

GURU NANAK COLLEGE (AUTONOMOUS)

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

Guru Nanak Salai, Velachery, Chennai – 600042.



B.Sc. Information Technology

(SEMESTER PATTERN WITH CHOICE BASED CREDIT SYSTEM)

Syllabus

(For the candidates admitted in the Academic year 2022-23 and thereafter)

PREAMBLE

B.Sc. (INFORMATION TECHNOLOGY) is a systematically designed three-year programme that prepares the student for a career in IT Industry. The B.Sc. (IT) program develops requisite professional skills and problem-solving abilities for pursuing a career in Software Industry. The main objective of this B.Sc. (IT) program is to inculcate among the students, the technical as well as the theoretical knowledge about the computers and its various applications in different fields. This programme is designed in such a way that students can have a detailed knowledge of subjects as well as the knowledge of IT related applications. Throughout this program the students will go through the IT scenario, its scope, career and the essentials of the IT world. The courses offered in the IT Program aims to focus on enabling the students to familiarize with the new technologies, and at the same time enhance and strengthen the fundamental knowledge in Computer Applications, Mathematics, and Statistics.

LEARNING OUTCOME BASED CURRICULUM FRAMEWORK

From the Academic Year 2022-23 and thereafter

VISION

To provide an outstanding IC T education for our students and enable them to be leaders with successful careers in industry, academia and government

MISSION

- The future of students is driven by their aspirations and not bound by their Circumstances.
- The IT course will nurture creativity, lateral thinking and Problem-solving skills.
- To train young minds into industry ready professionals.
- Up – Knowledging Up - skilling

PROGRAMME OUTCOME **B.Sc. INFORMATION TECHNOLOGY**

PO1: Develop appropriate skill set, analytical abilities, and construct computer-based solutions for real life problems.

PO2: Solve problems in Big Data Concepts by Evaluating current real-world scenarios and use appropriate techniques.

PO3: Employ techniques, skills, and modern hardware and software tools necessary for Information technology.

PO4: Explain effectively in a variety of concepts pertaining to Information Technology and Big Data.

PO5: Produce results to assigned problems in a given situation by Collaborating with team members of the team at various levels

PROGRAMME SPECIFIC OUTCOMES **B.Sc. INFORMATION TECHNOLOGY**

PSO 1: Employ appropriate concepts in the areas like Web services, Data Analytics, Cloud Computing, Design and Analysis of Algorithms and User Interface Design and core computing subjects and apply them in real world scenarios.

PSO 2: Implement the knowledge and skills gained and meet the current demand of IT Industry and be successful personnel.

**B.Sc. (INFORMATION TECHNOLOGY)
COURSE STRUCTURE 2022 -25 Batch**

Sem.	Part	Course Component	Subject Name	Credits	Hours	Internal	External	Total
I	I	Language	Language – I	3	6	50	50	100
	II	English	English- I	3	4	50	50	100
	III	Core I	Problem solving using C program	4	6	50	50	100
	III	Core II	Problem solving using C lab	4	4	50	50	100
	III	Allied I	Allied Mathematics	5	6	50	50	100
	IV	1. NME/ Basic/Advance Tamil	Practical – HTML and CSS Lab	2	2	-	100	100
	IV	2. Soft Skills I	Introduction to Study Skills	3	2	-	100	100
CREDIT TOTAL = 24 / TOTAL HOURS PER WEEK -30								
II	I	Language	Language – II	3	6	50	50	100
	II	English	English- II	3	4	50	50	100
	III	Core III	Programming in Java	4	5	50	50	100
	III	Core IV	Practical - Programming in Java Lab	4	5	50	50	100
	III	Allied II	Operation Research	5	6	50	50	100
	IV	1. NME/ Basic /Advance Tamil	Basics of Cyber Security	2	2	-	100	100
	IV	2. Soft Skills II	Life Skills	3	2	-	100	100
CREDIT TOTAL = 24 / TOTAL HOURS PER WEEK -30								
III	III	Core V	Design and Analysis of Algorithm	4	5	50	50	100
	III	Core VI	Data Analysis using Spread Sheet	4	6	50	50	100
	III	Core VII	Practical - Data Analysis using Spread Sheet Lab	4	5	50	50	100
	III	Core VIII	Operating Systems	4	6	50	50	100
	III	Allied III	Statistics - I	5	6	50	50	100
	IV	Soft Skills III	Job-Oriented Skills	3	2	-	100	100
CREDIT TOTAL = 24 / TOTAL HOURS PER WEEK -30								

**B.Sc. (INFORMATION TECHNOLOGY)
COURSE STRUCTURE 2022 -25 Batch**

Sem.	Part	Course	Title	Credits	Hours	Internal	External	Total
IV	III	Core IX	Web Technology	4	6	50	50	100
	III	Core X	Relational Data Base Management Systems	4	6	50	50	100
	III	Core XI	Practical - Web Application Lab	4	8	50	50	100
	III	Allied IV	Statistics - II	5	6	50	50	100
	IV	Soft Skills IV	Digital Marketing Lab	3	2	-	100	100
	IV	EVS	Environmental Studies	2	2	-	100	100
CREDIT TOTAL = 22 / TOTAL HOURS PER WEEK -30								
V	III	Core XII	Big Data Analytics	4	6	50	50	100
	III	Core XIII	Programming in Python	4	6	50	50	100
	III	Core XIV	Practical – Python Lab	4	6	50	50	100
	III	Elective – I	Inter Disciplinary Elective - Web Designing	5	5	50	50	100
	III	Elective – II	Information Security / Software Project Management / Network Security and Cryptography	5	6	50	50	100
	IV	Value Education	Value Education	2	1	-	100	100
	V	Internship	Internship	2	-	-	-	-
CREDIT TOTAL = 26 / TOTAL HOURS PER WEEK -30								
VI	III	Core XV	Mini project	4	6	50	50	100
	III	Core XVI	Software Engineering	4	6	50	50	100
	III	Core XVII	R Programming	4	6	50	50	100
	III	Core XVIII	Practical –R Programming Lab	4	6	50	50	100
	III	Elective - III	Cloud Computing / Mobile Computing / Parallel Computing	5	6	50	50	100
	V	Extension Activity		1		-	-	-
CREDIT TOTAL = 22 / TOTAL HOURS PER WEEK -30								
OVERALL CREDIT TOTAL = 142 / TOTAL HOURS -180								

SEMESTER - I

CORE - I

PROBLEM SOLVING USING C PROGRAMMING

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

COURSE FRAMEWORK:

To develop the ability to analyze a problem and develop an algorithm to solve it using C Programming

COURSE OUTCOME:

On completion of the course the students will be able

1. Understand the concepts of Programming techniques and C fundamentals.
2. Describe the usage of Data Input output functions and Control structures.
3. Apply the concepts of Functions and storage classes.
4. Implement the usage of Arrays and strings in C.
5. Explain the effective utilization of Pointers and files.

UNIT I:

(18 Hours)

Planning the Computer Program: Problem definition, Program design, Debugging, Types of Errors in programming, Techniques of Problem Solving: Flowcharting, 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 & Priti Sinha, “Computer Fundamentals”, BPB Publications, 6th Edition.
2. Dr. Anita Goel, Computer Fundamentals, Pearson Education, 2010.
3. E. Balaguruswamy, 2016, 7th Edition, Programming in ANSIC, TMH Publishing Company Ltd.
4. Kanetkar Y., 1999, Let us C, BPB Pub., New Delhi.

REFERENCE BOOKS:

1. K.R.Venugopal,Programming with C,1997,McGraw-Hill
2. Varalakshmi,Programming using C,2000(Reprint July 2001), V.Ramesh5
3. R.Rajaram,C Programming Made Easy,V.Ramesh
4. B.W. Kernighan and D.M.Ritchie, 1988, The C Programming Language, 2nd Edition, PHI.
5. H. Schildt, C,2004, The Complete Reference, 4th Edition, TMH
6. Gottfried. B.S, 1996, Programming with C, Second Edition, TMH Pub. Co. Ltd., New Delhi.

WEBSITES:

1. <http://www.cprogramming.com/>
<http://www.richardclegg.org/previous/ccourse/>

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 –II

PRACTICAL – PROBLEM SOLVING USING C LAB

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

Course Framework:

To Read, understand, develop and trace the execution of programs written in C language.

Course Outcome:

1. Implement the concepts of sequential programming in C.
 2. Implement the concepts of Conditional Structures in C.
 3. Implement the iterative concepts in C.
 4. Implement Programs with function and perform various arithmetic operations.
 5. Implement C programs for manipulating strings and Arrays
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1. Write a program to add, subtract, multiply and divide two numbers.
 2. Write a program to check if a number is even or odd.
 3. Write a program to find the largest of three numbers.
 4. Write a program to find the maximum and minimum of n numbers.
 5. Write a program to check for prime number.
 6. Write a program to check for Armstrong number.
 7. Write a program to accept day number and print the day of the week.
 8. Write a program for counting the number of vowels, consonants, words, white spaces in a line of text.
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9. Write a program to arrange a set of numbers in ascending order.
 10. Write a program to implement linear search.
 11. Write a program to implement binary search.
 12. Write a program to add two matrices.
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13. Write a program to check whether a string is a palindrome or not.
 14. Write a program to print Fibonacci series using function.
 15. Write a program to find factorial of a number using recursive function.

