Programme is divided into the following Courses:

(i) **Language Courses:**

(ii) **Core Courses:** The Core Courses are releated to the Programme concerned including practicals and project offered under the Programme.

(iii) **Elective Courses:** There are TWO Elective Courses offered under the Programme related to the Discipline or Generic but are to be selected by the students.

(iv) **Skill Enhancement Courses (SEC):** This course aims to impart advanced and recent developments in the concerned discipline.

(v) **Ability Enhancement Compulsory Courses (AECC):** Mandatory courses that lead to Knowledge enhancement apart from concerned discipline.

(v) **Extra Credit Courses:** In order to facilitate the students gaining extra credits, the Extra Credit Courses are offered. According to the guidelines of the UGC, the students are encouraged to avail this option of enriching the knowledge by enrolling themselves in the Massive Open Online Courses (MOOC) provided by various portals, such as SWAYAM, NPTEL, etc.

11. Programme of Study

The Programme of study for the Degree shall be in the Branch – Information Technology (Choice Based Credit System) with internal assessment comprised of instructions in the following subjects according to the syllabi and books prescribed from time to time.

12. Credit

Weightage given to each course of study is termed as Credit.

13. Credit System

The weightage of credits are spread over to four different semesters during the period of study and the cumulative credit point average shall be awarded based on the credits earned by the student. A total of 152 Credits are prescribed for the B.Sc. Information Technology Degree Programme which is the minimum Credit requirement for the three year B.Sc. Information Technology Degree Programme.

Bachelor of Science

Information Technology

SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE
(Autonomous)
Bachelor of Science in Information Technology
Programme Pattern and Syllabus (Outcome Based Education with CBCS)
(For Students Admitted in the College from the Academic Year 2024-2025 Onwards)

SI. No	Part	Nature of Course	Course Code	Name of the Course	Hours/ Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER – I									
1	I	Language	24UTA1F01	Foundation Tamil – I / Other Language	5	3	25	75	100
2	II	Language	24UEN1F01	Foundation English–I	5	3	25	75	100
3	III	Core – I	24UIT1C01	Fundamentals of Computer Programming	6	5	25	75	100
4		Core Practical – I	24UIT1P01	Computer Programming Lab	3	5	25	75	100
5		Elective Course – I (Generic)	24UMA1EG01	Discrete Mathematics - I	5	3	25	75	100
6	IV	Foundation Course	24UIT1FC01	Data Structures	4	2	25	75	100
7		NME		NME	2	2	25	75	100
Total					**30**	**23**	**175**	**525**	**700**
SEMESTER – II									
8	I	Language	24UTA2F02	Foundation Tamil – II / Other Language	5	3	25	75	100
9	II	Language	24UEN2F02	Foundation English-II	5	3	25	75	100
10	III	Core – II	24UIT2C02	Java Programming	5	5	25	75	100
11		Core Practical – II	24UIT2P02	Java Programming Lab	3	5	25	75	100
12		Core – III	24UIT2C03	Software Engineering	5	5	25	75	100
13		Elective Course – II (Generic)	24UMA2EG02	Discrete Mathematics - II	5	3	25	75	100
14	IV	NME		NME	2	2	25	75	100
Total					**30**	**26**	**175**	**525**	**700**
SEMESTER – III									

15	I	Language	24UTA3F03	Foundation Tamil – III / Other Language	5	3	25	75	100
16	II	Language	24UEN3F03	Foundation English-III	5	3	25	75	100
17	III	Core – IV	24UIT3C04	Database Management System	5	5	25	75	100
18		Core Practical – III	24UIT3P03	Database Management System Lab	3	5	25	75	100
19		Core – V	24UIT3C05	Computer Networks	5	5	25	75	100
20		Elective Course – III (Discipline)			5	3	25	75	100
21	IV	SEC Practical – I	24UIT3S01	Office Automation Lab	2	2	25	75	100
Total					**30**	**26**	**175**	**525**	**700**

SEMESTER – IV

22	II	Language	24UTA4F04	Foundation Tamil – IV / Other Language	4	3	25	75	100
23	III	Language	24UEN4F04	Foundation English-IV	4	3	25	75	100
24		Core – VI	24UIT4C06	.Net Programming	5	5	25	75	100
25	III	Core Practical – IV	24UIT4P04	.Net Programming Lab	3	5	25	75	100
26		Core – VII	24UIT4C07	Open Source Technologies	5	5	25	75	100
27		Elective Course – IV (Discipline)			5	3	25	75	100
28	IV	SEC Practical – II	24UIT4S02	PHP Programming Lab	2	2	25	75	100
29		AECC – I	24UES401	Environmental Studies	2	2	25	75	100
Total					**30**	**28**	**200**	**600**	**800**

SEMESTER – V

30	III	Core – VIII	24UIT5C08	Operating Systems	6	4	25	75	100
31		Core – IX	24UIT5C09	Python Programming	6	4	25	75	100
32		Core Practical – V	24UIT5P05	Python Programming Lab	3	4	25	75	100
33		Elective Course – V		Elective Course – V	6	3	25	75	100
34		Elective		Elective Course – VI	6	3	25	75	100

		Course – VI						
35	IV	SEC Practical –III	24UIT5S03	Advanced Excel Lab	2	2	25	75	100
36		Internship	24UIT5IN01	Internship / Industrial Training	-	2	-	-	-
37		AECC – II	24UVE501	Value Education	2	2	25	75	100
		Total			**30**	**24**	**175**	**525**	**700**
				SEMESTER – VI					
39	III	Core – X	24UIT6C10	Ethical Hacking & Cyber Security	6	4	25	75	100
40		Core – XI	24UIT6C11	Data Analytics using R Programming	6	4	25	75	100
41		Core Practical-VI	24UIT6P06	R Programming Lab	3	4	25	75	100
42		Elective Course – VII		Elective Course – VII	5	3	25	75	100
43		Elective Course –VIII		Elective Course – VIII	5	3	25	75	100
44		Project	24UIT6PR01	Project Work with Viva Voce	5	4	25	75	100
45	IV	SEC Practical –IV	24UIT6S04	Data Visualization Lab	3	2	25	75	100
46	V		24UEX601	Extension Activities	-	1	-	-	-
		Total			**30**	**25**	**175**	**525**	**700**
		Grand Total			**180**	**152**	**1075**	**3225**	**4300**

Note

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

Elective Courses

Elective – III

Semester	Part	Course Code	Name of the Course
III	III	24UIT3E01	Software Project Management
		24UIT3E02	Analytics for Service Industry
		24UIT3E03	Human Computer Interaction

Elective – IV

Semester	Part	Course Code	Name of the Course
IV	III	24UIT4E04	Cryptography
		24UIT4E05	Grid Computing
		24UIT4E06	Artificial Neural Networks

Elective – V

Semester	Part	Course Code	Name of the Course
V	III	24UIT5E07	Machine Learning
		24UIT5E08	Image Processing
		24UIT5E09	IoT and its Applications

Elective – VI

Semester	Part	Course Code	Name of the Course
V	III	24UIT5E10	Natural Language Processing
		24UIT5E11	Data Mining
		24UIT5E12	Big Data Analytics

Elective – VII

Semester	Part	Course Code	Name of the Course
VI	III	24UIT6E13	Software Metrics
		24UIT6E14	Artificial Intelligence
		24UIT6E15	Information Security

Elective – VIII

Semester	Part	Course Code	Name of the Course
VI	III	24UIT6E16	Introduction to Data Science
		24UIT6E17	Mobile Adhoc Network
		24UIT6E18	Cloud Computing

Skill Enhancement Courses (SEC)

Part	Semester	Nature of Course	Course Code	Name of the Course	Hours/ Week	Credits	Marks		
							CIA	ESE	Total
IV	III	SEC Practical – I	24UIT3S01	Office Automation Lab	2	2	25	75	100
IV	IV	SEC Practical – II	24UIT4S02	PHP Programming Lab	2	2	25	75	100
IV	V	SEC Practical – III	24UIT5S03	Advanced Excel Lab	2	2	25	75	100
IV	VI	SEC Practical – IV	24UIT6S04	Data Visualization Lab	2	2	25	75	100

Ability Enhancement Compulsory Courses (AECC)

Part	Semester	Nature of Course	Course Code	Name of the Course	Hours/ Week	Credits	Marks		
							CIA	ESE	Total
IV	IV	AECC – I	24UES401	Environmental Studies	2	2	25	75	100
IV	V	AECC – II	24UVE501	Value Education	2	2	25	75	100

Non Major Elective (NME)

Extra Disciplinary Subjects offered by the Department of Information Technology.

The department can offer any one of the subjects to the other major subject students in each semester.

Part	Semester	Course Code	Name of the Course	Hours/ Week	Credits	Marks		
						CIA	ESE	Total
IV	I	24UIT1N01	Understanding Internet	2	2	25	75	100
IV	I	24UIT1N02	Office Automation	2	2	25	75	100
IV	II	24UIT2N03	Introduction to HTML	2	2	25	75	100
IV	II	24UIT2N04	Web Designing	2	2	25	75	100

List of Extension Activities

1. National Service Scheme (NSS)
2. Youth Red Cross (YRC)
3. Physical Education (PYE)
4. Eco Club (ECC)
5. Red Ribbon Club (RRC)
6. Women Empowerment Cell (WEC)

14. Break-Up of Marks and Credits

The break-up of marks and credits for the B.Sc. Information Technology Degree Programme is as follows:

Sl. No.	Part	Subject	Marks	Credits
1.	I	Language – Tamil	400	12
2.	II	Language – English	400	12
3.	III	Core Courses – Theory/Practical	1700	79
		Generic Elective Courses – Theory/Practical	400	12
		Discipline Elective Courses	400	12
		Project	100	4
4.	IV	Skill Enhancement Courses (SEC)	400	8
		Non Major Elective (NME)	200	4
		Foundation Course	100	2
		Ability Enhancement Compulsory Courses (AECC)	200	4
		Internship / Industrial Training	-	2
5.	V	Extension Activities	-	1
Total			**4300**	**152**

➢ The students are advised to complete a **SWAYAM/MOOC** before the completion of the even semester of each year of study and submit the course completion certificate to the HOD. Two credits will be given to the candidates who have successfully completed.

➢ The field trip preferably relevant to the course should be undertaken every year.

15. Examinations

The examinations consist of Continuous Internal Assessment (CIA) and end of semester examinations (ESE). The ESE shall be of Three Hours duration for each theory courese at the end of every semester. The candidate failing in any course(s) will be permitted to appear for each failed course(s) in the subsequent examination. The end of semester practical examinations shall be of Three Hours for the each practical course conducted at the end of every semester.

To maintain uniformity, particularly for interdepartmental transfer of credits, there shall be a uniform pattern of examination to be adopted by all the teachers offering courses. There shall be three tests, one seminar and one assignment for CIA and ESE during each semester. The distribution of marks for CIA and ESE shall be 25 marks and 75 marks, respectively. Further, the distribution of CIA will be 15 marks for test, 5 marks for assignment and 5 marks for attendance. The average of the highest two test marks out of the three CIA tests will be taken for CIA.

16. Components of Continuous Internal Assessment (CIA)

Components		Marks	Total Marks
Theory			
CIA I	75	(75+75 = 150/10)	
CIA II	75	15	
Assignment		05	25
Attendance		05	
Practical			
CIA		15	
Practical Observation Notebook		05	25
Attendance		05	

17. Question Paper Pattern

Bloom's Taxonomy Based Assessment Pattern

(K1 – Remember;   **K2** – Understand;   **K3** – Apply;   **K4** – Analyze;   **K5** – Evaluate)

(i) Theory Examinations (CIA I & CIA II = 25 Marks and ESE = 75 Marks)

Knowledge Level	Section	Marks	Description	Total Marks
K1	A (Answer ALL) Q1–Q15	$15 \times 1 = 15$	Multiple Choice Questions (MCQ) (Three questions from each unit)	15
K2	B (Answer any THREE out of FIVE) Q16–Q20	$3 \times 5 = 15$	Short Answers (One question from each unit)	15
K3 & K4	C (Either or Pattern) Q20–Q25	$5 \times 9 = 45$	Descripitive/Detailed Answers (Two questions from each unit)	45
Total Marks				**75**

Passing Minimum (CIA) 40% = 10 Marks

Passing Minimum (ESE) 40% = <u>30 Marks</u>

<u>**40 Marks**</u>

(ii) Practical Examinations (CIA = 25 Marks and ESE = 75 Marks)

Knowledge Level	Components	Marks	Total
K3	Experiments	60	75
K4	Record Work	15	
K5			

Passing Minimum (CIA) 40% = 10 Marks

Passing Minimum (ESE) 40% = <u>30 Marks</u>

<u>**40 Marks**</u>

The candidate shall be declared to have passed the examination if the candidates secure not less than 30 marks out of 75 marks in the semester examination in each theory course and 10 marks out of 25 marks in the CIA and in total not less than 40 marks.

For the practical course, 30 marks out of 75 marks in the semester examination and the record notebook taken together and 10 marks out of 25 marks in the CIA and in total 40 marks. There is no passing minimum for the record notebook. However, submission of the record notebook is necessary.

Candidate who does not obtain the required minimum marks for a pass in a Course/Practical shall be declared Re-Appear (RA) and the candidate has to appear and pass the same at a subsequent appearance.

18. Maximum Duration for the Completion of the B.Sc. Information Technology Programme

The maximum duration for completion of the B.Sc. Information Technology Programme shall not exceed twelve semesters.

19. Commencement of this Regulation

This regulation and syllabus shall take effect from the academic year 2024–2025 for students who are admitted to the first year of the Programme during the academic year 2024–2025 and thereafter.

20. Grading

Once the marks of the cumulative CIA and ESE are available, they will be added. The marks thus obtained will then be graded as per details given below:

Marks and Grades:

The following table gives the marks grade points, letter grades and classification to indicate the performance of the candidate.

Range of Marks	Grade Points	Letter Grade	Description
90–100	9.0–10.0	O	Outstanding
80–89	8.0–8.9	D+	Excellent
75–79	7.5–7.9	D	Distinction
70–74	7.0–7.4	A+	Very Good

60–69	6.0–6.9	A	Good
50–59	5.0–5.9	B	Average
40–49	4.0–4.9	C	Satisfactory
00–39	0.0	U	Re-appear
ABSENT	0.0	AAA	ABSENT

C_i = Credits earned for course i in any semester

G_i = Grade Point obtained for course i in any semester

n = Semester in which such course were credited

Grade point average (for a Semester):

Calculation of grade point average semester-wise and part-wise is as follows:

GRADE POINT AVERAGE [GPA] = $\Sigma i\ C_i\ G_i\ /\ \Sigma i\ C_i$

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the courses under each part}}{\text{Sum of the credits of the courses under each part in a semester}}$$

Calculation of Grade Point Average (CGPA) (for the entire programme):

A candidate who has passed all the examinations under different parts (Part – I to V) is eligible for the following part wise computed final grades based on the range of CGPA.

CUMULATIVE GRADE POINT AVERAGE [CGPA] = $\Sigma n\ \Sigma i\ C_{ni}\ G_{ni}\ /\ \Sigma n\ \Sigma i\ C_{ni}$

$$GPA = \frac{\text{Sum of the multiplication of grade points by the credits of the entire program under each part}}{\text{Sum of the credits of the courses of the entire program under each part}}$$

21. Classification of Successful Candidates

A candidate who passes all the examinations and securing following CGPA and Grades shall be declared as follows:

CGPA	GRADE	CLASSIFICATION OF FINAL RESULT
9.5–10.0	O+	First Class – Exemplary
9.0 and above but below 9.5	O	
8.5 and above but below 9.0	D++	First Class with Distinction
8.0 and above but below 8.5	D+	
7.5 and above but below 8.0	D	
7.0 and above but below 7.5	A++	First Class
6.5 and above but below 7.0	A+	
6.0 and above but below 6.5	A	
5.5 and above but below 6.0	B+	Second Class
5.0 and above but below 5.5	B	
4.5 and above but below 5.0	C+	Third Class
4.0 and above but below 4.5	C	

22. Ranking

A candidate who qualifies for the B.Sc. Information Technology, passing all the Examinations in the first attempt within the minimum period prescribed for the Programme from the date of admission to the Programme and secures first, second or third class shall be eligible for ranking and such ranking will be confined to 10% of the total number of candidates qualified in that particular subject to a maximum of 10 ranks.

23. Conferment of the Degree

No candidate shall be eligible for conferment of the Degree unless he/she has undergone the prescribed Programme of study for a period of not less than six Semesters in an Institution approved by and affiliated to the Periyar University and earns has passed the Examinations as have been prescribed.

24. Transitory Provision

Candidates who have undergone the Programme of Study prior to the Academic Year 2024–2025 will be permitted to take the Examinations under those Regulations for a period of six years i.e. up to and inclusive of the Examination of April 2030. Thereafter, they will be permitted to take the Examination only under the Regulations in force at that time.

