GURU NANAK COLLEGE (AUTONOMOUS)

GURU NANAK SALAI, VELACHERY, CHENNAI – 600042

(Re-accredited at 'A-Grade' by NAAC) Affiliated to University of Madras

B.Sc. COMPUTER SCIENCE

(SEMESTER PATTERN WITH CHOICE BASED CREDIT SYSTEM)

SYLLABUS

(For the candidates admitted for the Academic year 2022-2023 and thereafter)

PREAMBLE

Bachelor of Computer Science is a 3 – Year undergraduate programme extend over six semesters. The main goal of this programme is to engender software developers for high end IT services. The Curriculum of B.Sc., Computer Science programme specially designed to develop analytical & computational thinking, and problem solving skills among students. The programme builds a base for entry level jobs in information technology and prepares the students for higher studies in the area of Computer Science. It covers the core Computer Science topics like computer systems architecture, algorithms and data structures, computer networks, operating systems, cloud computing, big data, software engineering, database management systems, data science, artificial intelligence, and android applications.

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

From the Academic Year (2022- 23) and there after

Vision

To create a unique and futuristic space in imparting quality higher education in Computer Science in the International arena and to augment a pool of knowledge base for the uplift of the Indian society and to manifest the perfection and quality in the mankind.

Mission

To contribute to the overall development of the society on the national and global scale, be excellence in education, Teaching-Learning and engaging the Student with Extra-Curricular activities on par with by international standards.

PROGRAMME OUTCOMES
B.Sc., COMPUTER SCIENCE

The following points are the expected outcomes of the three-year B.Sc., Computer Science programme of Guru Nanak College:

PO1 :Implement knowledge of computing fundamentals, computing specialization and domain knowledge for the abstraction and conceptualization of computing models.

PO2 : Identify and Analyze user needs and use them in the selection, creation of high-level reliable software systems.

PO3 : Use the techniques, skills and modern hardware and software tools necessary for innovative software solutions.

PO4 : Employ essential IT support skills gained to install, configure, secure and ability to do preliminary Troubleshooting.

PO5 : Collaborate effectively with teams to accomplish shared computing design, evaluation, or implementation goals.

PROGRAMME SPECIFIC OUTCOMES
B.Sc., COMPUTER SCIENCE

PSO 1: Employ appropriate concepts of problem solving methods for varied applications.

PSO 2: Develop aptitude to meet the challenges and keep themselves abreast of the upcoming trends in the IT industry.

B.Sc. (COMPUTER SCIENCE)
COURSE STRUCTURE 2022-23 BATCH

Semester	Part	Course Component	Subject Name	Credits	Hours	Internal	External	Tota
Semester - I	I	Language	Language – I	3	6	50	50	100
	II	English	English - I	3	4	50	50	100
	III	Core Paper-I	Problem Solving using C Programming	4	6	50	50	100
	III	Core Paper-II	Practical - Problem Solving using C Lab	4	4	50	50	100
	III	Allied-I	Mathematics I	5	6	50	50	100
	IV	Non Major Elective-I / Basic/ Advanced Tamil	Advanced Tamil - I / Basic Tamil –I / Basic Hindi - I/Practical- Fundamentals of web skills and MS – Access Lab	2	2	-	100	100
	IV	Soft Skills-I	Introduction to Study Skill	3	2	-	100	100
Total Credits: 24 / Total Hours per week: 30								
Semester - II	I	Language	Language – II	3	6	50	50	100
	II	English	English - II	3	4	50	50	100
	III	Core Paper – III	Analysis of Algorithms and Data Structures	4	6	50	50	100
	III	Core Paper- IV	Practical - Analysis of Algorithms and Data Structures Using C Lab	4	4	50	50	100
	III	Allied-II	Mathematics II	5	6	50	50	100
	IV	Non Major Elective-II / Basic/ Advanced Tamil	Advanced Tamil - II / Basic Tamil –II / Basic Hindi - II / Introduction to Information Technology	2	2	-	100	100
	IV	Soft Skills-II	Life Skills	3	2	-	100	100
Total Credits: 24 / Total Hours per week: 30								

B.Sc. (COMPUTER SCIENCE)
COURSE STRUCTURE 2022-23 BATCH

Semester	Part	Course Component	Subject Name	Credits	Hours	Internal	External	Total
Semester - III	I	Language	Language – III	3	6	50	50	100
	II	English	English - III	3	4	50	50	100
	III	Core Paper-V	Programming in Java	4	8	50	50	100
	III	Core Paper-VI	Practical - Programming in Java Lab	4	4	50	50	100
	III	Allied-III	Operations Research with Big data	5	6	50	50	100
	IV	Soft Skills-III	Job Oriented Skills	3	2	-	100	100
	IV	2.EVS	Environmental Studies	-	-	-	-	-
Total Credits: 22 / Total Hours per week: 30								
Semester - IV	I	Language	Language – IV	3	6	50	50	100
	II	English	English - IV	3	4	50	50	100
	III	Core Paper- VII	VB.NET Programming and Database Management System	4	6	50	50	100
	III	Core Paper- VIII	Practical - RDBMS with VB.NET Lab	4	4	50	50	100
	III	Allied-IV	Statistical Methods and their Applications	5	4	50	50	100
	III	Allied-IV	Statistical Methods and their Applications – Practical	-	2	50	50	100
	IV	Soft Skills-IV	Quantitative Aptitude	3	2	-	100	100
	IV	EVS	Environmental Studies	2	2	50	50	100
Total Credits: 24 / Total Hours per week: 30								

B.Sc. (COMPUTER SCIENCE)
COURSE STRUCTURE 2022-23 BATCH

Semester	Part	Course Component	Subject Name	Credits	Hours	Internal	External	Total
Semester - V	III	Core Paper-IX	Operating Systems	4	6	50	50	100
	III	Core Paper-X	Digital Logic and Computer Architecture	4	6	50	50	100
	III	Core Paper-XI	Programming in Python	4	6	50	50	100
	III	Core Paper-XII	Practical - Python Programming Lab	4	6	50	50	100
	III	Elective-I (Interdisciplinary Elective)	Practical - Internet and its applications Lab	5	5	50	50	100
	IV	Value Education	Value Education	2	1	50	50	100
	V	Internship	Internship	2	-	-	-	-
Total Credits: 25 / Total Hours per week: 30								
Semester - VI	III	Core Paper-XIII	Software Engineering	4	6	50	50	100
	III	Core Paper-XIV	Web Programming with PHP and MySQL	4	6	50	50	100
	III	Core Paper-XV	Practical – Web Programming with PHP and MySQL Lab	4	6	50	50	100
	III	Elective-II	Data Communication & Networking / Data Mining / Software Testing / Data Science / Cloud Computing	5	6	50	50	100
	III	Elective-III	Mini Project / Fundamentals of Multimedia /Android Application Development Practical / Artificial Intelligence	5	6	50	50	100
	V	Extension Activity	Participation in NSS /NCC /ROTRACT etc.	1	-	-	-	-
Total Credits: 23 / Total Hours per week: 30								
Grand Total Credits: 142 / Total Hours: 180								

INTERNSHIP

- To provide opportunities for experiential learning in varied areas of the discipline beyond 'teaching-training' and enhance professional growth of the students.
- To help students prepare for career in computer science and develop a road map for the same.
- To provide students with an environment that facilitates increasing knowledge, enhancing skills/ competencies.
- To enable students to identify strengths, identify and upgrade those skills that need improvement in line with their career goals.
- To enable students to strengthen their commitment towards becoming responsible well-trained professionals with a code of ethics.

CORE PAPER-I
PAPER TITLE: PROBLEM SOLVING USING C PROGRAMMING

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: I	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *Develop an in-depth understanding of functional and logical programming paradigms.*
- *By learning the basic programming constructs, they can easily adopt to any other programming language.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Design Programming using statements
2. Demonstrate Control flow verification
3. Explain importance function in avoidance of code redundancy
4. Discuss manipulation of Array and structure
5. Compute external file data through file handling methods

UNIT I: (18 Hours)

Planning the Computer Program: Problem definition, Program design, Debugging, Types of Errors in programming, Techniques of Problem Solving: Flow charting, Algorithms.C Fundamentals: Character set - Identifiers and Keywords - Data Types - Constants - Variables - Declarations - Expressions - Statements - Operators: Arithmetic, Unary, Relational and Logical, Assignment and Conditional.

UNIT II: (18 Hours)

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

UNIT III: (18 Hours)

Functions: Definition - Proto-types - Passing arguments - Recursions. Storage Classes - automatic, external, static, register variables -Library functions.

UNIT IV: (18 Hours)

Arrays - Defining and Processing - Passing arrays to functions – Multi-dimension arrays - Arrays and String. Structures - User defined data types – Unions.

UNIT V: (18 Hours)

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

PRESCRIBED BOOKS:

1. P. K. Sinha&PritiSinha, 2017 –Computer Fundamentals‖, BPB Publications, 6th Edition.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education,2010.
3. E. Balaguruswamy, 2016, 8th Edition, Programming in ANSI C, TMH Publishing Company Ltd.
4. Kanetkar Y., 2018 LET US C - 16th Edition BPB Pub., NewDelhi.

REFERENCE BOOKS:

1. K.R.Venugopal, Programming withC,1997,McGraw-Hill

2. Varalakshmi, Programming using C,2000(Reprint July 2001),V.Ramesh5
3. R.Rajaram, C Programming MadeEasy, V.Ramesh
4. B.W. Kernighan and D.M.Ritchie, 1988, The C Programming Language, 2ndEdition, PHI.
5. H. Schildt, 2004 C, The Complete Reference, 4th Edition, TMH
6. Gottfried. B.S, 1996, Programming with C, Second Edition, TMH Pub. Co. Ltd., New Delhi.

WEBSITES FOR REFERENCES:

1. http://www.cprogramming.com/
2. http://www.richardclegg.org/previous/ccourse/
3. https://www.studytonight.com/c/programs/
4. https://www.cprogramming.com/tutorial/computersciencetheory/stackcode.html

WEBSITES FOR ONLINE COURSES:

NPTEL & MOOC courses titled C programming

1. https://www.udemy.com/courses/search/?src=ukw&q=problem+solving+using+c+programming
2. https://www.coursera.org/courses?query=c+programming
3. https://alison.com/course/introduction-to-c-programming

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS		**100**		

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	

CORE PAPER-II
PAPER TITLE: PRACTICAL - PROBLEM SOLVING USING C LAB

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: I	**CREDITS: 4**	**TOTAL HOURS: 60**

COURSE FRAMEWORK:

- *To acquire knowledge in how to apply the specification of syntax rules for numerical constants and variables, data types.*
- *This course provides to write C programs using decision making, branching, looping constructs.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Demonstrate calculator through arithmetic operators
2. Demonstrate logical and relational operators using Condition statements
3. Illustrate iteration using 'for, while and do..while 'statement and switchstatement
4. Demonstrate and compute Fibonacci series using function
5. Demonstrate factorial of number using recursive function

(15 Hours)

1. Write a program to add, subtract, multiply and divide two numbers. (Arithmetic operation).
2. Write a program to check if a number is even or odd.(if-else)
3. Write a program to find the largest of three numbers. (using if-else, logical&&)
4. Write a program to find the maximum and minimum of n numbers. (using for- statement)

(15 Hours)

5. Write a program to check for prime number. (do while loop)
6. Write a program to check for Armstrong number. (while loop)
7. Write a program to accept day number and print the day of theweek.(switch)
8. Write a program for counting the number of vowels, consonants, words, white spaces in a line of text. (switch)

(15 Hours)

9. Write a program to arrange a set of numbers in ascending order. (1DArray).
10. Write a program to implement linear search.(1DArray)
11. Write a program to implement binary search. (1DArray)
12. Write a program to add two matrices. (2DArrays)

(15 Hours)

13. Write a program to check whether a string is a palindrome ornot.(String)
14. Write a program to print Fibonacci series using function.
15. Write a program to find factorial of a number using recursive function.

COURSE COMPONENT: ALLIED MATHEMATICS – I
(For B.Sc. Computer Science and BCA)

SUBJECT CODE:	**THEORY & PROBLEMS**	**100 MARKS**
SEMESTER: I	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To improve basics in Mathematics and analytical skills*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Demonstrate knowledge in computing solutions to Summation series involving Binomial, Exponential and Logarithmic Series
2. Compute the eigen values and eigen vectors of a given matrix and apply Cayley Hamilton theorem in computing the integrals powers and also the inverse of a given matrix.
3. Knowledge in solving polynomial equations including reciprocal equations and application of Newton's method in finding approximate roots to the polynomial equations.
4. Compute radius of curvature using Cartesian co-ordinates.
5. Evaluate maxima and minima of functions involving two variables.

UNIT I: **(18 Hours)**

ALGEBRA: Summation of Series - Binomial, Exponential and Logarithmic Series (Without proof) and Simple Problems.
Chapter 2, Section 2.1.3, 2.2, 2.2.1, 2.3, 2.3.3

UNIT II: **(18 Hours)**

MATRICES: Eigen Values – Eigen Vectors - Cayley - Hamilton Theorem (without proof)
Chapter 4 Section 4.5, 4.5.2, 4.5.3

UNIT III: **(18 Hours)**

THEORY OF EQUATIONS: Polynomial equations, irrational roots, complex roots, increasing and decreasing of roots, Reciprocal equations - Approximation of roots of a polynomial equation by Newton's Method.
Chapter 3, Section 3.1 to 3.4.1

UNIT IV: **(18 Hours)**

DIFFERENTIAL CALCULUS: n^{th} derivatives - Leibnitz Theorem - Jacobians - Radius of Curvature (Cartesian Coordinates only) – Maxima and Minima of functions of two variables.
Chapter 1, Section 1.1.1 to 1.3.1 and Section 1.4.3

UNIT V: **(18 Hours)**

TRIGONOMETRY: Expansions of $\sin n\theta$, $\cos n\theta$, $\tan n\theta$ - Expansions of $\sin^n\theta$, $\cos^n\theta$- Hyperbolic and Inverse hyperbolic functions.
Chapter 6, Section 6.1 to 6.3.