ALLIED – I
ALLIED MATHEMATICS

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

COURSE FRAME WORK:

To improve basics in Mathematics and analytical skills

COURSE OUTCOME:

1. Compute the eigen values and eigen vectors. Apply Cayley Hamilton theorem
2. Solve the Polynomial equations, Reciprocal equations and approximations by Newton's method numerically
3. Solve Algebraic equations numerically by Gauss seidel and Gauss Jordan methods.
4. Find the inverse of the matrix using Gauss Elimination method.
5. Evaluate the positive roots of an equation using bisection, False Position and Newton Raphson method

UNIT I: (18 HOURS)

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

UNIT 2: (18 HOURS)

Theory of Equations: Polynomial Equations, irrational roots, complex roots, Reciprocal equations- Approximation of roots of a polynomial equation by Newton's Method.
Chapter 3, Section 3.1 to 3.4.1

UNIT 3: (18 HOURS)

Algebraic Equations : Gauss elimination method - Inverse of a matrix - Gauss -Jordan method- Gauss-Seidel method.
Chapter 4-Section 4.3,4.4,4.5,4.8

UNIT 4: (18 HOURS)

Roots of Equations: Bisection Method – False-Position Method– Newton-Raphson Method.
Chapter 3- Section 3.3, 3.4,3.5

UNIT 5: (18 HOURS)

Numerical Integration: Trapezoidal Rule - Simpson's 1/3 rule and 3/8 rule , Weddle's rule Romberg's method.

Chapter 8-Section 8.5

Content and Treatment as in

1. Allied Mathematics-Volume I by P. Duraipandian and S. Udayabaskaran, S. Chand Publications
2. Numerical methods by S.Arumugam, A.Thangapandi Isaac and A.Somasundaram. Scitech Publications.

REFERENCE BOOKS :

1. Allied Mathematics, A.Singaravelu.

2. Ancillary Mathematics, A. Manickavasagam Pillai and Narayanan.
3. Numerical Methods with Programming in C-T. Veerarajan and T. Ramachandran.

WEBSITES:

1. www.freetchbooks.com/mathematics-f38.html
2. www.e-booksdirectory.com
3. www.freebookcentre.net/SpecialCat/Free-Mathematics-Books-Download.html

Question Paper Pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	20– 25	10	40
TOTAL				100

Distribution of Questions:

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

NME – PRACTICAL –HTML AND CSS LAB

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

COURSE FRAMEWORK:

To learn basic concepts of HTML and CSS and build a dynamic Website.

COURSE OUTCOME:

1. Implementation of HTML Tags
 2. Implementation of List, Image and Hyper Link in websites
 3. Implementation of Frames and Table format in webpage
 4. Implementation of font styles in CSS
 5. Implementation of different text formatting and background color for webpages.
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1. Implement a HTML Program to illustrate body and pre tags.
 2. Develop a HTML Program to illustrate text Font tag.
 3. Implement a HTML Program to illustrate text formatting tags
 4. Implement a HTML Program to illustrate Order, Unordered and Definition List tag.
 5. Develop a HTML Program to illustrate Img tag.
 6. Create a HTML Program to illustrate Hyper Link tag (Anchor tag)
 7. Create a HTML page to demonstrate the usage of Frames. Choose the content of the page on your own.
 8. Develop a HTML Program to illustrate Table tag.
 9. Create a web page that displays college information using various Style sheets.
 10. Implement a program to Use different font styles in CSS.
 11. Develop a HTML program Using CSS to set a background image for both the pages and single elements on the page.
 12. Develop a webpage to display your Bio Data with back ground and other formatting using CSS

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

Paragraph and Essay Writing

REFERENCE BOOKS:

1. Hewings, Martin. 1999. Advanced English Grammar: A Self- study Reference and 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.

SEMESTER - II

CORE – III
PROGRAMMING IN JAVA

SUBJECT CODE :	THEORY	MARKS 100
SEMESTER: II	CREDITS: 4	TOTAL HOURS: 75

COURSE FRAMEWORK:

To gain knowledge of the structure and model of the Java programming language.

COURSE OUTCOME:

1. Designs will demonstrate the use of good object-oriented design principles including Encapsulation and information hiding.
2. Knowledge of the structure and model of the Java programming language.
3. Evaluate user requirements for software functionality required to decide whether the Java programming language can meet user requirements.
4. Use the Java programming language for various programming technologies.
5. Propose the use of certain technologies by implementing them in the Java programming language to solve the given problem.

UNIT I

(15 Hours)

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

UNIT II

(15 Hours)

Classes, Objects and Methods - Constructors - Methods Overloading – Inheritance -Overriding Methods – Finalizer and Abstract Methods - Visibility Control –Arrays - Strings and Vectors - String Buffer Class.

UNIT III

(15 Hours)

Interfaces – Packages - Creating Packages - Accessing a Package - Multithreaded Programming – Creating Threads - Stopping and Blocking a Thread - Life Cycle of a Thread - Using Thread Methods - Thread Priority – Synchronization - Implementing the Runnable Interface.

UNIT IV

(15 Hours)

Managing Errors and Exceptions - Syntax of Exception Handling Code - Using Finally Statement - Throwing Our Own Exceptions - Applet Programming - Applet Life Cycle-Graphics Programming.

UNIT V

(15 Hours)

Introducing the AWT: Working with Windows, Graphics and Text- AWT Classes- Working with Frames-Working with Graphics-Working with Color-Working with Fonts-Using AWT Controls, Layout Managers and Menus.

1. Recommended Books

- i. E. Balagurusamy 2004, Programming with JAVA - 2nd Edition, Tata McGraw-Hill Publishing Co. Ltd, New Delhi.
- ii. Herbert Schildt, The Complete Reference Java™ 2-5th Edition, Tata McGraw-Hill Publishing Co. Ltd, New Delhi.

2. Reference Books

- i. Y. Daniel Liang, 2003, An Introduction to JAVA Programming, Prentice – Hall of India Pvt. Ltd.
- ii. Cay S. Horstmann and Gary Cornell, 2005, Core Java™2 Volume I, Fundamental 7th Edition, Pearson Education.

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 – IV

PRACTICAL - PROGRAMMING IN JAVA LAB

SUBJECT CODE :	PRACTICAL	MARKS 100
SEMESTER: II	CREDITS: 4	TOTAL HOURS: 75

COURSE FRAMEWORK:

To Implement Object Oriented programming concept and to build Java Application.

COURSE OUTCOME:

1. Implement Object Oriented programming concept using basic syntaxes of controls Structures, strings and function for developing skills of logic building activity.
2. Identify classes, objects, members of a class and the relationships among them needed for a finding the solution to specific problem.
3. Demonstrates how to achieve reusability using inheritance, interfaces and packages and describes faster application development can be achieved.
4. Develop Java applications with threads and generics classes
5. Demonstrate understanding and use of different exception handling mechanisms and concept of multithreading for robust faster and efficient application development.

Application

1. To read student marks for five subjects and print the total and average.
2. Finding the largest among three numbers.
3. To implement the concept of method overloading.
4. To convert the given temperature in Fahrenheit to Celsius using the formula,
 $C = F - 32/1.8$.
5. To find the factorial of the given number.
6. To compute Simple and Compound Interest.
7. To check whether the given number is Prime or not.
8. To check whether the given number is Armstrong or not.
9. To print Fibonacci series.
10. To check whether the given string is Palindrome or not.
11. Substring Removal from a String. Use String Buffer Class.
12. Finding area and Perimeter of Triangle. Use Stream class.(Circle & Rectangle)
13. Determining the order of numbers generated randomly using Random class.
14. String Manipulation using Char Array

Applets

15. Incorporating Graphics.
16. Working with Colors and Fonts.

ALLIED II -OPERATIONS RESEARCH

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

COURSE FRAME WORK:

To give an overall idea about the various Optimization techniques and their usages

COURSE OUTCOME:

1. Explain LPP and solve LPP by Graphical and simplex method
2. Formulate LPP to Transportation problem, Find initial solution using North west corner method, Least cost method and Vogle's Approximation method. Find optimal solution using MODI method.
3. Formulate LPP to Assignment Problem, Solve by Hungarian method
4. Demonstrate Sequencing Problem and solve n-jobs through 2,3,m machines. Solve two person zero sum games by Minimax principle, Dominance property

UNIT -I : (18 hours)

Linear Programming:-- Formulation - Graphical Solution - Simplex method

Chapter 2, Section 2.1 to 2.8

Chapter 3, Section 3.1.1 to 3.1.3

UNIT -II : (18 hours)

Transportation Problem:-- Mathematical formulation – Initial basic feasible solution – Test of optimality (MODI method) – Maximization problem – Unbalanced Transportation problem.