PROGRAMME SYLLABUS

Programme: B.Sc. Information Technology				
Core – I		**Course Code:** 24UIT1C01		**Course Title:** Fundamentals of Computer Programming
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	6	90	5	100

COURSE OBJECTIVES

1. To impart knowledge about Computer fundamentals
2. To understand the concepts and techniques in C Programming
3. To equip and indulge themselves in problem solving using C
4. To introduce the concepts of Object Oriented Programming Paradigm in C++

UNIT - I

Introduction to C: Overview of C - Introduction - Character set - C tokens - keyword & Identifiers - Constants - Variables - Data types - Declaration of variables - Assigning values to variables - Defining Symbolic Constants - Arithmetic, Relational, Logical, Assignment, Conditional, Bitwise, Special, Increment and Decrement operators - Arithmetic Expressions - Evaluation of expression - precedence of arithmetic operators - Type conversion in expression - operator precedence & associativity - Mathematical functions - Reading & Writing a character - Formatted input and output.

UNIT II

Decision Making , Looping and Arrays: Decision Making and Branching: Introduction - if, if….else, nesting of if …else statements else if ladder - The switch statement, The ?: Operator - The go to Statement. Decision Making and Looping: Introduction - The while statement- the do statement - the for statement-jumps in loops. Arrays - Character Arrays and Strings

UNIT - III

Introduction to C++ - key concepts of Object-Oriented Programming – Advantages - Object Oriented Languages - I/O in C++ - C++Declarations. Functions in C++ - inline functions -

Bachelor of Science

Information Technology

Function Overloading. Classes and Objects: Declaring Objects - destructor with static members.

UNIT - IV

Inheritance: Operator Overloading: Overloading unary, binary operators - Overloading Friend functions - type conversion - Inheritance: Types of Inheritance - Single, Multilevel, Multiple, Hierarchal, Hybrid, Multipath inheritance - Virtual base Classes - Abstract Classes.

UNIT - V

Pointers & Files: Pointers - Declaration - Pointer to Class, Object - this pointer - Pointers to derived classes and Base classes - Arrays - Characteristics - array of classes. Files - File stream classes - file modes - Sequential Read/Write operations - Binary and ASCII Files - Random Access Operation - Templates - Exception Handling - Miscellaneous functions.

Text Book(s)

1. E Balagurusamy: Computing Fundamentals & C Programming – Tata McGraw-Hill, Second Reprint 2008
2. Ashok N Kamthane ,Object-Oriented Programming with Ansi and Turbo C++, Pearson Education,2003.

Reference Books

1. Ashok N Kamthane: Programming with ANSI and Turbo C, Pearson, 2002.
2. E. Balagurusamy, Object-Oriented Programming with C++,TMH,1998
3. Maria Litvin &Gray Litvin, C++foryou,Vikaspublication,2002.
4. JohnRHubbard, Programming with C, 2ndEdition,TMH publication,2002

Related Online Contents (MOOC,SWAYAM,NPTEL,Websitesetc)

1. https://onlinecourses.swayam2.ac.in/aic20_sp06/preview
2. https://onlinecourses.swayam2.ac.in/arp19_ap79/preview

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Course Outcomes (CO)

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

CO Number	CO Statement	Programme Outcomes
CO1	Learn about the Computer fundamentals and the Problem solving and understand the basic concepts of C and C++ programming	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Demonstrate the various basic programming constructs like decision making statements. Looping statements and functions	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Analyze the object oriented concepts like overloading, inheritance ,polymorphism, Virtual functions ,constructors and destructors	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Compare the various file stream classes;file types,usage of templates and exception Handling mechanisms, pros and cons of procedure oriented language with the concepts of programming language	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop programs incorporating the programming constructs of object oriented Programming concepts	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with POs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	3	3	3
CO3	3	2	3	3	3
CO4	3	3	2	3	3
CO5	3	3	3	3	3
Weight age of course contributed to each PSO	15	14	14	15	15

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		
Core Practical – I	**Course Code:** 24UIT1P01	**Course Title:** Computer Programming Lab

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	3	45	5	100

COURSE OBJECTIVES

1. To impart knowledge about Computer fundamentals
2. To understand the concepts and techniques in C Programming
3. To equip and indulge themselves in problem solving using C
4. To introduce the concepts of Object Oriented Programming Paradigm in C++

LIST OF PROGRAMS

1. Write a C program to find the sum, average, standard deviation for a given set of numbers.
2. Write a C program to generate n prime numbers.
3. Write a C program to generate Fibonacci series.
4. Write a C program to sort the given set of numbers in ascending order.
5. Write a C program to count the number of Vowels in the given sentence.
6. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E_Number, E_Name,Department, Basic, Salary, Grade. Write a member function to get and display them.
7. Write a C++ Program to create a class SHAPE which consists of two virtual functions
8. Write a C++ Program using function overloading to read two matrices of different Data Types Such as integers and floating point numbers.
9. Write a C++ Program to create a File and to display the contents of that file with line numbers.
10. Write a C++ Program to merge two files into a single file.

Course Outcomes (CO)

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

CO Number	CO Statement
CO1	Apply the various basic programming constructs like decision making statements. Looping statements.
CO2	Applying the functions, concepts like overloading, inheritance, polymorphism,virtual functions, constructors and destructors
CO3	Illustrate the concept of Virtual Classes, inline functions and friend functions
CO4	Compare the various file stream classes; file types, usage of templates and exception Handling mechanisms.
CO5	Compare the pros and cons of procedure oriented language with the concepts of object Oriented language

Mapping of COs with POs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	3	3	3	3
CO2	3	3	1	3	2
CO3	3	3	3	3	2
CO4	3	3	3	3	2
CO5	3	2	3	3	3
Weight age of course contributed to each PSO	15	15	13	15	13

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Foundation Course – I		**Course Code:** 24UIT1FC01		**Course Title:** Data Structures
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	4	60	2	100

Course Objectives

1. To understand the concepts of ADTs
2. To learn linear data structures - lists, stacks, queues
3. To learn Tree structures and application of trees
4. To learn graph structures and application of graphs
5. To understand various sorting and searching

UNIT – I

Algorithms (Analysis and Design): Problem Solving – Top-Down and Bottom-Up – Design, Implementation, Verification of Algorithm – Efficiency Analysis of Algorithms: Space, Time Complexity, and Frequency Count – Introduction: Definitions – Concepts – Overview – Abstract Data Types (ADTs).

UNIT – III

Arrays: Definition – Terminology – One Dimensional Array – Multi Dimensional Array.
Linked List: Definition – Single Linked List – Double Linked List – Circular Linked List – Applications: Sparse Matrix – Polynomial Representation – Dynamic Storage Management.

UNIT – III

Stack ADT – Operations – Applications – Evaluating arithmetic expressions – Conversion of infix to postfix expression – Queue ADT – Operations – Circular Queue – Priority Queue – deQueue – applications of queues.

UNIT – IV

Tree ADT – tree traversals – Binary Tree ADT – expression trees – applications of trees – binary search tree ADT – Heap Tree. Graph: Definition – Representation of Graph – Types of graph – Breadth first traversal – Depth first traversal – Topological sort – Applications of graphs.

UNIT – V

Searching – Linear Search Techniques with – Array, Linked List, and Ordered List – Binary search – Sorting – Bubble sort – Selection sort – Insertion sort – Shell sort – Radix sort – Quick Sort – Merge Sort.

Text Book

1. MarkAllenWeiss ― Data Structures and Algorithm Analysis in C++, Pearson Education, 2014, 4th Edition.
2. ReemaThareja ― Data Structures Using C, Oxford Universities Press 2014, 2nd Edition

Reference Books

1. Thomas H.Cormen, Chales E.Leiserson, Ronald L.Rivest, Clifford Stein - Introduction to Algorithms, McGraw Hill 2009,3rd Edition.
2. AhoHopcrofanUllman - Data Structures and Algorithms, Pearson Education, 2003.

WebResources

1. NPTEL&MOOCcoursestitledDataStructures
2. https://nptel.ac.in/courses/106106127/

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the concept of Dynamic memory management, datatypes, algorithms, Big O notation	PO1, PO6
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO2
CO3	Describe the hash function and concepts of collision and its resolution methods	PO2, PO4
CO4	Solve problem involving graphs, trees and heaps	PO6, PO8
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO7

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	-	1	-
CO2	1	2	1	-	-	-
CO3	3	1	2	1	-	-
CO4	2	2	1	-	-	1
CO5	3	1	1	-	-	-
Weight age of course contributed to each PSO	12	9	8	1	1	1

3 – Strong   2– Medium   1 – Low

Programme: B.SC. B.Sc. Information Technology				
Core – II		**Course Code:** 24UIT2C02		**Course Title:** Java Programming
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	5	75	5	100

Course Objectives

1. To provide fundamental knowledge of object-oriented programming
2. To equip the student with programming knowledge in Core Java from the basics up.
3. To enable the students to use AWT controls, EventHandling and Swing for GUI.
4. To provide fundamental knowledge of object-oriented programming.
5. To equip the student with programming knowledge in Core Java from the basics up.

UNIT – I

Introduction: Review of Object Oriented concepts - History of Java - Java buzz words - JVM architecture - Datatypes - Variables - Scope and life time of variables - arrays - operators - control statements - type conversion and casting - simple java program - constructors - methods - Static block - Static Data - Static Method String and String Buffer Classes.

UNIT – II

Inheritance: Basic concepts - Types of inheritance - Member access rules - Usage of this and Super keyword -Method Overloading -Method overriding - Abstract classes - Dynamic method dispatch - Usage of final keyword. Packages: Definition - Access Protection - ImportingPackages. Interfaces: Definition – Implementation – Extending Interfaces.

Exception Handling: try – catch - throw - throws – finally – Built-inexceptions - Creating own Exception classes.

UNIT – III

Multi threaded Programming: Thread Class - Runnable interface – Synchronization – Using synchronized methods – Using synchronized statement - Inter thread Communication – Deadlock.

I/O Streams: Concepts of streams - Stream classes - Byte and Character stream - Reading console Input and Writing Console output - File Handling.

UNIT – IV

AWT Controls: The AWT class hierarchy - user interface components - Labels - Button - Text Components - Check Box - Check Box Group - Choice - List Box - Panels – Scroll Pane - Menu - Scroll Bar. Working with Frame class - Colour - Fonts and layout managers.

Event Handling: Events - Eventsourcs - EventListeners - Event Delegation Model (EDM) - Handling Mouse and Keyboard Events - Adapter classes - Innerclasses.

UNIT – V

Swing: Introduction to Swing - Hierarchy of swing components. Containers - Top level containers - JFrame - JWindow - JDialog - JPanel - JButton - JToggleButton - JCheckBox - JRadioButton - JLabel, JTextField - JTextArea - JList - JComboBox - JScrollPane.

Text Books

1. Herbert Schildt, The Complete Reference, Tata McGraw Hill, New Delhi, 7th Edition, 2010.
2. Gary Cornell, Core Java 2 Volume I – Fundamentals, Addison Wesley, 1999.

Reference Books

1. Head First Java, O'Rielly Publications,
2. Y.Daniel Liang, Introduction to Java Programming, 7th Edition, Pearson Education India, 2010.

Wen References

1. https://javabeginnerstutorial.com/core-java-tutorial
2. http://docs.oracle.com/javase/tutorial/
3. https://www.coursera.org/

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1, PO2, PO6
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO2, PO3, PO8
CO3	Implement multi-threading and I/O Streams of Core Java	PO1, PO3, PO7
CO4	Implement AWT and Event handling.	PO2, PO6
CO5	Use Swing to create GUI.	PO1, PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	-	2	2
CO2	3	1	2	1	2
CO3	1	-	2	2	2
CO4	2	2	2	2	2
CO5	1	2	-	2	2
Weight age of course contributed to each PSO	10	7	6	9	10

3 – Strong　　　　**2 – Medium**　　　　**1 – Low**

Programme: B.Sc. Information Technology		
Core Practical - II	**Course Code:** 24UIT2P02	**Course Title:** Java Programming Lab

Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	5	100

Course Objectives

1. To provide fundamental knowledge of object-oriented programming.
2. To equip the student with programming knowledge in Core Java from the basics up.
3. To enable the students to know about Event Handling.
4. To enable the students to use String Concepts.
5. To equip the student with programming knowledge into create GUI using AWT controls.

List of Programs:

1. Write a Java program that prompts the user for an integer and then prints out all the prime number sup to that Integer
2. Write a Java program to multiply two given matrices.
3. Write a Java program that displays the number of characters, lines and words in a text
4. Generate random numbers between two given limits using Random class and print messages according to the range of the value generated.
5. Write a program to do String Manipulation using Character Array and perform the following string operations:
   a. String length
   b. Finding a character at a particular position
   c. Concatenating two strings
6. Write a program to perform the following string operations using String class:
   a. String Concatenation
   b. Search a substring
   c. To extract sub string from given string

7. Write a program to perform string operations using String Buffer class:
    a. Length of a string
    b. Reverse a string
    c. Delete a sub string from the given string

8. Write a java program that implements a multi-thread application that has three threads. First thread generates random integer every 1 second and if the value is even, second thread computes the square of the number and prints. If the value is odd, the third thread will print the value of cube of the number.

9. Write a threading program which uses the same method asynchronously to print the numbers 1 to 10 using Thread 1 and to print 90 to 100 using Thread 2.

10. Write a program to demonstrate the use of following exceptions.
    a. Arithmetic Exception
    b. Number Format Exception
    c. Array Index Out of Bound Exception
    d. Negative Array Size Exception

11. Write a Java program that reads on file name from the user, then displays information about whether the file exists, whether the file is readable, whether the file is writable, the type of file and the length of the file in bytes

12. Write a program to accept a text and change its size and font. Include bold italic options. Use frames and controls.

13. Write a Java program that handles all mouse events and shows the event name at the center of the window when a mouse event is fired. (Use adapter classes).

14. Write a Java program that works as a simple calculator. Use a grid layout to arrange buttons for the digits and for the +, -, *, % operations. Add a text field to display the result. Handle any possible exceptions like divide by zero.

15. Write a Java program that simulates a traffic light.The program lets the user select one of three lights: red, yellow, or green with radio buttons. On selecting a button, an appropriate message with —stop or —ready or —go should appear above the buttons in a selected color. Initially there is no message shown.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the basic Object-oriented concepts. Implement the basic constructs of Core Java.	PO1
CO2	Implement inheritance, packages, interfaces and exception handling of Core Java.	PO1, PO2
CO3	Implement multi-threading and I/O Streams of Core Java	PO4, PO6
CO4	Implement AWT and Event handling.	PO4, PO5, PO6
CO5	Use Swing to create GUI.	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	1	3	2
CO2	3	2	1	3	1
CO3	3	2	1	3	2
CO4	3	2	1	3	2
CO5	3	2	1	3	2
Weight age of course contributed to each PSO	15	10	5	15	9

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Core – III		**Course Code:** 24UIT2C03		**Course Title:** Software Engineering
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
II	5	75	5	100

Course Objectives

1. Understanding of software requirements and the SRS documents.
2. Understanding of the role of project management including planning, scheduling, risk management, etc.
3. Describe different models and understanding of different software architectural styles.
4. Understanding on quality control and how to ensure good quality software.
5. Be successful professionals in the field with firm fundamental knowledge of software engineering.
6. Apply their foundations in software engineering to adapt to readily changing environments using the appropriate theory, principles and processes.

UNIT – I

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.

UNIT – II

Software Project Management: Responsibilities of a Software Project Manager – Project Planning – Metrics for Project Size Estimation – Project Estimation Techniques – Risk Management. Requirements Analysis and Specification: Requirements Gathering and Analysis – Software Requirements Specification (SRS) – Formal System Development Techniques.

UNIT – III

Software Design: Characteristics of a Good Software Design – Cohesion and Coupling – Neat Arrangement – Software Design Approaches.

Function-Oriented Software Design: Overview of SA/SD Methodology – Structured Analysis – Data Flow Diagrams (DFDs).

UNIT – IV

Object Modeling Using UML: Overview of Object-Oriented Concepts – UML Diagrams – Use Case Model – Class Diagrams – Interaction Diagrams – Activity Diagrams – State Chart Diagram. User Interface Design: Characteristics of a Good User Interface – Basic Concepts – Types of User Interfaces – Component-Based GUI Development;

UNIT – V

Coding and Testing: Coding – Testing – UNIT Testing – Black-Box Testing – White-Box Testing – Debugging – Integration Testing – System Testing. Software Reliability and Quality Management: Software Reliability – Statistical Testing –Software Quality – Software Quality Management System – ISO 9000.

