



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]

Katteri – 636 902, Uthangarai (Tk), Krishnagiri (Dt)

Tamil Nadu, India

Website: www.svmcugi.com

E-mail: svmugibca@gmail.com



DEGREE OF BACHELOR OF COMPUTER APPLICATIONS **CHOICE BASED CREDIT SYSTEM (CBCS)**

REGULATIONS AND SYLLABUS FOR

BCA PROGRAMME

(SEMESTER PATTERN)

(For Students Admitted in the College from the Academic Year 2023-2024 Onwards)



REGULATIONS AND SYLLABUS FOR BCA PROGRAMME

(For Students Admitted in the College from the Academic Year 2023-2024 Onwards)

1. Vision of the Department

The vision is create national leaders in the field of computer by transforming their lives through innovative, rigorous and compassionate approach to computer education.

2. Mission of the Department

The mission is to provide accessible, affordable and revelant education and workforce training for students to develop soft, technical and research skills by offering programs of study and Add-on courses as well as community education that leads to transfer assoiciate degrees and certificates for personal and professional career.

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. Aims of the Programme

1. To produce the under Graduate in BCA with strong knowledge of theoretical computer science.
2. Impart quality education and provide technical skills in Computer Science through best of practices.
3. To produce graduates who can contribute professionally to the society and widely as IT professionals or entrepreneurs.
4. To develop Listening, Speaking, Reading, Writing skills with advanced technologies.
5. Forms the students to compete in the career and higher education with proper skillsets.
6. Effectively communicating computing concepts and solutions to create and initiate innovation in Computer field.
7. Effectively using their knowledge of Computing and Mathematical theory to develop sustainable solutions to computing problems.
8. 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 demonstrating 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.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
PSO1	Y	Y	Y	Y	Y	Y	Y	Y
PSO2	Y	Y	Y	Y	Y	Y	Y	Y
PSO3	Y	Y	Y	Y	Y	Y	Y	Y
PSO4	Y	Y	Y	Y	Y	Y	Y	Y
PSO5	Y	Y	Y	Y	Y	Y	Y	Y

7. Eligibility for Admission

A candidate who has passed in Higher Secondary Examination with Mathematics or Business Mathematics or Computer Science 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 **Bachelor of Computer Applications** degree examination of this 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 Enhancement 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 BCA Degree Programme is divided into the following Courses:

- (i) **Language Courses:**
- (ii) **Core Courses:** The Core Courses are related 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) **Non-Major Elective (NME):** Irrespective of the discipline, the student can select papers that are offered by other disciplines as non-major elective course.
- (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 – Computer Applications (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 140 Credits are prescribed for the BCA Degree Programme which is the minimum Credit requirement for the three year BCA Degree Programme.



SRI VIDYA MANDIR ARTS & SCIENCE COLLEGE

(Autonomous)

Bachelor of Computer Applications (BCA)

Programme Pattern and Syllabus (CBCS)

(For Students Admitted in the College from the Academic Year 2023-2024 Onwards)

Sl. No	Part	Nature of Course	Course Code	Name of the Course	Hours/Week	Credits	Marks		
							CIA	ESE	Total
SEMESTER – I									
1	I	Language	23UTA1F01	Foundation Tamil – I / Other Language	5	3	25	75	100
2	II	Language	23UEN1F01	Foundation English – I	5	3	25	75	100
3	III	Core – I	23UCA1C01	Python Programming	6	5	25	75	100
4		Core Practical – I	23UCA1P01	Python Programming Lab	3	5	25	75	100
5		Elective Course – I (Generic)	23UMA1EG01	Discrete Mathematics - I	5	3	25	75	100
6	IV	SEC – I		NME	2	2	25	75	100
7		FC	23UCA1FC01	Structured Programming Language in C	4	2	25	75	100
Total					30	23	175	525	700
SEMESTER – II									
8	I	Language	23UTA2F02	Foundation Tamil – II / Other Language	5	3	25	75	100
9	II	Language	23UEN2F02	Foundation English - II	5	3	25	75	100
10	III	Core – II	23UCA2C02	Object Oriented Programming Concepts using C++	6	5	25	75	100
11		Core Practical – II	23UCA2P02	C++ Programming Lab	3	5	25	75	100
12		Elective Course – II (Generic)	23UMA2EG02	Discrete Mathematics - II	5	3	25	75	100
13	IV	SEC – II		NME	3	2	25	75	100
14		SEC – III	23UCA2S01	Introduction to HTML	3	2	25	75	100
Total					30	23	175	525	700



