

**P.K.R. ARTS COLLEGE FOR WOMEN**  
(Accredited with 'A' Grade by NAAC)  
An Autonomous Institution – Affiliated to Bharathiar University  
No.21 Pariyur Road, Gobichettipalayam – 638476.

**Department of Computer Science**

**BACHELOR OF SCIENCE – INFORMATION TECHNOLOGY**

**BOARD OF STUDIES**

**Syllabus**

*for the candidates admitted from the Academic Year 2020-21 and onwards*

*Under CBCS PATTERN*



**P.K.R ARTS COLLEGE FOR WOMEN**  
 (An Autonomous Institution, Accredited with 'A' Grade by NAAC)  
 Gobichettipalayam – 638476.  
**BACHELOR OF SCIENCE –INFORMATION TECHNOLOGY**  
**COURSE STRUCTURE**  
**CBCS – 2020-21& ONWARDS**

(For courses offering Part – I and Part - II for two semesters)

Parts	No. of Courses	Credit(s) / Course	Total Credits	Proposed Semester
<b>Part – I :</b> Tamil/Hindi/French/Kanada/Malayalam/Sanskrit	2	4	8	I – II
<b>Part – II :</b> English	2	4	8	I – II
<b>Part - III :</b> Core Courses (Core Theory /Core Practical/ Core Allied/ Elective/Comprehension in Computer Science)	32	2/3/4/5	110	I-VI
Mini Project	1	1	1	To be done in Summer Vacation of Semester IV, ESE in Semester V
<b>Part –IV:</b> <b>A. Foundation Courses:</b> i. Environmental Studies ii. Yoga and Ethics	1 1	2 2	4	I II
<b>B. Ability Enhancement Courses:</b> i. Information Security ii. Consumer Rights	1 1	2 2	4	III IV
<b>C. Skill Enhancement Courses:</b> i. Programming in PHP- Practical ii. Life Skills(Soft skills/Entrepreneur skills/Homepreneurship) iii. Programming in 3D Max- Practical	1 1 1	2 2 2	6	IV V VI
<b>D. Non-Major Elective:</b> i. Indian Women and Society / Advanced Tamil	1	2	2	III
<b>E. Open Elective:</b>	1	3	3	V
<b>Part – V :</b> <b>Proficiency Enhancement (Self Study)</b> <b>Community Engagement:</b> i. NSS/YRC/RRC/CCC/PHY.EDU ii. Students Social Activity	1 1 1	2 1 1	4	V I to VI semesters Between I to II semesters
<b>Total Marks : 4200</b>			<b>Total Credits : 150</b>	

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**BACHELOR OF SCIENCE –INFORMATION TECHNOLOGY**

Course Scheme and Scheme of Examinations

(For students admitted from 2020-21& onwards)

(For branches offering Part-I and Part-II for two Semesters)

Part	Category	Course Code	Title of the Course	Hrs/ week	Exam hrs.	Max.Marks			Credits
						CIA	ESE	Total	
<b>I – SEMESTER</b>									
I	Language: I	20LTU01/ 20LHU01/ 20LFU01/ 20LKU01/ 20LMU01/ 20LSU01	Tamil- I/Hindi-I/French-I/ Kannada-I/ Malayalam-I / Sanskrit-I	6	3	25	75	100	4
II	English: I	20LEU01	English: I	6	3	25	75	100	4
III	Core: I	20ITU01	Programming in C	4	3	25	75	100	4
III	Core :II	20ITU02	Programming in C-Practical	3	3	40	60	100	4
III	Core : III	20ITU03	Digital Fundamentals and Computer Architecture	4	3	25	75	100	4
III	Core : IV Allied : I	20ITU04	Mathematical Structures for Computer Science	5	3	25	75	100	3
III	Core :V	20ITU05	Comprehension in Computer Science-I (Online Exam / Self- Study)	-	1 1/2	-	50	50	1
IV	Foundation Course: I	20FCU01	Environmental studies	2	3	-	50	50	2
<b>TOTAL</b>				<b>30</b>				<b>700</b>	<b>26</b>
<b>II – SEMESTER</b>									
I	Language: II	20LTU02/ 20LHU02/ 20LFU02/ 20LKU02/ 20LMU02/ 20LSU02	Tamil- II/Hindi-II/French-II/ Kannada-II/ Malayalam-II/ Sanskrit-II	6	3	25	75	100	4
II	English: II	20LEU02	English: II	6	3	25	75	100	4
III	Core: VI	20ITU06	Programming in C++	5	3	25	75	100	4
III	Core : VII	20ITU07	Programming in C++ -Practical	4	3	40	60	100	4
III	Core : VIII	20ITU08	Programming in HTML- Practical	2	3	40	60	100	2
III	Core : IX Allied : II	20ITU09	Discrete Mathematics	5	3	25	75	100	3
III	Core :X	20ITU10	Comprehension in Computer Science-II (Online Exam / Self- Study)	-	1 1/2	-	50	50	1
IV	Foundation Course : II	20FCU02	Yoga and Ethics	2	3	-	50	50	2
<b>TOTAL</b>				<b>30</b>				<b>700</b>	<b>24</b>

III – SEMESTER									
III	Core :XI	20ITU11	Internet of Things	5	3	25	75	100	4
III	Core : XII	20ITU12	Java Programming	6	3	25	75	100	5
III	Core : XIII	20ITU13	Programming in Java – Practical	5	3	40	60	100	4
III	Core : XIV	20ITU14	Web Programming with PHP	6	3	25	75	100	4
III	Core: XV Allied : III	20ITU15	Microprocessor and ALP	4	3	25	75	100	3
III	Core :XVI	20ITU16	Comprehension in Computer Science-III (Online Exam / Self-Study)	-	1 1/2	-	50	50	1
IV	Ability Enhancement Course : I	20AEU01	Information Security	2	3	100	-	100	2
IV	Non - Major Elective :I	20NMU01A/ 20NMU01B	Indian Women and Society /Advanced Tamil	2	3	-	50	50	2
			<b>TOTAL</b>	<b>30</b>				<b>700</b>	<b>25</b>
IV - SEMESTER									
III	Core: XVII	20ITU17	Data Structures	6	3	25	75	100	5
III	Core : XVIII	20ITU18	Advanced Operating System	6	3	25	75	100	5
III	Core : XIX	20ITU19	Operating System - Practical	6	3	40	60	100	4
III	Core : XX Allied : IV	20ITU20	Customer Relationship Management	5	3	25	75	100	4
III	Core :XXI	20ITU21	Comprehension in Computer Science-IV(Online Exam / Self-Study)	-	1 1/2	-	50	50	1
IV	Skill Enhancement Course : I	20SEUIT01	Programming in PHP – Practical	4	3	40	60	100	2
IV	Ability Enhancement Course: II	20AEU02	Consumer Rights	3	1 1/2	-	50	50	2
			<b>TOTAL</b>	<b>30</b>				<b>600</b>	<b>23</b>

V – SEMESTER									
III	Core : XXII	20ITU22	Relational Database Management System	6	3	25	75	100	5
III	Core : XXIII	20ITU23	Programming in Python	6	3	25	75	100	4
III	Core : XXIV	20ITU24	Programming in Python and Oracle- Practical	6	3	40	60	100	4
III	Core : XXV	20ITU25	Mini Project	-	-	100	-	100	1
III	Core: XXXVI Elective: I	20ITU26A/ 20ITU26B/ 20ITU26C/	Data Mining / Animation Techniques/ /Cloud Computing Techniques	6	3	25	75	100	4
III	Core:XXVII	20ITU27	Comprehension in Computer Science-V (Online Exam / Self-Study)	-	1 1/2	-	50	50	1
IV	Skill Enhancement Course: II	20SEU02	Life Skills(Soft skills/Entrepreneur skills/Homepreneurship)	2	-	100	-	100	2
IV	**	**	Open Elective	4	3	25	75	100	3
V	Proficiency Enhancement	20PEUIT1	Software Project Management (Self Study)	-	3	-	100	100	2
<b>TOTAL</b>				<b>30</b>				<b>850</b>	<b>26</b>

VI – SEMESTER									
III	Core: XXVIII	20ITU28	Research Methodology	6	3	25	75	100	4
III	Core: XXIX	20ITU29	Programming in VB.NET	6	3	25	75	100	5
III	Core:XXX	20ITU30	Programming in VB.NET - Practical	5	3	40	60	100	4
III	Core: XXXI Elective: II	20ITU31A/ 20ITU31B/ 20ITU31C/	Big data Analytics/ Mobile Computing Techniques / Blockchain Technology	5	3	25	75	100	4
III	Core: XXXII Elective: III	20ITU32A/ 20ITU32B/ 20ITU32C /	Graphics and Multimedia / Green Computing/ Web Services	5	3	25	75	100	4
III	Core: XXXIII	20ITU33	Comprehension in Computer Science-VI (Online Exam / Self-Study)	-	1 1/2	-	50	50	1
IV	Skill Enhancement Course: III	20SEUIT03	Programming in 3Ds Max - Practical	3	3	40	60	100	2
<b>TOTAL</b>				<b>30</b>				<b>650</b>	<b>24</b>
V	Community Engagement	NSS / YRC / RRC / CCC / PHYSICAL EDUCATION			II – VI SEMESTER				1
		Students Social activity (Curriculum related)			Between I to II SEMESTER				1
<b>Total credits</b>							<b>4200</b>	<b>150</b>	

\*The students shall take up a minimum of **ONE Extra Course Paper** which is /are not offered by their own department under Part: V to complete the program. Also, the students are permitted to appear for any extra course paper(s) which is/ are offered by other departments. On passing an extra paper, the student will earn 2 extra credits.\***Life skills course – 100% Internal paper.** (Marks split up: CIA I – 25; CIA 2 – 25; Practicals – 25; Model Examination – 25)

*P. H. e. h. r.*  
**Head, Department of Computer Science**  
**P.K.R. Arts College for Women (Autonomous)**  
**Gobichettipalayam - 638476.**

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: I	20ITU01	PROGRAMMING IN C	48	-	4

### Preamble

To learn about the C programming language concepts.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn basics of C programming language	K1, K2
CO2	Understand the concept of control structures	K1, K2
CO3	Understand the implementation of arrays and Strings	K3, K5
CO4	Disseminate in functions, structures and unions	K3, K4
CO5	Familiar with Pointers and file concepts	K4, K5

## SYLLABUS

### UNIT I (10 Hours)

#### Overview of C

History of C – Importance of C – Constants, Variables and Data Types – Character Set – C Tokens – Keywords and Identifiers – Constants - Variables – Data Types –Declaration of Variables – Declaration of Storage Class – Assigning values to Variables – Defining Symbolic Constants – Declaring Variable as Constant – Operators and Expressions – Managing Input and Output Operations.