Content and treatment as in

Allied Mathematics Volume I and II by P. Duraipandian and S. Udayabaskaran, S. Chand Publications, 2016 Edition.

PRESCRIBED BOOKS:

1. Allied Mathematics,A.Singaravelu.
2. Ancillary Mathematics, A. ManickavasagamPillai andNarayanan.

REFERENCE BOOKS:

1. Allied Mathematics, S.G.Venkatachalapathy
2. P.Kandasamy and K.Thilagavathi,Allied Mathematics Volume I and Volume II -- 2004, S.Chand and Co, NewDelhi.
3. Ancillary Mathematics Volume 1 and 2 by P.Balasubramanian&K.G.Subramanian.

WEBSITES

1. www.freetechbooks.com/mathematics f38.htmlwww.e-booksdirectory.com
2. www.freebookcenre.net/SpecialCat/Free-Mathematics-Books-Download.html

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
	TOTAL MARKS			**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	No. of Questions	
		Theory	Problems
Section A	Unit – 1		2
	Unit – 2	1	2
	Unit – 3	1	1
	Unit – 4		2
	Unit – 5	1	2
Section B	Unit – 1		2
	Unit – 2		1
	Unit – 3		2
	Unit – 4		1
	Unit – 5		1
Section C	Unit – 1		1
	Unit – 2		2
	Unit – 3		1
	Unit – 4		1
	Unit -5		1

NON MAJOR ELECTIVE
PAPER TITLE: PRACTICAL – FUNDAMENTALS OF WEB SKILLS AND MS-ACCESS LAB
(From B.Sc. Computer Science)

SUBJECT CODE :	**PRACTICAL**	**MARKS : 100**
SEMESTER: I	**CREDITS : 2**	**TOTAL HOURS: 30**

COURSE FRAMEWORK:

- *To familiarize the students with features of E-mail.*
- *To educate students in uploading files in web portals and giving exposure to students in creating and scheduling online meets in video conferencing tools.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Understand the fundamentals of Internet and the Web concepts.
2. Explain the usage of internet concepts and analyze its components.
3. Identify and apply the online information resources.
4. Inspect and utilize the appropriate Google Apps for education effectively.
5. Describe summarizing data and queries using Ms-Access.

1. Assume that you are studying in final year of your graduation and are eagerly looking for a job. Visit any job portal and upload your resume.
2. Create a meeting using Google calendar and share meeting id to the attendees. Transfer the ownership to the Manager once the meeting id is generated.
3. Create a label and upload bulk contacts using import option in Google Contacts.
4. Create your own Google classroom and invite all your friends through email id. Post study material in Google classroom using Google drive. Create a separate folder for every subject and upload all unit wise E-Content Materials.
5. Create and share a folder in Google Drive using 'share a link' option and set the permission to access that folder by your friends only.
6. Create one page story in your mother tongue by using voice recognition facility of Googledocs.
7. Create a registration form for your Department Seminar or Conference using Google Forms.
8. Create a question paper with multiple choice types of questions for a subject of your choice, using Google Forms.
9. Create a Google form with minimum 25 questions to conduct a quiz and generate a certificate after submission.
10. Create a meet using Google Calendar and record the meet using Google Meet.
11. Create a Google slides for a topic and share the same with yourfriends.

MS- Access

12. Create a table with appropriate table level constraints.
13. Create a form to for data entry.
14. Sort the table data on a column. View selected records from a table byfilter.
15. Create a Query manually and perform calculations using a query.

SOFT SKILLS – I

PAPER TITLE: INTRODUCTION TO STUDY SKILLS

SUBJECT CODE :	**THEORY**	**MARKS : 100**
SEMESTER: I	**CREDITS: 3**	**NO. OF HOURS : 30**

COURSE FRAMEWORK:

- To help, develop and improve the vocabulary of the learners
- To help the learners develop the skill of inference
- To help the learners to acquire writing skills in English

Use of Dictionary and Dictation
Speech Sounds in English & Right Pronunciation Stress & Intonation Vocabulary Building Exercises Listening and Reading Comprehension Paragraphand Essay Writing

REFERENCE BOOKS:

1. Hewings, Martin. 1999. Advanced English Grammar: A Self- study Referenceand Practice Book for South Asian Students. Reprint 2003.Cambridge University Press. New Delhi.
2. Lewis Norman.1991. Word Power Made Easy.
3. Mohan, Krishna &Meenakshi Raman. 2000. Effective English Communication. Tata Mc Graw Hill Publishing Company Ltd.
4. Mohan, Krishna &Meera Banerji. 2001. Developing Communication Skills. Macmillan. Syamala. 2002. Effective English Communication for You. Emerald Publishers, Chennai.
5. Harishankar, Bharathi. Ed. Essentials of Language and Communication. University of Madras.
6. Swan, Michael and Catherine Walter. 1990. The Cambridge English Course-2. Cambridge University Press.

CORE PAPER- III
PAPER TITLE: ANALYSIS OF ALGORITHMS AND DATA STRUCTURES

SUBJECT CODE:	**THEORY**	**MARKS : 100**
SEMESTER: II	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To ensure that the student evolves into a competent programmer capable of designing and analyzing implementations of algorithms and data structures for different kinds of problems.*
- *To choose appropriate data structures and algorithms, understand the ADT/libraries, and use it to design algorithms for a specific problem.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Discuss design principles and concepts of algorithms and Analyze the efficiency of algorithms using time and space complexity
2. Compare the computational efficiency of various sorting and searchingtechniques
3. Analyze various static data structures like array implementation of stack and queue
4. Compare static data structures with dynamic data structures such as linked list
5. Demonstrate the data structures tree and graphs and their traversal methods

UNIT I: (18 Hours)

Introduction: Basic Design and Analysis techniques of Algorithms, Correctness of Algorithm. Algorithm Design Techniques: Iterative techniques, Divide and Conquer Algorithms.

UNIT II: (18 Hours)

Sorting Techniques: Elementary sorting techniques - Bubble Sort, Insertion Sort, Merge Sort, Selection Sort - Advanced Sorting Techniques-Heap Sort, Quick Sort. Searching Techniques: Linear and Binary search.

UNIT III: (18 Hours)

Introduction to Data structure-Arrays: Single and Multi-dimensional Arrays, Sparse Matrices -Stacks: Implementing stack using array - Recursion - Prefix, Infix and Postfix expressions, Conversion from Infix to Postfix – Postfix evaluation.

UNIT IV: (18 Hours)

Queues: Array implementation of Queue, Priority Queues, Circular Queue - Linked Lists: Singly, Doubly- representation of Stack and Queue as Linked Lists.

UNIT V: (18 Hours)

Trees: Introduction; Binary Trees, Binary Search Tree: Creation and Traversal: Inorder, Preorder and Postorder. Graph: Definition, Types of Graphs, Traversal – Breadth First Search and Depth First Search.

PRESCRIBED BOOKS:

1. Ellis Horowitz,Sartaj Sahni and Susan Anderson,–Fundamentals of Data Structures in C,August 2008,2nd edition Silicon Press, United States.
2. Programming and Data Structures A. P. Godse and A. A. Puntambekar, 2016, Technical Publications.
3. Ellis Horowitz and SartajSahni,1984 –Fundamentals of Computer Algorithms, Computer Science Press

REFERENCE BOOKS:

1. R.S.Salaria,–Data Structures and Algorithms using C (Theory, Design and Implementation), 5th Edition, 2015, Khanna Publishing (AICTE Prescribed Book).
2. Dr.Brijesh Bakariya,–Data Structures and Algorithms implementation through C,2020,BPB Publishing.

WEBSITES FOR REFERENCES:

1. https://www.geeksforgeeks.org/data-structures/
2. https://visualgo.net/en/bst?slide=1
3. https://www.tutorialspoint.com/data_structures_algorithms/index.htm
4. https://www.programiz.com/dsa
5. https://www.cprogramming.com/tutorial/computersciencetheory/stackcode.html

WEBSITES FOR ONLINE COURSES:

1. https://www.coursera.org/specializations/data-structures-algorithms
2. https://www.geeksforgeeks.org/data-structures-and-algorithms-online-courses-free-and-paid/
3. https://digitaldefynd.com/best-data-structures-algorithms-tutorial-course-certification/
4. https://www.edx.org/course/algorithms-and-data-structures

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	1	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	1	
	Unit -5	1	

CORE PAPER-IV
PAPER TITLE: PRACTICAL - ANALYSIS OF ALGORITHMS AND DATA STRUCTURES USING C LAB

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: II	**CREDITS: 4**	**TOTAL HOURS: 60**

COURSE FRAMEWORK:

- *Implement various algorithms and data structures in C.*
- *Compare the performance of different algorithms for same problem.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Illustration of iterative algorithmic technique with insertion sort, bubble sort and selection sort
2. Demonstrate divide and conquer algorithm using quick and merge sort
3. Explain algorithmic technique backtracking using heap sort
4. Implement stack and apply stack for applications like postfix expression and evaluation of expressions
5. Discuss dynamic data structures linked list and doubly linked list and their applications in formulating data structures like trees and graphs

(15 Hours)

1. Implement Insertion Sort (The program should reportthe number of comparisons)
2. Implement Merge Sort(The program should report the number ofcomparisons)
3. Implement Selection Sort ((The program should report the number of comparisons)
4. Implement Quick Sort (The program should report the number ofcomparisons)

(15 Hours)

5. Array implementation of stack
6. Conversion of infix to postfix using stack operations
7. Postfix Expression Evaluation **(15 Hours)**
8. Array implementation of Queue

9. Implementation of Recursive function –Fibonacci series
10. Implementation of Single Linked list
11. Implementation of Stack using linked list
12. Implementation of queue using linked list

(15 Hours)

13. Implementation of Doubly Linked list
14. Creation and traversal of Binary Search Tree. (Preorder, Inorder, Postorder)
15. Creation and traversal of Graph (DFS,BFS)

COURSE COMPONENT: ALLIED MATHEMATICS – II
(For B.Sc. Computer Science and BCA)

SUBJECT CODE:	**THEORY & PROBLEMS**	**100 MARKS**
SEMESTER: II	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To improve basics in mathematics and analytical skills*

COURSE OUTCOME:

On Completion of the course the students will be able to

1. Demonstrate skill in computing integrations containing an integer parameter
2. Identify the concept of difference tables and use them in computing problems involving Newton and Lagrange formulae.
3. Knowledge in solving second order differential equations involving constantcoefficients.
4. Skill in computing solutions to partial differential equations of differenttypes.
5. Identify the basics of Laplace transformation and apply different properties in computing problems.

UNIT - I: **(18 Hours)**

INTEGRAL CALCULUS: - Bernoulli's formula – Reduction formula for $\int \text{Sin}^n x\, dx$, $\int \text{Cos}^n x\, dx$ and $\int \text{Sin}^m x \text{Cos}^n x\, dx$.
Chapter 2, Sections 2.7 and 2.9

UNIT - II: **(18 Hours)**

FINITE DIFFERENCES: Operators E, differences tables, Newton's forward and backward interpolation formulae, Lagrange's Interpolation formulae.
Chapter 5, Section 5.1, 5.2

UNIT - III: **(18 Hours)**

DIFFERENTIAL EQUATION: Second order Differential Equation with Constant Coefficient differential equation of the form $(aD^2+bD+C)y = e^{ax}\, ó\, (x)$ where a, b, c are constants, $ó\, (x)$ = Sin mx (or) Cos mx (or) x^m.
PARTIAL DIFFERENTIAL EQUATION : Eliminating Arbitrary constants and functions - Four Standard types.f(p,q) = 0; f(x,p,q) = 0, f (y,p,q) = 0, f(z,p,q) = 0.
Chapter 5, Section 5.2, 5.2.1
Chapter 6, Section 6.1 to 6.3

UNIT - IV: **(18 Hours)**

Laplace Transformation - Properties and Problems -
$L\,[e^{at} f\,(t)]$, $L\,[t^n f\,(t)]$, $L\,[e^{at}\, t\, f\,(t)]$, $L\,[f\,(t)/t]$.
Chapter 7, Section 7.1.1 to 7.1.4

UNIT - V: **(18 Hours)**

Inverse Laplace Transformation: - Solving Differential Equation using Laplace Transformation (excluding simultaneous equations).
Chapter 7, Section 7.2 to 7.3
Content and treatment as in Allied Mathematics Volume I and II by P. Duraipandian and S. Udayabaskaran, S. Chand Publications, 2016 Edition

REFERENCE BOOKS:

1. Allied Mathematics,A.Singaravelu.
2. Ancillary Mathematics, A. Manickavasagam Pillai andNarayanan.
3. Allied Mathematics, S.G. Venkatachalapathy, Margham Publications, 2016Edition
4. P.Kandasamy and K.Thilagavathi, Allied Mathematics Volume I and Volume II -- 2004, S.Chand and Co, NewDelhi.
5. Ancillary Mathematics Volume 1 and 2 by P.Balasubramanian & K.G. Subramanian, Tata McGraw Hill, New Delhi.