SEMESTER – III									
15	I	Language	23UTA3F03	Foundation Tamil – III / Other Language	5	3	25	75	100
16	II	Language	23UEN3F03	Foundation English - III	5	3	25	75	100
17	III	Core – III	23UCA3C03	DataStructures and Algorithms	6	5	25	75	100
18		Core Practical – III	23UCA3P03	DataStructures and Algorithms Lab Using C++	3	5	25	75	100
19		Elective Course – III (Generic)			6	3	25	75	100
20	IV	SEC – IV	23UCA3S02	Web Designing	2	1	25	75	100
21		SEC – V	23UCA3S03	Office Automation	2	2	25	75	100
22		Common Course		Envirinmental Studies	1	-			
Total					30	22	175	525	700
SEMESTER – IV									
24	I	Language	23UTA4F04	Foundation Tamil – IV / Other Language	5	3	25	75	100
25	II	Language	23UEN4F04	Foundation English - IV	5	3	25	75	100
26	III	Core – IV	23UCA4C04	Programmig in Java	6	5	25	75	100
27		Core Practical – IV	23UCA4P04	Programmig in Java Lab	3	5	25	75	100
28		Elective Course – IV (Generic)			5	3	25	75	100
29	IV	SEC – VI	23UCA4S04	PHP Programming	2	2	25	75	100
30		SEC – VII	23UCA4S05	Advanced Excel	2	2	25	75	100
31		Common Course	23UES401	Environmental Studies	2	2	25	75	100
Total					30	25	200	600	800
SEMESTER – V									
32	III	Core – V	23UCA5C05	Operating System	5	4	25	75	100
33		Core – VI	23UCA5C06	ASP.Net Programming	5	4	25	75	100



34		Core Practical – V	23UCA5P05	ASP.Net Programming Lab	3	4	25	75	100
35		Elective Course – V		Elective Course – V	5	3	25	75	100
36		Elective Course – VI		Elective Course – VI	5	3	25	75	100
37		Project	23UCA5PR01	Project with Viva Voce	5	4	25	75	100
38	IV	Value Education	23UVE501	Value Education	2	2	25	75	100
39				Internship	-	2			
Total					30	26	175	525	700
SEMESTER – VI									
40	III	Core – VII	23UCA6C07	Computer Networks	7	4	25	75	100
41		Core – VIII	23UCA6C08	Data Analytics using R Programming	6	4	25	75	100
42		Core Practical –VI	23UCA6P06	R Programming Lab	3	4	25	75	100
43		Elective Course – VII		Elective Course – VII	5	3	25	75	100
44		Elective Course – VIII		Elective Course – VIII	5	3	25	75	100
45	IV	PCSEC	23UCA6S06	Robotics & its Applications	4	2	25	75	100
46	V		23UEX601	Extension Activities	-	1	-	-	-
Total					30	21	150	450	600
Grand Total					180	140	1050	3150	4200

Note

CBCS – Choice Based Credit system

CIA – Continuous Internal Assessment

ESE – End of Semester Examinations

**Elective Courses****Elective – V**

Semester	Part	Course Code	Name of the Course
V	III	23UCA5E01	Software Metrics
		23UCA5E02	Artificial Intelligence
		23UCA5E03	Database Management System

Elective – VI

Semester	Part	Course Code	Name of the Course
V	III	23UCA5E04	Natural Language Processing
		23UCA5E05	Software Project Management
		23UCA5E06	Cryptography

Elective – VII

Semester	Part	Course Code	Name of the Course
VI	III	23UCA6E07	IoT and its Applications
		23UCA6E08	Image Processing
		23UCA6E09	Big Data Analytics

Elective – VIII

Semester	Part	Course Code	Name of the Course
VI	III	23UCA6E10	Cloud Computing
		23UCA6E11	Grid Computing
		23UCA6E12	Mobile Adhoc Network