### UNIT II (6 Hours)

#### Control structures

Decision Making and Branching – Decision Making and Looping – Sample programs.

### UNIT III (10 Hours)

#### Arrays and Strings

Introduction – OneDimensional Arrays – Declaration of One Dimensional Arrays - Initialization of OneDimensional Arrays - Two Dimensional Arrays – Initialization of Two Dimensional Arrays – Character Arrays and Strings – Declaring and Initializing String Variables – Reading and Writing Strings – String Handling Functions.

### UNIT IV (10 Hours)

#### Function, Structure and Union

User Defined Functions –Structure and Unions –Defining a Structure – Declaring a Structure Variables – Accessing Structure Members – Structure Initialization – Arrays of Structures – Unions.

### UNIT V (12 Hours)

#### Pointers and Files

Understanding Pointers – Accessing the Address of Variables – Declaring the Pointer Variable – Accessing a Variable Through its Pointer – Pointer Expression – Pointer and Arrays – Array of

Pointer – Pointer as Function Arguments - File Management in C – Defining and Opening a File  
- Closing the File – Input and Output Operations on Files – Sample Programs.

**TEXT BOOK:**

1. E.Balagurusamy, Programming in ANSI C ,3rd Edition, Tata McGraw-Hill, 2004.

**REFERENCE BOOKS:**

1.Ashok N Kamthane, Programming with ANSI and Turbo C, Pearson, 2002.

2.E Balagurusamy, Computing Fundamentals & C Programming, Tata McGraw-Hill, Second Reprint 2008.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: II	20ITU02	PROGRAMMING IN C-PRACTICAL	-	36	4

**Subject Description:** This course provides hands on experience on C Programming.

**Goal:** To enable the students to develop software in C language.

**Objectives:** On successful completion of the course the students will understand the concepts of C language and expertise in using C.

### Practical List

1. Evaluate the expression which performs all arithmetic operations in mixed mode.
2. Program to solve Binomial coefficient.
3. Check the given number is odd or even - using if else/switch case/conditional operator methods.
4. Print all prime numbers between any two given limit.
5. Program to find the sum of the digits of a number.
6. Program to calculate gross salary of an employee [using formula : gross\_sal = basic\_sal+hra+da].
7. Finding area of a square, rectangle, circle using switch case.
8. Arrange the given set of numbers in ascending and descending order.
9. Matrix addition.
10. Mark list processing using Structure.
11. Calculate the factorial value using recursive function.
12. Program to perform various file operations – Add/Delete/Update/Finding no of records in the file.



CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: III	20ITU03	DIGITAL FUNDAMENTALS AND COMPUTER ARCHITECTURE	48	-	4

#### Preamble

To understand the fundamentals behind digital logic design and the course includes fundamentals of Boolean algebra, Combinational, Sequential circuits, Input-Output organization and Memory organization.

#### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To provide an insight of how basic computer components are specified, also to perform number conversions and to identify logic gates and its functionalities	K1, K2
CO2	Apply Boolean laws and rules to simplify the expression, to Understand the digital logic circuits and their design	K2, K3, K5
CO3	Illustrate I/O devices and peripherals and to acquire knowledge of Input-Output interfaces	K3
CO4	Gain an ability to handle interrupts, also to identify and illustrate basic organization of computer	K4, K5
CO5	To work with memory organization and to understand memory concepts	K4

## SYLLABUS

### UNIT I (10Hours) Number System and Binary Codes

Number System and Binary Codes: Decimal, Binary, Octal, Hexadecimal – Binary Addition, Multiplication, Division – Floating Point Representation, Complements, BCD, Excess3, Gray Code. Arithmetic Circuits: Half Adder, Full Adder, Parallel Binary Adder, BCD Adder, Half Subtractor, Full Subtractor, Parallel Binary Subtractor - Digital Logic: The Basic Gates – NOR, NAND, XOR Gates.

### UNIT II (10 Hours) Logical Circuit

Combinational Logic Circuits: Boolean Algebra – Karnaugh Map – Canonical Form 1 – Construction and Properties – Don't Care Combinations - Product of Sum, Sum of Products, Simplifications. Sequential Circuits: Flip-Flops: RS, D, JK, and T - Multiplexers – Demultiplexers – Decoder- Encoder – Introduction to Shift Registers and Counters.

### UNIT III (10Hours) Input-Output Organization

Input – Output Organization: Input – Output interface – I/O Bus and Interface – I/O Bus versus Memory Bus – Isolated versus Memory – Mapped I/O – Example of I/O Interface. Asynchronous Data Transfer: Strobe Control and Handshaking.

### UNIT IV (8 Hours) Interrupts and DMA

Priority Interrupt: Daisy- Chaining Priority, Parallel Priority Interrupt. Direct Memory Access: DMA Controller, DMA Transfer. Input – Output Processor: CPU-IOP Communication.

**UNIT V (10Hours)****Memory Organization**

Memory Organization: Memory Hierarchy – Main Memory - Associative Memory: Hardware Organization, Match Logic, Read Operation, Write Operation. Cache Memory: Associative, Direct, Set-Associative Mapping – Writing into Cache Initialization.

**TEXT BOOKS:**

1. V.K. Puri, Digital Electronics Circuits and Systems, TMH.
2. Albert Paul Malvino, Donald P Leach, Digital principles and applications, TMH, 1996.
3. M. Morris Mano, Computer System Architecture, PHI.

**REFERENCE BOOK:**

1. M. Carter, Computer Architecture, Schaum's outline series, TMH.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
FOUNDATION COURSE:I	20FCU01	ENVIRONMENTAL STUDIES	24	-	2

### Preamble

To bring about an awareness of a variety of environmental concerns and to create a pro-environmental attitude and a behavioral pattern in society that is based on creating sustainable lifestyle.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To give information about the environment and the resources to act at our own level to protect them	K1
CO2	To analyze the roles of organisms as part of interconnected food webs, populations, communities, and ecosystems	K4
CO3	Understand the scale dependence of biodiversity and its measurement	K2
CO4	To learn how to assess pollution sources, study exposure pathways and fate, and evaluate consequences of human exposure to pollution and its impacts to environmental quality.	K1,K3
CO5	To balance our economic, environmental and social needs, allowing prosperity for now and future generations	K5

## SYLLABUS

### UNIT I (4 Hours)                      Multidisciplinary Nature of Environmental Studies

**Environment:** Definition, Components, Segments and Types. **Natural Resources:** Meaning, Components: (1. **Forest**-Meaning, Importance and Types 2. **Water**- Meaning, Types and Problems 3. **Mineral**- Meaning and Classification 4.**Food**-Meaning and Problems 5.**Energy**-Meaning, Forms and Types 6.**Land**- Meaning, Structure and Functions, Components), **Classification:** Renewable and Non-Renewable Resources, Role of an Individual in Conservation of Natural Resources.

### UNIT II(5 Hours)                      Ecosystems

**Ecosystems** – Definition, Features, Structure and Function of an Ecosystem, Producers, Consumers and Decomposers, Energy Flow in the Ecosystem (Water,Carbon,Nitrogen,Oxygen and Energy), Food Chains, Food Webs and Ecological Pyramids

**Introduction Types, Characteristics Features, Structure and Function of the following Ecosystem:**

- Forest Ecosystem
- Grassland Ecosystem
- Desert Ecosystem
- Aquatic Ecosystems (Ponds, Streams, Lakes, Rivers, Ocean, Estuaries)

### UNIT III(5 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 Value- 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 and Conservation of Biodiversity.

#### UNIT IV(5 Hours)

#### Environmental Pollution

Definition, Causes, Effects, control measures and Prevention Acts for Air, Water, Soil, Noise, Thermal Pollutions and Nuclear Hazards. **Solid Waste Management:** Meaning, Causes, effects and control measures of urban and industrial wastes. **Disaster Management:** Meaning, Types of Disasters: floods, earthquake, cyclone and landslides. **Environmental Ethics:** Issues and possible solutions- Climate change, global warming, acid rain, ozone layer depletion, nuclear - accidents and holocaust. Consumerism and waste products, Public Awareness.

#### UNIT V(5 Hours)

#### Social Issues and the Environment

**Social Issues and the Environment:** From Unsustainable to Sustainable development- Urban problems related to energy- Water conservation, rain water harvesting, watershed management- Resettlement and rehabilitation of people; its problems and concerns.

**Human Population and the Environment:** Population growth and distribution- Population explosion – Family Welfare Programme-Environment and human health- HIV/AIDS- Role of Information Technology in Environment and human health- Medical transcription and bio-informatics.