Chapter 7, Section 7.1 to 7.5

UNIT -III : (18 hours)

Assignment Problem:-- Mathematical formulation – Optimality (Hungarian) – Maximization problem, Unbalanced assignment problem

Chapter 8, Section 8.1 to 8.7

UNIT - IV : (18 hours)

Sequencing problem :-, n jobs through 2 machines ,n jobs through 3 machines , 2 jobs through m machines , n jobs through m machines

Chapter 14

Section 14.1 to 14.7

Game theory :-Two person zero –sum games – Maximin-Minimax Principle –Saddle point and value of the game-Games without saddle point, Mixed Strategies – Dominance Property –

solving $2 \times n$ game or $m \times 2$ game by graphical method Chapter 16

Section 16.1 to 16.4 & 16.6 to 16.7

UNIT - V : (18 hours)

Network Analysis:-PERT – CPM : Project Network Diagram – Critical Path (Crashing excluded) – PERT computation

Chapter 15, Section 15.1 to 15.7

Content and treatment as in

Resource Management Techniques (Operations Research) by V.Sundaresan, K.S.Ganapathy Subramanian,K.Ganesan (A.R Publications) Ninth edition-June 2015

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, New York.
4. Introduction to Operations Research, P.R.Vittal
5. Gupta P.K. and HiraD.S. Problems in Operations Research, S.Chand& Co.

Question Paper Pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	20– 25	10	40
TOTAL				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

NME – BASICS OF CYBER SECURITY

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

COURSE FRAMEWORK:

To learn about the concepts of cyber security and cyber ethics among the students to help them become responsible cyber citizens.

COURSE OUTCOME:

1. Define the basics of cyber security
2. Discuss the types of cyber security and its threats.
3. Discuss the various threats to E-Commerce
4. Implement Cyber security techniques
5. Implement Data security and backup storage.

UNIT-I

(6 Hours)

Cyber security: Definition - Cyber Security goals- Basic terminologies: Network – Internet – Internet Protocol - Benefits of cyber security.

UNIT-II

(6 Hours)

Types of cyber security – Cyber Security Threats: Malware – Phishing – Distributed Denial of Services (DDoS) – Brute Force – Domain Name System Attack.

UNIT-III

(6 Hours)

Threat to E-Commerce: Electronic Payment System – E-Cash: Backdoor Attacks – Direct Access Attacks – Eavesdropping.

UNIT-IV

(6 Hours)

Security Technologies: Firewall and VPN-Intrusion Detection System (IDS) – Access Control.

UNIT-V

(6 Hours)

Cyber Security Principle – Data Security Consideration – Backups – Archival Storage – Disposal of data.

Recommended Text Book:

1. Anand Shinde -Introduction to Cyber Security - Guide to the World of Cyber Security ,Publisher Notion Press , edition , 2021
2. Joseph Steinberg - Cybersecurity for Dummies , Publisher Wiley , edition 2020

Websites:

1. <https://www.javatpoint.com/cyber-security-tutorial>
2. https://swayam.gov.in/nc_details/NPTEL

Question Paper Pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Answer any 5 out of 10 questions	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 Management

Time 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.essentiallifefskills.net//>

SEMESTER - III

CORE - V

DESIGN AND ANALYSIS OF ALGORITHM

SUBJECT CODE:	THEORY	MARKS 100
SEMESTER: III	CREDITS: 4	TOTAL HOURS: 75

COURSE FRAMEWORK:

To learn and analyze the different Algorithm design techniques for problem solving.

COURSE OUTCOME:

1. Define the basic concepts of analyze and the performance of algorithms.
2. Discuss various algorithm design techniques for developing algorithms.
3. Discuss various searching, sorting and graph traversal algorithms.
4. To find the shortest path in multistage graph method.
5. Using the search techniques find the solution for Depth First Search and Breadth First Search.

Unit 1:

(15 Hours)

Introduction - Definition of Algorithm – pseudo code conventions – recursive algorithms – time and space complexity –big-“oh” notation – practical complexities.

Unit 2:-

(15 Hours)

Divide and Conquer: General Method - Finding maximum and minimum – merge sort
-Quicksort, Stassen’s matrix multiplication

Unit 3:

(15 Hours)

Greedy Method: General Method –knapsack problem - Tree vertex splitting - Job sequencing with dead lines – optimal storage on tapes.

Unit 4:

(15 Hours)

Dynamic Programming: General Method - multistage graphs – all pairs shortest paths – single source shortest paths - String Editing – 0/1 knapsack.

Unit 5:

(15 Hours)

Search techniques for graphs –DFS-BFS-connected components – biconnected components Back Tracking: General Method -Sum of subsets Branch and Bound: General Method - Traveling Salesperson problem.

Recommended Texts

1. Horowitz and Sahani, Fundamentals of Computer Algorithms, 2ND Edition, 2012
2. .S.K.Basu, “Design Methods and Analysis of Algorithms”, Fourth edition, 2010

Reference Books

1. Alfred.V.Aho , Data Structures and Algorithms Pearson
2. Robert Sedgewick and Kevin Wayne, “Algorithms”, Fourth Edition, Pearson Education, 2012

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 - VI

DATA ANALYSIS USING SPREAD SHEET

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

COURSE FRAMEWORK:

Learn Advance Excel Function and to Analyze and Protect the data using Data Validation Techniques.

COURSE OUTCOME:

1. Group cells and use outlines to manipulate the worksheet; protect data in worksheets and workbooks.
2. Use of advance Excel Formula.
3. Use of If conditions with advance Excel functions.
4. Use a variety of data validation techniques, use advanced filters to analyze data in a list
5. Share workbooks with other users

Unit 1:

(18 Hours)

Cell Editing, Usage of Formulae and Built-in Functions, File Manipulations, Data Sorting (both number and alphabets), Worksheet Preparation, Drawing Graphs, Usage of Auto Formatting. Inserting Clip arts and Pictures, Frame movements of the above, Insertion of new slides

Unit 2:

(18 Hours)

Uses of Advance Excel Formulas -VLOOKUP, HLOOKUP, SUMIF, SUMIFS, SUMPRODUCT, DSUM, COUNTIF, COUNTIFS, IF, IFERROR, ISERROR, ISNA, ISNUMBER, ISNONTEXT, OR, AND, SEARCH, INDEX, MATCH etc

Unit 3:

(18 Hours)

What-IF Analysis, Sorting, Data Forms, Adding Data Using the Data Form, Finding Records Using Criteria: Filtering Data, AutoFilter, Pivot tables ,Totals and Subtotals Total, Row, Various Methods of Filter Creating and Updating Subtotals .

Unit 4:

(18 Hours)

Introduction to VBA, Variables in VBA- Variable Data Types- Message Box and Input box functions – Conditional Statements, Looping in VBA.

Unit 5:

(18 Hours)

Macro and VBA,Creating a Macro Using VBA Editor, Running Macros, Editing a Macro, Debugging Macro Code, Recording a Macro, Storing a Macro, Saving a Macro Enabled File, Protect Macro.

Recommended Texts

1. Jordan Goldmeyer, “Advanced Excel Essentials” ,APress, 2015 edition.

Reference Books

1. John Walkenbach , “Microsoft Excel 2013 Bible” ,Wiley Publications ,2013

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
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TOTAL MARKS				100

Distribution of Questions:

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		Theory	Problems
Section A	Unit – 1	3	
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	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 - VII

PRACTICAL - DATA ANALYSIS USING SPREAD SHEET LAB

SUBJECT CODE:	PRACTICAL	MARKS 100
SEMESTER: III	CREDITS: 4	TOTAL HOURS: 75

COURSE FRAMEWORK:

Understand Excel Advanced Functions and Implement VBA Macros

COURSE OUTCOME:

1. Understand Excel basic functions and charts.
2. To work with mathematical text and date function.
3. Implements sorting and filtering concepts in Excel.
4. To work with Pivot tables.
5. To share the workbook using VBA Macros.

1. Excel Basic Functions
2. Formatting and Proofing
3. Mathematical Functions
4. Text Functions
5. Data and Time Functions
6. Sorting
7. Filtering
8. Logical Functions
9. Data Validation
10. Pivot tables
11. Charts and Slicers
12. VBA Macros

CORE - VIII
OPERATING SYSTEMS

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

COURSE FRAMEWORK:

To Understand and Evaluate the requirement for process synchronization and coordination handled by operating system.

COURSE OUTCOME:

1. Describe the important computer system resources and the role of operating system in their management policies and algorithms.
2. Understand the process management policies and scheduling of processes by CPU.
3. Evaluate the requirement for process synchronization and coordination handled by operating system.
4. Describe and analyze the memory management and its allocation policies.
5. Identify use and evaluate the storage management policies with respect to different storage management technologies.