Skill Enhancement Courses

Part	Semester	Nature of Course	Course Code	Name of the Course	Hours/Week	Credits	Marks		
							CIA	ESE	Total
IV	I	SEC - I		NME	2	2	25	75	100
IV	II	SEC - II		NME	2	2	25	75	100
IV	II	SEC - III	23UCA2S01	Introduction to HTML	2	2	25	75	100
IV	III	SEC - IV	23UCA3S02	Web Designing	2	1	25	75	100
IV	III	SEC - V	23UCA3S03	Office Automation	2	2	25	75	100
IV	IV	SEC - VI	23UCA4S04	PHP Programming	2	2	25	75	100
IV	IV	SEC - VII	23UCA4S05	Advanced Excel	2	2	25	75	100
IV	VI	PCSEC SEC - VIII	23UCA6S06	Robotics & its Applications	4	2	25	75	100

Non Major Elective – (NME)

Extra Disciplinary Subjects offered by the Department of Computer Applications. 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	23UCA1N01	Understanding Internet	2	2	25	75	100
IV	I	23UCA1N02	Office Automation	2	2	25	75	100
IV	II	23UCA2N03	Introduction to HTML	2	2	25	75	100
IV	II	23UCA2N04	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 BCA 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	1400	64
		Generic Elective Courses – Theory/Practical	400	12
		Discipline Elective Courses	400	12
		Project	100	4
4.	IV	Skill Enhancement Courses / NME	700	13
		Environmental Studies	100	2
		Value Education	100	2
		Foundation Course	100	2
		Professional Competency Skill Enhancement Course	100	2
		Internship / Industrial Training	-	2
5.	V	Extension Activities	-	1
Total			4200	140

- 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 course 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)	25
CIA II	75	15	
Assignment		05	
Attendance		05	
Practical			
CIA		15	25
Practical Observation Notebook		05	
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	$5 \times 9 = 45$	Descriptive/Detailed Answers (Two questions from each unit)	45
Total Marks				75

Passing Minimum (CIA) 40% = 10 Marks

Passing Minimum (ESE) 40% = 30 Marks

40 Marks

(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% = 30 Marks

40 Marks



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 BCA Programme

The maximum duration for completion of the BCA Programme shall not exceed twelve semesters.

19. Commencement of this Regulation

This regulation and syllabus shall take effect from the academic year 2023–2024 for students who are admitted to the first year of the Programme during the academic year 2023–2024 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:

$$\text{GRADE POINT AVERAGE [GPA]} = \frac{\sum C_i G_i}{\sum C_i}$$

Sum of the multiplication of grade points by the credits of the courses under each part

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

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.

$$\text{CUMULATIVE GRADE POINT AVERAGE [CGPA]} = \frac{\sum_n \sum_i C_{ni} G_{ni}}{\sum_n \sum_i C_{ni}}$$

Sum of the multiplication of grade points by the credits of the entire program under each part

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



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 BCA, 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 2023–2024 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 2029. Thereafter, they will be permitted to take the Examination only under the Regulations in force at that time.



PROGRAMME SYLLABUS



Programme: BCA				
Core – I		Course Code: 23UCA1C01		Course Title: Python Programming
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	6	90	5	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, else suite in loop 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_\(programming_language\)](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

CO \ PSO	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: BCA				
Core Practical – I		Course Code: 23UCA1P01		Course Title: Python Programming Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	3	45	5	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

CO \ PSO	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: BCA				
Foundation Course – I		Course Code: 23UCA1FC01		Course Title: Structured Programming Language in C
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	4	60	2	100

Course Objectives

1. To familiarize the students with the Programming basics and the fundamentals of C, Data types in C, Mathematical and logical operations.
2. To understand the concept using if statements and loops
3. This unit covers the concept of Arrays
4. This unit covers the concept of Functions
5. To understand the concept of implementing pointers.

UNIT - I

Overview of C: Importance of C, sample C program, C program structure, executing C program. Constants, Variables, and Data Types: Character set, C tokens, keywords and identifiers, constants, variables, datatypes, declaration of variables, assigning values to variables – Assignment statement, declaring a variable as constant, as volatile. Operators and Expression.

UNIT - II

Decision Making and Branching: Decision making with If, simple IF, IF ELSE, nested IF ELSE, ELSE IF ladder, switch, GOTO statement. Decision Making and Looping: While, Do-While, For, Jumps in loops.

UNIT - III

Arrays: Declaration and accessing of one & two -dimensional arrays, initializing two-dimensional arrays, multidimensional arrays.