#### REFERENCEBOOKS

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. Bharucha Erach, The Biodiversity of India, Mapin Publishing Pvt. Ltd., Ahmedabad
3. Brunner R.C., 1989, Hazardous Waste Incineration, McGraw Hill Inc. 480p
4. Clark R.S., Marine Pollution, Clarendon Press Oxford (TB)
5. Cunningham, W.P. Cooper, T.H. Gorhani, E & Hepworth, M.T. 2001,
6. Environmental Encyclopedia, Jaico Publ. House, Mumabai, 1196p
7. De A.K., Environmental Chemistry, Wiley Eastern Ltd.
8. Down to Earth, Centre for Science and Environment (R)
9. Gleick, H.P. 1993. Water in crisis, Pacific Institute for Studies in Dev.,
10. Environment & Security. Stockholm Env. Institute Oxford Univ. Press. 473p
11. Hawkins R.E., Encyclopedia of Indian Natural History, Bombay Natural
12. History Society, Bombay (R)
13. Heywood, V.H & Waston, R.T. 1995. Global Biodiversity Assessment, Cambridge Univ. Press 1140p.
14. Jadhav, H & Bhosale, V.M. 1995. Environmental Protection and Laws, Himalaya Pub. House, Delhi 284 p.
15. Mckinney, M.L. & School, R.M. 1996. Environmental Science systems & Solutions, Web enhanced edition. 639p.
16. Mhaskar A.K., Matter Hazardous, Techno-Science Publication (TB)
17. Miller T.G. Jr. Environmental Science, Wadsworth Publishing Co. (TB)
18. Odum, E.P. 1971. Fundamentals of Ecology. W.B. Saunders Co. USA, 574p
19. Rao M N. & Datta, A.K. 1987. Waste Water treatment. Oxford & IBH Publ.Co. Pvt. Ltd. 345p.
20. Sharma B.K., 2001. Environmental Chemistry. Geol Publ. House, Meerut
21. Survey of the Environment, The Hindu (M)
22. Townsend C., Harper J, and Michael Begon, Essentials of Ecology, Blackwell Science (TB)

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:VI	20ITU06	PROGRAMMING IN C++	60	-	4

### Preamble

To learn about Object Oriented Concepts through C++.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn basics of OOPS	K1,K2
CO2	Understand various functions in C++	K2
CO3	Learn overloading and inheritance concepts	K3, K4
CO4	Ability to learn pointers and virtual functions	K3, K5
CO5	Know about working principles of files, error handling and string handling	K4, K5

## SYLLABUS

### UNIT I(12 Hours) Introduction to C++

Software Evolution- A Look at Procedure-Oriented Programming- Object Oriented Paradigm- Basic Concepts of OOP- Benefits of OOP- Object Oriented Languages- Applications of OOP- Beginning With C++ - Tokens- Expressions and Control Structures.

### UNIT II(12 Hours) Function in C++

Main Function- Function Prototyping- Call By Reference- Return By Reference- Inline Function- Function Overloading – Classes and Objects: C Structures Revisited- Specifying a Class- Defining Member Function- C++ Program with Class- Nesting of Member Function- Private Member Function- Memory Allocation for Objects- Static Data Members and Functions- Array of Objects- Objects as Function Arguments- Friendly Functions – Constructors and Destructors: Constructor- Parameterized Constructors- Multiple Constructor in a Class- Copy Constructor- Destructor.

### UNIT III(12 Hours) Operator Overloading

Introduction- Defining Operator Overloading- Overloading Unary Operator- Overloading Binary Operator- Overloading Binary Operator Using Friends- Rules for Overloading Operator – Inheritance: Defining Derived Classes- Single Inheritance- Making a Private Member Inheritable- Multilevel Inheritance- Multiple Inheritance- Hierarchical Inheritance- Hybrid Inheritance- Virtual Base Classes- Abstract Classes.

### UNIT IV(12 Hours) Pointers

Introduction- Pointers- Array of Pointers- Pointers to Objects- This Pointer- Pointer to Derived Class- Virtual Functions- Rules for Virtual Function- Pure Virtual Function – Managing Console I/O Operations.

### UNIT V(12 Hours) Exception Handling and Strings

Working with Files –Exception Handling: Introduction- Basics of Exception Handling- Exception Handling Mechanism- Throwing Mechanism- Catching Mechanism – Strings: Introduction- Creating (String) Objects- Manipulating String Objects- Relational Operators- String Characteristics.

**TEXT BOOK:**

1.E.Balagurusamy,Object Oriented Programming with C++, Fifth Edition, TMH Publication.

**REFERENCE BOOKS:**

1.John R Hubbard, Programming with C++, 2<sup>nd</sup> Edition, TMH Publication, 2002.

2.Maria Litvin & Gary Litvin, C++ for you, Vikas Publication, 2002.

3.Yashavant Kanetkar, Let us C++, BPB Publication, 2<sup>nd</sup> Edition, 2010.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: VII	20ITU07	PROGRAMMING IN C++- PRACTICAL	-	48	4

**Subject Description:** This course provides rich experience on C++ Programming.

**Goal:** To enable the students to develop software in C++ language.

**Objectives:** On successful completion of the course the students will understand the concepts of C++ language and expertise in using C++.

### Practical List

1. Write a C++ program to find a factorial for a given number using recursive function
2. Write a C++ program to find a Fibonacci series using while loop
3. Define a class to represent a bank account. Include the following members:  
**Data members:** Name of the depositor, Account number, Type of account Balance amount in the account  
**Member functions:** To assign initial values, To deposit an amount, To withdraw an amount after checking the balance, To display the name and balance. Write a main program to invoke the member functions
4. Write a C++ program to read an integer number and find the sum of all the digits until it reduces to a single digit using constructors, destructors and inline member functions.
5. Write a C++ program to swap two numbers using friend function
6. Write a C++ Program to create class, which consists of EMPLOYEE Detail like E\_Number, E\_Name, Department, Basic, Salary, and Grade. Write a member function to get and display them. Derive a class PAY from the above class and write a member function to calculate DA, HRA and PF depending on the grade. Create array of objects for the derived class
7. Write a C++ program to add two complex numbers using operator overloading concept
8. Write a C++ Program to check whether the given string is a palindrome or not using Pointers
9. Write a C++ Program to merge two files into a single file
10. Write a C++ Program to implement exception handling concept using divide by zero
11. Write a C++ program to implement the concept of class template
12. Write a C++ Program to implement any four built in string functions

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: VIII	20ITU08	PROGRAMMING IN HTML - PRACTICAL	-	24	2

**Subject Description:** This course provides complete knowledge in HTML.

**Goal:** To enable the students to develop HTML web page.

**Objectives:** On successful completion of the course the students will understand the applications of HTML and create web page.

### Practical List

1. A Program to illustrate body, pre tags, text formatting tags
2. A Program to illustrate text Font tag, comment, h1...h6, and div tag
3. A Program to illustrate all types of list tag
4. A Program to illustrate img tag, Hyper Link tag (Anchor tag)
5. A Program to illustrate image map
6. A Program to illustrate Table tag
7. A Program to illustrate Frame tag
8. A Program to illustrate Form tag
9. A Program to illustrate CSS (Cascading Style Sheet)
10. A Program in HTML using JavaScript



CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
FOUNDATION COURSE: II	20FCU02	YOGA AND ETHICS	24	-	2

### Preamble

To enable the learners to acquire the knowledge on basic yogasanas and values and practice them in real life.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Acquire the basic knowledge on yoga and value education	K1
CO2	Understand the importance of yoga, mental exercises, principles of life and components of values	K2
CO3	Enhance their physical and mental health by practicing the different types of asanas, kriyas, mental exercises and values	K3
CO4	Lead a meaningful life for the fulfillment of the needs of family, workplace, society and country	K4
CO5	Enrich their understanding on family, social, professional and religious values	K4

## SYLLABUS

### UNIT I (5 Hours)

#### Yoga and Health

#### Theory:

Yoga-Meaning-Importance of Yoga- Pancha Koshas - Benefits of Yoga-General Guidelines.

#### Practice:

Dynamic Exercise- Surya Namaskar-Basic Set of Asanas-Pranayama and Kriya.

### UNIT II (5 Hours)

#### Art of Nurturing the Mind

#### Theory:

Ten Stages of Mind-Mental Frequency – Methods for Concentration.Eradication of Worries-Benefits of Blessings- Greatness of Friendship- Individual Peace and World Peace.

#### Practice: Worksheet.

### UNIT III (5Hours)

#### Philosophy and Principles of Life

Purpose and Philosophy of Life- Introspection – Analysis of Thought - Moralization of Desires-Neutralization of Anger. Vigilance and Anti- Corruption- Redressal Mechanism - Urban Planning and Administration.

#### Practice:Worksheet.

### UNIT IV (5 Hours)

#### Value Education (Part-I)

Ethical Values: Meaning – Need and Significance- Types - Value Education – Aim of Education and Value Education. Components of Value Education: Individual Values – Self Discipline, Self Confidence, Self-Initiative, Empathy, Compassion, Forgiveness, Honesty, Sacrifice, Sincerity, Self-Control, Tolerance and Courage.

#### Practice:Worksheet.

**UNIT V (4 Hours)****Value Education (Part-II)**

Family Values: Constitutional or National Values – Democracy, Socialism, Secularism, Equality, Justice, Liberty, Freedom and Fraternity. Social Values – Pity and Probity, Self-Control, Universal Brotherhood. Professional Values – Knowledge Thirst, Sincerity in Profession, Regularity, Punctuality and Faith. Religious Values – Tolerance, Wisdom, Character.

**Practice:** Worksheet.

**REFERENCE BOOKS:**

1. Vethathiri Maharishi, Yoga for Human Excellence, Sri Vethathiri Publications, 2015.
2. Value Education for Human Excellence- Study Material by Bharathiar University.
3. Value Education - Study Material by P.K.R Arts College for Women.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XI	20ITU11	INTERNET OF THINGS	60	-	4

### Preamble

This course gives an overview of basic concepts of building an IoT system and its application in various fields.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Define and describe the fundamental concepts of IoT	K1, K2
CO2	Integrate knowledge on the communication and network protocols used in IoT	K1, K2
CO3	Discuss the IoT design methodology and its implementation	K2, K3
CO4	Demonstrate the ideas of building IoT system and experiment with Raspberry pi and Arduino.	K3, K4
CO5	Examine the usage of cloud storage in IoT and relate to various real time applications	K4, K5

## SYLLABUS

### UNIT I (12 Hours)

#### Fundamentals of IoT

Introduction – Characteristics-Physical Design - Protocols – Logical Design – Enabling Technologies – IoT Levels – Domain Specific IoTs – IoT vs M2M.

### UNIT II (12 Hours)

#### IoT Communication and Network Protocols

M2M -IoT Vs M2M – Software Defined Network and Network Function Virtualization - IoT Systems Management – Simple Network Management Protocol - NETCONF-YANG.

### UNIT III (12 Hours)

#### IoT Design Methodology

IoT Design Methodology – Case study on IoT System for Home Automation –Weather Monitoring – Python in IoT.