Text Book

1. Rajib Mall, "Fundamentals of Software Engineering", 3rd Edition, Prentice Hall of India Private Limited, 2008.

Reference Books

1. Roger S.Pressman and Bruce R.Maxim, "Software Engineering: A Practitioner's Approach", 8th Edition, McGraw Hill Higher Education, 2015.
2. Rajib Mall, "Fundamentals of Software Engineering", 4th Edition, Prentice Hall of India Private Limited, 2014.
3. Richard Fairley, "Software Engineering Concepts", TMGH Publications, 2004.
4. Hans van Vliet, "Software Engineering: Principles and Practice", Third Edition, Wiley, 2010.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Apply the software engineering life cycle by demonstrating competence in communication, planning, analysis, design, construction, and deployment.	PO1, PO2, PO3
CO2	Ability to work in one or more significant application domains.	PO4, PO5
CO3	Work as an individual and as part of a multidisciplinary team to develop and deliver quality software.	PO6
CO4	Ability to work as an effective member or leader of software engineering teams.	PO6, PO7
CO5	Ability to understand and meet ethical standards and legal responsibilities.	PO7, PO8

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	3	2	3	2	2
CO2	3	3	3	3	2
CO3	3	3	3	2	3
CO4	3	2	3	3	3
CO5	3	3	3	2	2
Weight age of course contributed to each PSO	15	13	15	12	12

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Core – IV		**Course Code:** 24UIT3C04		**Course Title:** Database Management System
Semester III	**Hours/Week** 5	**Total Hours** 75	**Credits** 5	**Total Marks** 100

Course Objectives

1. To enable the students to learn the designing of database systems, foundation on the relational model of data and normal forms.
2. To understood the concepts of database management system, design simple Database models
3. To learn and understand to write queries using SQL, PL/SQL.
4. To enable the students to learn the designing of database systems, foundation on the relational model of data and normal forms.
5. To understood the concepts of database management system, design simple Database models.

UNIT – I

Database Concepts: Database Systems – Data vs Information - Introducing the database - File system - Problems with file system – Database systems. Data models – Importance – Basic Building Blocks - Business rules - Evolution of Data models - Degrees of Data Abstraction.

UNIT – II

Design Concepts: Relational database model – logical view of data – keys – Integrity rules - relational set operators – data dictionary and the system catalog – relationships - data redundancy revisited – indexes - codd's rules. Entity relationship model – ER diagram.

UNIT – III

Normalization of Database Tables: Database tables and Normalization – The Need for Normalization – The Normalization Process – Higher level Normal Form.

Introduction to SQL: Data Definition Commands – Data Manipulation Commands – SELECT Queries – Additional Data Definition Commands – Additional SELECT Query Keywords–Joining Database Tables.

UNIT – IV

Advanced SQL: Relational SET Operators: UNION –UNIONALL – INTERSECT - MINUS. SQL Join Operators: Cross Join – Natural Join – Join USING Clause – JOIN ON Clause – Outer Join. Sub Queries and Correlated Queries: WHERE – IN – HAVING –ANY and ALL – FROM. SQL Functions: Date and Time Function – Numeric Function – String Function – Conversion Function.

UNIT – V

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Variable Declaration –Assignment operation – Arithmetic operators. Control Structures and Embedded SQL: Control Structures –Nested Blocks – SQL in PL/SQL – Data Manipulation – Transaction Control statements.PL/SQL Cursors and Exceptions: Cursors – Implicit Cursors, Explicit Cursors and Attributes – Cursor FOR loops – SELECT…FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

Text Book

1. Coronel, Morris, Rob, "Database Systems, Design, Implementation and Management", Ninth Edition
2. Nilesh Shah, "Database Systems Using Oracle", 2nd edition, Pearson Education India, 2016.

Reference Book

1. Abraham Silberschatz, Henry F.Korth and S.Sudarshan, Database System Concepts, McGraw Hill International Publication, VI Edition
2. Shio Kumar Singh, Database Systems, Pearson publications, II Edition.

Reference Book

1. Web resources from NDL Library, E-content from open-source libraries.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the various basic concepts of Database System. Difference between filesystem and DBMS and compare various data models.	PO1
CO2	Define the integrity constraints. Understand the basic concepts of Relational Data Model, Entity-Relationship Model.	PO1, PO2
CO3	Design database schema considering normalization and relationships within database. Understand and construct database using Structured Query Language. Attain a good practical skill of managing and retrieving of data using Data Manipulation Language (DML)	PO4, PO6
CO4	Classify the different functions and various join operations and enhance the knowledge of handling multiple tables.	PO4, PO5, PO6
CO5	Learn to design Database operations and implement using PL/SQL programs. Learn basics of PL/SQL and develop programs using Cursors, Exceptions	PO3, PO8

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	3	3	2
Weight age of course contributed to each PSO	15	15	14	15	14	14

3 – Strong　　　　**2 – Medium**　　　　**1 – Low**

Programme: B.Sc. Information Technology		
Core Practical – III	**Course Code:** 24UIT3P03	**Course Title:** Database Management System Lab

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	3	45	5	100

Course Objectives

1. To understand the concepts of Database concepts.
2. To understand the concepts of Relational Calculus.
3. To develop the logical design of the database using data modeling concepts such as entity-relationship diagrams.
4. To develop programming skills in PL/SQL.
5. To create a relational database using a relational database package, function and trigger.

List of Programs

   I. SQL

       1. DDLCOMMANDS

       2. DMLCOMMANDS

       3. TCLCOMMANDS

   II. PL/SQL

       4. FIBONACCI SERIES

       5. FACTORIAL

       6. STRING REVERSE

       7. SUM OF SERIES

       8. TRIGGER

   III. CURSOR

       9. STUDENT MARK ANALYSIS USING CURSOR

   IV. APPLICATION

       10. LIBRARY MANAGEMENT SYSTEM

       11. STUDENT MARK ANALYSIS

Course Outcomes (COs)

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

CO Number	CO Statement	Programme outcomes
CO1	Understand database concepts, structures and E-R Model.	PO1
CO2	Understand the relational model and relational algebra operations.	PO1, PO2
CO3	Normalize the relational tables applying normalization rules.	PO4, PO6
CO4	Perform PL/SQL programming using concept of Cursor Management, Error Handling, Package and Trigger.	PO4, PO5, PO6
CO5	Apply PL/SQL procedural interfaces statement on relational tables as per requirements.	PO3, PO5

Mapping of COs with PSOs

PSO / CO	PSO 1	PSO 2	PSO 3	PSO 4	PSO 5	PSO 6
CO1	3	2	3	3	3	2
CO2	3	3	1	2	2	2
CO3	2	2	3	3	3	3
CO4	2	2	3	3	3	1
CO5	2	3	3	3	3	3
Weight age of course contributed to each PSO	12	12	13	14	14	11

3 – Strong　　　　**2 – Medium**　　　　**1 – Low**

Programme: B.Sc. Information Technology		
Core – V	**Course Code:** 24UCA3C05	**Course Title:** Computer Networks

Semester	Hours/Week	Total Hours	Credits	Total Marks
III	5	75	5	100

Course Objectives

1. To understand the concept of Data communication and Computer network
2. To get a knowledge on routing algorithms.
3. To impart knowledge about networking and inter networking devices
4. To study about Network communication.
5. To learn the concept of Transport layer.

UNIT – I

Introduction – Network Hardware – Software – Reference Models – OSI and TCP/IP Models – Example Networks: Internet, ATM, Ethernet and Wireless LANs – Physical Layer – Theoretical Basis for Data Communication – Guided Transmission Media.

UNIT – II

Wireless Transmission – Communication Satellites – Telephone System: Structure, Local Loop, Trunks and Multiplexing and Switching. Data Link Layer: Design Issues – Error Detection and Correction.

UNIT – III

Elementary Data Link Protocols - Sliding Window Protocols – Data Link Layer in the Internet - Medium Access Layer – Channel Allocation Problem – Multiple Access Protocols – Bluetooth.

UNIT – IV

Network Layer – Design Issues – Routing Algorithms – Congestion Control Algorithms – IP Protocol – IP Addresses – Internet Control Protocols.

UNIT – V

Transport Layer-Services – Connection Management - Addressing, Establishing and Releasing a Connection – Simple Transport Protocol – Internet Transport Protocols (ITP) – Network Security: Cryptography.

Text Book

1. A.S. Tanenbaum, Computer Networks,4th Edition, Prentice-Hall of India, 2008.

Reference Books

1. B.A. Forouzan, Data Communications and Networking, Tata McGraw Hill,4th Edition, 2017
2. F. Halsall, Data Communications, Computer Networks and Open Systems, Pearson Education, 2008
3. D. Bertsekas and R. Gallagher, Data Networks, 2nd Edition, PHI, 2008.
4. Lamarca, Communication Networks, Tata McGraw-Hill, 2002.

Web Reference

1. https://en.wikipedia.org/wiki/Computer_network
2. https://citationsy.com/styles/computer-networks

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	To Understand the basics of Computer Network architecture, OSI and TCP/IP reference model	PO1
CO2	To gain knowledge on Telephone systems using wireless network	PO1, PO2
CO3	To understand the concept of MAC	PO4, PO6
CO4	To analyze the characteristics of Routing and Congestion control algorithms	PO4, PO5, PO6
CO5	To understand network security and define various protocols such as FTP, HTTP, Telnet, DNS	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	2	1	-
CO2	3	2	1	2	2	-
CO3	3	-	-	2	-	2
CO4	3	1	-	2	1	-
CO5	3	3	-	2	1	-
Weight age of course contributed to each PSO	15	8	1	10	5	2

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Core – VI		**Course Code:** 24UIT4C06		**Course Title:** .Net Programming
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
IV	5	75	5	100

Course Objectives

1. To identify and understand the goals and objectives of the .NET framework and ASP.NET with C# language.
2. To develop ASP.NET Web application using standard controls.
3. To implement file handling operations.
4. To handles SQL Server Database using ADO.NET.
5. Understand the Grid view control and XML classes..

UNIT – I

Overview of .NET framework: Common Language Runtime (CLR), Framework Class Library - C# Fundamentals: Primitive types and Variables – Operators - Conditional statements – Looping statements – Creating and using Objects–Arrays – String operations.

UNIT – II

Introduction to ASP.NET – IDE – Languages supported Components – Working with Web Forms – Web form standard controls: Properties and its events – HTML controls – List Controls: Properties and its events.

UNIT – III

Rich Controls: Properties and its events – validation controls: Properties and its events– File Stream classes -File Modes – File Share – Reading and Writing to files –Creating, Moving, Copying and Deleting files –File uploading.

UNIT – IV

ADO.NET Overview – Database Connections – Commands – Data Reader – Data Adapter – Data Sets – Data Controls and its Properties – DataBinding.

UNIT – V

Grid View control: Deleting, editing, Sorting and Paging. XML classes – Web form to manipulate XML files – Website Security – Authentication – Authorization – Creating a Web application.

Text Books

1. Svetlin Nakov, Veselin Kolev & Co, Fundamentals of Computer Programming with C#, Faber publication, 2019.
2. Mathew, MacDonald, The Complete Reference ASP.NET, Tata McGraw-Hill, 2015.

Reference Book

1. Herbert Schildt, The Complete Reference C#.NET, Tata McGraw-Hill, 2017.
2. Kogent Learning Solutions, C# 2012 Programming Covers .NET4.5 BlackBook, Dreamtechpres, 2013.
3. AnneBoehm, JoelMurach, Murach's C# 2015, Mike Murach & Associates Inc. 2016.
4. Denielle Otey, Michael Otey, ADO.NET: The Complete reference, McGrawHill, 2008.
5. Matthew MacDonald, Beginning ASP.NET4 in C# 2010, APRESS, 2010.

Web Reference

1. https://www.geeksforgeeks.org/introduction-to-net-framework/
2. https://www.javatpoint.com/net-framework

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Develop working knowledge of C# programming constructs and the .NET Framework	PO1, PO2, PO6
CO2	To develop a software to solve real-world problems using ASP.NET	PO2, PO3, PO8
CO3	To Work on Various Controls Files	PO1, PO3, PO7
CO4	To create a web application using Microsoft ADO.NET.	PO2, PO6
CO5	To develop web applications using XML	PO1, PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	1	3
CO2	3	2	2	2	2	3
CO3	3	3	2	2	3	3
CO4	3	1	2	2	1	3
CO5	3	1	2	2	1	2
Weight age of course contributed to each PSO	15	8	10	10	8	14

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		
Core Practical – IV	**Course Code:** 24UIT4P04	**Course Title:** .Net Programming Lab

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	3	45	4	100

Course Objectives

1. To develop ASP.NET Web application using standard controls.
2. To create rich database applications using ADO.NET.
3. To implement file handling operations.
4. To implement XML classes.
5. To utilize ASP.NET security features for authenticating the website.

List of Programs

1. Create an exposure of Web applications and tools.
2. Implement the Html Controls.
3. Implement the Server Controls.
4. Web application using Web controls.
5. Web application using List controls.
6. Web Page design using Rich control. Validate user input using Validation controls.
7. Web application using Data Controls.
8. Data binding with Web controls.
9. Data binding with Data Controls.
10. Database application to perform insert, update and delete operations.
11. Database application using Data Controls to perform insert, delete, edit, paging and sorting operation.
12. Implement the Xml classes.
13. Implement Authentication – Authorization.
14. Ticket reservation using ASP.NET controls.
15. Online examination using ASP.NET controls.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	To create web applications and implement various controls	PO1, PO2, PO6
CO2	Create a web page in Rich control.	PO3, PO8
CO3	Develop knowledge about file handling operations	PO1, PO4, PO8
CO4	An ability to design XML classes	PO2, PO6, PO7
CO5	To develop a software to solve real-world problems using ASP.NET	PO1, PO3, PO5, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	2	1	1
CO2	3	2	3	2	2	2
CO3	3	3	2	2	1	1
CO4	3	2	3	2	1	1
CO5	3	2	2	2	1	2
Weight age of course contributed to each PSO	15	11	12	10	6	7

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		
Core – VII	**Course Code:** 24UIT4C07	**Course Title:** Open-Source Technologies

Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	5	75	5	100

Course Objectives

1. To provide the necessary knowledge on basics of PHP.
2. To design and develop dynamic, database-driven web applications using PHP version.
3. To get an experience on various web application development techniques.
4. To learn the necessary concepts for working with the files using PHP.
5. To get a knowledge on OOPS with PHP.

UNIT – I

Introduction to PHP - Basic Knowledge of websites - Introduction of Dynamic Website - Introduction to PHP - Scope of PHP - XAMPP and WAMP Installation.

UNIT – II

PHP Programming Basics - Syntax of PHP - Embedding PHP in HTML - Embedding HTML in PHP. Introduction to PHP Variable - Understanding Data Types - Using Operators - Using Conditional Statements - If(), else if() and else if condition Statement.

UNIT – III

Switch() Statements - Using the while() Loop - Using the for() Loop PHP Functions. PHP Functions - Creating an Array - Modifying Array Elements - Processing Arrays with Loops - Grouping Form Selections with Arrays - Using Array Functions.

UNIT – IV

PHP Advanced Concepts - Reading and Writing Files - Reading Data from a File.

UNIT – V

Managing Sessions and Using Session Variables - Destroying a Session - Storing Data in Cookies - Setting Cookies.

Text Books

1. Head First PHP & MySQL: A Brain-Friendly Guide- 2009-Lynn mighley and Michael Morrison.
2. The Joy of PHP: A Beginner's Guide to Programming Interactive Web Applications with PHP and MySQL- Alan Forbes.

Reference Book

1. PHP: The Complete Reference-Steven Holzner.
2. DT Editorial Services (Author), "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Paperback 2016, 2nd Edition.

Web Reference

1. Refer MOOC Courses like NPTEL and SWAYAM
2. https://www.w3schools.com/php/default.asp

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Write PHP scripts to handle HTML forms	PO1, PO4, PO6, PO8
CO2	Write regular expressions including modifiers, operators, and metacharacters.	PO2, PO5, PO7
CO3	Create PHP Program using the concept of array.	PO3, PO6, PO8
CO4	Create PHP programs that use various PHP library functions	PO2, PO3, PO5, PO8
CO5	Manipulate files and directories.	PO3, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	1	-	1
CO2	2	-	1	1	2	1
CO3	3	3	1	1	-	1
CO4	1	3	2	1	-	1
CO5	3	2	1	1	-	1
Weight age of course contributed to each PSO	12	11	6	5	2	5

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Core – VIII		**Course Code:** 24UIT5C08		**Course Title:** Operating System
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	6	90	4	100

Course Objectives

1. Understanding the design of the Operating System
2. Imparting knowledge on CPU scheduling, Process and Memory Management.
3. To code specialized programs form an aging overall resources and operations of the computer.
4. To study about the concept of Job and process or scheduling
5. To learn about the concept of memory organization and multiprogramming

UNIT – I

Introduction: operating system, history (1990s to 2000 and beyond), distributed computing, parallel computation. Process concepts: definition of process, process states – Life cycle of a process, process management – process state transitions, process control block (PCB), process operations, suspend and resume, context switching, Interrupts – Interrupt processing, interrupt classes, Inter process communication - signals, message passing.

UNIT – II

Asynchronous concurrent processes: mutual exclusion - critical section, mutual exclusion primitives, implementing mutual exclusion primitives, Peterson's algorithm, software solutions to the mutual Exclusion Problem - n-thread mutual exclusion-Lamports Bakery Algorithm. Semaphores – Mutual exclusion with Semaphores, thread synchronization with semaphores, counting semaphores, implementing semaphores.Concurrent programming: monitors, message passing.

UNIT – III

Deadlock and indefinite postponement: Resource concepts, four necessary conditions for deadlock, deadlock prevention, deadlock avoidance and Dijkstra's Banker's algorithm, deadlock detection, deadlock recovery.

UNIT – IV

Job and processor scheduling: scheduling levels, scheduling objectives, scheduling criteria, preemptive vs non-preemptive scheduling, interval timer or interrupting clock, priorities, scheduling algorithms - FIFO scheduling, RR scheduling, quantum size, SJF scheduling, SRT scheduling, HRN scheduling, multilevel feedback queues, Fairshare scheduling.