WEBSITES:

www.freetechbooks.com/mathematics-f38.htmlwww.e-booksdirectory.com
www.freebookcenre.net/SpecialCat/Free-Mathematics-Books-Download.html

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	No. of Questions	
		Theory	Problems
Section A	Unit – 1		2
	Unit – 2	1	1
	Unit – 3		3
	Unit – 4		3
	Unit – 5		2
Section B	Unit – 1		1
	Unit – 2		2
	Unit – 3		1
	Unit – 4		2
	Unit – 5		1
Section C	Unit – 1		1
	Unit – 2		1
	Unit – 3		2
	Unit – 4		1
	Unit -5		1

NON MAJOR ELECTIVE
PAPER TITLE: INTRODUCTION TO INFORMATION TECHNOLOGY
(From B.Sc. Computer Science)

SUBJECT CODE :	**THEORY**	**MARKS : 100**
SEMESTER: II	**CREDITS : 2**	**TOTAL HOURS : 30**

COURSE FRAMEWORK:

- *To introduce basics of software and hardware*
- *To impart knowledge on applications of Information Technology*

COURSE OUTCOME:

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

1. Understand the functions of computers, computer hardware and number systems.
2. Provide knowledge of computer software and operating system.
3. Discuss about basic concepts and terminology of information technology.
4. Understand the technologies used in networking and DBMS.
5. Acquire the knowledge of network security issues and its technologies.

Unit I:

Introduction to Computer: Digital and Analog Computers-Characteristics of Computer- **The Computer System Hardware:** Introduction-Central Processing Unit-Memory Unit-Control Unit-ALU-Input/Output Unit - Number Systems: Decimal, Binary, Octal and Hexa decimal – Conversion from decimal to binary, octal and hexadecimal and Vice-versa – ASCII and Unicode.

Unit II:

Computer Software: Introduction-Types of Software-System Software-Application Software-Software Acquisition. **Operating System:** Introduction-Objectives of Operating System-Types of OS-Functions of OS.

Unit III:

Information Technology - Applications of Information Technology**:** Computers in Science and Engineering and healthcare - Governance - Business and industry - Educations and Training – Entertainment.

Unit IV:

Data Communication and Computer Network: Importance of Networking-Data Transmission Media-Network Topology-Communication Protocol. **Fundamentals of Database:** Introduction-Database-Database System-Database Management System-Database Applications-Introduction to Data Warehousing-Data Mining-Big Data.

Unit V:

Network Security: Introduction-Security Threat and Security Attack-Malicious Software- -Security Mechanisms: Cryptography, Digital Signature, Firewall, Users Identification and Authentication- Security Awareness.

PRESCRIBED BOOKS:

1. Fundamentals of Information Technology - Alexis Leon, Mathews Leon.
2. V. Rajaraman, Introduction To Information Technology - PHI Learning Private Limited.
3. P. K. Sinha & Priti Sinha, 2017 - Computer Fundamentals, BPB Publications, 6th Edition.
4. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010

WEBSITES:

1. https://www.javatpoint.com/computer-fundamentals-tutorial
2. https://www.tutorialspoint.com/data_communication_computer_network/index.html
3. https://www.guru99.com/data-communication-computer-network-tutorial.html
4. https://www.youtube.com/watch?v=7BfdMKeLTj0
5. https://www.youtube.com/watch?v=dx1-_4tlJus

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 5 out of 10	1-10	20	100
TOTAL MARKS		**100**		

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	2	
	Unit – 2	2	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	

SOFT SKILLS – II
PAPER TITLE: LIFE SKILLS

SUBJECT CODE :	THEORY	MARKS: 100
SEMESTER: II	CREDITS: 3	NO. OF HOURS : 30

COURSE FRAMEWORK:

- To build the confidence of learners to face the challenges of a globalized society
- To sensitize learners' ethical, moral and social values in their work environment
- To help them understand how to overcome stress-related problems
- To train the learners to use their time effectively

SWOC Analysis
Etiquette
Stress ManagementTime
Management
Discussion of Success Stories

i. Auto-suggestions
ii. Problem solving
iii. Decision Making
iv. Presentation Skills-Oral/PPT

REFERENCE BOOKS:

1. Pease, Allen. 1998. Body Language: How to read other's thoughts by their gestures. Sudha Publications. New Delhi.
2. Powell. In Company. MacMillan

WEBLINKS:

1.http://www.essentiallifeskills.net//

CORE PAPER-V
PAPER TITLE: PROGRAMMING IN JAVA

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: III	**CREDITS: 4**	**TOTAL HOURS: 120**

COURSE FRAMEWORK:

- *To understand the importance of Classes & objects, in-built packages and thread.*
- *To provide knowledge in Applet programming and awt class.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Demonstrate object oriented programming through real time entities
2. Apply string buffer class to provide flexible memorymanagement
3. Create own packages and handle runtime errors by exception handler
4. Compare and analyze I/O streams and Utility Packages
5. Demonstrate GUI through AWT controls

UNIT I: **(24 Hours)**

Introduction to Java – Object Oriented Concepts – Java Tokens- Java Statements – Constants – Variables - Data Types - Type Casting – Operators – Expressions -Control Statements: Branching and Looping Statements.

UNIT II: **(24 Hours)**

Classes – Objects – Methods - Constructors – Overloading methods – Inheritance – Overriding methods – Finalizer and Abstract Methods-Visibility Control- Arrays– String Class — String Arrays – String Methods - String Buffer Class - Java Utility Classes: Wrapper-Vector-Calendar-Random

UNIT III: **(24 Hours)**

INTERFACES: Defining Interfaces-Extending Interfaces-Implementing Interfaces-Accessing Interfaces- Packages: Creating Packages- Accessing Packages – Importing Packages – Exception Handling throw and throws – Thread: Creating Threads-Stopping and Blocking a Thread-Life Cycle of a Thread-Using Thread Methods-Thread Priority-Synchronization- Implementing the Runnable Interface.

UNIT IV: **(24 Hours)**

INPUT / OUTPUT FILES: Concept of Streams-Stream Classes-Byte Stream Classes-Character Stream Classes –Using the File Class-Creation of Files- Applet Programming: Applet Life Cycle - **INTRODUCING THE AWT:** Working with Windows, Graphics: Drawing Lines, Drawing Rectangles, Drawing Ellipses and Circles, Drawing arcs and Drawing Polygons- Working with Text

UNIT V: **(24 Hours**)

AWT Classes- Working with Frames- Working with Color-Working with Fonts-Using AWT Controls: Labels - Button-Check Box-Radio Button-Choice-List – Scrollbars, Layout Managers: Flow Layout-Border Layout - Grid Layout - Card Layout - Grid bag Layout- Menu Bars and Menus –Dialog Boxes-Event Classes: The ActionEvent Class, The Focus Event Class and The

MouseEvent Class - Event Listener Interfaces: The ActionListener Interface, The FocusListener Interface and The MouseListener Interface.

PRESCRIBED BOOKS:

1. P.Naughton and H.Schildt - Java 2(The Complete Reference) – 2018, 10th Edition TMH
2. Programming with Java, - A Primer – E. Balaguruswamy, 5thEdition.

REFERENCE BOOKS

1. Ken Arnold,The Java Programming Language-Third Edition, Addison Wesley Longman , 2000
2. Ivan Bayross, HTMl Javascript, DHTML, and PHP, First Edition- 2015,Fourth Revised Edition: 2010
3. Sachin.B.Patil, FAQ‘s in Java, Mr.Purushothaman, 2011 Scitech Publications(India) Pvt .ltd
4. Programming in Java –C.Muthu
5. Cay S. Horstmann, Gary Cornell – Paper Java 2 Volume I – Fundamentals, 5th Edition. PhI, 2000.
6. K.Arnold and J.Gosling – The Java Programming Language – Second Edition Addison Wesley, 1996.

WEBSITES FOR REFERENCE:

1. http://www.vogella.com/tutorials/JavaIntroduction/article.html
2. http://www.math.hcmuns.edu.vn/~hvthao/courses/java_programming/lecture_notes/
3. https://www.javatpoint.com/java-tutorial.
4. https://beginnersbook.com/java-tutorial-for-beginners-with-examples/
5. https://www.tutorialspoint.com/java/index.htm
6. https://www.w3school.com
7. https://www.greeksforgreeks.com
8. https://goalkicker.com/JavaBook/
9. https://www.guru99.com
10. https://www.programiz.com

WEBSITES FOR ONLINE COURSE:

1. NPTEL & MOOC courses titled Java Programming
2. https://www.coursera.org/courses?query=java
3. https://alison.com/course/java-programming-for-complete-beginners

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
	TOTAL MARKS			**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	1	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	1	
	Unit -5	1	

CORE PAPER-VI
PAPER TITLE: PRACTICAL - PROGRAMMING IN JAVA LAB

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: III	**CREDITS: 4**	**TOTAL HOURS: 60**

COURSE FRAMEWORK:

- *To implement solutions to various I/O operations, Threads, Exceptions and String manipulations.*
- *To learn and practice applet programming and awt class to develop GUI based programming.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Revive basic programming like arithmetic operation and decision makingstatements
2. Apply object oriented concepts class and object
3. Demonstrate polymorphism through method overloading and methodoverriding
4. Create basic applet programs
5. Design web page by using different layouts and AWT controls

APPLICATION **(40 Hours)**

1. Calculate Simple and Compound Interest
2. Largest of 3numbers
3. To illustrate class and object
4. Determining the Order of Numbers Generated randomly using RandomClass.
5. Usage of Calendar Class and Manipulation.
6. To illustrate constructors
7. Method overloading
8. To illustrate inheritance
9. Method overriding
10. Packages
11. To illustrate Thread
12. To illustrate Exception handling

APPLET **(20 Hours)**

13. Generate various shapes using Applet
14. Point class manipulation
15. Draw a Human face
16. Program to create Checkbox, choice, Radio Button, Label and Textbox
17. Change Font and Color
18. Working with panel and all types of Layout.

COURSE COMPONENT: OPERATIONS RESEARCH WITH BIG DATA
(For B.Sc. Computer Science)

SUBJECT CODE:	**THEORY & PROBLEMS**	**MARKS: 100**
SEMESTER: III	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To give an overall idea about the various Optimization techniques and their usages.*
- *To give basic idea about Big Data Platform.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Identify and develop operation research models from the verbal description of the real system. Formulate the Linear Programming Problem. Evaluate the LPP using Graphical Method
2. Formulate LPP to Transportation problem, Evaluate the initial solution using North west corner method, Least cost method and Vogle's Approximation method
3. Demonstrate the method of sequencing problem by n jobs through 2 machines, n jobs through 3 machines
4. Use CPM and PERT techniques to plan, schedule and control project techniques
5. Analyze the Big Data framework like Hadoop and NOSQL to efficiently store and process Big Data to generate analytics.

UNIT I **(18 Hours)**

Basics of Operations Research (OR): Characteristics of OR - Necessity of OR in Industry -OR and Decision making - Role of Computers in OR Linear Programming: Formulations and Graphical solution (of 2 variables) Canonical & Standard terms of Linear Programming Problem. Algebraic Solution: Simplex Method.

(Chapters: 1.1 to 1.4, 2.1 to 2.28, 3.1 to 3.54, 4.1 to 4.31)

UNIT II **(18 Hours)**

Transportation Model: Definition - Formulation and Solution of Transportation Models - Row - Minima, Column - Minima, Matrix Minima and Vogel's Approximation Methods. Assignment Model: Definition of Assignment Model - Comparison with Transportation Model - Formulation and Solution of Assignment Model - Variations of Assignment Problem. (Chapters: 10.1 to 10.73, 11.1 to 11.60)

UNIT III **(18 Hours)**

Sequencing Problem: Processing each of N Jobs through M Machines - Processing N Jobs through 2 Machines - Processing N Jobs through 3 Machines - Processing 2 Jobs through M Machines - Processing N Jobs through M Machines - Travelling Salesman Problem. Game Theory: Characteristics of Games - Maxmin, Minmax Criteria of Optimality - Dominance Property - Algebraic and Graphical Method of Solution of Solving 2 X 2 Games. (Chapters: 12.1 to 12.66, 15.1 to 15.52)

UNIT IV **(18 Hours)**

PERT – CPM: Project Network Diagram – Critical Path (Crashing excluded) – PERT Computation. (Chapters: 14.1 to 14.78)

UNIT V **(18 Hours)**

Big Data: Introduction – Big Data Glossary: Batch Processing, Cluster Computing, Data Warehouse, Data Lake, Data Mining, Hadoop, In-memory Computing, Machine Learning, Map Reduce, NoSQL, Stream Processing- Characteristics of Big Data – Solution based approaches for data – Big data Environment Setup-HDFS-MapReduce.

RECOMMENDED TEXTS

1. V.Sundaresan, K.S.Ganapathy Subramanian, K.Ganesan – Resource Management Techniques (OperationsResearch).
2. Introduction to Operations Research, P.R.Vittal Gupta P.K. and HiraD.S.Problems in Operations Research, S.Chand&Co.
3. Big Data Architects Handbook,Syed Muhammad FahadAkhta.

REFERENCE BOOKS

1. KantiSwaroop, Gupta P.K. and Manmohan – Problems in Operations Research, Sultan Chand &Sons.
2. Ravidran A., Philips,D.T. and Solberg J.J.,Operations Research, John Wiley &sons.
3. Taha H.A., Operations Research, Macmillian Publishing company,Newyork.