### UNIT IV (12 Hours)

#### Physical Devices and Endpoints

Basic Building blocks – Raspberry Pi- Interfaces – Programming with Raspberry Pi- IoT with Arduino-Connecting -Testing Sensors using Arduino sketch.

### UNIT V (12 Hours)

#### IoT Cloud offerings and Case Studies

Cloud Storage Models and Communication APIs–WAMP- Xively Cloud- Amazon Web Services for IoT-Variou Real Time Applications of IoT.

### TEXT BOOK :

1.Arshdeep Bahga, Vijay Madisetti,Internet of Things – A hands-on approach, Universities Press, 2015.

### REFERENCE BOOKS:

1.Marco Schwartz, Internet of Things with the Arduino Yun, Packt Publishing, 2014.  
2.Adrian McEwen, Hakim Cassimally, Designing the Internet of Things, ISBN: 978-1-118-43062-0,Wiley,November 2013.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XII	20ITU12	JAVA PROGRAMMING	72	-	5

### Preamble

To inculcate knowledge on Java Programming concepts.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn basic concepts Java Programming Language	K1,K2
CO2	Acquire knowledge of control structures, classes, objects and methods	K1,K2
CO3	Familiarize in the concepts of Arrays, Inheritance, Packages and Multithreaded programming	K2,K5
CO4	Create wide range of Applications and Applets using Java	K3,K4
CO5	Ability to work with I/O Streams	K4,K5

## SYLLABUS

### UNIT I (15Hours) Fundamentals of Object-Oriented Programming

Basic Concepts of Object-Oriented Programming – Benefits of Object-Oriented Programming – Application of Object-Oriented Programming. Java Evolution: Features – How Java differs from C and C++. Overview of Java: Simple Java Program – Structure – Java Tokens – Statements – Java Virtual Machine.

### UNIT II (15Hours) Control Structures

Constants, Variables, Data Types - Operators and Expressions – Decision Making and Branching: If, If..Else, Nested If, Switch, ? : Operator - Decision Making and Looping: While, Do, For – Jumps in Loops - Labeled Loops – Classes, Objects and Methods.

### UNIT III (15Hours) JAVA Programming

Arrays, Strings and Vectors – Interfaces: Multiple Inheritance – Packages: Putting Classes together – Multithreaded Programming.

### UNIT IV (12 Hours) Programming with JAVA

Applet Programming – Graphics Programming.

### UNIT V (15Hours) Managing Input / Output Files in Java

Concepts of Streams - Stream Classes – Byte Stream Classes – Character Stream Classes – Using Streams – I/O Classes – File Class – I/O Exceptions - Creation of Files.

### TEXT BOOK:

1. E. Balagurusamy, Programming with Java a Primer, 3rd Edition, TMH.

### REFERENCE BOOKS:

1. Patrick Naughton & Hebert Schildt, The Complete Reference Java 2, 3<sup>rd</sup> Edition, TMH.
2. John R. Hubbard, Programming with Java, 2<sup>nd</sup> Edition, TMH.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XIII	20ITU13	PROGRAMMING IN JAVA-PRACTICAL	-	60	4

**Subject Description:** This course provides hands on experience on Java Programming.

**Goal:** Enable to create wide range of Applications and Applets using Java.

**Objective:** On successful completion of the course the students will understand the concepts of Java Programming language and expertise in using Java.

### Practical list

1. Write a Java Program to define a class, define instance methods for setting and Retrieving values of instance variables and instantiate its object
2. Write a Java Program to demonstrate use of subclass
3. Write a Java Program to implement array of objects
4. Write a Java program to practice using String class and its methods
5. Write a Java program to practice using String Buffer class and its methods
6. Write a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods
7. Write a program to demonstrate use of implementing interfaces
8. Write a program to Implementing Thread based applications
9. Write a program using Applet to display a message in the Applet
10. Write an applet program working with Colors and Fonts
11. Write a program using Applet for configuring Applets by passing parameters
12. Write programs for using Graphics class
  - to display basic shapes and fill them
  - draw different items using basic shapes
  - set background and foreground colors

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XIV	20ITU14	WEB PROGRAMMING WITH PHP	72	-	4

### Preamble

To learn about the development of PHP Programming and MySQL database connectivity.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn basic development concepts of PHP	K1,K2
CO2	Acquire knowledge about control structures	K1,K2
CO3	Working with arrays	K2,K5
CO4	Analyze about OOPS and File concepts	K3,K4,K5
CO5	Learn connectivity and XML	K2, K3, K5

## SYLLABUS

### UNIT I (9 Hours)

#### Introduction to PHP

Introducing PHP – Basic Development Concepts – Creating First PHP Scripts – Using Variable and Operators – Storing Data in Variable – Understanding Data Types – Setting and Checking Variables Data Types – Using Constants – Manipulating Variables with Operators.

### UNIT II (10 Hours)

#### Control Structures

Controlling Program Flow: Writing Simple Conditional Statements - Writing More Complex Conditional Statements – Repeating Action with Loops – Working with String and Numeric Functions.

### UNIT III (10 Hours)

#### Arrays

Working with Arrays: Storing Data in Arrays – Processing Arrays with Loops and Iterations – Using Arrays with Forms - Working with Array Functions – Working with Dates and Times.

### UNIT IV (9 Hours)

#### OOPS and File Concepts

Using Functions and Classes: Creating User-Defined Functions - Creating Classes – Using Advanced OOP Concepts. Working with Files and Directories: Reading Files-Writing Files-Processing Directories.

### UNIT V (10 Hours)

#### Database and XML

Working with Database and SQL: Introducing Database and SQL- Using MySQL-Adding and Modifying Data-Handling Errors – Using SQLite Extension and PDO Extension. Introduction XML-Simple XML and DOM Extension.

### TEXT BOOKS:

1.Vikram Vaswani, PHP A Beginner’s Guide, Tata McGraw-Hill.

### REFERENCE BOOKS:

1. Steven Holzner,The PHP Complete Reference, Tata McGraw-Hill Edition.

2.Julie Meloni, Matt Telles, PHP 6, 3<sup>rd</sup> Edition, Cengage Learning India Edition, 2009.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XV ALLIED: III	20ITU15	MICROPROCESSOR AND ALP	48	-	3

### Preamble

To introduces the details about basic concepts of data communication and networking.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain basics of the processors	K1,K2
CO2	Familiarize with assembly level language programming	K2,K3
CO3	Understand the Architecture & Memory management	K1,K4
CO4	Familiarize the external devices to the processor according to the user requirements	K3,K4
CO5	Analyze and create novel products and solutions for the real time problems Communication protocols	K4,K5

## SYLLABUS

### UNIT I (10Hours) Introduction to Microprocessor

Introduction to Microprocessors : Evolution of Microprocessors – Single-Chip Microcomputer – Embedded Microprocessors – Bit- Slice processors – Microprogramming – RISC and CISC Processors – Scalar and Superscalar Processors – Vector Processors – Array Processors – Symbolic Processors – Digital Signal Processors Intel 8086 – Pin Description of Intel 8086 – Operating Modes of 8086 – Register Organization of 8086 – BIU and EU – Interrupts – 8086 Based Computer System – Addressing Modes of 8086 .

### UNIT II (10Hours) Instruction Set and Simple Programs in Microprocessor

8086 Instruction Set – Instruction Groups – Addressing Mode Byte – Segment Register Selection – Segment Override – 8086 Instructions Assembly Language Programs for 8086: Largest Number, Smallest Number in a Data Array – Numbers in Ascending and Descending order – Block Move or Relocation – Block Move using REP instruction – Sum of a Series – Multibyte Addition.

### UNIT III (10Hours) Intel Architecture and Memory Management

Intel 386 and 486 Microprocessors: Intel 386 and 486 Microprocessor – 486DX Architecture – Register Organization of 486 Microprocessor – Memory Organization – Operating Modes of Intel 486 – Virtual Memory – Memory Management Unit – Gates – Interrupts and Exceptions – Addressing Modes of 80486 – Pin Configuration.

### UNIT IV (9Hours) Addressing Modes , Microprocessor and its Types

Input Devices – Output Devices – Memory and I/O addressing – 8086 Addressing and Address Decoding – Programmable I/O Ports – DMA Data Transfer. Other Microprocessors – PowerPC Microprocessors – Pentium Microprocessors – Pentium Pro microprocessor – Alpha Microprocessor – Cyrix Microprocessor – MIPS Microprocessor – AMD Microprocessor.

### UNIT V (9 Hours) MOTOROLA and Applications of Microprocessor

MOTOROLA 68000, MOTOROLA 68020, MOTOROLA 68030, MOTOROLA 68040  
Interfacing of A/D Converter and Applications: Introduction – Interfacing of ADC 0808 or  
ADC 0809 to Intel 8086 – Bipolar to Unipolar Converter – Sample and Hold Circuit, LF 398 –  
Microprocessor-Based Measurement and Control of Physical Quantities.

**TEXT BOOK:**

1. Badri Ram, Advanced Microprocessors and Interfacing, Tata McGraw-Hill Publishing  
Company Limited, Fourteenth reprint, 2007.

**REFERENCE BOOK:**

1. A.K. Ray, K.M. Bhurchandi, Advanced Microprocessors and Peripherals, Tata McGraw-  
Hill Publishing Company Limited, Second Edition, 2007.



CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
ABILITY ENHANCEMENT COURSE: I	20AEU01	INFORMATION SECURITY	24	-	2

### Preamble

To learn about the basics of Information Security.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain fundamental knowledge of Information Security	K1,K2
CO2	Learn basic concepts of Risks in Information Security	K1,K2
CO3	Familiarize the ideas of security planning and policies	K2,K3
CO4	Understand with Privacy and Ethical Issues in Information Security	K3,K4
CO5	Learn about Cryptography	K4, K5

## SYLLABUS

### UnitI (5 Hours) Introduction to Information Security

Information Security: Principles, Concepts and Definitions - The need for Information Security - Benefits of Information Security. The Security Problem in Computing: The Meaning of Computer Security - Computer Criminals.