UNIT – V

Real Memory organization and Management: Memory organization, Memory management, Memory hierarchy, Memory management strategies, contiguous vs non-contiguous memory allocation, single user contiguous memory allocation, fixed partition multiprogramming, variable partition multiprogramming, Memory swapping.

Virtual Memory organization: virtual memory basic concepts, multilevel storage organization, block mapping, paging basic concepts, segmentation, paging/segmentation systems. Virtual Memory Management: Demand Paging, Page replacement strategies.

Text Book

1. H.M.Deitel, Operating Systems, Third Edition, Pearson Education Asia, 2011.

Reference Books

1. William Stallings, Operating System: Internals and Design Principles, Seventh Edition, Prentice-Hall of India, 2012.

2. A.Silberschatz, and P.B. Galvin., Operating Systems Concepts, Ninth Edition, John Wiley & Sons(ASIA) Pte. Ltd., 2012

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Define the fundamentals of OS and identify the concepts relevant to process, process life cycle, Scheduling Algorithms, Deadlock and Memory management	PO1
CO2	Know the critical analysis of process involving various algorithms, an exposure to threads and semaphores	PO1, PO2
CO3	Have a complete study about Deadlock and its impact over OS. Knowledge of handling Deadlock with respective algorithms and measures to retrieve from deadlock.	PO4, PO6
CO4	Have complete knowledge of Scheduling Algorithms and its types.	PO4, PO5, PO6
CO5	Understand memory organization and management	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	-	1	2	-	1
CO2	2	3	1	2	-	1
CO3	3	2	-	3	-	1
CO4	1	3	1	1	3	2
CO5	3	-	1	3	2	1
Weight age of course contributed to each PSO	12	8	4	11	5	6

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		
Core – IX	**Course Code:** 24UIT5C09	**Course Title:** Python Programming

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	6	90	4	100

Course Objectives

1. To make students understand the concepts of Python programming.
2. To apply the OOPs concept in PYTHON programming.
3. To impart knowledge on demand and supply concepts
4. To make the students learn best practices in PYTHON programming
5. To know the costs and profit maximization

UNIT - I

Basics of Python Programming: History of Python – Features of Python – Literal – Constants – Variables – Identifiers – Keywords - Built-in Data Types – Output Statements – Input Statements - Comments – Indentation - Operators - Expressions-Type conversions. Python Arrays: Defining and Processing Arrays–Array methods.

UNIT - II

Control Statements: Selection/Conditional Branching statements: if, if-else, nested if and if-elif-else statements. Iterative Statements: while loop, for loop, elsesuiteinloop and nested loops. Jump Statements: break, continue and pass statements.

UNIT - III

Functions: Function Definition – Function Call – Variable Scope and its Lifetime – Return Statement. Function Arguments: Required Arguments, Keyword Arguments, Default Arguments and Variable Length Arguments - Recursion. Python Strings: String operations-Immutable Strings - Built-in String Methods and Functions - String Comparison.

Modules: import statement - The Python module – dir() function – Modules and Namespace – Defining our own modules.

UNIT - IV

Lists: Creating a list – Access values in List - Updating values in Lists-Nested lists – Basic list operations - List Methods. Tuples: Creating, Accessing, Updating and Deleting Elements in a tuple – Nested tuples – Difference between lists and tuples. Dictionaries: Creating, Accessing, Updating and Deleting Elements in a Dictionary–Dictionary Functions and Methods-Difference between Lists and Dictionaries.

UNIT - V

Python File Handling: Types of files in Python - Opening and Closing files - Reading and Writing files: write() and writelines() methods - append()method – read()andreadlines()methods – withkeyword – Splittingwords – Filemethods - FilePositions-Renaming and deleting files.

TEXT BOOK

1. Reema Thareja ― Python Programming using problem solving approach, First Edition, 2017, Oxford University Press.
2. Dr. R. Nageswara Rao ― Core Python Programming, First Edition, 2017, Dreamtech Publishers.

REFERENCES

1. Vamsi Kurama ― Python Programming: A Modern Approach, Pearson Education.
2. Mark Lutz, Learning Python, Orielly.
3. Adam Stewarts ― Python Programming, Online.
4. Fabio Nelli ― Python Data Analytics, A Press.
5. Kenneth A. Lambert ― Fundamentals of Python – First Programs, CENGAGE Publication.

Web Reference

- https://www.programiz.com/python-programming
- https://www.guru99.com/python-tutorials.html
- https://www.w3schools.com/python/python_intro.asp
- https://www.geeksforgeeks.org/python-programming-language/
- https://en.wikipedia.org/wiki/Python_(programming_language)

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Learn the basics of python, Do simple programs on python, Learn how to use an array.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Develop program using selection statement, Work with Looping and jump statements, Do programs on Loops and jump statements.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Concept of function, function arguments, Implementing the concept strings in various application, Significance of Modules, Work with functions, Strings and modules.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Work with List, tuples and dictionary, Write program using list, tuples and dictionary.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Usage of File handlings in python, Concept of reading and writing files, Do programs using files.	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with POs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	3	3
CO2	3	2	2	3	2	3
CO3	3	2	2	3	2	2
CO4	3	2	2	3	2	3
CO5	3	2	2	3	3	3
Weight age of course contributed to each PSO	15	10	10	15	12	14

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		
Core Practical – V	**Course Code:** 24UIT5P05	**Course Title:** Python Programming Lab

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	3	45	4	100

Course Objectives

1. Be able to design and program Python applications.
2. Be able to create loops and decision statements in Python.
3. Be able to work with functions and pass arguments in Python.
4. Be able to build and package Python modules for reusability.
5. Be able to read and write files in Python.

List of Programs

1. Program using variables, constants, I/O statements in Python.
2. Program using Operators in Python.
3. Program using Conditional Statements.
4. Program using Loops.
5. Program using Jump Statements.
6. Program using Functions.
7. Program using Recursion.
8. Program using Arrays.
9. Program using Strings.
10. Program using Modules.
11. Program using Lists.
12. Program using Tuples.
13. Program using Dictionaries.
14. Program for File Handling.

Course Outcomes (COs)

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

CO Number	CO Statement
CO1	Demonstrate the understanding of syntax and semantics of
CO2	Identify the problem and solve using PYTHON programming techniques.
CO3	Identify suitable programming constructs for problem solving.
CO4	Analyze various concepts of PYTHON language to solve the problem in an efficient way.
CO5	Develop a PYTHON program for a given problem and test for its correctness.

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	2	3	2
CO2	2	1	3	2	-	2
CO3	3	3	1	1	1	2
CO4	2	3	3	1	-	1
CO5	3	2	3	1	1	-
Weight age of course contributed to each PSO	12	11	12	7	5	7

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Core – X		**Course Code:** 24UIT6C10	**Course Title:** Ethical Hacking and Cyber Security	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	6	90	4	100

Course Objectives

1. To introduce the concepts of security and various kinds of attacks
2. Introduction about scanning and enumeration
3. To learn about system hacking
4. Programming For Security Professionals
5. To explain about penetration testing

UNIT - I

Introduction to Hacking – Importance of Security – Elements of Security – Phases of an Attack – Types of Hacker Attacks – Hacktivism – Vulnerability Research – Introduction to Foot printing – Information Gathering Methodology – Foot printing Tools – WHOIS Tools – DNS Information Tools – Locating the Network Range – Meta Search Engines.

UNIT - II

Introduction to Scanning – Objectives – Scanning Methodology – Tools – Introduction to Enumeration – Enumeration Techniques – Enumeration Procedure – Tools.

UNIT - III

System Hacking: Introduction – Cracking Passwords – Password Cracking Websites – Password Guessing –Password Cracking Tools – Password Cracking Countermeasures – Escalating Privileges –Executing Applications – Keyloggers and Spyware.

UNIT - IV

Programming For Security Professionals: Programming Fundamentals – C language – HTML – Perl – Windows OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures – Linux OS Vulnerabilities – Tools for Identifying Vulnerabilities – Countermeasures.

UNIT - V

Penetration Testing: Introduction – Security Assessments – Types of Penetration Testing- Phases of Penetration Testing – Tools – Choosing Different Types of Pen-Test Tools – Penetration Testing Tools.

TEXT BOOK

1. EC-Council, ―Ethical Hacking and Countermeasures: Attack Phases, Cengage Learning, 2010.
2. Michael.T.Simpson, Kent Backman, James.E.Corley, ― Hands on Ethical Hacking and Network Defense, Cengage Learning, 2013.

REFERENCES

1. Patrick Engebretson, ―The Basics of Hacking and Penetration Testing – Ethical Hacking and Penetration Testing Made Easy, Second Edition, Elsevier, 2013
2. Rafay Boloch, ― Ethical Hacking and Penetration Testing Guide, CRC Press,2014
3. Jon Erickson, ― Hacking, The Art of Exploitation, 2nd Edition: No Starch Press Inc., 2008.

Web Reference

- https://www.scribd.com/document/538684936/Hands-On-Ethical-Hacking-and-NetworkDefense-PDFDrive

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand Where information networks are most vulnerable	PO1, PO2
CO2	Understand and apply the concepts of system Hacking	PO3, PO4, PO5
CO3	Understand and apply the programming concepts for hacking	PO4, PO5, PO6
CO4	Distinguish and examine the function and phases in penetration testing	PO7, PO8
CO5	Classify Various hacking techniques and attacks	PO5, PO6, PO8

Mapping of COs with POs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	1	2	2	3	1
CO2	3	2	2	1	3	2
CO3	2	3	2	2	2	3
CO4	3	3	2	2	3	3
CO5	1	2	2	3	1	2
Weight age of course contributed to each PSO	12	11	10	10	12	11

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Core – XI	**Course Code:** 24UIT6C11		**Course Title:** Data Analytics Using R Programming	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	6	90	4	100

Course Objectives

1. To understand the problem-solving approaches
2. To learn the basic programming constructs in R Programming
3. To practice various computing strategies for R Programming-based solutions to real world problems
4. To use R Programming data structures-lists, tuples, and dictionaries.
5. To do input/output with files in R Programming..

UNIT – I

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

UNIT – II

CONTROL STRUCTURES AND VECTORS: Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, extracting elements of a vector using subscripts, working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors - Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations.

UNIT – III

LISTS- Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, Data Frames, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations.

UNIT – IV

FACTORS AND TABLES – Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array – Like Operations on Tables, Extracting a Sub table, Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions R PROGRAMMING.

UNIT – V

OBJECT-ORIENTED PROGRAMMING S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation.

Text Book

1. Roger D. Peng, R Programming for Data Science, 2012.
2. Norman Matloff, The Art of R Programming – A Tour of Statistical Software Design, 2011.

Reference Books

1. Garrett Grolemund, Hadley Wickham, Hands-On Programming with R: Write Your Own Functions and Simulations, 1st Edition, 2014
2. Venables, W.N. and Ripley, S programming ― Springer, 2000.

Reference Books

1. https://www.simplilearn.com

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO2
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO4, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Learn No SQL databases and management.	PO3, PO8

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	-	3	1	-
CO2	3	3	2	2	-	2
CO3	1	2	3	1	2	1
CO4	2	2	1	-	2	1
CO5	2	2	2	1	3	1
Weight age of course contributed to each PSO	11	11	8	7	8	5

3 – Strong   2 – Medium   1 – Low

Programme: B.Sc. Information Technology				
Core Practical – VI		**Course Code:** 24UIT6P06		**Course Title:** R Programming Lab
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	3	45	4	100

Course Objectives

1. To understand the problem-solving approaches
2. To learn the basic programming constructs in R Programming
3. To practice various computing strategies for R Programming-based solutions to real world problems
4. To use R Programming data structures-lists, tuples, and dictionaries.
5. To do input/output with files in R Programming..

List of Programs

1. Program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Program to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
3. Write a program to find list of even numbers from1to n using R-Loops.
4. Create a function to print squares of numbers in sequence.
5. Write a program to join columns and rows in a data frame using cbind() and rbind() in R.
6. Implement different String Manipulation functions in R.
7. Implement different data structures in R (Vectors, Lists, Data Frames)
8. Write a program to read a csv file and analyze the data in the file in R.
9. Create pie chart and bar chart using R.
10. Create a data set and do statistical analysis on the data using R.
11. Program to find factorial of the given number using recursive function
12. Write a R program to count the number of even and odd numbers from array of N numbers.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Acquire programming skills in core R Programming	PO1, PO4, PO5
CO2	Acquire Object-oriented programming skills in R Programming.	PO1, PO4, PO8
CO3	Develop the skill of designing graphical-user interfaces (GUI)in R Programming	PO1, PO3, PO6
CO4	Acquire R Programming skills to move into specific branches	PO3, PO4
CO5	Develop the skill of designing in R Programming	PO1, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	1	2
CO2	2	3	3	3	1	2
CO3	2	3	3	3	1	2
CO4	2	3	3	3	1	2
CO5	2	3	3	3	1	2
Weight age of course contributed to each PSO	11	15	15	15	5	10

3 – Strong   **2 – Medium**   **1 – Low**

ELECTIVE COURSES

Programme: B.Sc. Information Technology				
Elective – III		**Course Code:** 24UIT3E01		**Course Title:** Software Project Management
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	5	75	3	100

Course Objectives

1. To define and highlight importance of software project management.
2. To formulate and define the software management metrics & strategy in managing projects
3. To understand the tasks and activities in software project management.
4. To understand to apply software testing techniques in commercial environment
5. To understand the quality reqiurements in project..

UNIT – I

Introduction to Competencies - Product Development Techniques - Management Skills - Product Development Life Cycle – Software Development Process and models – The SEICMM - International Organization for Standardization.

UNIT – II

Managing Domain Processes - Project Selection Models – Project Portfolio Management - Financial Processes - Selecting a Project Team - Goal and Scope of the Software Project - Project Planning -Creating the Work Breakdown Structure - Approaches to Building a WBS – Project Milestones – Work Packages – Building a WBS for Software.

UNIT – III

Tasks and Activities - Software Size and Reuse Estimating – The SEICMM – Problems and Risks – Cost Estimation - Effort Measures - COCOMO: A Regression Model - COCOMOII - SLIM: A Mathematical Model – Organizational Planning - Project Roles and Skills Needed.

UNIT – IV

Project Management Resource Activities - Organizational Form and Structure - Software Development Dependencies - Brainstorming -Scheduling Fundamentals – PERT and CPM - Leveling Resource Assignments – Map the Schedule to a Real Calendar – Critical Chain Scheduling.

UNIT – V

Quality: Requirements – The SEI CMM - Guidelines - Challenges -Quality Function Deployment – Building the Software Quality Assurance - Plan - Software Configuration Management: Principles -Requirements – Planning and Organizing – Tools – Benefits - Legal Issues in Software – Case Study.

Text book

1. Robert T. Futrell, Donald F. Shafer, Linda I. Safer, Quality Software Project Management, Pearson Education Asia, 2002.

Reference Book

1. Pankaj Jalote, Software Project Management in Practice, Addison Wesley, 2002.
2. Hughes, Software Project Management, Tata McGraw Hill 2004, 3rd Edition..

Web Reference

1. NPTEL & MOOC courses titled Software Project Management
2. www.smartworld.com/notes/software-project-management

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the principles and concepts of project management	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knowledge gained to train software project managers	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply software project management methodologies.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Able to create comprehensive project plans	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Evaluate and mitigate risks associated with software development process	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	-	3	3	1
CO2	2	1	-	3	3	-
CO3	3	-	1	2	3	3
CO4	2	3	2	3	2	-
CO5	2	2	-	3	3	3
Weight age of course contributed to each PSO	11	8	3	14	14	7

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – III		**Course Code:** 24UIT3E02		**Course Title:** Analytics for Service Industry
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
III	5	75	3	100

Course Objectives

1. Recognize challenges in dealing with datasets in service industry.
2. Identify and apply appropriate algorithms for analysing the healthcare, Human resource, hospitality and tourism data.
3. Make choices for a model for new machine learning tasks.
4. To identify employees with high attrition risk.
5. To Prioritizing various talent management initiatives for your organization.

UNIT – I

Healthcare Analytics: Introduction to Healthcare Data Analytics Electronic Health Records – Components of EHR- Coding Systems Benefits of EHR - Barrier to Adopting HER Challenges Phenotyping Algorithms. Biomedical Image Analysis and Signal Analysis Genomic Data Analysis for Personalized Medicine. Review of Clinical Prediction Models.

UNIT – II

Healthcare Analytics Applications: Applications and Practical Systems for Healthcare – Data Analytics for Pervasive Health - Fraud Detection in Healthcare - Data Analytics for Pharmaceutical Discoveries Clinical Decision Support Systems - Computer Assisted Medical Image Analysis Systems - Mobile Imaging and Analytics for Biomedical Data.

UNIT – III

HR Analytics: Evolution of HR Analytics, HR information systems and data sources, HR Metric and HR Analytics, Evolution of HR Analytics; HR Metrics and HR Analytics; Intuition versus analytical thinking; HRMS/HRIS and data sources; Analytics frameworks like LAMP, HCM:21(r)Model.