Unit 1:

(18 Hours)

Introduction: Views –Goals –Types of system – OS Structure –Components – Services
- System Structures – Layered Approach -Virtual Machines - System Design and Implementation.
Process Management: Process - Process Scheduling – Cooperating Process–CPU Scheduling :
CPU Schedulers – Scheduling criteria – Scheduling Algorithms

Unit 2:

(18 Hours)

Process Synchronization: Critical-Section problem - Semaphores – Classic Problems of Synchronization – Critical Region – Monitors. Deadlock : Methods for handling Deadlocks – Prevention, Avoidance, and Detection of Deadlock - Recovery from deadlock.

Unit 3:

(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

Unit 4:

(18 Hours)

VirtualMemory :: 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.

Unit 5:**(18 Hours)**

I/O Systems: Overview - I/O Hardware – Application I/O Interface – Kernel I/O subsystem – Transforming I/O Requests to Hardware Operations – Performance.

Recommended Texts

1. Abraham Silberschatz, Peter Baer Galvin and Greg Gagne, “Operating System Concepts”,
2. 9 th Edition, John Wiley and Sons Inc., 2012

Reference Books

1. H.M. Deitel ,, An Introduction to Operating System,- Second Edition, Addison Wesley.
2. Andrew S.Tanenbaum, Modern Operating Systems, Pearson Education, II Ed.

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
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TOTAL MARKS				100

Distribution of Questions:

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	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	

ALLIED- III

ALLIED STATISTICS – I

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

COURSE FRAMEWORK

To develop the students ability to deal with numerical and quantitative issues in business

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.

Unit -I: (18 hours)

Collection of data and sampling – Primary and secondary data – limitations.

Chapter - 3 (Page Nos: 40-47, 57-60)

Chapter - 4 (Page Nos: 64-74)

Unit-II: (18 hours)

Classification and tabulation of data – Diagrammatic and graphical representation of data.

Chapter - 5 (Page Nos: 92-106, 109-113)

Chapter - 6 (Page Nos: 130-145, 165-175)

Unit -III: (18 hours)

Measures of Central value – Mean, median, mode, geometric and harmonic mean – properties, merits and demerits – Measures of Dispersion – Range, Mean deviation, Quartile Deviation and Standard Deviation.

Chapter - 7 (Page Nos: 180-226)

Chapter - 8 (Page Nos: 271-292)

Unit -IV: (18 hours)

Correlation – Types – Scatter diagram method – Karl Pearson’s coefficient of correlation – Rank Correlation – Regression for two lines.

Chapter - 10 (Page Nos: 383-394, 406-414)

Chapter – 11 (Page Nos: 441-451)

Unit -V: (18 hours)

Index Numbers – Simple Aggregative Method – Simple average of price relatives method – Weighted Aggregative method –Laspayre’s, Paasche’s, Bowley’s, Fisher’s and Marshall-Edgeworth method – Test of Adequacy – Time Reversal Test – Factor Reversal Test –

Chain Index Numbers – Conversion of Chain index to Fixed Index.

Chapter - 13 (Page Nos: 523-548)

Content and treatment as in

Business Statistics – S.P.Gupta and M.P.Gupta,Sultan Chand &Sons,Sixteenth Edition

Reference Books

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical methods by S.P. Gupta, thirty eighth edition(2009)-Sultan Chand

WEBSITES:

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

Question Paper Pattern:

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Section C	Essay Answer any 4 out of 6 questions	20– 25	10	40
TOTAL				100

Distribution of Questions:

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

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–

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)

SEMESTER - IV

CORE – IX

WEB TECHNOLOGY

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

COURSE FRAMEWORK:

Develop a dynamic web page using client side and server-side scripting languages and understand concept of Web Security.

COURSE OUTCOME:

1. Understand VB Script language programming constructs.
2. Understand the basic concepts of JavaScript language.
3. Apply JavaScript to add dynamic content to pages that meet specific needs and interests.
4. Develop web pages using ASP
5. Develop a dynamic web page using client side and server-side scripting languages.

UNIT I

(18 Hours)

Introduction to VBScript - Adding VBScript Code to an HTML Page - VB Script Basics - VBScript Data Types - VBScript Variables - VBScript Constants - VBScript Operators: Mathematical - Comparison - Logical - Using Conditional Statements - Looping Through Code - VBScript Procedures – Type Casting Variables - Math Functions – Date Functions – String Functions – Other Functions - VBScript Coding Conventions - Dictionary Object in VBScript - Err Object.

UNIT II

(18 Hours)

Introduction to Java Script – Advantages of Java Script – Java Script syntax - Data Type – Variable - Array – Operator & Expression – Looping – Control Structures - Constructor Function – User Defined Function Dialog Box.

UNIT III

(18 Hours)

Java Script Document Object Model – Introduction – Object in HTML – Event Handling – Window Object – Document Object – Browser Object – Form Object – Navigator Object – Screen Object – Build in Object – User Defined Object – Cookies.

UNIT IV

(18 Hours)

ASP.NET Language Structure – Page Structure – Page Event, Properties & Compiler Directives - HTML Server Controls – Anchor, Tables, Forms, Files. Basic Web server Controls – Label, Text Box, Button, Image Links, Check & Radio Button, Hyperlink, Data List Web Server Controls – Check Box List. Radio Button List, Drop Down List, List Box, Data Grid, Repeater.

UNIT V

(18 Hours)

Request and Response Objects, Cookies, Working with Data – OLEDB Connection Class, Command Class, Transaction Class, Data Adaptor Class, Data Set Class. Advanced Issues – E-mail, Application Issues, Working with IIS and Page Directives, Error Handling.
Security – Authentication, IP Address, Secure by SSL & Client Certificates

1. Recommended Texts

- i. I. Bayross, 2000, Web Enable Commercial Application Development Using HTML, DHTML, Javascript, Perl CGI, BPB Publications.
- ii. A. Russell Jones, Mastering Active Server Pages 3, BPB Publications.

2. Reference Books

- i. Hathleen Kalata, Internet Programming with VBScript and JavaScript, Thomson Learning
- ii. Mike McGrath, XML Harness the Power of XML in easy steps, Dreamtech Publications
- iii. T.A. Powell, 2002, Complete Reference HTML, TMH.
- iv. J. Jaworski, 1999, Mastering Javascript, BPB Publications.
- v. Powell, Thomas; Schneider, Fritz, JavaScript: The Complete Reference, 2nd edition 2004, TMH

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 –X

RELATIONAL DATABASE MANAGEMENT SYSTEMS

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

COURSE FRAMEWORK:

Analyze the existing design of a database schema and Create database for real-life application, with constraints and keys, using SQL and PL/SQL.

COURSE OBJECTIVE:

1. Understand the conceptual models of a database using ER modelling.
2. Describe the relational model in Database.
3. Analyze the existing design of a database schema and apply concepts of normalization to design an optimal database
4. Create and populate a database for a real-life application, with constraints and keys, using SQL
5. Explain PL/SQL structure in databases.

UNIT – I

(18 Hours)

Introduction to DBMS– Data and Information- Database – Database Management System – Objectives - Advantages – Components - Architecture. ER Model: Building blocks of ER Diagram – Relationship Degree – Classification – ER diagram to Tables – ISA relationship – Constraints – Aggregation and Composition – Advantages.

UNIT – II

(18 Hours)

Relational Model: CODD’s Rule- Relational Data Model - Key - Integrity – Relational Algebra Operations – Advantages and limitations – Relational Calculus – Domain Relational Calculus - QBE.

UNIT – III

(18 Hours)

Structure of Relational Database. Introduction to Relational Database Design - Objectives – Tools – Redundancy and Data Anomaly – Functional Dependency - Normalization – 1NF – 2NF – 3NF – BCNF. Transaction Processing – Database Security.

UNIT – IV

(18 Hours)

SQL: Commands – Data types – DDL - Selection, Projection, Join and Set Operations – Aggregate Functions – DML – Modification - Truncation - Constraints – Subquery.

UNIT – V

(18 Hours)

PL/SQL: Structure - Elements – Operators Precedence – Control Structure – Iterative Control - Cursors - Procedure - Function - Packages – Exceptional Handling - Triggers.

TEXT BOOK:

1. S. Sumathi, S. Esakkirajan, “Fundamentals of Relational Database Management Systems ”, Springer International Edition, 2007.

REFERENCE BOOKS:

1. Abraham Silberchatz, Henry F. Korth, S. Sudarshan, “Database System Concepts”, 7th McGrawHill, 2019.
2. Alexis Leon & Mathews Leon, “Fundamentals of DBMS”, 2nd Edition, Vijay Nicole Publications, 2014.