### UnitII (4 Hours) Information Risk

Information Risk: Threats and Vulnerabilities of Information Systems – Introduction to Risk Management. Information Security Management Policy, Standards and Procedures.

### UnitIII (5 Hours) Security Planning

Administering Security: Security Planning - Security Planning Team Members - Assuring Commitment to a Security Plan - Business Continuity Plan - Incident Response Plan - Organizational Security Policies, Physical Security.

### Unit IV (5 Hours) Privacy and Ethical Issues in Information Security

Legal Privacy and Ethical Issues in Information Security: Protecting Programs and Data - Information and the Law - Rights of Employees and Employers - Software Failures - Computer Crime - Ethical Issues in Information Security.

### Unit V (5 Hours) Cryptography

Cryptography: Introduction to Cryptography -What is Cryptography – Plain Text – Cipher Text – Substitution Ciphers - Transposition Ciphers.

**TEXT BOOK:**

1. Sumitra Kisan and D.Chandrasekhar Rao, Information Security Lecture Notes, Department of Computer Science and Engineering & Information Technology, Veer Surendra Sai University of Technology (Formerly UCE, Burla) Burla, Sambalpur, Odisha.

**REFERENCE BOOK:**

1. Andy Taylor (Editor), David Alexander, Amanda Finch & David Sutton, Information Security Management Principles An ISEB Certificate, The British Computer Society, 2008.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
NON-MAJOR ELECTIVE: I	20NMU01A	INDIAN WOMEN AND SOCIETY	24	-	2

### Preamble

To familiarize students with the specific cultural contexts of women in India.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Demonstrate knowledge of the history of women's studies as an academic discipline	K1, K2
CO2	Analyze the various roles of women and the challenges faced by them in the society	K3
CO3	Assimilate and evaluate the importance of women health	K3, K5
CO4	Identify the different issues related to women in general	K4
CO5	Assessing the Women Empowerment and the role of Central & State Government in developing Women	K5

### UNIT I (5 Hours)

#### Historical Background

History of Women's status from Vedic times, Women's participation in India's Pre and Post Independence movement and Economic Independence, fundamental rights and importance of women in Modern Society.

### UNIT II (5 Hours)

#### Role of Women (Challenges & remedies)

Women in Family, Agriculture, Education, Business, Media, Defense, Research and Development, Sports, Civil Services, Banking Services, Social Work, Politics and Law.

### UNIT III (5 Hours)

#### Women and Health

Women and health issues, Malnutrition, Factors leading to anemia, Reproductive maternal health and Infant mortality, Stress.

### UNIT IV (5 Hours)

#### Issues of Women

Women's issues, Dowry Related Harassment and Dowry Deaths, Gender based violence against women, Sexual harassment, Loopholes in Practice to control women issues.

### UNIT V (4 Hours)

#### Women Empowerment

Meaning, objectives, Problems and Issues of Women Empowerment, Factors leading to Women Empowerment, Role and Organization of National Commission for Women, Central and State Social Welfare Board for Women Empowerment, Reality of women empowerment in the era of globalization.

**REFERENCE BOOKS:**

<b>S.No</b>	<b>Authors</b>	<b>Title</b>	<b>Publishers</b>	<b>Year of Publication</b>
1	Mala Khullar	Writing the Women's Movement: A Reader	Zubaan	2005
2	IAWS	The State and the Women's Movement in India	IAWS, Delhi	1994
3	Kosambi, Meera	Crossing Thresholds: Feminist Essays in Social History	Permanent Black	2007
4	T Rowbotham, Sheila	Hidden from History: Women's Oppression and the Fight against It	Pluto Press, London	1975
5	Susheela Mehta	Revolution and the Status of Women	Metropolitan Book co.pvt ltd, New Delhi	1989

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XVII	20ITU17	DATA STRUCTURES	72	-	5

### Preamble

The Proposed Core Paper, offers first formal introduction to various algorithms, method for analyzing the performance of algorithms, Stack and Queues, Basic Terminology of Trees, Hash Tables and Various Sorting Techniques.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Describe how arrays, linked lists, stacks, queues, are represented in memory and used by algorithms	K1, K2
CO2	Illustrate some of the special trees, symbol tables and Hashing Techniques	K2, K5
CO3	Demonstrate knowledge of Sorting Algorithms and their run-time complexity	K3, K4
CO4	Understand the basics of sorting and to learn about External sorting	K4, K5
CO5	File Organization and indexing technique will be analyzed	K4, K5

## SYLLABUS

### UNIT I (12Hours)

#### Introduction to Algorithms

Introduction of Algorithms, Analyzing Algorithms. Arrays: Sparse Matrices -Representation of Arrays. Stacks and Queues. Fundamentals -Evaluation of Expression Infix to Postfix Conversion.

### UNIT II(12Hours)

#### Linked List and Storage Management

Singly Linked List -Linked Stacks and Queues -Polynomial Addition -Doubly Linked List and Dynamic -Storage Management.

### UNIT III (12Hours)

#### Trees, Symbol Tables & Hash Tables

**Trees:** Basic Terminology -Binary Trees -Binary Tree Representations **Symbol Tables:** Static Tree Tables -Dynamic Tree Tables **-Hash Tables:** Hashing Functions -Overflow Handling.

### UNIT IV (12Hours)

#### External Sorting

Storage Devices -Sorting with Disks: K-Way Merging -Sorting with Tapes.

### UNIT V (12Hours)

#### Internal Sorting & File Organization

**Internal Sorting:** Insertion Sort -Quick Sort -2 Way Merge Sort -Heap Sort -Shell Sort -Sorting on Several Keys. **Files:** Files, Queries and Sequential organizations -Index Techniques -File Organizations.

**TEXT BOOK:**

1.Ellis Horowitz, Sartaj Shani, Data and File Structures, Galgotia Publication,1999.

**REFERENCE BOOKS:**

1.Samanta, D., Classic Data structure, Prentice- Hall of India Pvt Ltd, Ninth edition, 2007.

2.Trembly & Sorenson, Data Structures with Applications, Tata McGraw Hill Company, 2nd Edition, 1991 (only for Queue application).

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XVIII	20ITU18	ADVANCED OPERATING SYSTEM	72	-	5

### Preamble

To learn about the basic building blocks to understand the Operating System in detail.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn fundamentals of Operating System	K1,K2
CO2	Obtain knowledge about processes and deadlock	K2,K3
CO3	Gain information about memory management	K2,K3,K4
CO4	Attain knowledge about storage management	K1,K2, K3
CO5	Learn about Linux and Windows	K2,K3,K4

## SYLLABUS

### UNIT I (14 Hours) Introduction

Introduction-What Operating Systems Do – Computer System Organization – Computer System Architecture- Operating System Operations- Resource Management- Security and Protection – Virtualization – Distributed Systems - Kernel Data Structures- Computing Environments- Free and Open-Source Operating Systems(Pages:04-52).

### UNIT II (15 Hours) Process Management and Deadlock

**Processes Management:** Process Concept- Process Scheduling- Operations on Processes- Interprocess Communication- IPC in Shared Memory Systems – IPC in Message Passing Systems - Examples of IPC Systems- Communication in Client–Server Systems (Pages:106-152)

**Deadlocks:** System Model- Deadlock in Multithreaded Applications - Deadlock Characterization- Methods for Handling Deadlocks- Deadlock Prevention- Deadlock Avoidance- Deadlock Detection- Recovery from Deadlock(Pages:318-342).

### UNIT III (14 Hours) Memory Management

**Main Memory:** Background- Contiguous Memory Allocation- Segmentation- Paging- Structure of the Page Table – Swapping (Pages:349-378).

**Virtual Memory:** Background- Demand Paging- Copy-on-Write - Page Replacement- Allocation of Frames-Thrashing- Memory Compression - Allocating Kernel Memory(Pages:389-429).

### UNIT IV (14 Hours) Storage Management

**Mass Storage Structure:** Overview of Mass-Storage Structure- HDD Scheduling – NVM Scheduling- Error Detection and Correction – Storage Device Management – Swap-Space Management – Storage Attachment- RAID Structure (Pages:449-484).

**File –System Interface:** File Concept- Access Methods- Directory Structure- Protection – Memory-Mapped Files (Pages:529-559).

**UNIT V (15 Hours)****Linux and Windows**

**The Linux System:** Linux History- Design Principles- Kernel Modules- Process Management- Scheduling- Memory Management- File Systems- Input and Output- Interprocess Communication- Network Structure- Security(Pages:775-817).

**Windows 10:** History- Design Principles- System Components- Terminal Services and Fast User Switching- File System- Networking- Programmer Interface(Pages:821-895).

**TEXT BOOK:**

1. Silberschatz, Galvin Gagne, Operating System Concepts, 10th Edition, Wiley India Edition, 2018.

**REFERENCE BOOKS:**

1. DeitelChoffnes, Operating Systems, 3rd Edition, Pearson Education, 2003.
2. Stuart E. Madnick, John J.Donovan. Operating Systems, 3rd Edition, Tata McGraw Hill,2003.
3. <http://spoken-tutorial.org/>



CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XIX	20ITU19	OPERATING SYSTEM - PRACTICAL	-	72	4

**Subject Description:** This course provides programming knowledge in advanced Operating System.

**Goal:** To enable the students to gain skills in Android and Linux shell programming.

**Objectives:** On successful completion of the course the students will understand the concepts of Operating System.

### Practical List

#### Linux

1. Simple shell script for basic arithmetic and logical calculations
2. Write a shell program to find out reverse string of the given string and check the given string is palindrome or not
3. Write a shell script that displays a list of all the files in the current directory to which the user has read, write and execute permissions
4. Write a shell script to implement menu driven program to display list of users who are currently working in the system, copying files (cp command), rename a file, list of files in the directory and quit option.( Hint: use case structure)
5. Write a Shell script to demonstrate Terminal locking

#### Operating System (OS)

1. Write a program to schedule a job in OS using Round Robin method.
2. Write a program to schedule a job in OS using FIFO Algorithm.
3. Write a program to replace a page in OS using Least Recently used method.
4. Write a program to replace a page in OS using FIFO Algorithm.
5. Write a program to place a page in OS using Best Fit method.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XX ALLIED:IV	20ITU20	CUSTOMER RELATIONSHIP MANAGEMENT	60	-	4

### Preamble

To enable the students to learn the basics of Customer Relationship Management

### Course Outcomes

On successful completion of the course the students should have:

CO Number	CO Statement	Knowledge Level
CO1	Understand the Basics of CRM	K1,K2,K4
CO2	Learn main component and types of CRM	K2,K3,K4
CO3	Learn CRM tools	K2,K3,K4
CO4	Acquire knowledge of E-CRM	K3
CO5	Learn CRM through case studies	K2,K3,K4,K5

## SYLLABUS

### UNIT I (12 Hours) Introduction to CRM – An Overview

CRM : Concept and Implementation – CRM – Architecture – Features of Good CRM – Implementing CRM – Role of CRM – Advantages of CRM – Steps for Successful CRM- Definition of CRM – Components of CRM – Need for CRM.