UNIT – IV

Performance Analysis: Predicting employee performance, training requirements, evaluating training and development, Optimizing selection and promotion decisions.

UNIT – V

Tourism and Hospitality Analytics: Guest Analytics – Loyalty Analytics – Customer Satisfaction – Dynamic Pricing – optimized disruption management – Fraud detection in payments.

Text book

1. Chandan K.Reddy and Charu C Aggarwal, ― Health care data analytics, Taylor & Francis,2015.
2. Edwards Martin R, Edwards Kirsten (2016), ― Predictive HR Analytics: Mastering the HR Metric, Kogan Page Publishers, ISBN-0749473924
3. Fitz-enzJac(2010), ― The new HR analytics: predicting the economic value of your
4. company 'shuman capital investments, AMACOM, ISBN-13:978-0-8144-1643-3
5. Rajendra Sahu, Manoj Dashand AnilKumar. Applying Predictive Analytics with in the Service Sector.

Reference Book

1. Hui Yang and Eva K. Lee, ― Health care Analytics: From Data to Knowledge to Healthcare Improvement, Wiley,2016
2. Fitz-enzJac, Mattox II John (2014), ― Predictive Analytics for Human Resources, Wiley, ISBN-1118940709.

Web Reference

1. https://www.ukessays.com/essays/marketing/contemporary-issues-in-marketingmarketing-essay.php
2. https://yourbusiness.azcentral.com/examples-contemporary-issues-marketing-field26524.html

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand and critically apply the concepts and methods of business analytics	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Identify, model and solve decision problems in different settings.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Interpret results/solutions and identify appropriate courses of action for a given managerial situation whether a problem or an opportunity.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Create viable solutions to decision making problems.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Instil a sense of ethical decision-making and a commitment to the long-run welfare of both organizations and the communities they serve.	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	2	3	3	3	3	3
CO3	3	3	2	3	3	2
CO4	3	3	3	3	3	3
CO5	3	3	3	3	3	3
Weight age of course contributed to each PSO	14	15	14	15	15	14

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – III		**Course Code:** 24UIT3E03		**Course Title:** Human Computer Interaction
Semester III	**Hours/Week** 5	**Total Hours** 75	**Credits** 3	**Total Marks** 100

Course Objectives

1. To learn about the foundations of Human Computer Interaction.
2. To learn the design and software process technologies.
3. To learn HCI models and theories.
4. To learn Mobile Ecosystem.
5. To learn the various types of Web Interface Design.

UNIT – I

FOUNDATIONS OF HCI :

- The Human: I/O channels – Memory
- Reasoning and problem solving; The Computer: Devices – Memory –processing and networks;
- Interaction: Models – frameworks – Ergonomics – styles – elements – interactivity-Paradigms. - Case Studies

UNIT – II

DESIGN & SOFTWARE PROCESS:

- Interactive Design:
- Basics – process – scenarios
- Navigation: screen design Iteration and prototyping.
- HCI in software process:
- Software life cycle – usability engineering – Prototyping in practice – design rationale. Design rules: principles, standards, guidelines, rules. Evaluation Techniques – Universal Design

UNIT – III

MODELS AND THEORIES: HCI Models: Cognitive models: Socio-Organizational issues and stakeholder requirements Communication and collaboration models-Hypertext, Multimedia and WWW.

UNIT – IV

Mobile HCI:

- Mobile Ecosystem: Platforms, Application frameworks
- Types of Mobile Applications: Widgets, Applications, Games
- Mobile Information Architecture, Mobile 2.0,
- Mobile Design: Elements of Mobile Design, Tools. - Case Studies.

UNIT – V

WEB INTERFACE DESIGN: Designing Web Interfaces – Drag & Drop, Direct Selection, Contextual Tools, Overlays, Inlays and Virtual Pages, Process Flow - Case Studies.

Text book

1. Alan Dix, Janet Finlay, Gregory Abowd, Russell Beale, Human –Computer Interaction, III Edition, Pearson Education, 2004 (UNIT I, II & III)
2. Brian Fling, ―Mobile Design and Development, I Edition, O_Reilly Media Inc., 2009(UNIT–IV)
3. Bill Scott and Theresa Neil, ―Designing Web Interfaces, First Edition, O_Reilly, 2009. (UNIT-V).

Reference Book

1. Shneiderman, ―Designing the User Interface: Strategies for Effective Human-Computer Interaction, V Edition, Pearson Education.

Web Reference

1. https://www.interaction-design.org/literature/topics/human-computer-interaction
2. https://link.springer.com/10.1007/978-0-387-39940-9_192
3. https://en.wikipedia.org/wiki/Human%E2%80%93computer_interaction

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the fundamentals of HCI.	PO1
CO2	Understand the design and software process technologies.	PO1, PO2
CO3	Understand HCI models and theories.	PO4, PO6
CO4	Understand Mobile Ecosystem, types of Mobile Applications, mobile Architecture and design.	PO4, PO5, PO6
CO5	Understand the various types of Web Interface Design.	PO3, PO4

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	2	3	2	2
CO2	3	3	2	3	2	2
CO3	3	3	3	3	2	2
CO4	3	3	2	3	2	2
CO5	3	3	2	3	3	2
Weight age of course contributed to each PSO	15	14	11	15	11	10

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		

Elective – IV		Course Code: 24UIT4E04	Course Title: Cryptography

Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	5	75	3	100

Course Objectives

1. To understand the fundamentals of Cryptography
2. To acquire knowledge on standard algorithms used to provide confidentiality, integrity and authenticity.
3. To understand the various key distribution and management schemes.
4. To understand how to deploy encryption techniques to secure data in transit across data networks
5. To design security applications in the field of Information technology.

UNIT – I

Introduction: The OSI security Architecture – Security Attacks – Security Mechanisms – Security Services – A model for network Security.

UNIT – II

Classical Encryption Techniques: Symmetric cipher model – Substitution Techniques: Caesar Cipher – Monoalphabetic cipher – Play fair cipher – PolyAlphabetic Cipher – Transposition techniques – Stenography.

UNIT – III

Block Cipher and DES: Block Cipher Principles – DES – The Strength of DES – RSA: The RSA algorithm.

UNIT – IV

Network Security Practices: IP Security overview – IP Security architecture – Authentication Header. Web Security: Secure Socket Layer and Transport Layer Security – Secure Electronic Transaction.

UNIT – V

Intruders – Malicious software – Firewalls.

Text Books

1. William Stallings, Cryptography and Network Security Principles and Practices.

Reference Books

1. Behrouz A.Foruzan, Cryptography and Network Security, Tata McGraw-Hill, 2007.

2. Atul Kahate, Cryptography and Network Security, Second Edition, 2003, TMH.

3. M.V. Arun Kumar, Network Security, 2011, First Edition, USP.

Web Reference

1. https://www.tutorialspoint.com/cryptography/

2. https://gpgtools.tenderapp.com/kb/how-to/introduction-to-cryptography

Course Outcomes (Cos)

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

CO Number	CO Statement	Programme Outcomes
CO1	Analyze the vulnerabilities in any computing system and hence be able to design a security solution.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Apply the different cryptographic operations of symmetric cryptographic algorithms	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Apply the different cryptographic operations of public key cryptography	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Apply the various Authentication schemes to simulate different applications.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Understand various Security practices and System security standards	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of Cos with PSOs

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	2	3	2
CO2	3	2	3	2	3	3
CO3	2	3	2	2	2	1
CO4	2	3	3	1	2	3
CO5	3	2	3	3	3	3
Weight age of course contributed to each PSO	13	13	12	10	13	12

3 – Strong　　　　**2 – Medium**　　　　**1 – Low**

Programme: B.Sc. Information Technology		
Elective – IV	**Course Code:** 24UIT4E05	**Course Title:** Grid Computing

Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	5	75	3	100

Course Objectives

1. To learn the basic construction and application of Grid computing.
2. To learn grid computing organization and their Role.
3. To learn Grid Computing Anatomy.
4. To learn Grid Computing Road map.
5. To learn various type of Grid Architecture..

UNIT – I

Introduction: Early Grid Activity, Current Grid Activity, Overview of Grid Business areas, Grid Applications, Grid Infrastructures.

UNIT – II

Grid Computing organization and their Roles: Organizations Developing Grid Standards, and Best Practice Guidelines, Global Grid Forum (GCF), #Organization Developing Grid Computing Tool kits and Framework#, Organization and building and using grid-based solutions to solve computing, commercial organization building and Grid Based solutions.

UNIT – III

Grid Computing Anatomy: The Grid Problem, The conceptual of virtual organizations, # Grid Architecture # and relationship to other distributed technology.

UNIT – IV

The Grid Computing Road Map: Autonomic computing, Business on demand and infrastructure virtualization, Service - Oriented Architecture and Grid, #Semantic Grids#.

UNIT – V

Merging the Grid services Architecture with the Web Services Architecture: Service - Oriented Architecture, Web Service Architecture, #XML messages and Enveloping#, Service message description Mechanisms, Relationship between Web Services and Grid Services, Web services Interoperability and the role of the WS-I Organization.

Text Books

1. Joshy Joseph and Craig Fellenstein, Grid computing, Pearson/IBM Press, PTR, 2004.

Reference Books

1. Ahmer Abbas and Grid computing, A Practical Guide to technology and applications, Charles River Media, 2003.

Web Reference

1. https://en.wikipedia.org/wiki/Grid_computing
2. https://link.springer.com/chapter/10.1007/978-1-84882-409-6_4
3. https://www.redbooks.ibm.com/redbooks/pdfs/sg246778.pdf

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	To understand the basic elements and concepts of Grid computing.	PO1
CO2	To understand the Grid computing tool kits and Framework.	PO1, PO2
CO3	To understand the concepts of Anatomy of Grid Computing.	PO4, PO6
CO4	To understand the concept of service oriented architecture.	PO4, PO5, PO6
CO5	To Gain knowledge on grid and web service architecture.	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	1	2
CO2	2	1	2	1	3	1
CO3	3	2	1	1	-	1
CO4	3	-	3	2	1	3
CO5	2	3	1	2	3	2
Weight age of course contributed to each PSO	12	9	8	8	8	9

3 – Strong　　　　**2 – Medium**　　　　**1 – Low**

Programme: B.Sc. Information Technology		
Elective – IV	**Course Code:** 24UIT4E06	**Course Title:** Artificial Neural Networks

Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	5	75	3	100

Course Objectives

1. Understand the basics of artificial neural networks, learning process, single layer and multi-layer perceptron networks.
2. Understand the Error Correction and various learning algorithms and tasks.
3. Identify the various Single Layer Perception Learning Algorithm.
4. Identify the various Multi-Layer Perception Network.
5. Analyze the Deep Learning of various Neural network and its Applications..

UNIT – I

Artificial Neural Model – Activation functions – Feed forward and Feedback, Convex Sets, Convex Hull and Linear Separability, Non-Linear Separable Problem - Multilayer Networks. Learning Algorithms - Error correction- Gradient Descent Rules, Perception Learning Algorithm, Perception Convergence Theorem.

UNIT – II

Introduction, Error correction learning, Memory-based learning, Hebbian learning, Competitive learning, Boltzmann learning, credit assignment problem, Learning with and without teacher, learning tasks, Memory and Adaptation.

UNIT – III

Single layer Perception: Introduction, Pattern Recognition, Linear classifier, Simple perception, Perception learning algorithm, Modified Perception learning algorithm, Adaptive linear combiner, Continuous perception,Learning incontinuous perception.Limitation of Perception.

UNIT – IV

Multi - Layer Perception Networks: Introduction, MLP with 2hidden layers,Simplelayer of a MLP, Delt a learning rule of the output layer,Multilayer feed forward neural network with continuous perceptions, Generalized delt a learning rule, Back propagation algorithm.

UNIT – V

Deep learning- Introduction- Neuro architectures building blocks for the DL techniques, Deep Learning and Neocognitron, Deep Convolutional Neural Networks, Recurrent Neural Networks (RNN), feature extraction, Deep Belief Networks, Restricted Boltzman Machines, Training of DNN and Applications.

Text Books

1. Neural Networks A Classroom Approach - SatishKumar, McGraw Hill – Second Edition.
2. Neural Network – A Comprehensive Foundation – Simon Haykins, Pearson Prentice Hall, 2nd Edition, 1999.

Reference Books

1. Artificial Neural Networks - B. Yegnanarayana, PHI, New Delhi, 1998.

Web Reference

1. https://www.w3schools.com/ai/ai_neural_networks.asp
2. https://en.wikipedia.org/wiki/Artificial_neural_network
3. https://link.springer.com/chapter/10.1007/978-3-642-21004-4_12

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Students will earn the basics of artificial neural networks with single	PO1
CO2	Learn about the Error	PO1, PO2
CO3	Learn the various Perception Learning Algorithm.	PO4, PO6
CO4	Learn about the various Multi-Layer Perception Network.	PO4, PO5, PO6
CO5	Understand the Deep Learning of various Neural network and its Applications.	PO3, PO8

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	2	-	1
CO2	3	2	3	2	3	3
CO3	3	1	2	2	2	3
CO4	2	3	3	1	3	1
CO5	3	3	3	3	3	3
Weight age of course contributed to each PSO	13	12	13	10	11	11

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		

Elective – V	Course Code: 24UIT5E07	Course Title: Machine Learning

Semester	Hours/Week	Total Hours	Credits	Total Marks
V	5	75	3	100

Course Objectives

1. To Learn about Machine Intelligence and Machine Learning applications
2. To implement and apply machine learning algorithms to real-world applications
3. To identify and apply the appropriate machine learning technique to classification, pattern recognition, optimization and decision problems
4. To create instant based learning
5. To apply advanced learning.

UNIT – I

Introduction Machine Learning - Difference between AI, Machine Learning and Big data. Supervised and unsupervised learning, parametric vs non-parametric models, parametric models for classification and regression- Linear Regression, Logistic Regression, Naïve Bayes classifier, simple non-parametric classifier-K-nearest neighbour, support vector machines.

UNIT – II

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 – III

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 – IV

Instant based learning K- Nearest Neighbour Learning – Locally weighted Regression – Radial Basis Functions – Case Based Learning.

UNIT – V

Advanced learning Recommendation systems – opinion mining, sentiment analysis. 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.

Text Books

1. Tom M. Mitchell, ―Machine Learning, McGraw-Hill Education (India) Private Limited, 2013.
2. Bengio, Yoshua, Ian J. Goodfellow, and Aaron Courville. "Deep learning" 2015, MIT Press.

Reference Books

1. Ethem Alpaydin, ―Introduction to Machine Learning (Adaptive Computation and Machine Learning), The MIT Press 2004.
2. Stephen Marsland, ―Machine Learning: An Algorithmic Perspective, CRC Press, 2009.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Appreciate the importance of visualization in the data analytics solution	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Apply structured thinking to unstructured problems	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand a very broad collection of machine learning algorithms and problems	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Learn algorithmic topics of machine learning and mathematically deep enough to introduce the required theory	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop an appreciation for what is involved in learning from data.	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	3	3	2	3
CO3	3	3	3	3	3	3
CO4	3	3	2	3	3	3
CO5	3	3	3	3	3	2
Weight age of course contributed to each PSO	15	15	14	15	14	14

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – V		**Course Code:** 24UIT5E08		**Course Title:** Image Processing
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	5	75	3	100

Course Objectives

1. To learn fundamentals of digital image processing.
2. To learn about various 2D Image transformations
3. To learn about various image enhancement processing methods and filters
4. To learn about various classification of Image segmentation techniques
5. To learn about various image compression techniques.

UNIT – I

Digital Image Fundamentals: Image representation - Basic relationship between pixels, Elements of DIP system - Applications of Digital Image Processing - 2D Systems - Classification of 2D Systems – Mathematical Morphology - Structuring Elements - Morphological Image Processing - 2D Convolution - 2D Convolution Through Graphical Method - 2D Convolution Through Matrix Analysis.

UNIT – II

2D Image transforms: Properties of 2D – DFT – Walsh transform - Hadamard transform – Haar transform – Discrete Cosine Transform - Karhunen – Loeve Transform – Singular Value Decomposition.

UNIT – III

Image Enhancement: Spatial domain methods – Point processing – Intensity transformations – Histogram processing – Spatial filtering - smoothing filter - Sharpening filters - Frequency domain methods: lowpass filtering, high pass Filtering – Homomorphic filter.

UNIT – IV

Image segmentation: Classification of Image segmentation techniques - Region approach – Clustering techniques - Segmentation based on thresholding – Edge based segmentation – Classification of edges – Edge detection – Hough transform - Active contour.

UNIT – V

Image Compression: Need for compression – Redundancy – Classification of image – Compression schemes – Huffman coding – Arithmetic coding - Dictionary based compression – Transform based compression.