WEBSITES FOR REFERENCE:

1. https://www.tutorialspoint.com/big_data_analytics/index.htm
2. https://www.tutorialspoint.com/hadoop/hadoop_big_data_overview.htm

WEBSITES FOR ONLINE COURSE:-

1. https://www.edx.org/course/operations-research-an-active-approach
2. SWAYAM & MOOC courses titled Operation research.
3. https://alison.com/course/diploma-in-operations-management-ops
4. https://www.udemy.com/course/operations-management/

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
	TOTAL MARKS			**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	No. of Questions	
		Theory	Problems
Section A	Unit - 1	1	1
	Unit - 2	1	1
	Unit - 3	1	1
	Unit - 4	1	2
	Unit - 5	1	2
Section B	Unit - 1		1
	Unit - 2		2
	Unit - 3		2
	Unit - 4		1
	Unit - 5		1
Section C	Unit - 1		1
	Unit - 2		1
	Unit - 3		1
	Unit - 4		2
	Unit - 5		1

SOFT SKILLS – III

PAPER TITLE: JOB-ORIENTED SKILLS

SUBJECT CODE :	**THEORY**	**MARKS: 100**
SEMESTER: III	**CREDITS: 3**	**NO. OF HOURS : 30**

COURSE FRAMEWORK:

- To prepare the students to be job-ready.
- To help learners use English Language appropriately to the role or situation.
- To develop confidence in them to face Interviews.
- To train them to prepare their own CV/Resume

Different kinds of Interviews

Letter of Application and CV

Technical Writing - Circulars, Memos, Agenda and Minutes

Group Discussion

Review

i. Books
ii. Films

REFERENCE BOOKS:

1. Harishankar, Bharathi. ed. Essentials of Spoken and Presentation Skills. University of Madras.
2. John, Seely. 1998. The Oxford Guide to writing and speaking. Oxford U P, 1998, Delhi.
3. The Princeton Language Institute and Lanny Laskowski.2001. 10 days to more confident Public Speaking. Warner Books.
4. http://jobsearch.about.com/cs/curriculumvitae.html.//
5. http://www.cvtips.com//

QUESTION PAPER PATTERN

UG - SOFT SKILLS

TIME – 3 HRS **MAXIMUM MARKS – 50**

PART – A (5X2=10)

Answer any FIVE from the questions given below from Q.No.1 to Q.No.7 (5 out of 7)

PART – B (4X5=20)

Answer any FOUR from the questions given below from Q.No.8 to Q.No.13 (4 out of 6)

PART – C (2X10=20)

Answer TWO questions only choosing one each from Q.No.14 &Q.No.15 (Internal Choice)

CORE PAPER-VII
PAPER TITLE: VB.NET PROGRAMMING AND DATABASE MANAGEMENT SYSTEMS

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: IV	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To impart UI design and access to back end using various VB objects.*
- *To emphasize the significance of Database Design and Normalization and to familiarize the concepts of Transaction Processing, Concurrency Control, Query Processing and Optimization.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Design and construct application using elements in .net framework
2. Determine decision structure and iterations
3. Create an vb.net program using functions, menus and toolbars
4. Build vb.net program using MDI form
5. Illustrate vb.net program with database connection

UNIT I: **(18 Hours)**

VISUAL BASIC .NET AND THE .NET FRAMEWORK: Introduction to .net framework -Features, Common Language Runtime (CLR) ,Framework Class Library(FCL).Visual Studio.Net – IDE, Languages Supported, Components. Visual Programming, VB.net- Features, IDE- Menu System, Toolbars, Code Designer, Solution Explorer, Object Browser, Toolbox, Class View Window, Properties Window, Server Explorer, Task List, Output Window, Command Window.

Elements of Visual Basic.net -Properties, Events and Methods of Form, Label, TextBox, ListBox, Combo Box, RadioButton, Button, Check Box, Progress Bar, Date Time Picker, Calendar, Picture Box,HScrollbar, VScrollBar, Group Box, ToolTip,Timer

UNIT II: **(18 Hours)**

PROGRAMMING IN VISUAL BASIC .NET: Data Types, Keywords, Declaring Variables and Constants, Operators, Understanding Scope and accessibility of variables, Conditional Statements- If- Then, If-Then-Else, Nested If, Select Case, and Looping Statement- Do loop, For Loop, For Each-Next Loop, While Loop, Arrays- Static and Dynamic.

FUNCTIONS, BUILT-IN DIALOG BOXES, MENUS AND TOOLBAR: Menus and toolbars- Menu Strip, Tool Strip, Status Strip, Built-In Dialog Boxes –Open File Dialogs, Save File Dialogs, Font Dialogs, Color Dialogs, Print Dialogs, InputBox, Msg Box, Interfacing With End user.

UNIT III: **(18 Hours)**

Creating MDI Parent and Child, Functions and Procedures- Built-In Functions- Mathematical and String Functions, User Defined Functionsand Procedures.

INTRODUCTION TO DATABASE MANAGEMENT SYSTEMS:

Introduction – Databases and Application Development – **Components of Database Management System:** Database Engine – Data Dictionary – Query Processor – Report Writer – Forms Generator – Application Generator – Communication and Integration – Security and other Utilities.

ADVANTAGES OF THE DBMS APPROACH: Focus on Data – Data Independence - Data Independence and Client/Server Systems. Brief history of DBMS: Hierarchical – Network - Relational and Object-Oriented Databases. The Feasibility Study: Costs – Benefits.

UNIT IV: (18 Hours)

DATABASE DESIGN AND DATA NORMALIZATION:

DATABASE DESIGN: Introduction **–** Identifying user requirements – Business objects – Tables and Relationships – Definitions – Primary key. **Class Diagrams:** Classes and Entities – Associations and Relationships – Class Diagram Details. **Datatypes (Domains/Objects):** Text – Numbers – Dates and Times – Binary Objects – Computed Values – User-Defined Types – Events. **DATA NORMALIZATION:** Introduction – Tables, Classed, and Keys – Relational Database – Primary Key – Composite Keys - Surrogate Keys – Sample Database for a Video Store – First Normal Form: Repeating groups – Nested Repeating groups. Second Normal Form: Problems with 1NF – 2NF Definition – Dependence. Third Normal Form: Problems with 2NF – Definition – Checking work with Non – Redundancy. Beyond 3NF: Boyce-Codd Normal Form – Fourth Normal Form – Domain-Key Normal Form. Data Rules and Integrity – Converting a class diagrams to Normalized tables: one-to-many, Many-to-many, N-ary Associations, Generalization, Composition, Reflexive associations. Data Dictionary: DBMS Table Definition – Data Volume and Usage.

UNIT V: (18 Hours)

QUERIES AND SUB QUERIES:

DATA QUERIES: Introduction – Three Tasks of a Query Language – Four Questions to Retrieve data – Query Basics: Single Tables – Introduction to SQL – Sorting Output – Distinct – Criteria – Boolean Algebra – DeMorgan's Law – WHERE Clauses. Computations: Basic Arithmetic Operators – Aggregation – Functions. Subtotals and GROUPBY: HAVING (Conditions on totals) – WHERE versus HAVING. Multiple Tables: Joining Tables – Identifying Columns in Different tables – Joining many tables – Table Alias – Create View.

ADVANCED QUERIES AND SUB QUERIES: Introduction – Sub Queries: Calculations – Sub queries and sets of data – Subquery with ANY and ALL – Subtraction: NOT IN – OUTER JOINS – SQL SELECT, UNION, INTESECT, EXCEPT – Multiple JOIN columns – Reflexive Join CASE Function – Inequality Joins – Questions with "Every" need the EXISTS – Clause – SQL Data Definition Commands – SQL Data Manipulation Commands: INSERT, DELETE, UPDATE – Quality: Testing Queries.

PRESCRIBED BOOKS

1. Visual Basic.Net Black Book by Steven HolznerDreamtech Press The Complete Reference. 1st Edition.
2. G. V. Post – Database Management Systems Designing and Building Business Application – McGraw Hill International edition – 3rd Edition.

REFERENCE BOOKS

1. Visual Basic .NET Jeffery R. Shapiro Tata McGraw HillsReferenceBooks:Murach's
2. Beginning Visual basic .Net By Anne Bohem
3. R. Ramakrishanan, J. Gehrke, Database Management Systems 3rd Edition, McGraw-Hill, 2002.
4. A. Silberschatz, H.F. Korth, S. Sudarshan, Database System Concepts 6th Edition, McGraw Hill, 2010.
5. R. Elmasri, S.B. Navathe Database Systems Models, Languages, Design and application Programming, 6th Edition, Pearson Education, 2013.
6. Raghu Ramakrishnan – Database Management Systems – WCB/McGraw Hill – 1998.

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
	TOTAL MARKS			**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit - 5	1	

CORE PAPER-VIII

PAPER TITLE: PRACTICAL - RDBMS withVB.NET LAB

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: IV	**CREDITS:** 4	**TOTAL HOURS: 60**

COURSE FRAMEWORK:

- *Design, formulate, and construct simple applications with VB.NET, assemble multiple forms, modules, and menus into working VB.NET solutions.*
- *Translate general requirements into data-related solutions using database concepts.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Explain the concept of click event and change event
2. Create a web form using tools
3. Demonstrate calculation, input validation using compare validator, request field validator
4. Discuss variables, hyperlink and methods
5. Design and build vb.net program to connect database

(15 Hours)

1. Create a button-click option to display a label
2. Create mouse move over to change button color
3. Create list box to display the selected item cost in web form. Create another label to display the total cost
4. Create a VB.NET program to calculate Boiling point of water using Compare Validator

(15 Hours)

5. Create a VB.NET program for User input name validation using Required Field Validator
6. Create a VB.NET program Checking the appropriate values using Validation button
7. Create a VB.NET program for Feedback form
8. Create a VB.NET for displaying the images with clear option
9. Creating a file holding variables, hyperlinks with lock & unlock methods

(30 Hours)

Oracle /MS-Access

For the following programs, create a database and perform the required operations given below:

i. Display a message when connection established with Database
ii. Create a table in Master Database
iii. Updating the fields of a table in Database
iv. Selecting the rows from a table in Database
v. Retrieving the Result in Dataset & Checkbox List by selecting afield
vi. Bind the dataset to a Radio button list with different forms
vii. Create a Table header fields in the form of drop downlist
viii. Use a Menu Driven Program:
   a. Insertion
   b. Deletion
   c. Modification
   d. Generate simple reports using queries.

10. Telephone directory maintenance.
11. Payroll.
12. Invoice System.
13. Mark sheet Processing.
14. Inventory System.
15. Library information system

COURSE COMPONENT: STATISTICAL METHODS AND THEIR APPLICATIONS
(For B.Sc. Computer Science)

SUBJECT CODE:	**THEORY& PROBLEMS**	**MARKS: 100**
SEMESTER: IV	**CREDITS: 3**	**TOTAL HOURS :60**

COURSE FRAMEWORK:

- *To introduce basic concepts of Statistics and computing statistical aspects.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Evaluate the Measures of Central tendency – Mean, median and mode for the given data and find the measure of Dispersion - Range, Quartile Deviation, Mean Deviation , Standard Deviation
2. Convert real-world problems into probability models. Discuss the concepts of probability, conditional probability and Baye's theorem and its applications.
3. Evaluate correlation between two variables and identify its types. Formulate the simple linear regression equation for a set of data.
4. Discuss the test of significance based on t, chi-square and F distributions with respect to mean and variance.
5. Prepare ANOVA table. Designs of experiments carry them out and analyze the data theyyield.

UNIT-I: **(12 Hours)**

Measures of location – Arithmetic Mean, Median, Mode, Geometric Mean, Harmonic Mean,
- Measures of Dispersion -- Range, Mean Deviation, Quartile Deviation, Standard deviation.
Chapter 7 & 8 (Volume I)

UNIT-II: **(12 Hours)**

Correlation -Types of Correlation-Scatter diagram –Karl Pearsons Coefficient of Correlation-
Rank Correlation Coefficient- Regression Lines
Chapter 10 & 11 (Volume I)

UNIT-III: **(12 Hours)**

Probability of an Event – Addition and Multiplication theorems – Baye‘s theorem.
Chapter 1 (Volume II)

UNIT-IV: **(12 Hours)**

Test of Significance based on t, Chi-Square and F-distributions with respect to Mean and Variance.
Chapter 3, 4 & 5 (Volume II)

UNIT-V: **(12 Hours)**

Analysis of Variance – One way and Two Way Classification – Analysis of CRD, RBD –
Latin Square Designs
Chapter 5 & 6 (Volume II)

Content and treatment as in

Statistical Methods by S P.Gupta(Sultan Chand & Sons) Revised edition 2009

REFERENCE BOOKS:

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - SultanChand
2. Wilks, S.S.: Elementary Statistical Analysis - Oxford and IBH
3. Snedecor, G.W., & Cochran, W.G.(1967): Statistical Methods, Oxford andIBH
4. Prentice Hall 4. Statistical Methods - Dr. S.P. Gupta - Sultan Chand &Sons

WEBSITES:

1. www.e-booksdirectory.com
2. www.bookboon.com/en/statistics-andmathematics-ebooks
3. www.freebookcentre.net

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
	TOTAL MARKS			**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	No. of Questions	
		Theory	Problems
Section A	Unit – 1		3
	Unit – 2	1	1
	Unit – 3	1	2
	Unit – 4	1	1
	Unit – 5	1	1
Section B	Unit – 1		1
	Unit – 2		1
	Unit – 3		2
	Unit – 4		2
	Unit – 5		1
Section C	Unit – 1		2
	Unit – 2		1
	Unit – 3		1
	Unit – 4		1
	Unit - 5		1

COURSE COMPONENT: STATISTICAL METHODS AND THEIR APPLICATIONS PRACTICAL

SUBJECT CODE:	PRACTICALS	MARKS: 100
SEMESTER: IV	CREDITS: 2	TOTAL HOURS: 30

COURSE FRAMEWORK:

- *To understand and implement various concepts of statistics methods to solve real life problems.*

COURSE OUTCOME:

1. Compute univariate and bivariate frequency distribution with samples of size not proceeding 200
2. Create the Diagrammatic and graphical representation of data using Simple bar diagram, Multiple bar diagram, sub-divided bar diagram, Deviation bar diagram, Histogram and Pie diagram, Cumulative frequency curve and Lorenz curves.
3. Compute various measures of location, dispersion, moments, skewness and kurtosis
4. Compare two variables using correlation and regression lines.
5. Discuss the test of significance based on t, chi-square and F distributions with respect to mean and variance.