UNIT - IV

Functions: The form of C functions, return values and types, calling a function, categories of functions, Nested functions, Recursion, functions with arrays, call by value, call by reference, storage classes – character arrays and string functions

UNIT - V

Pointers: definition, declaring and initializing pointers, accessing a variable through address and through pointer, pointer expressions, pointer increments and scale factor, pointers and arrays, pointers and functions, pointers and structures.

TEXT BOOK

1. E.Balagurusamy, Programming in ANSI C, Fifth Edition, TataMcGraw-Hill, 2010.

REFERENCES

1. Byron Gottfried, Schaum's Outline Programming with C, Fourth Edition, TataMcGraw-Hill, 2018.
2. Kernighan and Ritchie, The C Programming Language, Second Edition, Prentice Hall, 1998.
3. Yashavant Kanetkar, Let Us C, Eighteenth Edition, BPB Publications, 2021.

Web Reference

1. <https://codeforwin.org/>
2. <https://www.geeksforgeeks.org/c-programming-language/>
3. <http://en.cppreference.com/w/c>
4. <http://learn-c.org/>
5. <https://www.cprogramming.com/>



Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Remember the program structure of C with its syntax and semantics	PO1, PO3, PO5
CO2	Understand the programming principles in C (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2, PO3, PO6, PO7
CO3	Apply the programming principles learnt in real-time problems	PO3, PO4, PO7
CO4	Analyze the various methods of solving a problem and choose the best method	PO4, PO5, PO6
CO5	Code, debug and test the programs with appropriate testcases	PO7, PO8

Mapping of COs with PSOs

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	1	2	2	2	2	-
CO2	2	2	2	2	-	2
CO3	3	2	2	1	1	-
CO4	3	2	2	1	-	1
CO5	1	2	2	2	2	3
Weight age of course contributed to each PSO	10	10	10	8	5	6

3 – Strong

2 – Medium

1 – Low



Programme: BCA				
Core – II		Course Code: 23UCA2C02		Course Title: Object Oriented Programming Concepts Using C++
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	6	90	5	100

Course Objectives

1. Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
5. Demonstrate the use of various OOPs concepts with the help of programs

UNIT – I

Introduction to C++ - key concepts of Object-Oriented Programming – Advantages – Object Oriented Languages – I/O in C++ - C++ Declarations. Control Structures: Decision Making and Statements: If..else, jump, goto, break, continue, Switch case statements - Loops in C++ :for, while, do - functions in C++ - inline functions – Function Overloading.

UNIT – II

Classes and Objects: Declaring Objects – Defining Member Functions –Static Member variables and functions – array of objects – friend functions – Overloading member functions – Bit fields and classes – Constructor and destructor with static members.

**UNIT – III**

Operator Overloading: Overloading unary, binary operators – Overloading Friend functions – type conversion – Inheritance: Types of Inheritance – Single, Multilevel, Multiple, Hierarchical, Hybrid, Multi path inheritance – Virtual baseClasses – Abstract Classes.

UNIT – IV

Pointers – Declaration – Pointer to Class, Object – this pointer – Pointers to derived classes and Base classes – Arrays – Characteristics – array of classes – Memory models – new and delete operators – dynamic object – Binding, Polymorphism and Virtual Functions.

UNIT – V

Files – Filestream classes – file modes – Sequential Read / Write operations – Binary and ASCII Files – Random Access Operation – Templates – Exception Handling - String – Declaring and Initializing string objects – String Attributes – Miscellaneous functions.

Text Book

1. E. Balagurusamy, Object-Oriented Programming with C++, TMH2013, 7th Edition..

Reference Books

1. Ashok N. Kamthane, Object-Oriented Programming with ANSI and Turbo C++, Pearson Education, 2003.
2. Maria Litvin & Gray Litvin, C++ for you, Vikas publication, 2002..



Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Remember the program structure of C++ with its syntax and semantics	PO1, PO6
CO2	Understand the programming principles in C++ (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
CO3	Apply the programming principles learnt in real-time problems	PO4, PO7
CO4	Analyze the various methods of solving a problem and choose the best method	PO6
CO5	Code, debug and test the programs with appropriate test cases	PO7, PO8

Mapping of COs with PSOs

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	2	1	-	-	1
CO2	2	2	2	1	-	-
CO3	3	1	1	-	1	-
CO4	1	2	1	2	2	1
CO5	3	2	1	2	3	2
Weight age of course contributed to each PSO	12	9	6	5	6	4