Text Books

1. S Jayaraman, S Esakkirajan, T Veerakumar, Digital image processing, Tata McGraw Hill,2 015

2. Gonzalez Rafel C, Digital Image Processing, Pearson Education, 2009.

Reference Books

1. Jain Anil K, Fundamentals of digital image processing, PHI, 1988

2. Kenneth R Castleman, Digital image processing, Pearson Education, 2/e, 2003

3. Pratt William K, DigitalImageProcessing, John Wiley, 4/e, 2007

Web Reference

1. https://kanchiuniv.ac.in/coursematerials/Digital%20image%20processing%20-Vijaya%20Raghavan.pdf

2. http://sdeuoc.ac.in/sites/default/files/sde_videos/Digital%20Image%20Processing%20 3rd%20ed.%20-%20R.%20Gonzalez%2C%20R.%20Woods-ilovepdf-compressed.pdf

3. https://dl.acm.org/doi/10.5555/559707

4. https://www.ijert.org/image-processing-using-web-2-0-2

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the fundamental concepts of digital image processing.	PO1
CO2	Understand various 2D Image transformations	PO1, PO2
CO3	Understand image enhancement processing techniques and filters	PO4, PO6
CO4	Understand the classification of Image segmentation techniques	PO4, PO5, PO6
CO5	Understand various image compression techniques	PO3, PO8

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	3	2	2	3	1
CO2	3	2	3	2	3	3
CO3	3	3	2	2	2	1
CO4	3	3	3	1	3	3
CO5	3	2	3	3	3	3
Weight age of course contributed to each PSO	13	13	13	10	14	11

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – V		**Course Code:** 24UIT5E09		**Course Title:** IoT and its Applications
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	5	75	3	100

Course Objectives

1. Use of Devices, Gateways and Data Management in IoT.
2. Design IoT applications in different domain and be able to analyze their performance
3. Implement basic IoT applications on embedded platform
4. To gain knowledge on Industry Internet of Things
5. To Learn about the privacy and Security issues in IoT.

UNIT – I

IoT & Web Technology, The Internet of Things Today, Time for Convergence, Towards the IoT Universe, Internet of Things Vision, IoT Strategic Research and Innovation Directions, IoT Applications, Future Internet Technologies, Infrastructure, Networks and Communication, Processes, Data Management, Security, Privacy & Trust, Device Level Energy Issues, IoT Related Standardization, Recommendations on Research Topics.

UNIT – II

M2M to IoT – A Basic Perspective – Introduction, Some Definitions, M2M Value Chains, IoT Value Chains, An emerging industrial structure for IoT, The international driven global value chain and global information mono polies. M2M to IoT – An Architectural Overview – Building an architecture, Main design principles and needed capabilities, An IoT architecture outline, standards considerations.

UNIT – III

IoT Architecture -State of the Art – Introduction, State of the art, Architecture. Reference Model- Introduction, Reference Model and architecture, IoT reference Model, IoT Reference Architecture - Introduction, Functional View, Information View, Deployment and Operational View, Other Relevant architectural views.

UNIT – IV

IoT Applications for Value Creations Introduction, IoT applications for industry: Future Factory Concepts, Brown field IoT, Smart Objects, Smart Applications, Four Aspects in your Business to Master IoT, Value Creation from Big Data and Serialization, IoT for Retailing Industry, IoT for Oil and Gas Industry, Opinions on IoT Application and Value for Industry, Home Management.

UNIT – V

Internet of Things Privacy, Security and Governance Introduction, Overview of Governance, Privacy and Security Issues, Contribution from FP7 Projects, Security, Privacy and Trust in IoT – Data - Platforms for Smart Cities, First Steps Towards a Secure Platform, Smartie Approach. Data Aggregation for the IoT in Smart Cities, Security.

Text Books

1. Vijay Madisetti and Arshdeep Bahga, Internet of Things: (A Hands-on Approach), Universities Press (INDIA) Private Limited, 2014, 1st Edition.

Reference Books

1. Michael Miller, The Internet of Things: How Smart TVs, Smart Cars, Smart Homes, and Smart Cities Are Changing the World, kindle version.
2. Francisda Costa, Rethinking the Internet of Things: A Scalable Approach to Connecting Everything, Apress Publications, 2013,1st Edition,.
3. Waltenegus Dargie, Christian Poellabauer, "Fundamentals of Wireless Sensor Networks: Theory and Practice
4. CunoPfister, Getting Started with the Internet of Things, O"Reilly Media, 2011.

Web Reference

1. https://www.simplilearn.com
2. https://www.javatpoint.com
3. https://www.w3schools.com

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Gain the basic knowledge about IoT and they will be able to use IoT related products in real life.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Understand IoT Access Architecture and Protocols.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Helps to rely less on physical resources and started to do their work smarter.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Describe Design & Development of	PO1, PO2, PO3, PO4, PO5, PO6
CO5	IoT Know IoT supporting services.	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	-	-	2	-	2
CO2	2	1	-	1	3	1
CO3	3	-	1	1	-	1
CO4	2	-	-	2	1	2
CO5	2	-	-	2	-	2
Weight age of course contributed to each PSO	11	1	1	8	4	8

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – VI		**Course Code:** 24UIT5E10		**Course Title:** Natural Language Processing
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	5	75	3	100

Course Objectives

1. To understand approaches to syntax and semantics in NLP.
2. To learn natural language processing and to learn how to apply basic algorithms in this field.
3. To understand approaches to discourse, generation, dialogue and summarization with in NLP.
4. To get acquainted with the algorithmic description of the main language levels: morphology, syntax, semantics, pragmatics, etc.
5. To understand current methods for statistical approaches tom a chine translation..

UNIT – I

Introduction: Natural Language Processing tasks in syntax, semantics, and pragmatics – Issue - Applications – The role of machine learning –Probability Basics –Information theory – Collocations - N-gram Language Models – Estimating parameters and smoothing – Evaluating language models.

UNIT – II

Word level and Syntactic Analysis: Word Level Analysis: Regular Expressions - Finite-State Automata - Morphological Parsing - Spelling Error Detection and correction – Words and Word classes - Part-of Speech Tagging. Syntactic Analysis: Context – free Grammar – Constituency – Parsing – Probabilistic Parsing.

UNIT – III

Semantic analysis and Discourse Processing: Semantic Analysis: Meaning Representation – Lexical Semantics – Ambiguity – Word Sense Disambiguation. Discourse Processing: cohesion - Reference Resolution – Discourse Coherence and Structure.

UNIT – IV

Natural Language Generation: Architecture of NLG Systems - Generation Tasks and Representations - Application of NLG. Machine Translation: Problems in Machine Translation. Characteristics of Indian Languages – Machine Translation Approaches – Translation involving Indian Languages.

UNIT – V

Information retrieval and lexical resources: Information Retrieval: Design features of Information Retrieval Systems - Classical, Non-classical, Alternative Models of Information Retrieval – valuation Lexical Resources: World Net – Frame Net Stemmers – POS Tagger – Research Corpora SSAS.

Text Book

1. Daniel Jurafsky, James H.Martin, Speech & language processing ,Pearson publications.
2. Allen, James. Natural language understanding. Pearson,1995.

Reference Books

1. Pierre M. Nugues, An Introduction to Language Processing with Per land Prolog, Springer.

Web Reference

1. https://en.wikipedia.org/wiki/Natural_language_processing
2. https://www.techtarget.com/searchenterpriseai/definition/natural-language-processing-NLP

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Describe the fundamental concepts and techniques of natural language processing. Explain the advantages and disadvantages of different NLP technologies and their applicability in different business situations.	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Distinguish among the various techniques, taking into account the assumptions, strengths, and weaknesses of each Use NLP technologies to explore and gain a broad understanding of text data.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Use appropriate descriptions, visualizations, and statistics to communicate the problems and their solutions. Use NLP methods to analyze sentiment of a text document.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Analyze large volume text data generated from a range of real-world applications.Use NLP methods to perform topic modelling.	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Develop robotic process automation to manage business processes and to increase and monitor their efficiency and effectiveness. Determine the framework in which artificial intelligence and the Internet of things may function, including interactions with people, enterprise functions, and environments.	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	1
CO2	2	3	3	3	2	3
CO3	1	3	3	3	1	3
CO4	3	2	1	3	2	3
CO5	3	3	3	3	3	3
Weight age of course contributed to each PSO	12	14	13	15	11	13

3 – Strong   2 – Medium   1 – Low

Programme: B.Sc. Information Technology				
Elective – VI		**Course Code:** 24UIT5E11	**Course Title:** Data Mining	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	5	75	3	100

Course Objectives

1. To learn the basic concepts of Data Mining algorithms, methods and tools.
2. To Identify appropriate data mining algorithms to solve real world problems.
3. To develop and apply critical thinking, problem-solving, and decision-making skills.
4. To discover interesting patterns, analyze supervised and unsupervised models and estimate the accuracy of the algorithms.
5. To characterize the kinds of patterns that can be discovered by association rule mining, classification and clustering.

UNIT – I

Introduction: Data Mining Tasks – Data Mining Versus Knowledge Discovery in Databases – Relational Databases – Data Warehouses – Transactional Databases – Object Oriented Databases – Spatial Databases – Temporal Databases – Text and Multimedia Databases – Heterogeneous Databases – Mining Issues – Metrics – Social Implications of Data Mining.

UNIT – II

Data Preprocessing: Why Preprocess the Data – Data Cleaning – Data Integration – Data Transformation – Data Reduction – Data Discretization.

UNIT – III

Data Mining Techniques: Association Rule Mining – The Apriori Algorithm – Multilevel Association Rules – Multidimensional Association Rules – Constraint Based Association Mining.

UNIT – IV

Classification and Prediction: Issues regarding Classification and Prediction – Decision Tree induction – Bayesian Classification – Back Propagation – Classification Methods – Prediction – Classifiers accuracy.

UNIT – V

Clustering Techniques: Cluster Analysis – Clustering Methods – Hierarchical Methods – Density Based Methods – Outlier Analysis – Introduction to Advanced Topics: Web Mining, Spatial Mining and Temporal Mining.

Text Book

1. Han and M. Kamber, "Data Mining Concepts and Techniques", 2001, Harcourt India Pvt. Ltd, New Delhi.

Reference Books

1. K.P. Soman, Shyam Diwakar, V. Ajay "Insight into Data Mining Theory and Practice ", Prentice Hall of India Pvt. Ltd, New Delhi.
2. Parteek Bhatia, 'Data Mining and Data Warehousing: Principles and Practical Techniques', Cambridge University Press, 2019.

Web Reference

1. https://www.topcoder.com/thrive/articles/data-warehousing-and-data-mining#:~:text=Data%20warehousing%20is%20a%20method,compiled%20in%20the%20data%20warehouse.
2. https://www.javatpoint.com/data-mining-cluster-vs-data-warehousing
3. https://www.tutorialspoint.com/Data-Warehousing-and-Data-Mining

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	To understand the basic concepts and the functionality of the various data mining and data warehousing component	PO1, PO3, PO6, PO8
CO2	To know the concepts of Data mining system architectures	PO1, PO2, PO3, PO6
CO3	To analyze the principles of association rules	PO3, PO5
CO4	To get analytical idea on Classification and prediction methods	PO1, PO2, PO3, PO7
CO5	To Gain knowledge on Cluster analysis and its methods.	PO2, PO6, PO7

Mapping of COs with POs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	2
CO3	2	2	-	3	-	3
CO4	3	3	2	3	1	1
CO5	1	3	3	3	3	2
Weightage of course contributed to each PSO	12	14	10	15	9	11

3 – Strong　　　　　**2 – Medium**　　　　　**1 – Low**

Programme: B.Sc. Information Technology				
Elective – VI		**Course Code:** 24UIT5E12		**Course Title:** Big Data Analytics
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	5	75	3	100

Course Objectives

1. Understand the Big Data Platform and its Use cases, Map Reduce Jobs
2. To identify and understand the basics of cluster and decision tree
3. To study about the Association Rules, Recommendation System
4. To learn about the concept of stream
5. Understand the concepts of NoSQL Databases

UNIT – I

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

UNIT – II

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

UNIT – III

Advanced Analytical Theory and Methods: Association Rules - Overview - Apriori Algorithm - Evaluation of Candidate Rules - Applications of Association Rules - Finding Association& finding similarity - Recommendation System: Collaborative Recommendation

- Content Based Recommendation - Knowledge Based Recommendation - Hybrid Recommendation Approaches.

UNIT – IV

Introduction to Streams Concepts - Stream Data Model and Architecture - Stream Computing, Sampling Data in a Stream - Filtering Streams - Counting Distinct Elements in a Stream - Estimating moments - Counting oneness in a Window - Decaying Window - Real time Analytics Platform(RTAP) applications - Case Studies - Real Time Sentiment Analysis, Stock Market Predictions. Using Graph Analytics for Big Data: Graph Analytics.

UNIT – V

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

Text Book

1. AnandRajaraman and Jeffrey David Ullman, ―Mining of Massive Datasets, Cambridge University Press, 2012.

Reference Books

1. David Loshin, ―Big Data Analytics: From Strategic Planning to Enterprise
   Integration with Tools, Techniques, NoSQL, and Graph, Morgan Kaufmann/Elsevier
   Publishers, 2013
   2. EMC Education Services, ―Data Science and Big Data Analytics: Discovering, Analyzing, Visualizing and Presenting Data, Wiley publishers, 2015.

Web Reference

1. https://www.simplilearn.com
2. https://www.sas.com/en_us/insights/analytics/big-data-analytics.html

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Work with big data tools and its analysis techniques.	PO1
CO2	Analyze data by utilizing clustering and classification algorithms.	PO1, PO3
CO3	Learn and apply different mining algorithms and recommendation systems for large volumes of data.	PO2, PO6
CO4	Perform analytics on data streams.	PO4, PO5, PO6
CO5	Learn NoSQL databases and management.	PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	2	2
CO3	3	2	3	3	3	2
CO4	3	2	3	2	3	3
CO5	2	3	3	3	3	3
Weightage of course contributed to each PSO	14	13	14	14	14	13

3 – Strong　　　　**2 – Medium**　　　　**1 – Low**

Programme: B.Sc. Information Technology		

Elective – VII	Course Code: 24UIT6E13	Course Title: Software Metrics

Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	5	75	3	100

Course Objectives

1. Gain a solid understanding of what software metrics are and their significance
2. Learn how to identify and select appropriate software metrics based on project goals
3. Acquire knowledge and skills in collecting and measuring software metrics
4. Learn how to analyze and interpret software metrics data to extract valuable insights
5. Gain the ability to evaluate software quality using appropriate metrics.

UNIT – I

Fundamentals of Measurement: Need for Measurement: Measurement in Software Engineering, Scope of Software Metrics, The Basics of measurement: There presentational theory of measurement, Measurement and models, Measurement scales and scale types, meaningfulness in measurement.

UNIT – II

A Goal-Based Framework for Software Measurement: Classifying software measures, determining what to Measure, Applying the framework, Software measurement validation, Performing Software Measurement Validation

Empirical investigation: Principles of Empirical Studies, Planning Experiments, Planning case studies as quasi-experiments, Relevant and Meaningful Studies.

UNIT – III

Software Metrics Data Collection: Defining good data, Data collection for incident reports, How to collect data, Reliability of data collection Procedures. Analyzing software measurement data: Statistical distributions and hypothesis testing, Classical data analysis techniques, Examples of simple analysis techniques.

UNIT – IV

Measuring internal product attributes: Size Properties of Software Size, Code size, Design size, Requirements analysis and Specification size, Functional size measures and estimators, Applications of size measures. Measuring internal product attributes: Structure: Aspects of Structural Measures, Control flow structure of program units, Design-level Attributes, Object-oriented Structural attributes and measures.

UNIT – V

Measuring External Product Attributes: Modelling software quality, Measuring aspects of quality, Usability Measures, Maintain ability measures, Security Measures

Software Reliability: Measurement and Prediction: Basics of reliability theory, The software reliability problem, Parametric reliability growth models, Predictive accuracy.

Text Books

1. Software Metrics A Rigorous and Practical Approach, Norman Fenton, James Bieman, Third Edition, 2014.

Reference Books

1. Software metrics, Norman E, Fenton and Shari Lawrence Pfleeger, International Thomson Computer Press, 1997
2. Metric and models in software quality engineering, Stephen H. Kan, Second edition, 2002, Addison Wesley Professional
3. Practical Software Metrics for Project Management and Process Improvement, Robert B. Grady, 1992, Prentice Hall.

Web Reference

1. https://lansa.com/blog/general/what-are-software-metrics-how-can-i-measure-these-metrics/

2. https://stackify.com/track-software-metrics/

Course Outcomes (COs)

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

CO Number	CO Statement
CO1	Understand various fundamentals of measurement and software metrics
CO2	Identify framework and analysis techniques for software measurement
CO3	Apply internal and external attributes of software product for effort estimation
CO4	Use appropriate analytical techniques to interpret software metrics data and derive meaningful insights
CO5	Recommend reliability models for predicting software quality

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	-	3	3	2
CO2	3	1	2	3	3	3
CO3	3	1	1	2	3	3
CO4	2	3	2	3	2	3
CO5	2	2	-	3	3	3
Weight age of course contributed to each PSO	12	9	5	14	14	14

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – VII		**Course Code:** 24UIT6E14		**Course Title:** Artificial Intelligence
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	5	75	3	100

Course Objectives

1. To learn various concepts of AI Techniques.
2. To learn various Search Algorithm in AI.
3. To learn probabilistic reasoning and models in AI.
4. To learn about Markov Decision Process.
5. To learn various type of Reinforcement learning..