1. Construction of univariate and bivariate frequency distribution with samples of size not proceeding200.
2. Diagrammatic and graphical representation of various statisticaldata and frequency distributions.
3. Cumulative frequency curve and Lorenz curves.
4. Computation of various measures of location, dispersion, moments, skewness and kurtosis.
5. Curve fitting by the method of least squares.
   (i) $y = ax + b$; *(ii)* $y = ax^2 + bx + C$; *(iii)* $y = ae^{bx}$ *(iv)* $y = ax^b$
6. Computation of correlation coefficients - regression lines (raw data and grouped data) – correlation coefficients,
7. Exact test based on t, Chi-square, and F distributions with regard to mean, variance and correlation coefficients.
8. Analysis of variance – one way and two wayclassification,CRD,RBD

Content and treatment as in
Statistical Methods by S P.Gupta(Sultan Chand & Sons) Revised edition 2009

REFERENCE BOOKS:

1. Statistical and Numerical Methods by P.R.Vittal and V. Malini
2. Mode, E.B.: Elements of Statistics - Prentice Hall Wilks, S.S.: Elementary Statistical Analysis - Oxford and IBH Snedecor, G.W., & Cochran, W.G.: Statistical Methods, Oxford and IBH Simpson and Kafka: Basic Statistic
3. Burr, I.W.: Applied Statistical Methods, Academic Press.
   Croxton, FE. and Cowden, D.J.: Applied General Statistics, Prentice Hall
   Ostleo, B.: Statistics in Research, Oxford & IBH.
4. Sydney Siegel- Non-parametric Methods for Behavioural Sciences.
5. Daniel, W W- Biostatistics.

SOFT SKILLS – IV

PAPER TITLE: QUANTITATIVE APTITUDE

SUBJECT CODE :	**THEORY**	**MARKS: 100**
SEMESTER: IV	**CREDITS: 3**	**NO. OF HOURS : 30**

COURSE FRAMEWORK:

- To develop knowledge on Aptitude Concepts

UNIT I **(6 hours)**

Divisibility – HCF and LCM – Decimal Fractions – Square roots and Cube Roots – Logarithms – Antilogrithms.

UNIT II **(6 hours)**

Averages – Percentage – Profit and Loss - Ratio and Proposition – Partnership – Alligation and mixture.

UNIT III **(6 hours)**

Time and work – Pipes and Cistern – Time and Distance – Boats and Streams.

UNIT IV **(6 hours)**

Simple Interest – Compound Interest – Stocks and Shares – True Discount – Banker's discount.

UNIT V **(6 hours)**

Area – Volume and surface Areas – Heights and Distances – Data Interpretation : Tabulation – Bar Graphs – Pie Charts – Line Graphs.

REFERENCE BOOKS:

1. R.S. Aggarwal, Objective Arithmetic , S. Chand & Company, New Delhi , 2005
2. Govind Prasad Singh and Rakesh Kumar, Text Book of Quickest Mathematics (for all Competitive Examinations), Kiran Prakashan, 2012
3. R.S. Aggarwal, Quantitative Aptitude, S. Chand & Company, New Delhi, 2012

PAPER TITLE - ENVIRONMENTAL STUDIES

SUBJECT CODE:	**THEORY**	**MARKS: 100**
SEMESTER: IV	**CREDITS: 2**	**TOTAL HOURS: 30**

COURSE FRAMEWORK:

- This course introduces the concepts of Environmental Studies.

COURSE OUTCOME:

On completion of the course the students will be able

1. To know the importance of environmental studies and methods of conservation of natural resources.
2. To describe the structure and function of an ecosystem.
3. To identify the values and conservation of bio-diversity.
4. To explain the causes, effects and control measures of various types of pollutions.
5. To select the appropriate methods for waste management.

UNIT-1:

The Multidisciplinary nature of environmental studies Definition; Scope and importance, Need for public awareness.

UNIT-2:

Natural Resources: Renewable and non-renewable resources: Natural resources and associated problems.

a) Forest resources: Use and Over-exploitation, deforestation, case studies. Timber extraction, mining, dams and their effects on forests and tribal people.

b) Water resources: Use and over-utilization of surface and ground water, floods, drought, conflicts over water dams benefits and problems.

c) Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies.

d) Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

e) Energy resources: Growing energy needs, renewable and non-renewable energy sources, use of alternate energy sources, Case studies.

f) Land resources: Land as a resource, land degradation, man induced landslides, soil erosion and desertification. - Role of an individual in conservation of natural resources. - Equitable use of resources for sustainable lifestyles.

UNIT-3:

Ecosystems - Concept of an ecosystem. - Structure and function of an ecosystem. - Producers, consumers and decomposers. - Energy flow in the ecosystem.

- Ecological succession. - Food chains, food webs and ecological pyramids. - Introduction, types, characteristic features, structure and function of the following ecosystem: -

a. Forest ecosystem

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

UNIT-4:

Biodiversity and its Conservation

- Introduction-Definition: genetic, species and ecosystem diversity.
- Biogeographical classification of India.
- Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values.
- Biodiversity at global, National and local levels.
- India as a mega-diversity nation.
- Hot-spots of biodiversity.
- Threats to biodiversity: habital loss, poaching of wildlife, man-wildlifeconflicts.
- Endangered and endemic species of India.
- Conservation of biodiversity: In-situ and Ex-situ conservation ofbiodiversity.

UNIT-5: Environmental Pollution: Definition - Causes, effects and control measures of: -

a. Air pollution
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

- Solid waste Management: Causes, effects and control measures of urban and industrial wastes. - Role of an individual in prevention of pollution. - Pollution case studies. - Disaster management: floods, earthquake, cyclone and landslides.

CORE PAPER-IX
PAPER TITLE: OPERATING SYSTEMS

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: V	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To have an in-depth understanding of process concepts, scheduling algorithms, deadlock and memory management.*
- *Students will familiarize on the general structure of an operating system and case study is also provided.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Demonstrate how operating system acts as user interface and various types of Operatingsystems
2. Identify components of operating system and their functions
3. Discuss various process management concepts like scheduling
4. Illustrate concurrent processing , mutual exclusionand synchronizations and Deadlock
5. Elucidate Memory management techniques like paging, segmentation, demand paging

UNIT I: **(18 Hours)**

Introduction: Views –Goals – OS Structure –Components – Services - System Design and Implementation. Process Management: Process - Process Scheduling – Cooperating Process – Threads – Inter process Communication.

UNIT II: **(18 Hours)**

CPU Scheduling: CPU Schedulers – Scheduling criteria – Scheduling Algorithms - Process Synchronization: Critical-Section problem - Synchronization Hardware – Semaphores – Classic Problems of Synchronization – Critical Region.

UNIT III: **(18 Hours)**

Deadlock: Characterization – Methods for handling Deadlocks – Prevention, Avoidance, and Detection of Deadlock - Recovery from deadlock. Secondary Storage Structures: Protection – Goals- Domain Access matrix.

UNIT IV: **(18 Hours)**

Memory Management: Address Binding – Dynamic Loading and Linking – Overlays – Logical and Physical Address Space - Contiguous Allocation – Internal & External Fragmentation. Non Contiguous Allocation: Paging and Segmentation schemes – Implementation – Sharing - Fragmentation.

UNIT V: **(18 Hours)**

Virtual Memory**:** Demand Paging – Page Replacement - Page Replacement Algorithms – Thrashing. – File System: Concepts – Access methods – Directory Structure –Protection Consistency Semantics – File System Structures – Allocation methods – Free Space Management.

PRESCRIBED BOOKS:
1. Silberschatz A., Galvin P.B., Gange,.2012, Operating System Principles, Tenth Edition, John Wiley &Sons.

REFERENCE BOOKS:
1. H.M. Deitel ,2004, An Introduction to Operating System,- Third Edition, Addison Wesley Pearson Publication

WEBSITES FOR REFERENCES:
1. https://www.geeksforgeeks.org/types-of-operating-systems/
2. https://www.tutorialspoint.com/operating_system/index.htm
3. http://www.ics.uci.edu/~ics143/lectures.html
4. http://williamstallings.com/Extras/OS-Notes/notes.h

WEBSITES FOR ONLINE COURSES:
1. https://www.coursera.org/courses?query=operating%20system
2. https://alison.com/course/introduction-to-operating-systems
3. Swayam& MOOC courses titled Operating system

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	2	
	Unit – 2	3	
	Unit – 3	3	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	1	
	Unit – 5	1	

CORE PAPER-X
PAPER TITLE: DIGITAL LOGIC AND COMPUTER ARCHITECTURE

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: V	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *This course gives knowledge about various basic digital gates used in digital system and to develop and construct logical circuits using logic gates, combinational and Sequential circuits.*
- *To acquaint students with the basic concepts of functional components, architecture, register organization and performance metrics of a computer.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Evaluate Number systems and number system conversion
2. Demonstrate the structure, function and characteristics of computer systems
3. Identify the elements of instruction sets, registers and its types
4. Elucidate various levels of memory hierarchy and stack organization
5. Discuss about the approach of micro programmed control codes

UNIT I: **(18 Hours)**

Binary Systems & Code conversion, Boolean Algebra & Logic Gates – Truth Tables – Universal Gates – Simplification of Boolean functions: K-map, – Combinational Logic: Adders & Subtractors.

UNIT II: **(18 Hours)**

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

UNIT III: **(18 Hours)**

Basic Computer Organization and Design: Computer registers, bus system, instruction set, timing and control, instruction cycle, memory reference, input-output and interrupt.

UNIT IV: **(18 Hours)**

Central Processing Unit: Register organization arithmetic and logical micro-operations, stack organization, micro programmed control codes, machine language, assembly language, input output programming.

UNIT V: **(18 Hours)**

Input-output Organization: Peripheral devices, I/O interface, Modes of data transfer, direct memory access.

PRESCRIBED BOOKS:

1. M. Morris Mano, 2014, 4th Edition, Digital Logic and Computer Design, Prentice-Hall of India Pvt. Ltd.
2. M. Mano, Computer System Architecture, Pearson Education 2007, 3rd Edition.

REFERENCE BOOKS:

1. W. Stallings, Computer Organization and Architecture Designing for Performance, 8th Edition, Prentice Hall of India, 2009

2. A. J. Dos Reis, Assembly Language and Computer Architecture using C++ and JAVA, Course Technology, 2004
3. V. Vijayendran, 2004, Digital Fundamentals, S. Viswanathan (Printers & Publishers) Pvt. Ltd

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
	TOTAL MARKS			**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	No. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit - 5	1	

CORE PAPER-XI
PAPER TITLE: PROGRAMMING IN PYTHON

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: V	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To introduce object-oriented programming using an easy-to-use language.*
- *To use iterators and generators, lists, tuples, and dictionaries in Python programs.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Use if-else statements and switch-case statements to write programs in Python to tackle any decision-making scenario
2. Explain store and retrieve information using variables
3. Apply how to write loops and decision statements in Python
4. Identify how to use lists, tuples, and dictionaries in Python programs
5. Determine how to use exception handling in Python applications for errorhandling

UNIT I **(18 Hours)**

Introduction: Introduction to Python, Python Variables, Expressions, Statements: Variables, Keywords, Operators & Operands, Expressions, Statements, Order of Operations, String Operations, Comments, Keyboard Input. Functions: Type Conversion function, Math functions, Composition of Functions, Defining own function, Parameters, Arguments, Importing Functions.

UNIT II **(18 Hours)**

Conditions & Iterations: Conditions, Modulus Operator, Boolean Expression, Logical Operators, if, if-else, if-elif-else, nested conditions. Iteration while, for, break, continue, Nestedloop.

UNIT III **(18 Hours)**

Recursion: Python recursion, Recursion error. Strings: Accessing values in String, Updating String, Slicing String, String Methods – upper(), find(), lower(), capitalize(), count(), join(), len(), isalnum(), isalpha(), isdigit(), islower(), isnumeric(), isspace(), isupper() max(), min(), replace(), split().

UNIT IV **(18 Hours)**

Structures & Functions: List: Introduction, Traversal, Operations, Slice, Methods, Delete element, Difference between Lists and Strings. Dictionaries: Introduction, Brief idea of Dictionaries & Lists. Tuples: Introduction, Brief idea of Lists & Tuples, Brief idea of Dictionaries & Tuples**.** Date & Time, Modules, Defining Functions, Exit function, Default arguments.

UNIT V **(18 Hours)**

Classes & Objects: Creating class, Instance objects, Accessing attributes, Built in class attributes, destroying objects, Inheritance, Method overriding, Overloading methods, Overloading operators, Data hiding. Exceptions in Python, Detecting and Handling Exceptions, Exceptions as Strings, Raising Exceptions, Assertions, Standard Exceptions.

PRESCRIBED BOOKS

1. Allen Downey, Jeffrey Elkner, Chris Meyers, ―How to Think Like a Computer Scientist – Learning with Python, Green Tea Press,2008.

REFERENCE BOOKS:

1. JohnV.Guttag, ―Introduction to Computation and Programming using Python‖, Prentice Hall of India, 2014.
2. Mark Lutz, ―Learning Python: Powerful Object-Oriented Programming, Fifth Edition, O_Reilly, Shroff Publishers and Distributors, 2013.

WEBSITES FOR REFERENCES:

1. http://interactivepython.org/courselib/static/pythonds
2. http://www.ibiblio.org/g2swap/byteofpython/read/
3. http://www.diveintopython3.net/
4. http://greenteapress.com/wp/think-python-2e/

WEBSITES FOR ONLINE COURSES:

1. NPTEL & MOOC courses titled Python programming
2. http://spoken-tutorial.org/tutorial-search/?search_foss=Python&search_language=English
3. http://docs.python.org/3/tutorial/index.html

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	1	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	1	
	Unit – 3	2	
	Unit – 4	1	
	Unit – 5	1	

CORE PAPER- XII
PAPER TITLE: PRACTICAL – PYTHON PROGRAMMING LAB

SUBJECT CODE :	**PRACTICAL**	**MARKS 100**
SEMESTER: V	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To learn and understand python looping, control statements and string manipulations.*
- *To acquire programming skills and Object-Oriented Skills in core Python.*

COURSE OUTCOME:

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

1. Acquire programming skills in core Python
2. Acquire Object Oriented Skills in Python
3. Develop the skill of designing Graphical user Interfaces in Python
4. Develop the ability to write database applications in Python
5. Develop cost-effective robust applications using the latest Python trends and technologies

(18 Hours)

1. Write a python program to convert the given temperature from Fahrenheit to Celsius and vice versa depending upon user's choice.
2. Write a Python program to calculate total marks, percentage and grade of a student. Marks obtained in each of the three subjects are to be input by the user. Assign grades according to the following criteria:
   Grade A: Percentage >=80
   Grade B: Percentage>=70 and <80
   Grade C: Percentage>=60 and <70
   Grade D: Percentage>=40 and <60
   Grade E: Percentage<40
3. Write a program to sum all the elements from n1 to n2 where n1 and n2 are positiveintegers.