WEB REFERENCES:

- NPTEL & MOOC courses titled Relational Database Management Systems
- <https://nptel.ac.in/courses/106106093/>
- <https://nptel.ac.in/courses/106106095/>

Question paper pattern:

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Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
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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 – XI

PRACTICAL – WEB APPLICATION LAB

SUBJECT CODE:	PRACTICAL	MARKS 100
SEMESTER: IV	CREDITS: 4	TOTAL HOURS: 75

COURSE FRAMEWORK:

- Understand Internet Technology to develop dynamic webpages using web technology.

COURSE OBJECTIVE:

1. Develop basic programs. Using VB Script.
2. Develop basic programs using Java Script.
3. Write programs to implement databases
4. Develop web pages using ASP
5. Develop a dynamic web page using client side and server-side scripting languages.

VB SCRIPT & JAVASCRIPT

1. Write a program outputs the squares, roots, cubes and complements of integers between 1 and 100.
2. Create a calculator.
3. Write a script to Sort numbers and strings.
4. Create a program to generate a hit counter.
5. Create a program to verify whether email address provided by user is valid or invalid.
6. Write a program to scroll the text on status bar.
7. The form consists of two multiple choice list and one single choice list
 - a. The first multiple choice list displays the major dishes available.
 - b. The second multiple choice list displays the stocks available.
 - c. The single choice list display the miscellaneous (Milkshakes, soft drinks, softy available etc.)
8. Write a script to create a digital clock.
9. Create a web page using two image file which switch black and white one another as The mouse pointer moves over the image. Use the On Mouseover and On Mouse event, on Dblclick handler.
10. Build a WWW page with an image and 3 buttons, Pick three favorite graphics, Label the buttons and make each one swap in the graphic you have chosen.

11. Create a frameset that has two frames, side by side. Make the left-hand frame contain a form with 3 radio buttons. The buttons should be for three search engines:

- Yahoo (<http://www.yahoo.com>)
- Altavista (<http://www.altavista.com>)
- Infoseek (<http://www.infoseek.com>)

When the user clicks on of the option buttons, the frame on the right hand side should be loaded with the right search engine.

12. Write a program to implement Employee database with all validation

ASP

1. Create a login form, to expire, if the user does not type the password within 100 seconds.
2. Create an employee database and manipulate the records using command object in ASP.
3. Develop an application to illustrate the usage of Request and Response Objects in ASP.
4. Write an ASP program using Request Object to give the exact list of headers sent by the browser to the Web server.
5. Create an Active Server Page to display the records one by one from a student database. The student database should contain roll no, name, marks & total.
6. Design an ASP application that describes books in the Online Bookshop. (Use AD Rotator Component, Content Rotator Component, Content Linking Component)
7. Create a document and add a link to it. When the user moves the mouse over the link it should load the linked document on its own (User is not required to click on the link).
8. Create a document, which opens a new window without a toolbar, address bar, or a status bar that unloads itself after one minute.
9. Create a document that accepts the user's name in a text field form and displays the same the next time when the user visits the site informing him that he has accessed the site for the second time, and so on.

ALLIED – IV

ALLIED STATISTICS – II

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

COURSE FRAME WORK:

To introduce basic concepts of Statistics and computing statistical aspects

COURSE OUTCOME:

1. Discuss various components of time series. Compute the trend values for secular and seasonal variations
2. Discuss probability, apply Baye's theorem to problems. Evaluate expectations
3. Identify the different types of probability distributions, use them to solve real life problems.
4. Explain test of hypothesis, its significance and various types of statistical tests for one and two samples, uses.
5. Test of hypothesis for more than 2 samples using ANOVA

Unit - I: (18 hours)

Time Series – Components of Time series – Measurement of trend – Seasonal variations.
Chapter - 14 (Page Nos: 592-618, 628-641)

Unit -II: (18 hours)

Probability and expected value – Axiomatic approach to probability – Calculation of Probability – Theorems of probability – Conditional probability – Baye's theorem – Expectation.
Volume II Chapter – 1 (Page Nos: 753, 758-799)

Unit -III: (18 hours)

Theoretical distributions – Binomial, Poisson and Normal Distributions.
Volume II Chapter – 2 (Page Nos: 806-857)

Unit -IV: (18 hours)

Tests of hypothesis – Tests of Significance for small samples.
Volume II Chapter – 3 (Page Nos: 882-888, 910-926)
Volume II Chapter – 4 (Page Nos: 954-1000)

Unit -V: (18 hours)

F – test and Analysis of Variance.
Volume II Chapter – 3 (Page Nos: 1006-1038)

Content and treatment as in

Business Statistics – S.P.Gupta and M.P.Gupta, Sultan Chand & Sons, Sixteenth Edition

Reference Books

1. Fundamental of Mathematical Statistics - S.C. Gupta & V.K. Kapoor - Sultan Chand
2. Statistical methods by S.P. Gupta, thirty eighth edition(2009)-Sultan Chand

WEBSITES:

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

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	Unit – 3		2
	Unit – 4		1
	Unit – 5		1
Section C	Unit – 1		1
	Unit – 2		1
	Unit – 3		1
	Unit – 4		1
	Unit - 5		2

SOFT SKILL - IV

PRACTICAL - Digital Marketing Lab

SUBJECT CODE:	PRACTICAL	MARKS 100
SEMESTER: IV	CREDITS: 3	TOTAL HOURS: 45

COURSE FRAMEWORK:

To Create and manage functional multi-page website using Word Press on a remote server

COURSE OBJECTIVE:

1. Create a functional multi-page website using Word Press on a remote server.
2. Use basic HTML and CSS to edit content and modify formatting in a Word Press website.
3. Design and build digital marketing themes.
4. Implement text and graphics formatting in web pages.
5. Create web pages using Digital Marketing Plugins.

1. Word press Dashboard
2. Creating WordPress Site
3. Creating WordPress Themes
4. Wordpress Post
5. Wordpress Pages
6. Media Settings
7. Design and build Digital Marketing WordPress theme.
8. Organizing word press Content
9. Wordpress text Formatting
10. Creating Menus in WordPress.
11. Create pages using Digital Marketing Plugins.

EVS

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:

(6 Hours)

Multidisciplinary nature of environmental studies Definition, scope and importance.

Unit-2:

(6 Hours)

Natural Resources : Renewable and non-renewable resources :Natural resources and associated problems. - Forest resources : Use and over-exploitation, deforestation, case studies. - Timber extraction, mining, dams and their effects on forest and tribal people. - Water resources : Use and over-utilization of surface and ground water - floods, drought, conflicts over water, dams- benefits and problems. - Mineral resources : Use and exploitation, environmental effects of extracting and using mineral resources, case studies. - Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. Energy resources : Growing energy needs, renewable and non renewable energy sources, use of alternate energy sources. Case studies. 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:

(6 Hours)

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 :- . Forest ecosystem, Grassland ecosystem ,. Desert ecosystem,. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Unit-4:

(6 Hours)

Biodiversity and its conservation

- Introduction – Definition : genetic, species and ecosystem diversity. – Bio geographical 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 : habitat loss, poaching of wildlife, man-wildlife conflicts.
- Endangered and endemic species of India
- Conservation of biodiversity : In-situ and Ex-situ conservation of biodiversity.

Unit-5 :

(6 Hours)

Environmental Pollution

Definition

- Cause, 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.

Recommended Texts

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.

Reference Books

1. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001, Environmental Encyclopedia, Jaico Publ. House, Mumbai, 1196p.

SEMESTER - V

CORE –XII

BIG DATA ANALYTICS

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

COURSE FRAMEWORK:

Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.

COURSE OBJECTIVE:

1. Understand the key issues in big data management and its associated applications in intelligent business and scientific computing.
2. Acquire fundamental enabling techniques and scalable algorithms like Hadoop; Map Reduce and NO SQL in big data analytics.
3. Interpret business models and scientific computing paradigms, and apply software tools for big data analytics.
4. Achieve adequate perspectives of big data analytics in various applications like recommender systems, social media applications etc.
5. Modelling and design of data warehouses.

Unit-1 :

(18 Hours)

Basic nomenclature-Analytics process model-Analytics model requirements – Job Profiles in Analytics – Types of Data Sources- Sampling – Sampling - Types of Data Elements

Unit-2:

(18 Hours)

Missing Values-Outlier Detection and Treatments- Weight of Evidence Coding. Predictive Analytics basics – Linear Regression-Logistic Regression - Decision Trees

Unit-3 :

(18 Hours)

Descriptive Analytics: Association Rules- Support and Confidence- Applications of Association Rule – Sequence Rules – Segmentation.

Unit-4 :

(18 Hours)

Hierarchical clustering -Social Network Analytics: Social Network Definitions – Social Network Metrics - Social Network Learning -Relational Neighbor Classifier

Unit-5 :

(18 Hours)

Data Quality - Software-Privacy - Model Design and Documentation - Corporate Governance. Example applications: Credit Risk Modeling

Recommended Text:

1. Baesens, 2014, Analytics in a Big Data World :The Essential Guide to Data Science and Its applications, Wiley India Private Limited.