### UNIT II (12 Hours) CRM Basics

Types of CRM – Building Blocks of CRM - CRM by Indian Firms - Implementing Technology Based CRM Solution – Future Trends in CRM

### UNIT III (12 Hours) CRM Tools

CRM –Rationale of CRM – Issues in CRM – CRM Tools –Web-Based Customer Support –Email Communication – Composing an Email –Structure of an Email – Email Checklist

### UNIT IV (12 Hours) Introduction to E-CRM

E-CRM Implementation & Strategies –Introduction – Goal of CRM – Key Benefits of CRM solutions –E-CRM Opportunities – Vision and Building Blocks of E-CRM – Issues & Challenges in E-CRM

### UNIT V (12 Hours) Case studies of CRM

Case studies : Role of CRM in Banking – A Case Study of ICICI Bank – CRM in the Insurance Business –LIC of India

### TEXTBOOKS:

- 1.Customer Relationship Management – an Indian perspective, Mukesh Chaturvedi and Abhinav Chaturvedi, Excel books, First edition, 2005
- 2.Customer Relationship Management – Modern trends and perspectives Edited by S. Shanmugasundaram, PHI, 2008

**REFERENCE BOOKS:**

1. Customer Relationship Management – Concepts & Cases, Alok Kumar Rai, PHI, 2008
2. Kaushik Mukerjee – Customer Relationship Management – PHI.
3. M. Peeru Mohamed – Customer Relationship Management – Vikas

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
SKILL ENHANCEMENT COURSE: I	20SEUIT01	PROGRAMMING IN PHP – PRACTICAL	-	48	2

**Subject Description:** This course provides programming skills in PHP

**Goal:** To enable the students to develop web based application

**Objectives:** On successful completion of the course the students will understand the concepts of PHP and connectivity with My SQL

### Practical List

1. Create a simple HTML form and accept the user name and display the name through PHP echo statement
2. Write a PHP script, which changes the color of the first character of a word
3. Write a PHP script to redirect a user to a different page
4. Write a PHP program to swap two variables
5. Write a PHP program to remove duplicates from a sorted list
6. Create a script to construct the following pattern, using nested for loop

```

*
* *
* * *
* * * *
* * * * *

```
7. Write a PHP script using nested for loop that creates a chess board
8. Create a web application takes a name as input and on submit it shows a hello<name> page where <name> is taken from the request and it shows a start time at the right top corner of the page and provides the logout button on clicking this button it should show a logout page with thank you<name> message with the duration of Usage
9. Write a PHP program to develop college application form with MySQL
10. Write a PHP program to create personal blog

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
ABILITY ENHANCEMENT COURSE : II	20AEU02	CONSUMER RIGHTS	-	36	2

### Preamble

This paper seeks to familiarize the students with their rights and responsibilities as a consumer, the social framework of consumer rights and legal framework of protecting consumer rights.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the procedure of redress of consumer complaints, and the role of different agencies in establishing product and service standards	K2, K3
CO2	To provide a comprehensive introduction to the Consumer Protection Law in India	K1,K2
CO3	Have a conceptual knowledge about the Grievance Redressal Mechanism under the Indian Consumer Protection Law	K3
CO4	Evaluate the regulations and legal actions that helps to protect consumers	K5
CO5	Evaluate the Contemporary Issues in Consumer Affairs	K4,K5

### UNIT I (8 Hours) Conceptual Framework

**Consumer and Markets:** Concept of Consumer, Nature of markets: Liberalization and Globalization of markets with special reference to Indian Consumer Markets, E-Commerce with reference to Indian Market, Concept of Price in Retail and Wholesale, Maximum Retail Price (MRP), Fair Price, GST, labeling and packaging along with relevant laws, Legal Metrology.  
**Experiencing and Voicing Dissatisfaction:** Consumer buying process, Consumer Satisfaction/dissatisfaction-Grievances-complaint, Consumer Complaining Behaviour: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

### UNIT II (8 Hours) The Consumer Protection Law in India

**Objectives and Basic Concepts:** Consumer rights and UN Guidelines on consumer protection, Consumer goods, defect in goods, spurious goods and services, service, deficiency in service, unfair trade practice, and restrictive trade practice.

**Organizational set-up under the Consumer Protection Act:** Advisory Bodies: Consumer Protection Councils at the Central, State and District Levels; Adjudicatory Bodies: District Forums, State Commissions, and National Commission: Their Composition, Powers, and Jurisdiction (Pecuniary and Territorial), Role of Supreme Court under the CPA with important case law.

### UNIT III (8 Hours) Grievance Redressal Mechanism under the Indian Consumer Protection Law

Grounds of filing a complaint; Limitation period; Procedure for filing and hearing of a complaint; Disposal of cases, Relief/Remedy available; Temporary Injunction, Enforcement of order, Appeal; Offences and penalties. **Leading Cases decided under Consumer Protection**

**law by Supreme Court/National Commission:** Medical Negligence; Banking; Insurance; Housing & Real Estate; Electricity and Telecom Services; Education; Defective Products; Unfair Trade Practices.

#### **UNITIV (6 Hours)Role of Industry Regulators in Consumer**

- i. Banking: RBI and Banking Ombudsman
- ii. Insurance: IRDA and Insurance Ombudsman
- iii. Telecommunication: TRAI
- iv. Food Products: FSSAI
- v. Electricity Supply: Electricity Regulatory Commission
- vi. Real Estate Regulatory Authority

#### **UNIT V (6 Hours) Contemporary Issues in Consumer Affairs**

**Consumer Movement in India:** Evolution of Consumer Movement in India, Formation of consumer organizations and their role in consumer protection, Misleading Advertisements and sustainable consumption, National Consumer Helpline, Comparative Product testing, Sustainable consumption and energy ratings.

**Quality and Standardization:** Voluntary and Mandatory standards; Role of BIS, Indian Standards Mark (ISI), Ag-mark, Hallmarking, Licensing and Surveillance; Role of International Standards: ISO an Overview

**Note: Unit 2 and 3 refers to the Consumer Protection Act, 1986. Any change in law would be added appropriately after the new law is notified**

#### **Suggested Readings:**

1. Khanna, Sri Ram, Savita Hanspal, Sheetal Kapoor, and H.K. Awasthi. (2007) *Consumer Affairs*, Universities Press.
2. Choudhary, Ram Naresh Prasad (2005). *Consumer Protection Law Provisions and Procedure*, Deep and Deep Publications Pvt Ltd.
3. G. Ganesan and M. Sumathy. (2012). *Globalisation and Consumerism: Issues and Challenges*, Regal Publications
4. Suresh Misra and Sapna Chadah (2012). *Consumer Protection in India: Issues and Concerns*, IIPA, New Delhi
5. Rajyalaxmi Rao (2012), *Consumer is King*, Universal Law Publishing Company
6. Girimaji, Pushpa (2002). *Consumer Right for Everyone* Penguin Books.
7. E-books :- [www.consumereducation.in](http://www.consumereducation.in)
8. Empowering Consumers e-book,
9. ebook, [www.consumeraffairs.nic.in](http://www.consumeraffairs.nic.in)
10. *The Consumer Protection Act, 1986 and its later versions.* [www.bis.org](http://www.bis.org)

#### **Articles**

1. Misra Suresh, (Aug 2017) “Is the Indian Consumer Protected? One India One People.
2. Raman Mittal, SonkarSumit and Parineet Kaur (2016) Regulating Unfair Trade Practices: An Analysis of the Past and Present Indian Legislative Models, *Journal of Consumer Policy*.
3. Chakravarthy, S. (2014). MRTP Act metamorphoses into Competition Act. CUTS Institute for Regulation and Competition position paper. Available online at [www.cuts-international.org/doc01.doc](http://www.cuts-international.org/doc01.doc).
4. Kapoor Sheetal (2013) “Banking and the Consumer” *Akademios* (ISSN 2231-0584)
5. Bhatt K. N., Misra Suresh and Chadah Sapna (2010). *Consumer, Consumerism and Consumer Protection*, Abhijeet Publications.
6. Kapoor Sheetal (2010) “Advertising-An Essential Part of Consumer’s Life-Its Legal and Ethical Aspects”, *Consumer Protection and Trade Practices Journal*, October 2010.
7. Verma, D.P.S. (2002). *Regulating Misleading Advertisements, Legal Provisions and Institutional Framework*. *Vikalpa*. Vol. 26. No. 2. pp. 51-57.

**Periodicals**

1. Consumer Protection Judgments (CPJ) (Relevant cases reported in various issues)
2. Recent issues of magazines: International Journal on consumer law and practice, National Law School of India University, Bengaluru
3. '*Consumer Voice*', Published by VOICE Society, New Delhi.

**Websites:**

[www.ncdrc.nic.in](http://www.ncdrc.nic.in)

[www.consumeraffairs.nic.in](http://www.consumeraffairs.nic.in)

[www.iso.org](http://www.iso.org).