(18 Hours)

4. Input an array of n numbers and find separately the sum of positive numbers and negative numbers.
5. Write a program to print sum and multiply twomatrices.
6. Write a program to find the roots of a quadratic equation

(18 Hours)

7. Write a Python Program to check whether the given string is palindrome or not using built in string manipulation methods.
8. Write a Python Program to read a word and prints the number of letters, vowels and percentage of vowels in the word using dictionary
9. Write a Python Program to check a given sentence is a pangram or not using function/ Module.

(18 Hours)

10. Write a python program, using user-defined functions to find the area of rectangle, square, circle and triangle by accepting suitable input parameters from user.
11. Write a python program to display the first n terms of Fibonacci series.
12. Write a python program to find sum of the following series for n terms: 1 – 2/2!+3/3! n/n!
13. Write an Object oriented Python program to create two Time objects: current Time, which contains the current time; and breadTime, which contains the amount of time it takes for a

bread maker to make bread. Then we'll use addTime to figure out when the bread will be done. Write the printTime function to display the time when the bread will be done by the breadmaker.

(18 Hours)

14. Write a python program to illustrate list
15. Write a python program to illustrate exception handling

ELECTIVE-I (INTER DISCIPLINARY)
(Offered to other departments)
PAPER TITLE: PRACTICAL - INTERNET AND ITS APPLICATIONS LAB

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: V	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To understand and design simple websites using the basic HTML tags, TABLE tags, FRAMES and forms.*
- *To provide the students with the basic knowledge of World Wide Web, Web Browsers to develop websites, creating E-mails, Sending and receiving mails.*

COURSE OUTCOME:

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

1. Design webpage with different text formats
2. Demonstrate web pages with background and foreground images
3. Build web pages with tables
4. Design applications to view more than one web page in a single window using frametag
5. Create Simple websites

UNIT I: **(9 Hours)**

Introduction to Computers: Programming Language types History of Internet Personal Computers History of World Wide Web

UNIT II: **(9 Hours)**

Web Browsers -Internet Explorer - connecting to Internet Features of Internet explorer- Searching the Internet -online help and tutorials-File Transmission Protocol (FTP) Browser settings.

UNIT III: **(9 Hours)**

Attaching a file, Electronic mail creating an E-mail id sending and Receiving mails attaching a file- Instance messaging - other web browsers.

UNIT IV: **(9 Hours)**

Introduction to HTML Tags for Document structure (HTML, Head, and Body Tag). Headings paragraph(<p> tag) – Font style elements: (bold, italic, strike, font) - line breaks- headers - Linking- Images- lists – table – Frames – Forms : Input

UNIT V: **(9 Hours)**

E-marketing consumer tracking Electronic advertising search engine-CRM-credit card payments Digital cash and e-wallets micro payments-smart card

PRESCRIBED BOOKS:

1 1. Internet and World Wide Web Third edition H.M.Deitel, P.J. Deitel and A.B.Goldberg- PHI

REFERENCE BOOKS:

1 1. The Internet -Complete Reference Harley Hahn, Tata McGrawHill

PRACTICAL

1. To illustrate body and pre tags **(15 Hours)**

2. Create an HTML document with the following formatting options:
   a. Bold
   b. Italics
   c. Underline
   d. Headings (Using H1 to H6 heading styles)
   e. Font (Type, Size and Color)
3. Create a webpage to demonstrate font variation.
4. To illustrate Ordered list tag
5. To illustrate unordered list tag **(15 Hours)**
6. To illustrate image tag
7. Write a program to set background image using body tag.
8. Create an HTML document which implements Internal linking as well as external linking.
9. To illustrate Table tag
10. To illustrate frame tag

(15 Hours)

11. Create a form using HTML which has the following types of controls:
    I. Text Box
    II. Option/radio buttons
    III. Check boxes
    IV. Reset and Submit buttons
12. Creating e-mail id, sending and receiving mail with attachment, CC,BC
13. Design mark sheet using HTMLtags.

(15 Hours)

14. Create Guru Nanak College Website using HTML tags
15. Design a website to submit your resume.

PAPER TITLE - VALUE EDUCATION

SUBJECT CODE:	**THEORY**	**MARKS: 100**
SEMESTER: V	**CREDITS: 2**	**TOTAL HOURS: 15**

COURSE FRAMEWORK:

- *To teach and inculcate the importance of value based living.*
- *To give students a deeper understanding about the purpose of life.*

COURSE OUTCOME:

On completion of the course the students will be able

1. To inculcate the value system in their real life scenarios.
2. To implement the role of culture and civilization, roles and responsibilities in the society.
3. To effectively follow Salient values for life such as forgiveness, ability to sacrifice, self -esteem, teamwork and creative thinking.
4. To reflect the human rights, social values and welfare of the citizen.
5. To consider the relation between values and personal behavior affecting the achievement of a sustainable future.

UNIT 1: EDUCATION AND VALUES

Definition, Concept, Classification, Theory, Criteria and Sources of values Aims and objectives of value education Role and Need for value education in the contemporary society, Role of education in transformation of values in society Role of parents, teachers, society, peer group and mass media in fostering values

UNIT 2: VALUE EDUCATION AND PERSONAL DEVELOPMENT

Human Values: Truthfulness, Sacrifice, Sincerity, Self-Control, Altruism, Scientific Vision, relevancy of human values to good life. Character Formation towards Positive Personality

Modern challenges of adolescents: emotions and behavior Self-analysis and introspection: sensitization towards gender equality, differently abled, Respect for - age, experience, maturity, family members, neighbors, strangers, etc.

UNIT 3: HUMAN RIGHTS AND MARGINALIZED PEOPLE

Concept of Human Rights – Principles of human rights – human rights and Indian constitution – Rights of Women and children – violence against women – Rights of marginalized People – like women, children, minorities, transgender, differently abled etc.

Social Issues and Communal Harmony Social issues – causes and magnitude - alcoholism, drug addiction, poverty, unemployment – communal harmony –concept –religion and its place in public domain –secular civil society

UNIT 4: VALUE EDUCATION TOWARDS NATIONAL AND GLOBAL DEVELOPMENT

Constitutional Values :(Sovereign, Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom, Fraternity)

Social Values: (Pity and Probity, Self-Control, Universal Brotherhood).

Professional Values :(Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality, Faith).

Religious and Moral Values: (Tolerance, Wisdom, character).

Aesthetic Values: (Love and Appreciation of literature, fine arts)

Environmental Ethical Values

National Integration and international understanding.

Need of Humanistic value for espousing peace in society. Conflict of cross-cultural influences, cross-border education

UNIT 5:

Guru Nanak Devji's Teachings
Relevance of Guru Nanak Devji's teachings' relevance to Modern Society
The Guru Granth sahib
The five Ks
Values and beliefs
Rights and freedom (Right of equality, Right to Education, Right to Justice, Rights of women, Freedom of religion, Freedom of culture, Freedom of assembly, Freedom of speech)
Empowerment of women
Concept of Langar
Eminent Sikhpersonalities

REFERENCES BOOKS:

1. Dr.AbdulKalam. My Journey-Transforming Dreams into Actions. Rupa Publications, 2013.
2. Steven R Covey, 8th Habit of Effective People (From Effectiveness to Greatness), Free Press, NewYork, 2005.
3. Prem Singh, G.J. (2004). 'Towards Value Based Education', University News. Vol. 42 (45): P.11-12.
4. V.R. Krishna Iyer. Dialectics & Dynamics of Human Rights in India (Tagore Law Lectures) The Yesterday, Today and Tomorrow, Eastern Law Ho use (1999, Reprint 2018)
5. http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf

CORE PAPER- XIII
PAPER TITLE: SOFTWARE ENGINEERING

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To impart knowledge of basic Software engineering methods and practices*
- *A general understanding of software development models such as the waterfall and cost estimation techniques, design, implementation and maintenance of software products.*

COURSE OUTCOME:

On completion of the course the students will be able

1. Plan the development process through software life cyclemodels
2. Predict and estimate software cost
3. Compare and select software design techniques
4. Fix and review milestones, walkthrough andinspection
5. Implement the software as per standards and guidelines

UNIT I: **(18 Hours)**

Introduction to Software Engineering Some definition – Some size factors – Quality and productivity factors – Managerial issue. Planning a Software Project: Defining the problem – Developing a solution strategy – planning the development process – planning an organization structure – other planning activities.

UNIT II: **(18 Hours)**

Software Cost Estimation: Software – Cost factors – Software cost estimation techniques – specification techniques – level estimation – estimating software maintenance costs. The software requirements specification – formal specification techniques- languages and processors for requirementsspecification.

UNIT III: **(18 Hours)**

Software Design: Fundamental Design concepts – Modules and modularizing Criteria – Design Notations – Design Techniques – Detailed Design Consideration – Real time and distributed system design – Test plan – Mile stones walk through and inspection.

UNIT IV: **(18 Hours)**

Implementation issues: Structured Coding techniques – coding style – standards and guidelines – documentation guidelines – type checking – scooping rules – concurrency mechanisms.

UNIT V: **(18 Hours)**

Quality assurance – walk through and inspection - Static analysis – symbolic exception – Unit testing and Debugging – System testing – Formal verification: Enhancing maintainability during development -Managerial aspects of software maintenance -Configuration management – source code metrics – other maintenance tools andtechniques.

PRESCRIBED BOOKS:

1. Richard E.Fairly - Software Engineering Concepts, 5th Edition - Tata McGraw-Hill book Company.

REFERENCE BOOKS:

1. Richard E.Fairley, Software EngineeringConcepts,McGraw-Hill,1985
2. Ian Sommerville, Software Engineering-10thEdition,Pearson,2015
3. Roger S.Pressman, Software Engineering: A Practitioner‘s Approach-9th Edition, McGraw-Hill,2019
4. R.S.Pressman, 1997, Software Engineering – 1997 - Fourth Ed., McGrawHill.
5. RajibMall, 2014, Fundamentals of Software Engineering, 4th Edition, PHI.

WEBSITES FOR REFERENCES:

1. https://www.tutorialspoint.com/software_engineering/index.htm
2. http://www.vssut.ac.in/lecture_notes/lecture1428551142.pdf
3. http://people.cs.missouri.edu/~duanye/cs4320/lectures.htm
4. http://iiscs.wssu.edu/drupal/node/4566

WEBSITES FOR ONLINE COURSES:

1. https://www.udemy.com/courses/development/software-engineering/
2. https://www.onlinestudies.com/Courses/Software-Engineering/
3. https://www.simplilearn.com/software-engineer-masters-program-certification-training-course

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	

CORE PAPER-XIV
PAPER TITLE: WEB PROGRAMMING WITH PHP AND MYSQL

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 4**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *Creating, Reading and writing cookies, sessions.*
- *Learn different ways of connecting to MySQL through PHP, and how to create tables, enter data, select data, change data, and delete data. Connect to SQL Server and other data sources.*

COURSE OUTCOME:

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

1. Demonstrate the way arrays are handled in PHP
2. Create user defined functions with PHP
3. Explain sessions and cookies
4. Identify My SQL tools
5. Connect My SQL with PHP, process result set queries

UNIT I Introduction: (18 Hours)

Introduction- open source – PHP — history- features –variables- statements- operators – conditional statements – if – switch – nesting conditions – merging forms with conditional statements – loops – while –do – for loop iteration with break and continue.

UNIT II Arrays and Functions: (18 Hours)

Arrays: Creating an array- modifying array – processing array – grouping form with arrays – using array functions – creating user defined functions – using files – PHP server variables – Working with Date and Time – Performing Mathematical Operations- Working With String Functions

UNIT III (18 Hours)

Working with Forms: Introduction of Forms – Form Elements: Text box – Text Area – Password – Radio Button – Check box – The Combo Box – Hidden Field – Submit and Reset Buttons – Adding elements to a form – Uploading Files to the web server using PHP.

UNIT IV (18 Hours)

Regular Expression: Regular Expression Functions- Sessions – cookies – executing external programs – creating sample applications using PHP.

My SQL:

Effectiveness of MYSQL – MYSQL Tools – Pre-requisites for MYSQL connection – Databases and tables – MYSQL data types

UNIT V PHP with MYSQL: (18 Hours)

Working MYSQL with PHP – Database Connectivity – usage of MYSQL with PHP commands, processing result sets of queries – handling errors – debugging and diagnostic functions – Validating user input through Database layer and Application layer – formatting query output with Character, Numeric, Date and Time – sample Database Application.

PRESCRIBED BOOKS:

1. VIKRAMVASWANI,–PHP and MySQL‖, Tata McGraw-Hill, 2007
2. BENFORTA , –MySQL Crashcourse‖ SAMS, 2006, 2nd Edition
3. C.J.DATE, –An Introduction to Database Systems‖, Pearson, 8th Edition, 2003
4. Ramesh Elmasriand ShamkantB.Navathe, –fundamentals of Database Systems‖, Pearson Education, 7th Edition,2015

REFERENCE BOOKS:

1. Tim Converse, Joyce Park and Clark Morgan, –PHP5 and MySQL‖, Wiley India, 2008.
2. Robert Sheldon, GeoffMoes,–BeginningMySQL‖, Wrox, 2005.
3. Steve Suehring, Tim Converseand Joyce Park, –PHP6 and MySQL‖, Wiley India, 2009.