3 – Strong

2 – Medium

1 – Low



Programme: BCA				
Core Practical – II		Course Code: 23UCA2P02		Course Title: C++ Programming Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
I	3	45	5	100

Course Objectives

1. Describe the procedural and object-oriented paradigm with concepts of streams, classes, functions, data and objects
2. Understand dynamic memory management techniques using pointers, constructors, destructors, etc.
3. Describe the concept of function overloading, operator overloading, virtual functions and polymorphism
4. Classify inheritance with the understanding of early and late binding, usage of exception handling, generic programming
5. Demonstrate the use of various OOPs concepts with the help of programs

List of Programs

1. Write a C++ program to demonstrate function overloading, Default Arguments and Inline function.
2. Write a C++ program to demonstrate Class and Objects.
3. Write a C++ program to demonstrate the concept of Passing Objects to Functions.
4. Write a C++ program to demonstrate the Friend Functions.
5. Write a C++ program to demonstrate the concept of Passing Objects to Functions.
6. Write a C++ program to demonstrate Constructor and Destructor.
7. Write a C++ program to demonstrate Unary Operator Overloading.
8. Write a C++ program to demonstrate Binary Operator Overloading.
9. Write a C++ program to demonstrate:
 - Single Inheritance
 - Multilevel Inheritance
 - Multiple Inheritance



Hierarchical Inheritance

Hybrid Inheritance

10. Write a C++ program to demonstrate Virtual Functions.
11. Write a C++ program to manipulate a Text File.
12. Write a C++ program to perform Sequential I/O Operations on a file.
13. Write a C++ program to find the Biggest Number using Command Line Arguments.
14. Write a C++ program to demonstrate Class Template.
15. Write a C++ program to demonstrate Function Template.
16. Write a C++ program to demonstrate Exception Handling.

Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcome
CO1	Remember the program structure of C++ with its syntax and semantics	PO1, PO6
CO2	Understand the programming principles in C++ (datatypes, operators, branching and looping, arrays, functions, structures, pointers and files)	PO2
CO3	Apply the programming principles learnt in real-time problems	PO4, PO7
CO4	Analyze the various methods of solving a problem and choose the best method	PO6
CO5	Code, debug and test the programs with appropriate test cases	PO7, PO8



Mapping of COs with PSOs

CO \ PSO	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



Programme: BCA				
Core – III		Course Code: 23UCA3C03		Course Title: Data Structures and Algorithms
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	6	90	5	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

Abstract Data Types (ADTs)- List ADT - array-based implementation linked list implementation singly linked lists - circular linked lists - doubly linked lists - applications of lists - Polynomial Manipulation - All operations Insertion - Deletion - Merge – Traversal.

UNIT – II

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

UNIT – III

Tree ADT - tree traversals - Binary Tree ADT - expression trees - applications of trees - binary search tree ADT - Threaded Binary Trees - AVL Trees - B Tree - B+ Tree – Heap - Applications of heap.

**UNIT – IV**

Definition - Representation of Graph - Types of graph - Breadth first traversal – Depth first traversal - Topological sort - Bi-connectivity – Cut vertex Euler circuits - Applications of graphs.

UNIT – V

Searching - Linear search - Binary search - Sorting - Bubble sort - Selection sort - Insertion sort - Shell sort - Radix sort - Hashing - Hash functions - Separate chaining - Open Addressing - Rehashing Extendible Hashing.

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

CO \ PSO	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: BCA				
Core Practical – III		Course Code: 23UCA3P03		Course Title: Data Structures and Algorithms Lab Using C++
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	3	45	5	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

List of Programs

1. Write a program to implement the List ADT using arrays and linked lists.
2. Write a programs to implement the following using a singly linked list.
Stack ADT
Queue ADT
3. Write a program that reads an infix expression, converts the expression to postfix form and then evaluates the post fix expression (use stack ADT).
4. Write a program to implement priority queue ADT.
5. Write a program to perform the following operations:
Insert an element into a binary search tree.
Delete an element from a binary search tree.
Search for a key element in a binary search tree.
6. Write a program to perform the following operations
Insertion into an AVL-tree
Deletion from an AVL-tree
7. Write a program for the implementation of BFS and DFS for a given graph.



8. Write a program for implementing the following searching methods:
- Linear search
 - Binary search.
9. Write a program for implementing the following sorting methods:
- Bubblesort
 - Selectionsort
 - Insertionsort
 - Radixsort.