[www.bis.org.in](http://www.bis.org.in)

[www.consumereducation.in](http://www.consumereducation.in)

[www.consumervoice.in](http://www.consumervoice.in)

[www.fssai.gov.in](http://www.fssai.gov.in)

[www.cercindia.org](http://www.cercindia.org)

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XXII	20ITU22	RELATIONAL DATABASE MANAGEMENT SYSTEM	72	-	5

### Preamble

To enable the students to learn about the concepts of database system and manipulation of data.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of database system	K1,K2
CO2	Learn about basics of oracle9i and creation of tables	K3,K5
CO3	Work with table related queries and functions	K2,K3,K4
CO4	Enhance the knowledge on the basics of PL/SQL and its functions	K3,K4,K5
CO5	Understand the concept of PL/SQL composite data types	K5

## SYLLABUS

### UNIT I (12 Hours) Introduction to Database System

Database Concepts: A Relational approach: Database – Relationships – DBMS – Relational Data Model – Integrity Rules – Theoretical Relational Languages. Database Design: Data Modeling and Normalization: Data Modeling – Dependency – Database Design – Normal forms – Dependency Diagrams - Denormalization – Another Example of Normalization.

### UNIT II (15 Hours) Oracle9i and Oracle Tables

Oracle9i: Overview: Personal Databases – Client/Server Databases – Oracle9i an introduction – SQL \*Plus Environment – SQL – Logging into SQL \*Plus - SQL \*Plus Commands – Errors & Help – Alternate Text Editors - SQL \*Plus Worksheet - iSQL \*Plus. Oracle Tables: DDL: Naming Rules and conventions – Data Types – Constraints – Creating Oracle Table – Displaying Table Information – Altering an Existing Table – Dropping, Renaming, Truncating Table – Table Types – Spooling – Error codes.

### UNIT III (15 Hours) Working with Table

Working with Table: Data Management and Retrieval: DML – adding a new Row/Record – Customized Prompts – Updating and Deleting an Existing Rows/Records – retrieving Data from Table – Arithmetic Operations – restricting Data with WHERE clause – Sorting – Revisiting Substitution Variables – DEFINE command – CASE structure. Functions and Grouping: Built-in functions – Grouping Data. Multiple Tables: Joins and Set operations: Join – Set operations.

### UNIT IV (15 Hours) PL/SQL

PL/SQL: A Programming Language: History – Fundamentals – Block Structure – Comments – Data Types – Other Data Types – Declaration – Assignment operation – Bind variables – Substitution Variables – Printing – Arithmetic Operators. Control Structures and Embedded SQL: Control Structures – Nested Blocks – SQ L in PL/SQL – Data Manipulation – Transaction Control statements. PL/SQL Cursors and Exceptions: Cursors – Implicit & Explicit Cursors and



Attributes – Cursor FOR loops – SELECT...FOR UPDATE – WHERE CURRENT OF clause – Cursor with Parameters – Cursor Variables – Exceptions – Types of Exceptions.

**UNIT V (15 Hours)**

**PL/SQL Composite Data Types**

PL/SQL Composite Data Types: Records – Tables – Varrays. Named Blocks: Procedures – Functions – Packages –Triggers – Data Dictionary Views.

**TEXT BOOK:**

1.Nilesh Shah, Database Systems Using Oracle, 2nd edition, PHI. (UNIT-I: Chapters 1 & 2, UNIT-II: Chapters 3 & 4, UNIT-III: Chapters 5 & 6, UNIT-IV: Chapters 10 & 11, UNIT-V: Chapters 12, 13 & 14).

**REFERENCE BOOKS:**

- 1.Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts, 5<sup>th</sup>Edition, TMH(UNIT - I, II).
- 2.Alexis Leon, Mathews Leon, Fundamentals of Database Management Systems, Vijay Nicole Imprints Private Limited(UNIT – III).

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XXIII	20ITU23	PROGRAMMING IN PYTHON	72	-	4

### Preamble

To gain knowledge on basics of Python and to enrich the programming skills needed for software development.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Get introduced to python programming	K1
CO2	Acquire knowledge about Expressions, Operator Precedence and errors	K2, K3
CO3	Develop programs using conditional statements and expressions	K3,K5
CO4	Understand iteration concepts using looping statements and functions	K2, K4
CO5	Learn how to work with lists, objects and handling exceptions	K3, K6

## SYLLABUS

### UNIT I (15 Hours) Introduction to Python programming

Learning Programming with Python- Writing a Python Program-The Python Interactive Shell-A Longer Python Program- Values and Variables.

### UNIT II (12 Hours) Expressions and Arithmetic

Expressions-Mixed Type Expressions- Operator Precedence and Associativity-Formatting Expressions-Comments- Errors -More Arithmetic Operators- Working with Examples.

### UNIT III (15 Hours) Conditional Execution

Boolean Expressions- The Simple If Statement- The If/Else Statement- Compound Boolean Expressions- The Pass Statement- Floating-Point Equality Nested Conditionals- Multi-Way Decision Statements- Multi-Way versus Sequential Conditionals -Conditional Expressions.

### UNIT IV (15 Hours) Iteration

The While Statement - Definite Loops vs. Indefinite Loops- The For Statement- Nested Loops- Abnormal Loop Termination-Infinite Loops- Iteration Examples-Using Functions-Writing Functions- More on Functions.

### UNIT V (15 Hours) Working with list

List- Tuples, Dictionaries and Sets - Lists Processing: Sorting - Flexible Sorting – Search - Objects-Custom Types-Handling Exceptions.

### TEXT BOOKS:

1. Richard L. Halterman, Learning to Program with Python, Copyright © 2011.
2. Richard L. Halterman, Fundamentals of Programming Python, Southern Adventist University, November 30, 2017.
- 3.E.Balagurusamy,Introduction to Computing and Problem Solving Using Python.

**REFERENCE BOOK:**

1. Charles Dierbach, Introduction to Computer Science Using Python: A Computational Problem-Solving Focus.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XXIV	20ITU24	PROGRAMMING IN PYTHON AND ORACLE-PRACTICAL	-	72	4

**Subject Description:** This course provides complete knowledge in Python and Oracle.

**Goal:** To enable the students to develop applications using python and develop queries and PL/SQL programming using oracle.

**Objectives:** To learn how to design and program python applications and querying and programming in oracle.

### Practical List

#### PYTHON

1. Program to check Armstrong numbers in certain interval
2. Program make a simple calculator that can add, subtract, multiply and divide using functions
3. Program to sort alphabetically the words form a string provided by the user
4. Program to perform the following
  - a) Different set operations
  - b) Display calendar of given month of the year
5. Program to generate
  - a) Password
  - b) Random Number
6. Program to perform Binary search in a given list of ordered numbers

#### ORACLE

1. Create a table for Employee details with Employee Number as primary key and following fields: Name, Designation, Gender, Age, Date of Joining and Salary. Insert at least ten rows and perform various queries using any one Comparison, Logical, Set, Sorting and Grouping operators
2. Create tables for library management system which demonstrate the use of primary key and foreign key. Master table should have the following fields: Accno, Title, Author and Rate. Transaction table should have the following fields: User id, Accno, Date of Issue and Date of Return. Create a Report(Select verb) with fields Accno, Title, Date of Issue for the given Date of Return with column formats
3. Write a PL/SQL to update the rate field by 20% more than the current rate in inventory table which has the following fields: Prono, ProName and Rate. After updating the table a new field (Alter) called for Number of item and place for values for the new field without using PL/SQL block
4. Write a PL/SQL to split the student table into two tables based on result (One table for Pass and another for Fail). Use cursor for handling records of student table. Assume necessary fields and create a student details table

5. Create a database trigger to implement on master and transaction tables which are based on inventory management system for checking data validity. Assume the necessary fields for both tables
6. Write a PL/SQL to raise the following Exception in Bank Account Management table when deposit amount is zero

<b>CATEGORY</b>	<b>COURSE CODE</b>	<b>TITLE</b>	<b>C</b>	<b>P</b>	<b>CREDIT</b>
CORE:XXV	20ITU25	MINI PROJECT	-	-	1

Each student will develop and implement individually a simple application module/software based on any emerging latest technologies or maybe a project related to the courses learned in the previous semesters.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XXVI ELECTIVE: I	20ITU26A	DATA MINING	72	-	4

### Preamble

To learn about Data Mining and its techniques.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand basics of Data Mining concepts	K1,K2
CO2	Know about techniques of Data Mining	K1,K2
CO3	Understand classification algorithms	K2,K5
CO4	Familiarize in clustering techniques	K3,K4
CO5	Acquire Knowledge about association rules	K4,K5

### SYLLABUS

#### UNIT I (15Hours)

#### Basic of Data Mining

Basic Data Mining Tasks – Data Mining Versus Knowledge Discovery in Data Bases – Data Mining Issues – Data Mining Matrices – Social Implications of Data Mining – Data Mining from Data Base Perspective.

#### UNIT II (12 Hours)

#### Data Mining Techniques

Data Mining Techniques – a Statistical Perspective on data mining – Similarity Measures – Decision Trees – Neural Networks – Genetic Algorithms.

#### UNIT III (15Hours)

#### Classification Techniques

Introduction – Statistical Based Algorithms – Distance Based Algorithms – Decision Tree Based Algorithms – Neural Network Based Algorithms – Rule Based Algorithms – Combining Techniques.

#### UNIT IV (15Hours)

#### Clustering

Introduction – Similarity and Distance Measures – Outliers – Hierarchical Algorithms. Partitional Algorithms.

#### UNIT V (15Hours) Association Rules

Introduction - Large Item Sets – Basic Algorithms – Parallel and Distributed Algorithms – Comparing Approaches – Incremental Rules – Advanced Association Rules Techniques – Measuring the Quality of Rules.

#### TEXT BOOK:

1. Margaret H. Dunham, Data Mining Introductory and Advanced Topics, Pearson Education, 2003.

#### REFERENCE BOOK:

1. Jiawei Han & Micheline Kamber, Data Mining Concepts & Techniques, Academic Press, 2001.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE : XXVI ELECTIVE:I	20ITU26B	ANIMATION TECHNIQUES	72	-	4

### Preamble

To understand the basic concepts of animation and Flash.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of animation	K1,K2
CO2	Obtain the knowledge about creating animation in Flash	K2,K3,K4
CO3	Obtain the knowledge about 3D animation and its types	K3,K4
CO4	Acquire the knowledge to work effectively with 3D motion capture	K4,K5
CO5	Ability to develop a video, Audio using 3D animation	K5,K6

## SYLLABUS

### UNIT I (15 Hours) Introduction to Animation

What is Meant by Animation – Why We Need Animation – History of Animation – Uses of Animation – Types of Animation – Principles of Animation – Some Techniques of Animation – Animation on the Web – 3D Animation – Special Effects - Creating Animation.