WEBSITE FOR REFERENCES:

1. http://www.w3programmers.com/professional-web-development-with-php-mysql/
2. https://www.mysqltutorial.org/
3. https://www.tutorialspoint.com/mysql/index.htm
4. https://www.w3schools.com/php/
5. https://www.phptpoint.com/php-tutorial-pdf/
6. http://www.xmlsoftware.com/

WEBSITES FOR ONLINE COURSES:

1. https://www.edureka.co/php-mysql-self-paced
2. https://www.coursesforsuccess.com/products/introduction-to-php-and-mysql-online-course
3. NPTEL & MOOC courses entitled PHP ANDMYSQL.

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit – 5	1	

CORE PAPER-XV

PAPER TITLE: PRACTICAL - WEB PROGRAMMING WITH PHP AND MYSQL LAB

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: VI	**CREDITS: 4**	**TOTAL MARKS: 90**

COURSE FRAMEWORK:

- *Understand how server-side programming works on the web using PHP scripts*
- *How MySQL can be used with programming languages like PHP to create dynamic websites for visitors.*

COURSE OUTCOME:

On completion of the course the students will be able

1. Design simple web page using PHP
2. Create Sessions and Cookies
3. Demonstrate simple application to Validate input
4. Use aggregate functions
5. Demonstrate connecting My-SQL with PHP

(30 Hours)

1. Creating simple webpage using PHP
2. Use of conditional statements in PHP
3. Use of looping statements in PHP
4. Creating different types of arrays

(30 Hours)

5. File manipulation using PHP
6. Creation of sessions
7. Creation of cookies
8. Creating simple applications using PHP with input validations
9. Creating simple table with constraints
10. Insertion, Updating and Deletion of rows in MYSQL

(30 Hours)

11. Searching of data by different criteria
12. Sorting of data
13. Demonstration of joining tables
14. Usage of aggregate functions
15. Database connectivity in PHP with MYSQL

ELECTIVE- II
PAPER TITLE: DATA COMMUNICATION AND NETWORKING

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *Demonstrate understanding about various data communication transmission media, interface and Modulation techniques.*
- *To understand the various protocols, topologies, layers and configurations.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Explain the concepts of Network Topology and OSI reference models
2. Discuss the concepts of error correction and error detection
3. Analyze the concepts of Multiplexing and Telephone Systems
4. Evaluate the concept of routing algorithms and client/server architecture
5. Illustrate the concepts of Security and types of attacks and the authentication codes

UNIT I: **(18 Hours**)

Introduction to Data Communication, Network, Protocols and Standards - Line Configuration- Topology - Transmission mode - Classification of Network - OSI Model - Layers of OSIModel.

UNIT II: **(18 Hours)**

Parallel and Serial Transmission - DTE/DCE/such as EIA-449, EIA-530, EIA-202 and x.21 interface - Interface standards - Modems - Guided Media - Unguided Media - Performance - Types of Error - Error Detection - Error Corrections.

UNIT III: **(18 Hours)**

Multiplexing - Types of Multiplexing - Multiplexing Application - Telephone system - Project 802 - Ethernet - Token Bus - Token Ring - FDDI - IEEE 802.6 - SMDS - Circuit Switching - Packet Switching - Message switching - Connection Oriented and Connectionless services.

UNIT IV: **(18 Hours)**

Repeaters - Bridges - Routers - Gateway - Routing algorithms: Distance Vector, link State, path vector Routing, Multicast Routing - TCP/IP Network, Transport Layer of TCP/IP: TCP, TCP Services, TCP Features - Application Layers of TCP/IP:Namespace, DNS, Distribution of Namespace, Dns in the Internet, Resolution , DNS messages, Types of Records, Registers, Dynamics DNS, Encapsulation- World Wide Web: Architecture, Client, Server,URL, Cookies. Web document: Static Document, Dynamic Document, activeDocument.

UNIT V: **(18 Hours)**

Computer Security Concepts-Security Attacks: Active Attacks, Passive Attacks -Message authentication Codes: message Authentication Requirements, Message Authentication Functions Requirements for message Authentication codes-Electronic mail Security: s/MIME, Domain Keys

Identified Mail- IP Security: IP Security Overview, IP Security Policy, Encapsulating Security payload, Combining Security Associations, Internet key Exchange, Cryptographic suits- Firewalls: The Need for Firewalls, Firewall Characteristics, Types of Firewalls, Firewalls Basing, Firewall Location and Configuration.

PRESCRIBED BOOKS

1. Behrouz and Forouzan, 2017, Introduction to Data Communication and Networking, 5th Edition, TMH.
2. William Stallings, Cryptography and Network Security -8th Edition,PHI.
3. Cryptography and Network Security (UPTU), V.S.Bagad, I.A.Dhotre, Technical Publications.

REFERENCE BOOKS:

1. Jean Walrand 1998, Communication Networks (A first Course), Second Edition, WCB/TMH.
2. Behrouz and Forouzan, 2006, Data Communication and Networking, 3rd Edition, TMH.
3. Bruce, Schneider, Applied Cryptography, 2nd Edition , Toha Wiley &Sons,1996.
4. DougalsR.Stinson, Cryptography- Theory and Practice ,CRCPress,1995

WEBSITES FOR REFERENCES:

1. https://www.tutorialspoint.com/data_communication_computer_network/index.html
2. http://examradar.com/communication-networking-summary-1/
3. https://www.guru99.com/data-communication-computer-network-tutorial.html

WEBSITES FOR ONLINE COURSES:

1. SWAYAM courses entitled Computer Networking.
2. MOOC courses entitled Networking
3. https://www.coursera.org/learn/data-communication-network-services
4. NPTEL courses entitled Data communication and networking.
5. https://alison.com/course/diploma-in-computer-networking-revised

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit – 5		

ELECTIVE II
PAPER TITLE: DATA MINING

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To clean data and to check for missing data.*
- *To understand the concept of clustering and classification.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Demonstrate advanced knowledge of data mining concepts and techniques
2. Identify appropriate data mining algorithms to solve real world problem
3. Compare and evaluate data mining techniques like classification, prediction, clustering and association rule mining.
4. Explain the analyzing techniques of various data
5. Evaluate various mining techniques on complex data objects

UNIT I: **(18 Hours)**

Introduction: Data mining – Functionalities – Classification – Introduction to Data Warehousing – Data Preprocessing: Preprocessing the Data – Data cleaning – Data Integration and Transformation – Data Reduction

UNIT II: **(18 Hours)**

Data Mining, Primitives, Languages and System Architecture: Data Mining – Primitives – Data Mining Query Language, Architectures of Data mining Systems. Concept Description, Characterization and Comparison: Concept Description, Data Generalization and Summarization, Analytical Characterization, Mining Class Comparison – Statistical Measures.

UNIT III: **(18 Hours)**

Mining Association Rules: Basics Concepts – Single Dimensional Boolean Association Rules from Transaction Databases, Multilevel Association Rules from transaction databases – Multi dimension Association Rules from Relational Database and Data Warehouses.

UNIT IV: **(18 Hours)**

Classification and Prediction: Introduction – Issues – Decision Tree Induction – Bayesian Classification – Classification of Back Propagation. Classification based on Concepts from Association Rule Mining – Other Methods. Prediction – Introduction – Classifier Accuracy.

UNIT V: **(18 Hours)**

Cluster Analysis: Introduction – Types of Data in Cluster Analysis, Petitioning Methods – Hierarchical Methods Density Based Methods – GRID Based Method – Model based Clustering Method.

PRESCRIBED BOOKS

1. J.Han and M. Kamber, 2012,3rd Edition, Data Mining Concepts and Techniques, Harcourt India Pvt. Ltd - NewDelhi.

REFERENCE BOOKS

1. K.P. Soman, ShyamDiwakar, V.Ajay, 2006, Insight into Data Mining Theory and Practice, Prentice Hall of India Pvt. Ltd – New Delhi.

WEBSITES FOR REFERENCES:

1. http://www.academicpress.com
2. http://www.mkp.com
3. https://www.tutorialspoint.com/data_mining/index.htm
4. http://www.lastnightstudy.com/Show?id=37/Data-Mining-Functionalities

WEBSITES FOR ONLINE COURSES:

1. https://www.coursera.org/courses?query=data%20mining
2. https://www.edx.org/learn/data-mining
3. https://alison.com/course/data-analytics-mining-and-analysis-of-big-data
4. https://www.futurelearn.com/programs/data-mining

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	

ELECTIVE II
PAPER TITLE: SOFTWARE TESTING

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To test the work products such as requirements, design and code.*
- *To validate if the test object is complete and works as per the expectation of the user.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Analyze various testing methods like white box, black box testing and integratedtesting
2. Compare various testing methodologies such as system acceptance testing, performance testing and regression testing
3. Analyze usability and accessibility of testing organizational structure of testing teams
4. Demonstrate the steps involved in planning, managing , executing and reportingtest
5. Analyze and compare testing metrics

UNIT I: **(18 Hours)**
Principles of Testing – Software Development Life Cycle Models.

UNIT II: **(18 Hours)**
White Box Testing – Black Box testing – Integration Testing.

UNIT III: **(18 Hours)**
System and Acceptance Testing – Performance Testing – Regression Testing.

UNIT IV: **(18 Hours)**
Testing Object-Oriented Systems – Usability and Accessibility Testing Organization structures for Testing Teams.

UNIT V: **(18 Hours)**
Test Planning, Management, Execution, and Reporting – Software Test Automation – Test Metrics and Measurements.

PRESCRIBED BOOKS:
Software Testing Principles and Practices, Srinivasan Desikan& Ramesh Gopalswamy, Pearson Education.2009 Edition.

REFERENCE BOOKS:
Software Testing Technique-Beizer Boris, Dreamtech.

WEBSITES FOR REFERENCES:

1. https://www.geeksforgeeks.org/software-testing-basics/
2. https://www.tutorialspoint.com/software_testing/index.htm
3. http://www.inf.ed.ac.uk/teaching/courses/st/2011-12/Resource-folder/

WEBSITES FOR ONLINE COURSES:

1. https://www.coursera.org/courses?query=software+testing
2. https://www.udemy.com/courses/development/software-testing/
3. https://testinginstitute.com/
4. NPTEL & MOOC courses entitled SOFTWARE TESTING

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	

ELECTIVE II
PAPER TITLE: DATA SCIENCE

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To analyze how to collect, clean and prepare a data and explain the method of summarizing the data.*
- *To evaluate the data science findings.*

COURSE OUTCOME:

On completion of the course, the students will able to

1. Demonstrate the tools in data science
2. Explain data type, control structure and functions
3. Analyze how to collect, clean and prepare a data
4. Explain the method of summarizing the data
5. Evaluate the data science findings

UNIT I: **(18 Hours)**

Data Scientist‘s Tool Box: Turning data into actionable knowledge, introduction to the tools that will be used in building data analysis software: version control, markdown, git, GitHub, R, and RStudio.

UNIT II: **(18 Hours)**

R Programming Basics: Overview of R, R data types and objects, reading and writing data, Control structures, functions, scoping rules, dates and times, Loop functions, debugging tools, Simulation, code profiling.

UNIT III: **(18 Hours)**

Getting and Cleaning Data: Obtaining data from the web, from APIs, from databases and from colleagues in various formats. Basics of data cleaning and making data ―tidy‖.

UNIT IV: **(18 Hours)**

Exploratory Data Analysis: Essential exploratory techniques for summarizing data, applied before formal modeling commences, eliminating or sharpening potential hypotheses about the world that can be addressed by the data, common multivariate statistical techniques used to 45 visualize high-dimensional data.

UNIT V: **(18 Hours)**

Reproducible Research: Concepts and tools behind reporting modern data analyses in a reproducible manner, to write a document using R markdown, integrate live R code into a literate statistical program, compile R markdown documents using knitr and related tools, and organize a data analysis so that it is reproducible and accessible to others

PRESCRIBED BOOKS:

1. RACHEL SCHUTT, Cathy O'Neil, "Doing Data Science: Straight Talk from the Frontiline" by Schroff/O'Reilly, 2013. 1st Edition Kindleedition.
2. Foster Provost, Tom Fawcett, "Data Science for Business" What You Need to Know About

Data Mining and Data-Analytic Thinking" by O'Reilly, 2013.1st edition, kindle edition

REFERENCE BOOKS:

1. John W. Foreman, "Data Smart: Using data Science to Transform Information into Insight" by John Wiley & Sons,2013.
2. Ian Ayres, "Super Crunchers: Why Thinking-by-Numbers Is the New Way to Be Smart" Ist Edition by Bantam,2007.
3. Eric Seigel, "Predictive Analytics: The Power to Predict who Will Click, Buy, Lie, or Die", 1st Edition, by Wiley,2013.
4. Matthew A. Russel, "Mining the Social Web: Data mining Facebook, Twitter, Linkedln, Goole+, GitHub, and More", Second Edition, by O'Reilly Media,2013.
5. RogerPeng, -The ArtofData Science‖,lulu.com2016.
6. MurtazaHaider,-GettingStartedwithDataScience–MakingSenseofDatawithAnalytics‖,IBM press,E-book.
7. DavyCielen,ArnoD.B.Meysman,MohamedAli,―IntroducingDataScience:BigData,Machine Learning, and More, Using Python Tools‖, Dreamtech Press2016.
8. AnnalynNg,KennethSoo,-Numsense!DataScienceforthe Layman:NoMathAdded‖,2017,1stEdition.
9. Cathy O'Neil, Rachel Schutt, -Doing Data Science Straight Talk from the Frontline‖,O'Reilly Media2013.
10. Lillian Pierson, -Data Science for Dummies‖, 2017, 2nd Edition.