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, PO4, PO5
CO2	Understand basic data structures such as arrays, linked lists, stacks and queues	PO1, PO4, PO8
CO3	Describe the hash function and concepts of collision and its resolution methods	PO1, PO3, PO6
CO4	Solve problem involving graphs, trees and heaps	PO3, PO4
CO5	Apply Algorithm for solving problems like sorting, searching, insertion and deletion of data	PO1, PO5, PO6



Mapping of COs with PSOs

CO \ PSO	PSO1	PSO2	PSO3	PSO4	PSO5	PSO6
CO1	3	3	3	2	1	-
CO2	1	2	1	-	-	2
CO3	3	1	2	1	-	-
CO4	2	2	1	2	3	1
CO5	3	2	1	-	-	-
Weight age of course contributed to each PSO	12	10	8	5	4	4

3 – Strong

2 – Medium

1 – Low



Programme: BCA				
Core – IV		Course Code: 23UCA4C04		Course Title: Programming in JAVA
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	6	90	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 - EventSources - 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.

Web 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	PSO6
CO1	3	2	-	2	2	2
CO2	3	1	2	1	2	2
CO3	1	-	2	2	2	2
CO4	2	2	2	2	2	2
CO5	1	2	-	2	2	2
Weight age of course contributed to each PSO	10	7	6	9	10	10

3 – Strong

2 – Medium

1 – Low



Programme: BCA				
Core Practical - IV		Course Code: 23UCA4P04		Course Title: Programming in Java Lab
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	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	PSO6
CO1	3	2	1	3	2	3
CO2	3	2	1	3	1	3
CO3	3	2	1	3	2	3
CO4	3	2	1	3	2	3
CO5	3	2	1	3	2	3
Weight age of course contributed to each PSO	15	10	5	15	9	15

3 – Strong

2 – Medium

1 – Low



Programme: BCA				
Core – V		Course Code: 23UCA5C05		Course Title: Operating System
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	5	75	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: BCA				
Core – VI		Course Code: 23UCA5C06		Course Title: ASP. Net Programming
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	5	75	4	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: BCA				
Core Practical – V		Course Code: 23UCA5P05		Course Title: ASP.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. Working with File concepts.
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



Program: Bachelor of Computer Applications (BCA)

Project		Course Code: 23UCA5PR1		Course Title: Project Viva Voce	
Semester	Hours/Week	Total Hours	Credits	Total Marks	
V	5	75	4	100	

Course Objectives

1. To implement the concepts of SDLC.
2. To experience development of real time applications.
3. To practice the students rapid application development.

Course Outcomes (COs)

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

CO Number	CO Statement
CO1	Develop knowledge in Software project.
CO2	Understand the concept and challenges in Software Project Management
CO3	To analyses the issues in developing applications.
CO4	Gain hands-on experience on systematic approach in project development.
CO5	Can experience the bottlenecks of various languages and solve it.

Mapping of COs with PSOs

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	2	2	2	3	3
CO2	3	2	3	3	3
CO3	3	3	3	2	3
CO4	3	3	3	3	3
CO5	3	3	3	3	3

3 – Strong

2 – Medium

1 – Low



Programme: BCA				
Core – VII		Course Code: 23UCA6C07		Course Title: Computer Networks
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	7	105	4	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. Gallager, 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

CO \ PSO	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: BCA				
Core – VIII		Course Code: 23UCA6C08		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 Golemund, 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

CO \ PSO	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: BCA				
Core Practical – VI		Course Code: 23UCA6P06		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 from 1 to 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: BCA				
Elective – V		Course Code: 23UCA5E01		Course Title: Software Metrics
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	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

CO \ PSO	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: BCA				
Elective – V		Course Code: 23UCA5E02		Course Title: Artificial Intelligence
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	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 Artificial 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

CO \ PSO	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: BCA				
Elective – V		Course Code: 23UCA5E03		Course Title: Database Management System
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	5	75	3	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 understand 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 understand 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 - ERdiagram.