Reference Books

1. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", Cambridge University Press, 2012.
2. Kim H. Pries and Robert Dunnigan, "Big Data Analytics: A Practical Guide for Managers " CRC Press, 2015.

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 – XIII

PROGRAMMING IN PYTHON

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

COURSE FRAMEWORK:

To explore the mechanism of python programming using modules and package.

COURSE OBJECTIVE:

1. Understand the basic concepts of Python Syntax and Semantics.
2. Apply the control structures in Python programs.
3. Apply the functional concepts and strings in Python.
4. Implement the data structure concepts in Python
5. Implement the concepts of OOPS in Python.

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, Nested loop.

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.

1. Recommended Texts

- i. Allen Downey, Jeffrey Elkner, Chris Meyers, —How to Think Like a Computer Scientist - Learning with Python, Green Tea Press,2002.

2. Reference

- i. Prentice Hall of India, 2014.
- ii. MarkLutz,—LearningPython:PowerfulObject-OrientedProgrammingI,FifthEdition, O'Reilly, Shroff Publishers and Distributors, 2013.

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 – XIV

PRACTICAL – PYTHON LAB

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

COURSE FRAMEWORK:

To learn how to design and program complex and numeric Python applications.

COURSE OBJECTIVE:

1. Develop the basic programs in python.
 2. Develop programs in python using control structures and functions.
 3. Implement Object oriented programming in Python.
 4. Apply the concepts of List, Tuples and Dictionaries in Python.
 5. Write programs using different File handling operations.
-
1. Compute the GCD of two numbers.
 2. Find the square root of a number (Newton's method).
 3. Exponentiation (power of a number).
 4. Find the maximum of a list of numbers.
 5. Linear search and Binary search.
 6. Selection sort, Insertion sort.
 7. Merge sort.
 8. First n prime numbers.
 9. Multiply matrices.
 10. Programs that take command line arguments (word count).
 11. Find the most frequent words in a text read from a file.

INTER DISCIPLINARY ELECTIVE - I

WEB DESIGNING

SUBJECT CODE:	THEORY	MARKS 100
SEMESTER: V	CREDITS: 5	TOTAL HOURS: 75

COURSE FRAMEWORK:

Understand basic concepts in HTML, distinguish, and practice markup languages.

COURSE OBJECTIVE:

1. Identify the concepts of the World Wide Web
2. Understand the concepts of search Engine.
3. Understand basic concepts in HTML.
4. Distinguish and practice markup languages
5. Insert and control images on a web page.

UNIT I

(15 Hours)

BASIC INTERNET CONCEPTS: What is Internet – History – Host Machines and Host Names- Client / Server Model – Domain Names – Protocols- IP Address.

UNIT II:

(15 Hours)

ADVANCED INTERNET CONCEPTS: Anatomy of an Email Message – Viewing - Sending – Replying - Search Engines – Meta Search Engine

UNIT III:

(15 Hours)

HTML INTRODUCTION: History of HTML – HTML Document – Anchor Tags – Hyper Links- Sample HTML Documents.

UNIT IV:

(15 Hours)

HEAD AND BODY SECTIONS: Header Section – Title – Prologue – Links – Comment – Heading – Horizontal Rule – Paragraph – Images and Pictures - Ordered and Unordered List.

UNIT V:

(15 Hours)

TABLES: Table Creation – Cols pan, Row Span – Cell Spacing, Cell Padding – Nested Tables.

FRAMES: Frameset Definition – Frame Definition – Nested Frames. **FORMS:** Action Attribute – Method Attribute – Drop Down List – Sample Forms.

TEXT BOOKS :

1. Wendy G. Lehnert, “Internet 101 - A Beginners Guide to Internet and the World Wide Web”, Addison Wesley. UNITS I & II .
2. Xavier.C, World , “Wide Web design with HTML”, Tata McGraw Hill Publishing Limited, New Delhi. UNITS III, IV & V

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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	

ELECTIVE - II
INFORMATION SECURITY

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

COURSE FRAMEWORK:

To Learn Database and Network Threats and how to Implement Reliable Network Security

Unit-1: (18 Hours)

Introduction: Security- Attacks- Computer Criminals-Method of defense Program Security: Secure programs -Non-malicious program errors - Viruses and other malicious code-Targeted malicious code-Controls against program threats.

Unit-2: (18 Hours)

Operating System Security: Protected objects and methods of protection-Memory address protection-Control of access to general objects-File protection mechanism- Authentication: Authentication Basics-Password-Challenge-response-Biometrics.

Unit-3 : (18 Hours)

Database Security: Security Requirements-Reliability and integrity-Sensitive data-Interface-Multilevel Database-Proposals for multilevel security.

Unit-4: (18 Hours)

Security in Networks: Threats in networks –Network security control-Firewalls-Intrusion detection systems-Secure e-mail-Networks and cryptography-Example protocols: PEM-SSL-IPSec.

Unit-5 : (18 Hours)

Administrating Security: Security planning- Risk Analysis-Organizational security policies-Physical security-Legal-Privacy-and Ethical Issues in Computer Security-Protecting programs and data-Information and law-Rights of employees and employers-Software failures- Computer crime-Privacy-Ethical issues in computer society-Case studies of ethics.

Recommended Texts:

1. C.P.Pfleeger,and S.L.Pfleeger, Security in Computing, PearsonEducation,4thEdition, 2003
2. Matt Bishop, Computer Security: Art and Science, Pearson Education,2003.

Reference Books:

1. Stallings, Cryptography/w Security: Principlesandpractice, 4thEdition,2006.
2. Kaufman, Perlman, Spincer, Network Security, Prentice Hall, 2nd Edition, 2003
3. Eric Maiwald, Network Security: A BeginnersGuide,TMH, 1999

4. MacroPistoia, Java Network Security, Pearson Education, 2nd Edition, 1999
5. Whitman, Mattord, Principles of Information Security, Thomson, 2nd Edition, 2005

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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	

ELECTIVE - II

SOFTWARE PROJECT MANAGEMENT

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

COURSE FRAMEWORK:

Understand suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society.

COURSE OBJECTIVE:

1. Estimate project cost and perform cost-benefit evaluation among projects.
2. Perform project scheduling, activity network analysis and risk management.
3. Apply schedule and cost control techniques for project monitoring including contract management.
4. Apply quality models in software projects for maintaining software quality and reliability.
5. Use suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society.

UNIT I:

(18 Hours)

Introduction to Software Project Management- Software project versus other types of project-problems- management control- Stakeholders- Requirement Specification – Information and control in organizations Introduction to step wise project planning- Select-identify scope and objectives identify project infrastructure- Analyse project characteristics- products and activities- Estimate effort for each activity- Identify activity risks- Allocate resources- Review/ publicize plan- Execute plan and lower levels of planning. Project evaluation- Introduction – Strategic assessment-technical assessment - cost benefit analysis- cash flow forecasting- cost- benefit evaluation techniques- risk evaluation

UNIT II:

(18 Hours)

Selection of an appropriate project approach- choosing technologies-technical plan contents list- choice of process models- structured methods-rapid application development- waterfall model-process model-spiral model - software prototyping- ways of categorizing prototypes- incremental delivery- selecting process model.

UNIT III:

(18 Hours)

Software effort estimation- introduction where- problems with over and under estimates- basis for software estimating software effort estimation technique- expert judgement- Albercht function point analysis- COCOMO -Activity Planning- Objectives- Project schedules projects and activities- sequencing and scheduling activities

UNIT IV:

(18 Hours)

Network planning models- formulating a network model- using dummy activities- representing lagged activities- adding time dimension- forward pass- backward pass - identifying the critical path- Activity float- shortening project duration – identifying critical activities- precedence networks.

UNIT V:**(18 Hours)**

Risk Management- nature of risk- managing- identification-analysis reducing risks.

Prescribed Text:

1. Software Project Management – By Bob Hughes, Mike Cottrell – 5th Edition-2011-TMH

Reference Books:

1. Neil Whitten - Managing software development projects for success, John Wiley and sons
2. Roger S Pressman - Software engineering - McGrawHill
3. Watts Humphrey - Managing Software Process, Addison Wesley

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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	

ELECTIVE - II

NETWORK SECURITY & CRYPTOGRAPHY

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

COURSE FRAMEWORK:

Understand suitable project organization structure, leadership, decision and motivation styles, proper safety and ethical practices and be responsible to the society.

Unit 1: INTRODUCTION

(18 Hours)

Types of Physical Medium-Topologies-Wireless Networking: Wireless Protocols. Data Link Layer: Layered Data Link Protocols-SLIP and PPP-MAC and ARP. Network Layer: Routing Risks-Addressing - Fragmentation-Security.

Unit 2: INTERNET PROTOCOL

(18 Hours)

IP Addressing – ICMP - Security options. Transport Layer: Common Protocols- Transport Layer Functions-Gateways. TCP: Connection Oriented Protocols-TCP Connections-UDP. Session Layer: Session State Machine-Session and Stacks. SSL: SSL Functionality-Certificates. SSH: SSH and Security-SSH Protocols. STMP: Email Goals-Common servers. HTTP: HTTP Goals-URL.