UNIT – I

Introduction: Concept of AI, history, current status, scope, agents, environments, Problem Formulations, Review of tree and graph structures, State space representation, Search graph and Search tree.

UNIT – II

Search Algorithms: Random search, Search with closed and open list, Depth first and Breadth first search, Heuristic search, best first search, A*algorithm, Game Search.

UNIT – III

Probabilistic Reasoning: Probability, conditional probability, Bayes Rule, Bayesian Networks - representation, construction and inference, temporal model, hidden Markov model.

UNIT – IV

Markov Decision process: MDP formulation, utility theory, utility functions, value iteration, policy iteration and partially observable MDPs.

UNIT – V

Reinforcement Learning: Passive reinforcement learning, direct utility estimation, adaptive dynamic programming, temporal difference learning, active reinforcement learning - Qlearning.

Text Book

1. Stuart Russell and Peter Norvig, Artificial Intelligence: A Modern Approach, 3rd Edition, Prentice Hall.
2. Elaine Rich and Kevin Knight, Artificial Intelligence, Tata McGraw Hill .

Reference Books

1. Trivedi, M.C., A Classical Approach to Artifical Intelligence, Khanna Publishing House, Delhi.
2. Saroj Kaushik, Artificial Intelligence, Cengage Learning India, 2011.
3. David Poole and Alan Mackworth, Artificial Intelligence: Foundations for Computational Agents, Cambridge University Press 2010.

Web Reference

1. NPTEL&MOOCcoursestitledArtificialIntelligenceandExpertSystems
2. https://nptel.ac.in/courses/106106140/
3. https://nptel.ac.in/courses/106106126/

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the various concepts of AI Techniques.	PO1
CO2	Understand various Search Algorithm in AI.	PO1, PO2
CO3	Understand probabilistic reasoning and models in AI.	PO4, PO6
CO4	Understand Markov Decision Process.	PO4, PO5, PO6
CO5	Understand various type of Reinforcement learning Techniques.	PO3, PO8

Mapping of COs with PSOs

PSO \\ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	2	3	2	-
CO2	2	-	2	3	3	2
CO3	1	2	-	-	2	3
CO4	3	1	2	2	2	1
CO5	2	1	3	1	2	2
Weight age of course contributed to each PSO	10	7	9	9	11	8

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – VII		**Course Code:** 24UIT6E15		**Course Title:** Information Security
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	5	75	3	100

Course Objectives

1. To know the objectives of information security
2. Understand the importance and application of each of confidentiality, integrity, authentication and availability
3. Understand various cryptographic algorithms
4. Understand the basic categories of threats to computers and networks
5. To study about the concepts of security in networks, web security.

UNIT – I

Introduction to Information Security: Security mindset, Computer Security Concepts (CIA), Attacks, Vulnerabilities and protections, Security Goals, Security Services, Threats, Attacks, Assets, malware, program analysis and mechanisms.

UNIT – II

The Security Problem in Computing: The meaning of computer Security, Computer Criminals, Methods of Défense. Cryptography: Concepts and Techniques: Introduction, plain text and cipher text, substitution techniques, transposition techniques, encryption and decryption.

UNIT – III

Symmetric and Asymmetric Cryptographic Techniques: DES, AES, RSA algorithms. Authentication and Digital Signatures: Use of Cryptography for authentication, Secure Hash function, Key management – Kerberos.

UNIT – IV

Program Security: Non-malicious Program errors – Buffer overflow, Incomplete mediation, Time-of-check to Time-of- use Errors, Viruses, Trapdoors, Salami attack, Man-in-the- middle attacks, Covert channels. File protection Mechanisms, User Authentication Designing Trusted O.S: Security polices, models of security, trusted O.S design, Assurance in trusted O.S. Implementation examples.

UNIT – V

Security in Networks: Threats in networks, Network Security Controls – Architecture, Encryption, Content Integrity, Strong Authentication, Access Controls, Wireless Security, Honeypots, Traffic flow security. Web Security: Web security considerations, Secure Socket Layer and Transport Layer Security, Secure electronic transaction.

Text Book

1. Security in Computing, Fourth Edition, by Charles P. Pfleeger, Pearson Education
2. Cryptography And Network Security Principles and Practice, Fourth or Fifth Edition, William Stallings, Pearson.

Reference Books

1. Cryptography and Network Security: C K Shyamala, N Harini, Dr T R Padmanabhan, Wiley India, lst Edition
2. Cryptography and Network Security: Forouzan Mukhopadhyay, Mc Graw Hill, 2nd Edition
3. Information Security, Principles and Practice: Mark Stamp, Wiley India
4. Principles of Computer Security: WM.Arthur Conklin, Greg White, TMH.

Web Reference

1. https://www.geeksforgeeks.org/what-is-information-security/
2. https://www.tutorialspoint.com/what-is-information-security#:~:text=Information%20security%20is%20designed%20and,destruction%2C%20alteration%2C%20and%20disruption.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand network security threats, security services, and counter measures	PO1
CO2	Understand vulnerability analysis of network security	PO1, PO2
CO3	Acquire background on hash functions; authentication; firewalls; intrusion detection techniques	PO4, PO6
CO4	Gain hands-on experience with programming and simulation techniques for security protocols.	PO4, PO5, PO6
CO5	Apply methods for authentication, access control, intrusion detection and prevention	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	3	1	2	3	2
CO2	2	-	1	-	3	2
CO3	-	3	1	3	-	-
CO4	2	3	1	3	3	-
CO5	2	3	1	3	3	2
Weight age of course contributed to each PSO	8	12	5	11	12	6

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – VIII		**Course Code:** 24UIT6E16	**Course Title**: Introduction to Data Science	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	5	75	3	100

Course Objectives

1. To learn about basics of Data Science and Big data.
2. To learn about overview and building process of Data Science.
3. To learn about various Algorithms in Data Science.
4. To learn about Hadoop Framework.
5. To learn about case study about Data Science.

UNIT – I

Introduction: Benefits and uses – Facts of data – Data science process – Big data ecosystem and data science

UNIT – II

The Data science process:Overview – research goals - retrieving data - transformation – Exploratory Data Analysis – Model building .

UNIT – III

Algorithms :Machine learning algorithms – Modeling process – Types– Supervised – Unsupervised - Semi-supervised

UNIT – IV

Introduction to Hadoop :Hadoop framework – Spark – replacing MapReduce– NoSQL – ACID – CAP – BASE – types

UNIT – V

Case Study: Prediction of Disease - Setting research goals – Data retrieval – preparation - exploration - Disease profiling – presentation and automation

Text Books

1. Davy Cielen, Arno D. B. Meysman, Mohamed Ali, "Introducing Data Science", manning publications 2016

Reference Books

1. Roger Peng, "The Art of Data Science", lulu.com 2016.
2. MurtazaHaider, "Getting Started with Data Science – Making Sense of Data with Analytics", IBM press, E-book.
3. Davy Cielen, Arno D.B. Meysman, Mohamed Ali, "Introducing Data Science: Big Data, Machine Learning, and More, Using Python Tools", Dreamtech Press 2016.
4. Annalyn Ng, Kenneth Soo, "Numsense! Data Science for the Layman: No Math Added", 2017,1st Edition.
5. Cathy O'Neil, Rachel Schutt, "Doing Data Science Straight Talk from the Frontline", O'Reilly Media 2013.
6. Lillian Pierson, "Data Science for Dummies", 2017 II Edition

Web Reference

1. https://www.w3schools.com/datascience/
2. https://en.wikipedia.org/wiki/Data_science
3. http://www.cmap.polytechnique.fr/~lepennec/en/post/references/refs/.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the basics in Data Science and Big data.	PO1
CO2	Understand overview and building process in Data Science.	PO1, PO2
CO3	Understand various Algorithms in Data Science.	PO4, PO6
CO4	Understand Hadoop Framework in Data Science.	PO4, PO5, PO6
CO5	Case study in Data Science.	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	2	2	-
CO2	2	3	2	2	-	1
CO3	3	2	2	1	1	3
CO4	1	2	2	1	3	1
CO5	2	2	-	3	1	1
Weight age of course contributed to each PSO	11	11	7	9	7	6

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – VIII		**Course Code:** 24UIT6E17		**Course Title:** Mobile Adhoc Network
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	5	75	3	100

Course Objectives

1. To learn about basic concepts of Ad-hoc network models.
2. To learn about Medium Access Protocols (MAC).
3. To learn about Network Routing Protocols and Algorithms.
4. To learn about Delivery and Security in Transport Layer.
5. To learn about cross layer design and optimization techniques, Integration of ad-hoc with Mobile IP networks.

UNIT – I

Introduction: Introduction to ad-hoc networks – definition, characteristics features, applications. Characteristics of wireless channel, ad-hoc mobility models indoor and out-door models.

UNIT – II

Medium Access Protocol: MAC Protocols: Design issues, goals and classification - Contention based protocols – with reservation, scheduling algorithms, protocols using directional antennas. IEEE standards: 802.11a, 802.11b, 802.11g, 802.15. HIPERLAN..

UNIT – III

Network Protocols: Routing Protocols: Design issues, goals and classification. Proactive Vs reactive routing, unicast routing algorithms, Multicast routing algorithms, hybrid routing algorithm, energy aware routing algorithm, hierarchical routing, QoS aware routing.

UNIT – IV

End–end delivery and security: Transport Layer: Issues in designing – Transport layer classification, ad-hoc transport protocols. Security issues in ad-hoc networks: issues and challenges, network security attacks, secure routing protocols.

UNIT – V

Need for cross layer design, cross layer optimization, parameter optimization techniques, cross layer cautionary perspective. Integration of ad-hoc with Mobile IP networks..

Text Books

1. C.Siva Ram Murthy and B.S. Manoj, Ad-hoc Wireless Networks Architecture and Protocols II edition, Pearson Edition, 2007.
2. Charles E. Perkins, Ad-hoc Networking, Addison – Wesley, 2000.

Reference Books

1. Stefano Basagni, Marco Conti, Silvia Giordano and Ivanstojmenovic, Mobile ad-hoc networking, Wiley-IEEE press, 2004.
2. Mohammad Ilyas, The handbook of ad-hoc wireless networks, CRC press, 2002.
3. T.Camp, J.Boleng, and V.Davies ―A Survey of Mobility Models for Ad-hoc Network
4. Research ―Wireless Commn. and Mobile Comp-Special Issue on Mobile Ad-hoc networking Research, Trends and Applications, Vol.2, no.5, 2002, pp.483–502.
5. A survey of integrating IP mobility protocols and Mobile Ad-hoc networks, Fekri M.bduljalil and Shrikant K.Bodhe, IEEE communication Survey and tutorials, no: 12007.

Web Reference

1. https://en.wikipedia.org/wiki/Wireless_ad_hoc_network
2. https://www.ijert.org/mobile-ad-hoc-network
3. https://books.google.com/books/about/Mobile_Ad_Hoc_Networking.htmlid=GnkcHEsxAigC

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the basic concepts of Ad-hoc network models.	PO1
CO2	Understand the Medium Access Protocols (MAC).	PO1, PO2
CO3	Understand Network Routing Protocols, design issues and various types of Routing Algorithms.	PO4, PO6
CO4	Understand the concepts of Delivery and Security in Transport Layer.	PO4, PO5, PO6
CO5	Understand cross layer techniques and Integration of ad-hoc with Mobile IP networks.	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	-	3	3	1
CO2	2	1	2	3	3	-
CO3	3	2	1	2	3	3
CO4	3	3	2	3	2	-
CO5	2	2	-	3	3	3
Weight age of course contributed to each PSO	12	10	5	14	14	7

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Elective – VIII		**Course Code:** 24UIT6E18		**Course Title:** Cloud Computing
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	5	75	3	100

Course Objectives

1. Learning fundamental concepts and Technologies of Cloud Computing.
2. Learning various cloud service types and their uses and pitfalls.
3. To learn about Cloud Architecture and Application design.
4. To know the various aspects of application design, bench marking and security on the Cloud.
5. To learn the various Case Studies in Cloud Computing.

UNIT – I

Introduction to Cloud Computing: Definition of Cloud Computing –Characteristics of Cloud Computing – Cloud Models – Cloud Service Examples–Cloud-based Services and Applications. Cloud Concepts and Technologies: Virtualization – Load balancing – Scalability and Elasticity – Deployment – Replication – Monitoring –Software Defined Networking – Network Function Virtualization – Map Reduce – Identity and Access Management – Service Level Agreements – Billing.

UNIT – II

Cloud Services

Compute Services: Amazon Elastic Computer Cloud - Google Compute Engine – Windows Azure Virtual Machines. Storage Services: Amazon Simple Storage Service – Google Cloud Storage – Windows Azure Storage. Database Services: Amazon Relational Data Store - Amazon DynamoDB - Google Cloud SQL - Google Cloud Data Store - Windows Azure SQL Database – Windows Azure Table Service. Application Services: Application Runtimes and Frameworks – Queuing Services – Email Services – Notification Services-Media Services. Content Delivery Services: Amazon Cloud Front – Windows Azure Content Delivery

Network. Analytics Services: Amazon Elastic MapReduce - Google Map Reduce Service – Google Big Query – Windows Azure HD Insight. Deployment and Management Services: Amazon Elastic Bean stack - Amazon Cloud Formation. Identity and Access Management Services: Amazon identity and Access Management – Windows Azure Active Directory. Open-Source Private Cloud Software: Cloud Stack – Eucalyptus - Open Stack.

UNIT – III

Cloud Application Design: Introduction – Design Consideration for Cloud Applications – Scalability – Reliability and Availability – Security – Maintenance and Upgradation – Performance – Reference Architectures for Cloud Applications – Cloud Application Design Methodologies: Service Oriented Architecture (SOA), Cloud Component Model, IaaS, PaaS and SaaS Services for Cloud Applications, Model View Controller (MVC), RESTful Web Services –Data Storage Approaches: Relational Approach (SQL), Non-Relational Approach (NoSQL).

UNIT – IV

Cloud Application Benchmarking and Tuning: Introduction to Benchmarking – Steps in Benchmarking – Workload Characteristics –Application Performance Metrics–Design Consideration for Benchmarking Methodology – Benchmarking Tools and Types of Tests – Deployment Prototyping. Cloud Security: Introduction – CSA Cloud Security Architecture – Authentication (SSO) – Authorization – Identity and Access Management – Data Security: Securing data at rest, securing data in motion – Key Management – Auditing.

UNIT – V

Case Studies: Cloud Computing for Healthcare – Cloud Computing for Energy Systems - Cloud Computing for Transportation Systems – Cloud Computing for Manufacturing Industry – Cloud Computing for Education.

Text Books

1. Arshdeep Bahga, Vijay Madisetti, CloudComputing – A Hands On Approach, Universities Press (India) Pvt. Ltd., 2018.

Reference Books

1. Anthony T Velte, Toby J Velte, Robert Elsenpeter, Cloud Computing: A Practical Approach, TataMcGraw-Hill, 2013.

2. Barrie Sosinsky, Cloud Computing Bible, Wiley India Pvt. Ltd., 2013.

3. David Crookes, Cloud Computing in Easy Steps, TataMcGraw Hill, 2015.

4. Dr.Kumar Saurabh, Cloud Computing, Wiley India, Second Edition, 2012..

Web Reference

1. https://en.wikipedia.org/wiki/Cloud_computing

2. https://link.springer.com/chapter/10.1007/978-3-030-34957-8_7

3. https://webobjects.cdw.com/webobjects/media/pdf/solutions/cloud-computing/121838-CDW-Cloud-Computing-Reference-Guide.pdf

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Understand the fundamental concepts and Technologies in Cloud Computing.	PO1
CO2	Able to understand various cloud service types and their uses and pitfalls.	PO1, PO2
CO3	Able to understand Cloud Architecture and Application design.	PO4, PO6
CO4	Understand the various aspects of application design, benchmarking and security in the Cloud.	PO4, PO5, PO6
CO5	Understand various Case Studies in Cloud Computing.	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	3	1
CO2	3	1	2	3	3	-
CO3	3	2	1	2	1	3
CO4	3	3	2	3	2	-
CO5	2	2	1	3	3	3
Weight age of course contributed to each PSO	13	10	8	4	12	7

3 – Strong   **2 – Medium**   **1 – Low**

Skill Enhancement Course (SEC)

Programme: B.Sc. Information Technology				
SEC Practical – I	**Course Code:** 24UIT3S01		**Course Title:** Office Automation Lab	
Semester III	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Course Objectives

1. Understand and perform creating documents and formatting documents.
2. Perform creating tables and formatting tables.
3. Understand about Excel and spreadsheet applications.
4. Perform the generation of bills and reports in Excel.
5. Understand and discuss about the use of Presentation tool.

I. MS-WORD

1. Text Manipulation: Write a paragraph about your institution and Change the font size and type, Spell check, Aligning and justification of Text.
2. Bio data: Prepare a Bio-data.
3. Find and Replace: Write a paragraph about yourself and do the following.
   Find and Replace - Use Numbering Bullets, Footer and Headers.
4. Tables and manipulation: Creation, Insertion, Deletion (Columns and Rows).
   Create a mark sheet.
5. Mail Merge: Prepare an invitation to invite your friends to your birthday party. Prepare at least five letters.