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

CO \ PSO	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: BCA				
Elective – VI		Course Code: 23UCA5E04		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 Perl and 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

CO \ PSO	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: BCA				
Elective – VI		Course Code: 23UCA5E05		Course Title: Software Project Management
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	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 requirements 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
CO1	Understand the principles and concepts of project management
CO2	Knowledge gained to train software project managers
CO3	Apply software project management methodologies.
CO4	Able to create comprehensive project plans
CO5	Evaluate and mitigate risks associated with software development process



Mapping of COs with PSOs

CO \ PSO	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: BCA				
Elective – VI		Course Code: 23UCA5E06		Course Title: Cryptography
Semester	Hours/Week	Total Hours	Credits	Total Marks
V	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

CO \ PSO	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: BCA				
Elective – VII		Course Code: 23UCA5E07		Course Title: IoT and its Applications
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	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 Madiseti 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. Walteneus 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

CO \ PSO	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: BCA				
Elective – VII		Course Code: 23UCA5E08		Course Title: Image Processing
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	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, 2015
2. Gonzalez Rafael 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%203rd%20ed.%20-%20R.%20Gonzalez%20C%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: BCA				
Elective – VII		Course Code: 23UCA5E09		Course Title: Artificial Neural Networks
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	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 in continuous perception. Limitation of Perception.

**UNIT – IV**

Multi - Layer Perception Networks: Introduction, MLP with 2 hidden layers, Simple layer of a MLP, Delta learning rule of the output layer, Multilayer feed forward neural network with continuous perceptions, Generalized delta 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 Boltzmann 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

CO \ PSO	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: BCA				
Elective – VIII		Course Code: 23UCA5E10		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 Madiseti, 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

CO \ PSO	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



Programme: BCA				
Elective – VIII		Course Code: 23UCA5E11		Course Title: Grid Computing
Semester	Hours/Week	Total Hours	Credits	Total Marks
VI	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

CO \ PSO	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: BCA				
Elective – VIII		Course Code: 23UCA5E12		Course Title: Mobile Ad-hoc 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



Skill Enhancement Course (SEC)



Programme: BCA				
SEC – III		Course Code: 23UCA2S01		Course Title: Introduction to HTML
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	3	45	2	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

CO \ PSO	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: BCA				
SEC – IV		Course Code: 23UCA4S02		Course Title: Web Designing
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	2	30	1	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 text- 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

CO \ PSO	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



Programme: BCA				
SEC – V		Course Code: 23UCA4S03		Course Title: Office Automation
Semester	Hours/Week	Total Hours	Credits	Total Marks
III	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

CO \ PSO	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: BCA				
SEC – VI		Course Code: 23UCA4S04		Course Title: PHP Programming
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.

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 Books

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. ReferMOOCCourseslikeNPTELandSWAYAM
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

CO \ PSO	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: BCA				
SEC – VII		Course Code: 23UCA4S06		Course Title: Advanced Excel
Semester	Hours/Week	Total Hours	Credits	Total Marks
IV	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. Create pivot tables to consolidate data from multiple files.
5. Presenting data in the form of charts and graphs.

UNIT – I

Basics of Excel - Customizing common options - Absolute and relative cells - Protecting and un-protecting worksheets and cells - Working with Functions - Writing conditional expressions - logical functions - lookup and reference functions - VlookUP with Exact Match, Approximate Match - Nested VlookUP with Exact Match- VlookUP with Tables, Dynamic Ranges - Nested VlookUP with Exact Match - Using VLookUP to consolidate Data from Multiple Sheets

UNIT – II

Data Validations - Specifying a valid range of values - Specifying a list of valid values - Specifying custom validations based on formula - Working with Templates Designing the structure of a template - templates for standardization of worksheets - Sorting and Filtering Data - Sorting tables- multiple-level sorting - custom sorting. Filtering data for selected view - advanced filter options. Working with Reports Creating subtotals - Multiple-level subtotal.

UNIT – III

Creating Pivot tables Formatting and customizing Pivot tables - advanced options of Pivot tables - Pivot charts. Consolidating data from multiple sheets and files using Pivot tables -



external data sources - data consolidation feature to consolidate data - Show Value As % of Row, % of Column, Running Total, Compare with Specific Field - Viewing Subtotal under Pivot- Creating Slicers.

UNIT – IV

More Functions Date and time functions - Text functions - Database functions - Power Functions - Formatting Using auto formatting option for worksheets - Using conditional formatting option for rows, columns and cells - What If Analysis - Goal Seek - Data Tables - Scenario Manager

UNIT – V

Charts - Formatting Charts - 3D Graphs - Bar and Line Chart together - Secondary Axis in Graphs - Sharing Charts with PowerPoint / MS Word, Dynamically - New Features Of Excel Sparklines, Inline Charts, data Charts - Overview of all the new features.