Unit 3: CRYPTOGRAPHY

(18 Hours)

Importance - Threat Models - Concepts-Common Mitigation Methods. Network theory: Standards Bodies-Network Stacks-Multiple Stacks-Layers and Protocols-Common Tools. Cryptography: Securing Information-Necessary Elements-Authentication and Keys-cryptography and Randomness-Hashes-Ciphers-Encryption-Steganography.

Unit 4: TECHNIQUES

(18 Hours)

Data Encryption Techniques-Data Encryption Standards-Symmetric ciphers. Public key Cryptosystems-Key Management.

Unit 5: SECURITY

(18 Hours)

Authentication - Digital Signatures - E-Mail Security - Web Security – Intrusion - Firewall.

Recommended Texts

1. Neal Krawetz, Introduction Network Security, India Edition, Thomson Delmar Learning. 2007
2. V.K.Pachghare, Cryptography and Information Security, PHI Learning Private Limited 2009.

Reference Books :

1. William Stallings, Cryptography and Network Security, Prentice –Hall of India, 2008

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
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Section C	Essay Answer any 4 out of 6 questions	20– 25	10	40
TOTAL MARKS				100

Distribution of Questions:

Sections	Units	No. of Questions	
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	Unit – 4	2	
	Unit – 5	2	
Section B	Unit – 1	2	
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	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	

INTER DISCIPLINARY ELECTIVE - I

WEB DESIGNING

SUBJECT CODE:	THEORY	MARKS 100
SEMESTER: V	CREDITS: 5	TOTAL HOURS: 75

COURSE FRAMEWORK:

Understand basic concepts in HTML, distinguish, and practice markup languages.

COURSE OBJECTIVE:

6. Identify the concepts of the World Wide Web
7. Understand the concepts of search Engine.
8. Understand basic concepts in HTML.
9. Distinguish and practice markup languages
10. Insert and control images on a web page.

UNIT I

(15 Hours)

BASIC INTERNET CONCEPTS: What is Internet – History – Host Machines and Host Names- Client / Server Model – Domain Names – Protocols- IP Address.

UNIT II:

(15 Hours)

ADVANCED INTERNET CONCEPTS: Anatomy of an Email Message – Viewing - Sending – Replying - Search Engines – Meta Search Engine

UNIT III:

(15 Hours)

HTML INTRODUCTION: History of HTML – HTML Document – Anchor Tags – Hyper Links- Sample HTML Documents.

UNIT IV:

(15 Hours)

HEAD AND BODY SECTIONS: Header Section – Title – Prologue – Links – Comment – Heading – Horizontal Rule – Paragraph – Images and Pictures - Ordered and Unordered List.

UNIT V:

(15 Hours)

TABLES: Table Creation – Cols pan, Row Span – Cell Spacing, Cell Padding – Nested Tables.

FRAMES: Frameset Definition – Frame Definition – Nested Frames. **FORMS:** Action Attribute – Method Attribute – Drop Down List – Sample Forms.

TEXT BOOKS :

3. Wendy G. Lehnert, “Internet 101 - A Beginners Guide to Internet and the World Wide Web”, Addison Wesley. UNITS I & II .
4. Xavier.C, World , “Wide Web design with HTML”, Tata McGraw Hill Publishing Limited, New Delhi. UNITS III, IV & V

Question paper pattern:

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Section C	Essay Answer any 4 out of 6 questions	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	

VALUE EDUCATION

SUBJECT CODE:	THEORY	MARKS: 100
SEMESTER: V	CREDITS: 2	NO.OF HOURS PER WEEK: 2

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

(3 Hours)

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

(3 Hours)

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

(3 Hours)

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 (3 Hours)

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: (3 Hours)

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 Sikh personalities

REFERENCES

1. Dr.Abdul Kalam. *My Journey-Transforming Dreams into Actions*. Rupa Publications, 2013.
2. Steven R Covey, *8th Habit of Effective People (From Effectiveness to Greatness)*, FreePress, 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 House (1999, Reprint 2018)
5. <http://www.ncert.nic.in/rightside/links/pdf/framework/english/nf2005.pdf>

SEMESTER - VI

CORE – XV

MINI PROJECT

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

COURSE FRAMEWORK:

To Enable Students with knowledge to develop a Project within the chosen area of technology.

COURSE OBJECTIVE:

1. Recognize the area to develop a Project within the chosen area of technology.
2. Identify, discuss and justify the technical aspects of the chosen project with a comprehensive and systematic approach.
3. Apply the testing techniques in Project development.
4. Implement the key stages in development of the project.
5. Extend or use the idea in mini project for major projects.

A mini-project should be done by the students based on concepts they have already learnt in the first two years of the programme. It may be based on database concepts, object oriented concepts, image processing, data Science, optimization tools, Big Data, etc.

Objectives of the mini project : Working on Mini project is to get used to the larger project, which will be handled in Industry. The project work constitutes an important component of the B.Sc(IT) programme and it is to be carried out with due care and should be executed with seriousness by the students. The objective of this mini project is to help the student develop the ability to apply theoretical and practical tools/ techniques to solve real life problems related to industry, academic institutions and research laboratories.

Guidelines: A student is expected to devote about 3 months in planning, analyzing, designing and implementing the project. The initiation of project should be with the project proposal that is to be treated as an assignment:

Mini-project evaluation: The evaluation of the mini-project will be based on the project reports submitted by the student, a presentation and a demonstration.

CORE –XVI

SOFTWARE ENGINEERING

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

COURSE FRAMEWORK:

- Understand and demonstrate basic knowledge in software engineering.
- Identify risks; manage the change to assure quality in software projects.

COURSE OBJECTIVE:

1. Understand and demonstrate basic knowledge in software engineering.
2. Identify requirements analyze and prepare models.
3. Plan, schedule and track the progress of the projects.
4. Design & develop the software projects.
5. Identify risks; manage the change to assure quality in software projects.

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 requirements specification.

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 – scoping 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 and techniques.

PRESCRIBED BOOKS:

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

REFERENCE BOOKS:

1. Richard E.Fairley,Software Engineering Concepts,McGraw-Hill,1985
2. Ian Sommerville,Software Engineering-9th Edition,Darling Kindersley,2011
3. Roger S.Pressman,Software Engineering A Practitioner’s Approach-6th Edition, McGraw-Hill,2005
4. R.S.Pressman, 1997, Software Engineering – 1997 - Fourth Ed., McGraw Hill.
5. RajibMall ,2004,Fundamentals of Software Engineering,2nd Edition, PHI.

WEBSITES:

1. <http://people.cs.missouri.edu/~duanye/cs4320/lectures.htm>
2. <http://iiscs.wssu.edu/drupal/node/4566>

Question paper pattern:

Section	Question Component	Numbers	Marks	Total
Section A	Definition / Principles Answer any 10 out of 12 questions	1 – 12	3	30
Section B	Short Answer Answer any 5 out of 7 questions	13–19	6	30
Section C	Essay Answer any 4 out of 6 questions	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 – XVII

R PROGRAMMING

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

COURSE FRAMEWORK:

- Understand R Programming Environment and to explore Mathematical and Statistical Functions.

COURSE OBJECTIVE:

1. Understand the basics of R and the different types of data structures.
2. Apply the R programming structures to develop programs.
3. Apply Mathematical and statistical functions in R
4. Implement graphical usage in R for data analysis.
5. Implement advanced statistical functions in R for data analysis.

UNIT-I

(18 Hours)

Introduction - How to run R - R Sessions and Functions - Basic Math – Variables - Data Types – Vectors – Conclusion - Advanced Data Structures - Data Frames – Lists – Matrices – Arrays - Classes.

UNIT-II

(18 Hours)

R Programming Structures - Control Statements – Loops – Looping Over Non-vector Sets – If Else - Arithmetic and Boolean Operators and values - Default Values for Argument - Return Values - Deciding Whether to explicitly call return Returning Complex Objects - Functions are Objective - No Pointers in R – Recursion - A Quicksort Implementation Extended - Example: A Binary Search Tree.

UNIT-III

(18 Hours)

Doing Math and Simulation in R - Math Function - Extended Example Calculating Probability Cumulative Sums and Products Minima and Maxima Calculus - Functions for Statistical Distribution – Sorting - Linear Algebra Operation on Vectors and Matrices - Extended Example: Vector cross Product Extended Example: Finding Stationary Distribution of Markov Chains - Set Operation – Input /Output - Accessing the Keyboard and Monitor - Reading and writer Files.

UNIT-IV

(18 Hours)

Graphics - Creating Graphs - The Workhorse of R Base Graphics - the plot() Function – Customizing Graphs - Saving Graphs to Files.