II. MS-EXCEL

1. Data sorting-Ascending and Descending (both numbers and alphabets).
2. Mark list preparation for a student.
3. Individual Pay Bill preparation.
4. Invoice Report preparation.
5. Drawing Graphs. Take your own table.

III. MS-POWERPOINT

1. Create a slide show presentation for a seminar.

2. Preparation of Organization Charts.

3. Create a slide show presentation to display percentage of marks in each semester for all students.

a. Use bar chart (X-axis: Semester, Y-axis: % marks).

b. Use different presentation template different transition effect for each slide.

E-References

1. https://ptgmedia.pearsoncmg.com/images/9780735623026/samplepages/9780735623026.pdf

2. https://www.dit.ie/media/ittraining/msoffice/MOAC_Excel_2016_Core.pdf

3. https://ptgmedia.pearsoncmg.com/images/9780735697799/samplepages/9780735697799.pdf

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Possess the knowledge on the creating documents and formatting	PO1, PO2, PO3, PO6, PO8
CO2	Gain knowledge on Creating tables and formatting tables.	PO1, PO2, PO3, PO6
CO3	Learn the concepts of spreadsheet application.	PO3, PO5, PO7
CO4	Demonstrate the understanding of generating reports.	PO3, PO4, PO5, PO7
CO5	Utilize the automation tools for presentation purpose.	PO4, PO6, PO7, PO8

Mapping of COs with POs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	3	1
CO2	3	1	2	3	3	3
CO3	3	2	1	2	1	3
CO4	3	3	2	2	2	1
CO5	2	2	1	3	1	3
Weightage of course contributed to each PSO	13	10	8	13	10	11

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology		
SEC Practical – II	**Course Code:** 24UIT4S02	**Course Title:** PHP Programming Lab

Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	2	30	2	100

Course Objectives

1. To provide the necessary knowledge on basics of PHP.
2. To design and develop dynamic, database-driven web applications using PHP version.
3. To get an experience on various web application development techniques.
4. To learn the necessary concepts for working with the files using PHP.
5. To get a knowledge on OOPS with PHP.

List of Practicals

1. Write a PHP program to find the factorial of a number using forms.

2. Write a PHP program to design a login form using Conditional Statements.

3. Write a PHP program to design a visiting card.

4. Design a simple web page to generate multiplication table for a given number using PHP.

5. Design a web page that should compute one's age on a given date using PHP.

6. Write a PHP program to download a file from the server.

7. Write a PHP program to store the current date and time in a COOKIE and display 'Last Visited' date and time on the web page.

8. Write a PHP program to design a calendar for the current year.

9. Write a PHP Program to create a time table for the current semester.

10. Write a PHP Program to access the Student Examinations Result Database.

Web Reference

1. Refer MOOC Courses like NPTEL and SWAYAM
2. https://www.w3schools.com/php/default.asp

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Write PHP scripts to handle HTML forms	PO1, PO4, PO6, PO8
CO2	Write regular expressions including modifiers, operators, and metacharacters.	PO2, PO5, PO7
CO3	Create PHP Program using the concept of array.	PO3, PO6, PO8
CO4	Create PHP programs that use various PHP library functions	PO2, PO3, PO5, PO8
CO5	Manipulate files and directories.	PO3, PO5, PO6

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	1	1	-	1
CO2	2	-	1	1	2	1
CO3	3	3	1	1	-	1
CO4	1	3	2	1	-	1
CO5	3	2	1	1	-	1
Weight age of course contributed to each PSO	12	11	6	5	2	5

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
SEC Practical – III		**Course Code:** 24UIT5S03		**Course Title:** Advanced Excel Lab
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
V	2	30	2	100

Course Objectives

1. Handle large amounts of data.
2. Aggregate numeric data and summarize into categories and subcategories.
3. Filtering, sorting, and grouping data or subsets of data.
4. Understand the Excel functions.
5. Creating forms and spreadsheets.

LIST OF EXPERIMENTS

1. Create and Editing Worksheets by using Excel
2. Creating Excel Sheets with Formula and Functions
3. Create and Save Macros
4. Sorting and Querying Data
5. Calculation of Ratios using Excel
6. Preparation of Sales Transaction Report Using Excel
7. Monthly Expenses Report using Excel
8. Calculation of Ratios using Excel -2
9. Using basic functions in Excel – Average, Count, Minimum , Maximum
10. Application of Date Function in MS-Excel
11. Use of Sum, Sumif, Count and Count if functions
12. Extracting Data using combined Vlookup and H lookup
13. Consumer Satisfaction Survey Using Google Forms

Web Reference

1. https://www.javatpoint.com
2. https://www.w3schools.com

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	To learn handling large amounts of data.	PO1
CO2	Learn Aggregate numeric data and summarize into categories and subcategories.	PO1, PO2
CO3	To learn Filtering, sorting, and grouping data or subsets of data.	PO4, PO6
CO4	Learn to use to Vlookup and H lookup .	PO4, PO5, PO6
CO5	Learn to prepare forms and spreadsheets in google.	PO3, PO8

Mapping of COs with PSOs

PSO \ CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	1	3	-
CO2	3	2	2	1	1	3
CO3	3	2	1	2	1	3
CO4	3	3	2	2	2	1
CO5	3	2	1	3	1	3
Weight age of course contributed to each PSO	14	11	8	9	8	10

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
SEC Practical – IV		**Course Code:** 24UIT6S04		**Course Title:** Data Visualization Lab
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
VI	2	30	2	100

Course Objectives

1. To learn the basic functions and operations of Excel and tableau.

2. To explore to design, build, and deploy various charts for applications,

3. To comprehend, design and deploy the label and heat map

4. To understand and deploy dashboard

5. To understand the functions of tableau for data process.

LIST OF PROGRAMS

Use the following Dataset

http://www.tableau.com/sites/default/files/training/global_superstore.zip

Implement the following using Excel

1. Create Pie chart for Sales and Sales % by Country (sorted in descending order)

2. Create Bar chart for Sales by Country by Year (rounded to nearest thousand and sorted by Grand Total)

3. Create Line char for Sales by Ship Mode (First Class, Same Day, Second Class and Standard Class)

4. Create Scatter chart for Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class)

5. Create heat map for Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order)

6. Design and create the label for vendor list

7. Design and create the dash board

Implement the following using Tableau

8. Sales by Ship Mode (First Class, Same Day, Second Class and Standard Class)

9. Sales by Ship Mode by Country (rounded to the nearest dollar and sorted by First Class)

10. Sales by Category by Sub-Category (in thousands and sorted by sales value in descending order)

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Enable to create and apply Spread sheet and Tableau for various data processing.	PO1
CO2	Gains knowledge to create and design various visualization tools in Excel and Tableau.	PO1, PO2
CO3	Comprehend, create and deploy labels and heat map.	PO4, PO6
CO4	Enable to create and apply dashboard for various data processing.	PO4, PO5, PO6
CO5	Illustrate and apply data visualization tool for any data set.	PO3, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	1	3	-
CO2	3	2	2	1	1	3
CO3	3	2	1	2	1	3
CO4	3	3	2	2	2	1
CO5	3	2	1	3	1	3
Weight age of course contributed to each PSO	14	11	8	9	8	10

3 – Strong   **2 – Medium**   **1 – Low**

Non Major Elective
(NME)

Programme: B.Sc. Information Technology		
Non Major Elective – I	**Course Code:** 24UIT1N01	**Course Title:** Office Automation

Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	2	30	2	100

Course Objectives

1. Understand the basics of computer systems and its components.
2. Understand and apply the basic concepts of a word processing package.
3. Understand and apply the basic concepts of electronic spreadsheet software.
4. Understand and apply the basic concepts of database management system.
5. Understand and create a presentation using PowerPoint tool.

UNIT – I

Introductory concepts: Memory unit – CPU-Input Devices: Key board, Mouse and Scanner. Output devices: Monitor, Printer. Introduction to Operating systems & its features: DOS – UNIX – Windows. Introduction to Programming Languages.

UNIT – II

Word Processing: Open, Save and close word document; Editing text – tools, formatting, bullets; SpellChecker - Document formatting – Paragraph alignment, indentation, headers and footers,numbering; printing – Preview, options, merge.

UNIT – III

Spreadsheets: Excel – opening, entering text and data, formatting, navigating; Formulas – entering, handling and copying; Charts – creating, formatting and printing, analysis tables, preparation of financial statements, introduction to data analytics.

UNIT – IV

Database Concepts: The concept of data base management system; Data field, records, and files,Sorting and indexing data; Searching records. Designing queries, and reports; Linking of datafiles; Understanding Programming environment in DBMS; Developing menu drive applications in query language (MS–Access).

UNIT – V

Power point: Introduction to Power point - Features – Understanding slide typecasting & viewing slides – creating slide shows. Applying special object – including objects & pictures – Slide transition – Animation effects, audio inclusion, timers.

Text Books

1. Peter Norton, Introduction to Computers –Tata McGraw-Hill.

Reference Books

1. Jennifer Ackerman Kettel, Guy Hat-Davis, Curt Simmons, Microsoft 2003, Tata McGraw Hill.

Web Reference

1. https://www.udemy.com/course/office-automation-certificate-course/\
2. https://www.javatpoint.com/automation-tools

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Possess the knowledge on the basics of computers and its components	PO1, PO2, PO3, PO6, PO8
CO2	Gain knowledge on Creating Documents, spreadsheet and presentation.	PO1, PO2, PO3, PO6
CO3	Learn the concepts of Database and implement the Query in Database.	PO3, PO5, PO7
CO4	Demonstrate the understanding of different automation tools.	PO3, PO4, PO5, PO7
CO5	Utilize the automation tools for documentation, calculation and presentation purpose.	PO4, PO6, PO7, PO8

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	2	2	2	3	3	1
CO2	3	1	2	3	3	3
CO3	3	2	1	2	1	3
CO4	3	3	2	2	2	1
CO5	2	2	1	3	1	3
Weight age of course contributed to each PSO	13	10	8	13	10	11

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Non Major Elective – I		**Course Code:** 24UIT1N02	**Course Title:** Understanding Internet	
Semester	**Hours/Week**	**Total Hours**	**Credits**	**Total Marks**
I	2	30	2	100

Course Objectives

1. Knowledge of Internet medium
2. Internet as a mass medium
3. Features of Internet Technology,
4. Internetas sourceof infotainment
5. Studyofinternet audiences andabout cyber crime.

UNIT - I

The emergence of internet as a mass medium – the world of world wide web

UNIT - II

Features of internet as a technology.

UNIT - III

Internet as a source of infotainment – classification based on content and style.

UNIT - IV

Demographic and psychographic descriptions of internet audiences – effect of internet on the values and life – styles.

UNIT - V

Present issues such as cybercrime and future possibilities.

Textbooks

1. Barnouw, E and Krishnaswamy S [1990] Indian Film. New York, OUP.

2. Kumar, Keval [1999] Mass Communication in India. Mumbai, Jaico.

3. Srivastava, K M [1992] Media Issues. Sterling Publishers Pvt Ltd..

Reference Books

1. Acharya, R N [1987] Television in India. Manas Publications, New Delhi.

2. Barnouw, E [1974] Documentary – A History of Nonfiction. Oxford, OUP

3. Luthra, H R [1986] Indian Broadcasting. Ministry of I & B, New Delhi.

4. Vasudev, Aruna [1986] The New Indian Cinema. Macmillan India, New Delhi.

Web Reference

1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf

2. https://www.w3schools.com/html/default.asp

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Knows the basic concept in internet	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Concept of mass medium and world wide web	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Knows the concept of internet as a technology.	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Understand the concept of infotainment and classification based on content and style	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Can be able to know about Demographic and psychographic description of internet	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	2	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	2	3	3
Weight age of course contributed to each PSO	14	15	14	14	15	15

3 – Strong   **2 – Medium**   **1 – Low**

Programme: B.Sc. Information Technology				
Non Major Elective – II	**Course Code:** 24UIT2N03		**Course Title:** Introduction to HTML	
Semester II	**Hours/Week** 2	**Total Hours** 30	**Credits** 2	**Total Marks** 100

Course Objectives

1. Insert a graphic with in a webpage.
2. Create a link with in a webpage.
3. Create a table with in a webpage.
4. Insert heading levels within a webpage.
5. Insert ordered and unordered lists with in a web page. Create a webpage.

UNIT – I

Introduction: WebBasics: What is Internet – Web browsers – What is Webpage – HTML Basics: Understanding tags.

UNIT – II

Tags for Document structure (HTML, Head,Body Tag). Block level text elements: Headings paragraph (<p>tag) – Font style elements: (bold, italic, font, small, strong, strike, bigtags)

UNIT – III

Lists: Types of lists: Ordered, Unordered – Nesting Lists – Other tags: Marquee, HR, BR - Using Images – Creating Hyperlinks.

UNIT – IV

Tables: Creating basic Table, Table elements, Caption – Table and cell alignment – Rowspan, Colspan – Cell padding.

UNIT – V

Frames: Frameset – Targeted Links – No frame – Forms: Input, Textarea, Select, Option.

Text Books

1. Mastering HTML5 and CSS3 Made Easy'', Teach UComp Inc., 2014.
2. Thomas Michaud, Foundations of Web Design: Introduction to HTML & CSS

Web Reference

1. https://www.teachucomp.com/samples/html/5/manuals/Mastering-HTML5-CSS3.pdf
2. https://www.w3schools.com/html/default.asp

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Knows the basic concept in HTML Concept of resources in HTML	PO1, PO2, PO3, PO4, PO5, PO6
CO2	Knows Design concept. Concept of Meta Data Understand the concept of save the files.	PO1, PO2, PO3, PO4, PO5, PO6
CO3	Understand the page formatting. Concept of list	PO1, PO2, PO3, PO4, PO5, PO6
CO4	Creating Links. Know the concept of creating link to email address	PO1, PO2, PO3, PO4, PO5, PO6
CO5	Concept of adding images Understand the table creation.	PO1, PO2, PO3, PO4, PO5, PO6

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	3	3	3
CO2	3	3	2	3	3	3
CO3	2	3	3	3	3	3
CO4	3	3	3	3	3	3
CO5	3	3	3	2	3	3
Weight age of course contributed to each PSO	14	15	14	14	15	15

3 – Strong　　**2 – Medium**　　**1 – Low**

Programme: B.Sc. Information Technology		
Non Major Elective – II	**Course Code:** 24UIT2N04	**Course Title:** Web Designing

Semester	Hours/Week	Total Hours	Credits	Total Marks
II	2	30	2	100

Course Objectives

1. Understand the basics of HTML and its components
2. To study about the Graphics in HTML
3. Understand and apply the concepts of XML and DHTML
4. Understand the concept of JavaScript
5. To identify and understand the goals and objectives of the Ajax.

UNIT – I

HTML: HTML - Introduction - tag basics - page structure - adding comments working with texts, paragraphs and line break. Emphasizing test- heading and horizontal rules - list - font size, face and color - alignment links - tables - frames.

UNIT – II

Forms & Images Using Html: Graphics: Introduction - How to work efficiently with images in web pages, image maps, GIF animation, adding multimedia, data collection with html forms textbox, password, list box, combo box, text area, tools for building web page front page.

UNIT – III

XML & DHTML: Cascading style sheet (CSS) - what is CSS - Why we use CSS - adding CSS to your webpages - Grouping styles - extensible markup language (XML).

UNIT – IV

Dynamic HTML: Document object model (DCOM)- Accessing HTML & CSS through DCOM Dynamic content styles & positioning - Event bubbling - data binding. JavaScript:

Client-side scripting, What is JavaScript, How to develop JavaScript, simple JavaScript, variables, functions, conditions, loops and repetition.

UNIT – V

Advance script, JavaScript and objects, JavaScript own objects, the DOM and web browser environments, forms and validations.

Text Books

1. Pankaj Sharma, "Web Technology", Sk Kataria & Sons Bangalore 2011.
2. Mike Mcgrath, "Java Script", Dream Tech Press 2006, 1st Edition.
3. Achyut S Godbole & AtulKahate, "Web Technologies", 2002, 2nd Edition.

Reference Books

1. Laura Lemay, RafeColburn, Jennifer Kyrnin, "Mastering HTML, CSS & Javascript Web Publishing", 2016.
2. DT Editorial Services (Author), "HTML 5 Black Book (Covers CSS3, JavaScript, XML, XHTML, AJAX, PHP, jQuery)", Paperback 2016, 2nd Edition.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Develop working knowledge of HTML	PO1, PO3, PO6, PO8
CO2	Ability to Develop and publish Web pages using Hypertext Markup Language (HTML).	PO1, PO2, PO3, PO6
CO3	Ability to optimize page styles and layout with Cascading Style Sheets (CSS).	PO3, PO5
CO4	Ability to develop a java script	PO1, PO2, PO3, PO7
CO5	An ability to develop web application using Ajax.	PO2, PO6, PO7

Mapping of COs with PSOs

PSO / CO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	-	2	1	1
CO2	3	3	-	2	-	1
CO3	3	3	-	2	2	1
CO4	3	3	-	2	-	1
CO5	3	3	3	2	-	1
Weight age of course contributed to each PSO	15	15	3	10	3	4

3 – Strong   2 – Medium   1 – Low