Text Books

1. Excel 2019 All
2. Microsoft Excel 2019 Pivot Table Data Crunching

Reference Books

1. Excel 2019 All-in-One for Dummies, Greg Harvey, 1st editionReference Books

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	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 Create pivot tables to consolidate data from multiple files.	PO4, PO5, PO6
CO5	Learn to Presenting data in the form of charts and graphs.	PO3, PO8

Mapping of COs with PSOs

CO \ PSO	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: BCA				
SEC – VIII PCSEC		Course Code: 23UCA6S06		Course Title: Robotics and its Applications
Semester VI	Hours/Week 4	Total Hours 60	Credits 2	Total Marks 100

Course Objectives

1. To understand the robotics fundamentals
2. Understand the sensors and matrix methods
3. Understand the Localization: Self-localizations and mapping
4. To study about the concept of Path Planning, Vision system
5. To learn about the concept of robot artificial intelligence.

UNIT – I

Introduction: Introduction, brief history, components of robotics, classification, workspace, work-envelop, motion of robotic arm, end-effectors and its types, service robot and its application, Artificial Intelligence in Robotics.

UNIT – II

Actuators and sensors: Types of actuators, stepper - DC-servo- and brushless motors – model of a DC servo motor -types of transmissions – purpose of sensor – internal and external sensor - common sensors - encoders tachometers – strain gauge based force torque sensor – proximity and distance measuring sensors

Kinematics of robots: Representation of joints and frames, frames transformation, homogeneous matrix, D-H matrix, Forward and inverse kinematics: two link planar (RR) and spherical robot (RRP). Mobile robot Kinematics: Differential wheel mobile robot.

UNIT – III

Localization: Self-localizations and mapping - Challenges in localizations – IR based localizations – vision-based localizations – Ultrasonic based localizations – GPS localization systems.



UNIT – IV

Path Planning: Introduction, path planning – overview - road map path planning – cell decomposition path planning potential field path planning – obstacle avoidance - case studies. Vision system: Robotic vision systems – image representation – object recognition – and categorization – depth measurement – image data compression – visual inspection – software considerations

UNIT – V

Application: Ariel robots – collision avoidance robots for agriculture – mining – exploration – under water – civilian -and military applications – nuclear applications – space Applications – Industrial robots – artificial intelligence in robots - application of robots in material handling -continuous arc welding - spot welding - spray painting - assembly operation - cleaning - etc.

Text Books

1. Richard D. Klafter, Thomas Achmielewski and Mickael Negin, Robotic Engineering and Integrated Approach, Prentice Hall India – Newdelhi - 2001
2. Saeed B. Nikku, Introduction to robotics, analysis, control and applications, Wiley-India, 2nd edition 2011

Reference Books

1. Industrial robotic technology-programming and application by M.P. Groover et.al, McGraw hill 2008
2. Robotics technology and flexible automation by S.R. Deb, THH - 2009

Web Reference

1. https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_robotics.htm
2. <https://www.geeksforgeeks.org/robotics-introduction/>



Course Outcomes (COs)

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

CO Number	CO Statement	Programme Outcomes
CO1	Describe the different physical forms of robot architectures.	PO1
CO2	Kinematically model simple manipulator and mobile robots.	PO1, PO2
CO3	Mathematically describe a kinematic robot system	PO4, PO6
CO4	Analyze manipulation and navigation problems using knowledge of coordinate frames, kinematics, optimization, control, and uncertainty.	PO4, PO5, PO6
CO5	Program robotics algorithms related to kinematics, control, optimization, and uncertainty.	PO3, PO8

Mapping of COs with PSOs

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

3 – Strong

2 – Medium

1 – Low



Non Major Elective (NME)



Programme: BCA				
Non Major Elective – I		Course Code: 23UCA1N01		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. Internet as a source of infotainment
5. Study of internet audiences and about 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**

CO \ PSO	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: BCA				
Non Major Elective – I		Course Code: 23UCA1N02		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

CO \ PSO	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: BCA				
Non Major Elective – II		Course Code: 23UCA2N03		Course Title: Introduction to HTML
Semester	Hours/Week	Total Hours	Credits	Total Marks
II	2	30	2	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

CO \ PSO	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: BCA				
Non Major Elective – II		Course Code: 23UCA2N04		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 text- 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

CO \ PSO	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