UNIT-V

(18 Hours)

Probability Distributions - Normal Distribution Binomial Distribution Poisson Distributions other Distribution - Basic Statistics - Correlation and Covariance – Ttests – ANOVA - Linear Models - Simple Linear Regression - Multiple Regression Generalized Linear Models – Logistic Regression – Poisson Regression other Generalized Linear Models Survival Analysis, Nonlinear Models, Splines Decision Random Forests,

Recommended Texts

- i. The Art of R Programming, Norman Matloff, Cengage Learning
- ii. R for Everyone, Lander, Pearson
- iii. Siegel, S. (1956), Nonparametric Statistics for the Behavioral Sciences, McGrawHill International, Auckland.
- iv. R Cookbook, Paul Teetor, Oreilly.

Reference Books

- v. R in Action, Rob Kabacoff, Manning
- vi. Venables, W. N. and Ripley, B. D. (2000), S Programming, SpringerVerlag, New York.
- vii. Venables, W. N. and Ripley, B. D. (2002), Modern Applied Statistics with S, 4th ed., SpringerVerlag, New York.

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CORE - XVIII

PRACTICAL – R-PROGRAMMING LAB

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

COURSE FRAMEWORK:

Understand and apply the basics in R Programming from Statistical Perspective

COURSE OBJECTIVES:

1. Develop basic programs in R using sequential programming.
 2. Write programs using control structures.
 3. Write programs using R data structures.
 4. Implement the mathematical and statistical functions in R.
 5. Implement data visualizations with packages.
-
1. R Program to print "Hello World".
 2. R Program to Add Two Vectors.
 3. Find Sum, Mean and Product of Vector in R Programming.
 4. R Program to Take Input from User.
 5. R Program to Generate Random Number from Standard Distributions.
 6. R Program to Sample from a Population.
 7. R Program to Find Minimum and Maximum.
 8. R Program to Sort a Vector.
 9. R Program to Find the Factorial of a Number.
 10. R Multiplication Table.
 11. R Program to Check Prime Number.
 12. R Program to Check Armstrong Number.
 13. R Program to Print the Fibonacci sequence.
 14. R Program to Check for Leap Year.
 15. Check if a Number is Odd or Even in R Programming.

Elective – III

CLOUD COMPUTING

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

COURSE FRAMEWORK:

To enable students to understand the Cloud Computing concepts and services.

COURSE OBJECTIVES:

1. Analyze the Cloud computing setup with its vulnerabilities and applications using different architectures.
2. Design different workflows according to requirements and apply map reduce programming model.
3. Apply and design suitable Virtualization concept, Cloud Resource Management and design scheduling algorithms.
4. Create combinatorial auctions for cloud resources and design scheduling algorithms for computing clouds.
5. Assess cloud Storage systems and Cloud security, the risks involved, its impact and develop cloud application.

Unit-1:

(18 Hours)

Understanding Cloud Computing: Cloud Computing –History of Cloud Computing – Cloud Architecture –Cloud Storage –Why Cloud Computing Matters –Advantages of Cloud Computing – Disadvantages of Cloud Computing –Companies in the Cloud Today – Cloud Services.

Unit-2:

(18 Hours)

Developing Cloud Services: Web-Based Application –Pros and Cons of Cloud Service Development –Types of Cloud Service Development –Software as a Service –Platform as a Service- Infrastructure as a service –Web Services –On-Demand Computing –Discovering Cloud Services Development Services and Tools –Amazon Ec2 –Google App Engine –IBM Clouds.

Unit-3:

(18 Hours)

Cloud Computing For Everyone: Centralizing Email Communications –Collaborating on Schedules –Collaborating on To-Do Lists –Collaborating Contact Lists –Cloud Computing for the Community–Collaborating on Group Projects and Events –Cloud Computing for the Corporation.

Unit-4:

(18 Hours)

Using Cloud Services: Collaborating on Calendars, Schedules and Task Management – Exploring Online Scheduling Applications –Exploring Online Planning and Task Management–Collaborating on Event Management –Collaborating on Contact Management –Collaborating on Project Management –Collaborating on Word Processing -Collaborating on Databases –Storing and Sharing Files.

Unit-5:**(18 Hours)**

Other Ways To Collaborate Online: Collaborating via Web-Based Communication Tools –Evaluating Web Mail Services –Evaluating Web Conference Tools –Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.

Recommended Texts:

1. Michael Miller, Cloud Computing: Web-Based Applications That Change the Way You Work and Collaborate Online, Que Publishing, August 2008.
2. Kumar Saurabh, “Cloud Computing – Insights into New Era Infrastructure”, Wiley Indian Edition, 2011.
3. Haley Beard, Cloud Computing Best Practices for Managing and Measuring Processes for On-demand Computing, Applications and Data Centers in the Cloud with SLAs, Emereo Pty Limited, July 2008.

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Section C	Unit – 1	2	
	Unit – 2	1	
	Unit – 3	1	
	Unit – 4	1	
	Unit - 5	1	

Elective – III

MOBILE COMPUTING

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

COURSE FRAMEWORK:

To Understand Working of Wireless devices and interconnectivity

Unit-1: (18 Hours)

Introduction - Mobile and Wireless Devices – Simplified Reference Model – Need for Mobile Computing –Wireless Transmissions –Multiplexing – Spread Spectrum and Cellular Systems- Medium Access Control – Comparisons.

Unit-2: (18 Hours)

Telecommunication Systems – GSM – Architecture – Sessions – Protocols – Hand Over and Security – UMTS and IMT – 2000 – Satellite Systems.

Unit-3: (18 Hours)

Wireless Lan - IEEE S02.11 – Hiper LAN – Bluetooth – Security and Link Management.

Unit-4: (18 Hours)

Mobile network layer - Mobile IP – Goals – Packet Delivery – Strategies – Registration – Tunneling and Reverse Tunneling – Adhoc Networks – Routing Strategies.

Unit-5: (18 Hours)

Mobile transport layer - Congestion Control – Implication of TCP Improvement – Mobility – Indirect – Snooping – Mobile – Transaction oriented TCP - TCP over wireless – Performance.

Recommended Texts:

1. J.Schiller, 2003, Mobile Communications, 2nd edition, Pearson Education, Delhi.

Reference Books:

1. Hansmann, Merk, Nicklous, Stober, 2004, Principles of Mobile Computing, 2nd Edition, Springer (India).
2. Pahlavan, Krishnamurthy, 2003(2002), Principle of wireless Networks: A unified Approach, Pearson Education, Delhi.
3. MartynMallick, 2004, Mobile and Wireless Design Essentials, Wiley Dreamtech India Pvt. Ltd., NewDelhi.
4. W.Stallings, 2004, Wireless Communications and Networks, 2nd Edition, Pearson Education, Delhi.

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Elective – III

PARALLEL COMPUTING

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

COURSE FRAMEWORK:

To learn the major concepts and ideas in parallel computing and its applications and to understand various models of parallelism

Unit-1:

(18 Hours)

Introduction To Parallel Computing- History of Parallel Computers - Problem Solving in Parallel - Performance Evaluation - Elementary Concepts -The Need of Parallel Computation – Levels of Parallel Processing - Dataflow Computing - Applications of Parallel Processing.

Unit-2:

(18 Hours)

Introduction to Classification of Parallel Computers -Types of Classification - Flynn’s Classification -Handler’s Classification -Structural Classification - Classification Based on Grain Size.

Unit-3:

(18 Hours)

Introduction to Interconnection Networks - Network Properties- Design issues of Interconnection Network- Various Interconnection Networks-Concept of Permutation Network -Performance Metrics.

Unit-4:

(18 Hours)

Introduction to Parallel Computer Architecture - Pipeline Processing - Vector Processing – Array Processing - Superscalar Processors - VLIW Architecture - Multi-threaded Processors.

Introduction to Operating System For Parallel Computer - Parallel Programming Environment Characteristics- Synchronization Principles- Multitasking Environment.

Unit-5:

(18 Hours)

Introduction Performance Evaluations - Metrics for Performance Evaluation - Factors Causing Parallel Overheads- Laws For Measuring Speedup Performance - Tools For Performance Measurement - Performance Analysis- Performance Instrumentations.

Introduction to Recent Trends In Parallel Computing- Recent Parallel Programming Models – Parallel Virtual Machine.

Recommended Texts:

1. Rajaraman V. and Siva Ram Murthy C. *Parallel Computers –Architecture and Programming*, Second Edition, Prentice Hall of India .
2. SelimG.AkI*Parallel Computation, Models and Methods*: Prentice Hall of India.
3. Kai Hwang: *Advanced Computer Architecture: Parallelism, Scalability, Programmability* (2001), Tata McGraw Hill, 2001.

Reference Books:

1. Henessy J. L. and Patterson D. A. *Computer Architecture: A Qualitative Approach*, Morgan Kaufman (1990)
2. Thomas L. Casavant, PavelTvrdik, FrantiskPlasil, *Parallel Computers: Theory and Practice*,

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