WEBSITES FOR REFERENCES:

1. https://www.javatpoint.com/data-science
2. https://www.guru99.com/data-science-tutorial.html

WEBSITES FOR ONLINE COURSES:

1. https://www.coursera.org/browse/data-science
2. https://www.edx.org/course/subject/data-science
3. https://www.datasciencetech.institute/online-masters-level-data-science-ai/?gclid=EAIaIQobChMIr8fapruK6QIVzRiPCh3PzwYNEAAYAiAAEgKMLvD_BwE
4. https://alison.com/courses/data-science
5. http://www.openculture.com/free-online-data-science-courses

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	

ELECTIVE II
PAPER TITLE: CLOUD COMPUTING

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To analyse the components of cloud computing and its business perspective.*
- *To evaluate the various cloud development tools and to collaborate with real time cloudservices.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Describe the overall organization of data and storage
2. Explain the concept of cloud computing
3. Analyze the trade-offs between deploying application in the cloud and over the local infrastructure
4. Compare the advantages and disadvantages of various cloud computing platforms
5. Analyze the performance of scalability and availability in the underlying cloud technologies and software

UNIT I: **(18 Hours)**

Beyond the Desktop: Introduction to the Cloud Computing - Are you ready for computing the Cloud? -Developing Cloud Services.

UNIT II: **(18 Hours)**

Cloud Computing for Everyone- Cloud Computing for the Family- Cloud Computing for the Community- Cloud Computing for the Corporation.

UNIT III: **(18 Hours)**

Using cloud Services: Collaborating on Calendars, Schedules, and Task Management - Collaborating on Event Management -Collaborating on Contact Management -Collaborating on Project Management.

UNIT IV: **(18 Hours)**

Using cloud Services: Collaborating on Word -Collaborating on Spreadsheets-Collaborating on Presentations: Preparing Presentations Online-Evaluating Web-Based Presentation Applications.

UNIT V: **(18 Hours)**

Using cloud Services: Collaborating on Databases- Storing and Sharing files and other online content: Understanding Cloud storage- Evaluating Online File Storage and Sharing Services.

PRESCRIBED BOOKS:

1. Michael Miller, ‒Cloud Computing‖, Pearson Education Inc, 1st Edition, 2008
2. Ricardo Puttini, Thomas Erl, and Zaigham Mahmood,‖ Cloud Computing: Concepts, Technology & Architecture‖, Prentice Hall, 2013, 1st Edition.

REFERENCE BOOKS:

1. Rajkumar Buyya & Co., ‒Cloud Computing Principles and Paradigms‖,John Wiley & Sons Publications,2011.

2. Ray Rafaels,Cloud Computing: From Beginning to End,2018.
3. Arshdeep BahgaandVijay Madisetti,―*Cloud Computing–A Handson Approach*‖, Universities Press (India) Pvt Ltd.2014.

WEBSITES FOR REFERENCES:

1. https://www.tutorialspoint.com/cloud_computing/index.htm
2. https://www.w3schools.in/cloud-computing/cloud-computing/
3. https://www.tutorialride.com/cloud-computing/cloud-computing-tutorial.htm

WEBSITES FOR ONLINE COURSES:

1. https://www.coursera.org/browse/information-technology/cloud-computing
2. https://alison.com/course/introduction-to-mobile-and-cloud-computing
3. https://cloudacademy.com/product/courses/
4. https://www.simplilearn.com/cloud-computing/

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	

ELECTIVE III
PAPER TITLE: FUNDAMENTALS OF MULTIMEDIA

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *This course will expose students to the theoretical and fundamental concepts of multimedia, its applications and the techniques involved.*
- *Understand the building blocks of Multimedia such as text, audio, animation, image and video.*

COURSE OUTCOME:

On completion of the course the students will be able to

1. Explore the different roles, skill sets, jobs and equipment associated with the development of digital media.
2. Examine the processes involved in producing content to meet a specific communication goal toward a target audience
3. Identify and describe the function of the general skill sets in the multimedia industry
4. Identify the basic components of a multimedia project
5. Identify the basic hardware and software requirements for multimedia development andplayback

UNIT I: **(18 Hours**)

Multimedia Definition: CDROM and the Multimedia High Way, Where to use Multimedia – Introduction to Making Multimedia: The stages of a Project – Where you need – Hardware – Software – Creativity - Organization - Multimedia Skills: The Team – Project Manager - Multimedia Designer - Interface Designer – Writer - Video Specialist - Audio Specialist - Multimedia Programmer - Producer of Multimedia for the Web.

UNIT II: (**18 Hours)**

Multimedia Hardware and Software: Macintosh and Windows production Platform, Basic Software Tools: Text Editing and Word Processing Tool – OGR Software – Painting and Drawing Tools – 3-D Modeling and Animation Tools – Image-Editing tools – Sound Editing Tools – Animation, Video and Digital Movie Tools - Multimedia Authoring Tools: Making Instant Multimedia

UNIT III: **(18 Hours)**

Multimedia Building Blocks: Text – About Fonts and Faces, Using Text in Multimedia – Sound: The Power of Sound – Digital Audio – Making Digital Audio Files – MIDI Audio – MIDI Vs Digital Audio – Multimedia System Sounds – Audio File Formats.

UNIT IV: **(18 Hours)**

Images: Making Still Images – Color – Animation: The Power of Motion – Principles of Animation – Animation by Computer – Video: Using video – How video Works and Is Displayed-Digital Video Containers – Shooting and Editing Video.

UNIT V: **(18 Hours)**

Multimedia and Internet: Internet History – Internetworking – Multimedia on the Web - Designing for the World Wide Web: Developing for the web – Text for the Web – Images for the Web – Sound for the Web – Animation for the Web – Video for the Web.

PRESCRIBED BOOKS:

1. Tay Vaughan, Multimedia making it with, 9th Edition, Tata McGraw Hill, 2017.
2. Fundamentals of Multimedia, Ze-Nian Li, Mark S. Drew, Jiangchuan Liu. 2nd Edition.

WEBSITES FOR REFERENCES:

1. https://www.tutorialspoint.com/basics_of_computer_science/basics_of_computer_science_multimedia.htm
2. https://jianhua.cis.k.hosei.ac.jp/course/mm/Lecture_Note.html
3. https://www.elsevier.com/books/introduction-to-multimedia-systems/mitra/978-0-08-092478-

WEBSITES FOR ONLINE COURSES:

1. https://www.admecindia.co.in/online-training-courses-multimedia
2. http://www.webster.edu/communications/academics/electronic-photographic-media/fundamentals-multimedia-production.html
3. https://learndigital.withgoogle.com/digitalunlocked/courses
4. MOOC courses entitled MULTIMEDIA.

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL MARKS				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit - 5	1	

ELECTIVE III
PAPER TITLE: ANDROID APPLICATION DEVELOPMENT PRACTICAL

SUBJECT CODE:	**PRACTICAL**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *To study platforms and toolkits for fast development of modern Android applications.*
- *To provide skills to develop applications on mobile platform and deploying software to mobile devices.*

COURSE OUTCOME:

On completion of the course the students will be able

1. Install and configure Android application development tools
2. Design and develop user Interfaces for the Android platform
3. Design and develop user Interface with view displaying pictures and menus
4. Explain data persistence
5. Develop android service and public android application

UNIT I: **(18 Hours)**

Getting Started with Android Programming - Using Eclipse for Android Development - Using Android Emulator.

Exercises:

1. Exploring the Eclipse, Exploring Emulator
2. Styles, Themes and Progress Dialog
3. Linking Activities with Intent

UNIT II: **(18 Hours)**

Activities, Fragments and Intents - Getting to know the Android User Interface.

Exercises:

4. Fragments: Adding Fragments Dynamically, Communication Between Fragments
5. Intent Filters
6. Adding Categories, Displaying Notifications On Status Bar
7. View Groups: Linear Layout, Absolute Layout, Table Layout, Relative Layout, Frame Layout, Scroll View, Action Bar
8. Creating User Interface Programmatically 6.Registering Events for Views

UNIT III: **(18 Hours)**

Designing your User Interface with Views - Displaying pictures and menus with Views.

Exercises:

9. Basic Views: Handling View Events, Text View, Buttons, Progress Bar View, Auto Complete Text View
10. Views: Picker View, List View, Spinner View, Image View, Grid View, Web View
11. Specialized Fragments: List Fragment, Dialog Fragment, Preference Fragment
12. Menus with Views

UNIT IV: **(18 Hours)**

Data Persistence - Working with Audio and Video - Content Providers.

Exercises:

13. Saving and loading user preferences
14. Persisting Data to files
15. Creating and using databases
16. Audio and Video
17. Sharing Data using Content providers

UNIT V: **(18 Hours)**

Messaging - Developing Android Services - Publishing Android Applications.

Exercises:

18. SMS Messaging
19. Getting feedback after sending a message
20. Sending Email
21. Creating a Simple Service
22. Running repeated tasks using the timer class
23. Establishing communication between a service and activity

PRESCRIBED BOOKS:

1. Lee Wei-Meng, 2012,"Beginning Android 4 Application Development", Wiley India

REFERENCE BOOKS:

1. CinarOnur , "Android Apps with Eclipse", 2012,Apress, Springer(India) Private Limited.
2. Meier Reto, "Professional Android 2 Application Development", 2010,WileyIndia.

WEBSITE FOR REFERENCES:

1. http://deveIoper.android.com/training/basics/firstapp/index.html
2. www.vogella.com/articles/Android/article.html
3. www.coreservelets.com/antIroid-tutorial/
4. www.edumobile.org/android/category/android-beginner-tutorial/
5. www.edureka.in/blog/catcgory/androicI/android-development-tutorial/

ELECTIVE III
PAPER TITLE: ARTIFICIAL INTELLIGENCE

SUBJECT CODE:	**THEORY**	**MARKS 100**
SEMESTER: VI	**CREDITS: 5**	**TOTAL HOURS: 90**

COURSE FRAMEWORK:

- *Become familiar with basic principles of AI toward problem solving, inference, perception, knowledge representation, and learning.*
- *To conceptualize the basic ideas and techniques underlying the design of intelligent systems.*

COURSE OUTCOME:

On completion of the course the students will be able

1. Demonstrate knowledge of building blocks of AI as presented in terms of intelligent agents
2. Analyze and formulize the problem as a state space, graph and game based techniques to solvethem
3. Critique intelligent algorithms for constrain satisfaction problems and also design intelligent systems for game playing
4. Attain the capability to represent various real life problem domains
5. Apply concept of Natural language processing to problems leading to understanding of cognitive computing

UNIT I: (18 Hours)

Introduction: Introduction to Artificial Intelligence, Background and Applications, Turing Test and Rational Agent approaches to AI, Introduction to Intelligent Agents, their structure, behavior and environment.

UNIT II: (18 Hours)

Problem Solving and Searching Techniques: Problem Characteristics, Production Systems, Control Strategies, Breadth First Search, Depth First Search, Hill climbing and its Variations, Heuristics Search Techniques: Best First Search, A* algorithm, Constraint Satisfaction Problem, Means-End Analysis, Introduction to Game Playing, Min-Max and Alpha-Beta pruning algorithms.

UNIT III: (18 Hours)

Knowledge Representation: Introduction to First Order Predicate Logic, Resolution Principle, Unification, Semantic Nets, Conceptual Dependencies, Frames, and Scripts, Production Rules, Conceptual Graphs. Programming in Logic (PROLOG)

UNIT IV: (18 Hours)

Dealing with Uncertainty and Inconsistencies: Truth Maintenance System, Default Reasoning, Probabilistic Reasoning, Bayesian Probabilistic Inference, Possible World Representations.

UNIT V: (18 Hours)

Understanding Natural Languages: Parsing Techniques, Context-Free and Transformational Grammars, Recursive and Augmented Transition Nets.

PRESCRIBED BOOKS:

1. DAN.W. Patterson, Introduction to A.I and Expert Systems – PHI, 2015, 3rd Edition
2. Stuart Russell & Peter Norvig, Artificial Intelligence-A Modern Approach, LPE, Pearson Prentice Hall, 2016, 3rd Edition.

REFERENCE BOOKS:

1. Rich & Knight, Artificial Intelligence – Tata McGraw Hill, 2nd edition,1991.
2. W.F. Clocksin and Mellish, Programming in PROLOG, Narosa Publishing House, 3rd edition, 2001.
3. Ivan Bratko, Prolog Programming for Artificial Intelligence, Addison-Wesley, Pearson Education, 3rd edition,2001.

WEBSITES FOR REFERENCES:-

1. https://www.tutorialspoint.com/artificial_intelligence/index.htm
2. https://www.guru99.com/artificial-intelligence-tutorial.html

WEBSITES FOR ONLINE COURSE:

1. https://www.coursera.org/courses?query=artificial%20intelligence
2. https://www.edx.org/learn/artificial-intelligence
3. https://www.forbes.com/sites/bernardmarr/2018/04/16/the-6-best-free-online-artificial-intelligence-courses-for-2018/#20fbd5ef59d7
4. https://learndigital.withgoogle.com/digitalunlocked/courses
5. MOOC courses entitled Artificial Intelligence

QUESTION PAPER PATTERN:

Section	Question Component	Numbers	Marks	Total
A	Answer any 10 out of 12	1-12	3	30
B	Answer any 5 out of 7	13-19	6	30
C	Answer any 4 out of 6	20-25	10	40
TOTAL				**100**

DISTRIBUTION OF QUESTIONS:

Sections	Units	NO. of Questions	
		Theory	Problems
Section A	Unit – 1	3	
	Unit – 2	3	
	Unit – 3	2	
	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	2	
	Unit – 5	1	
Section C	Unit – 1	1	
	Unit – 2	2	
	Unit – 3	1	
	Unit – 4	1	
	Unit -5	1	