### UNIT II (15 Hours) Creating Animation in Flash

Introduction to Flash Animation – Introduction to Flash – Working with the Timeline and Frame-Based Animation - Working with the Timeline and Tween-Based Animation – Understanding Layers - Actionscript.

### UNIT III (12 Hours) 3D Animation and its types

Types of 3D Animation – Skeleton & Kinetic 3D Animation – Texturing & Lighting of 3D Animation – 3D Camera Tracking – Applications and Software of 3D Animation.

### UNIT IV (15 Hours) Motion Caption

Motion Caption - Formats – Methods – Usages – Expression – Motion Capture Software – Script Animation Usage – Different Language of Script Animation among the Software.

### UNIT V (15 Hours) Concept Development

Concept Development – Story Developing – Audio and Video – Color Model – Device Independent Color Model – Gamma and Gamma Correction - Production Budgets - 3D Animated Movies.

### TEXT BOOKS:

1. Ranjan Parekh, Principles of Multimedia, TMH, 2007. (Unit I, Unit V)
2. Ashok Banerji, Ananda Mohan Ghosh, Multimedia Technologies, McGraw Hill Publication. (Unit II: Chapter 10)
2. Text for Unit III, IV & V is appended.



**REFERENCE BOOK:**

1. William M. Neuman, Robert R. Spout, Principles of interactive Computer Graphics,  
McGraw Hill International Edition

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE : XXVI ELECTIVE:I	20ITU26C	CLOUD COMPUTING TECHNIQUES	72	-	4

### Preamble

To learn about cloud computing technologies, functions and its uses

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Provide an insight on the basics of cloud computing techniques	K1,K2
CO2	Ability to understand the concept of virtualization	K2,K3
CO3	Acquire knowledge about cloud infrastructure and its resources	K2,K3
CO4	Learn detailed view on securities in the cloud	K4
CO5	Explain about other technologies outside the cloud	K4,K5

## SYLLABUS

### UNIT I(12 Hours)

#### Understanding cloud computing

An Introduction to Cloud Computing –Cloud Models:-Characteristics –Cloud Services –Cloud Models (IaaS, PaaS, SaaS) –Public vs Private Cloud –Cloud Solutions -Cloud Ecosystem –Service Management –Computing on Demand.

### UNIT II (12 Hours)

#### Virtualization

Basics of Virtualization -Types of Virtualization -Implementation Levels of Virtualization - Virtualization Structures -Tools and Mechanisms -Virtualization of CPU, Memory, I/O Devices - Virtual Clusters and Resource Management –Virtualization for Data-center Automation.

### UNIT III(12 Hours)

#### Cloud infrastructure

Architectural Design of Compute and Storage Clouds –Layered Cloud Architecture Development –Design Challenges -Inter Cloud Resource Management –Resource Provisioning and Platform Deployment –Global Exchange of Cloud Resources.

### UNIT IV (12 Hours)

#### Security in the cloud

Security Overview –Cloud Security Challenges and Risks –Software-as-a-Service Security – Security Governance –Risk management –Security Monitoring –Security Architecture Design – Data Security –Application Security –Virtual Machine Security -Identity Management and Access Control–Autonomic Security.

### UNIT V (12 Hours)

#### Outside the cloud

Other ways to Collaborate Online: Collaborating via Web-Based Communication Tools - Collaborating via Social Networks and Groupware –Collaborating via Blogs and Wikis.

### **TEXT BOOKS**

1. George Reese, Cloud Application Architectures: Building Applications and Infrastructure in the Cloud, O'Reilly
2. Rajkumar Buyya, Christian Vecchiola, S. Thamarai Selvi, Mastering Cloud Computing, TMGH, 2013
3. Kai Hwang, Geoffrey C. Fox, Jack J. Dongarra, Distributed and Cloud Computing, From Parallel Processing to the Internet of Things, Morgan Kaufmann is an imprint of Elsevier, 2012.
4. Michael Miller, Cloud Computing, Pearson publication, 2013

### **REFERENCE BOOKS**

1. Toby Velte, Anthony Velte, Robert Elsenpeter, Cloud Computing, A Practical Approach, TMH, 2009.
2. Kumar Saurabh, Cloud Computing – Insights into New-Era Infrastructure, Wiley India, 2011.

## Open Elective

A student shall take up one **OPEN ELECTIVE** course offered by other departments under Part: IV to complete the programme. The score obtained in this course will be accounted for CGPA calculation. The enrollment is based on first come first served basis depending upon the available strength. The following is the list of optional papers offered by each department.

### UG PROGRAMME 2020-2021 ONWARDS

S.No.	Course Code	Department	Course
1.	20TAUOE1	Tamil	jd;dk;gpf;if ,yf;fpak; (ngz;Nz eP tho;f)
2.	20ENUOE1	English	English for Effective Communication
3.	20MAUOE1	Mathematics	Mathematics for Business
4.	20PHUOE1	Physics	Physics in day to day life
5.	20CSUOE1A 20CSUOE1B	Computer Science	Internet for Everyone Basics of Computer Technology
6.	20CGUOE1 20CCUOE1 20CPUOE1 20CFUC01	Commerce :B.Com B.Com (CA) B.Com (PA) B.Com (A&F)	Basics of Accounting Elements of Costing Investment Portfolio Accounting for Managerial Decision Making
7.	20BAUOE1	Management	Start up Business

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
OPEN ELECTIVE	20CSUOE1A	INTERNET FOR EVERYONE	48	-	3

### Preamble

This paper provides an insight of formal introduction to internet, WWW, Finding Information in the Internet and awareness on Internet Security and Privacy, illustrate the Possibilities of Social Networking. Learning discussion forum software, Effective use of video conferencing, Blogging & Making Money in the Internet.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	To get familiar with basics of the Internet, World Wide Web and Web browsers	K1
CO2	Obtain the Knowledge of Finding Information in the Internet and awareness on Internet Security and Privacy	K1, K2
CO3	Understand How to email, tips for effective use of Email, Advantages and Disadvantages of Email	K2, K3
CO4	To illustrate the Possibilities of Social Networking. Learning discussion forum software & effective use of video conferencing	K3
CO5	To learn Blogging & Making Money in the Internet	K3

## SYLLABUS

### UNIT I (10Hours) Introduction To Internet, WWW & Web Browsers

What is Internet? - How does Internet Work? - What is Special about the Internet? - What is WWW? - Internet and Web - How does the web works? - What are web browsers? - Types of Browsers - Web Browsing Tips.

### UNIT II (10Hours) Searching the Web, Safety & Privacy

Information Sources - Finding Information on the internet - Searching the Web - Search Engines - Making Your Search- Improving Your Searching - Tips for Internet Research- Privacy - Anonymity - Understanding Security and Privacy.

### UNIT III (10Hours) EMAIL

Introduction - How E-mail works? - Why use E-mail? - E-mail Names and Addresses - Mailing Basics - How Private is the e-mail?- Email Ethics - Spamming - E-mail Advantages and Disadvantages - Tips for effective E-mail use - E-mail Safety tips.

### UNIT IV (8Hours) Social Networking and Discussion Forums

Introduction - Social Networking Timeline - Why Social Networking? - Dangers of Social Networking?-Discussion Forums - Discussion Forum Software - Internet Telephony - Video Conferencing.

### UNIT V (10Hours) Making Money On the Internet And Blogging

What is a Blog? - Why Blog? - Why is Blogging so Popular? - Blog Search Engines and Communities - Blogs and Employment - Pitfalls to avoid while Blogging. Introduction - Writing Product Reviews - Sharing Your Knowledge - Advertising - Affiliate programs -Selling - Online Tutoring.

**TEXT BOOK:**

1. Alexis Leon, Mathews Leon , INTERNET FOR EVERYONE ,Vikas Publishing Housing Pvt Ltd , 15<sup>th</sup> Anniversary Edition

**REFERENCE BOOKS:**

1. Keiko Pitter, Sara Amato,John Callahan,Niger Kerr, Eric Tilton, Robert Minato,Tata McGraw-Hill Edition 2003
2. Peter Weverka, The Everyday Internet All-in-One Desk Reference for Dummies,Wiley Publishing Inc, 3rd Edition

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
OPEN ELECTIVE	20CSUOE1B	Basics of Computer Technology	48	-	3

### Preamble

To learn about the basics of Computer Technology

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Learn the basics of Computers	K1,K2
CO2	Acquire knowledge about data communication and Computer networks	K1,K2
CO3	Attain the skill of Database	K2,K3
CO4	Able to know basics Mobile Computing	K3,K4
CO5	Obtain knowledge about Cloud Computing	K3,K4

## SYLLABUS

### UNIT I (9 Hours)

#### Computer Basics

Introduction-Generations of Computers-Classification of Computers- Central Processing Unit-Communication among Various Units-Memory Hierarchy-RAM-ROM-Secondary Storage Devices-Operating System: Introduction- Definition-Types.

### UNIT II (10 Hours) Data Communication and Computer Networks

Introduction- Data Communication- Transmission Media- Multiplexing- Switching. Computer Network: Types of Computer Networks- Network Topologies- Communication Protocol.Internet: Introduction-Basic Internet Terms- Internet Applications-Search Engines.

### UNIT III (9 Hours) Database Fundamentals

Introduction-Definition-Logical Data Concepts-Physical Data Concepts-Database Management System-DBMS Architecture-Types of Databases.SQL: Introduction-Getting Started with SQL.

### UNIT IV (10 Hours) Mobile Computing

Wireless The beginning –Mobile Computing –Dialogue Control–Networks –Middleware and Gateways –Application and Services-Developing Mobile Computer Applications –Security in Mobile Computing–Architecture for Mobile Computing-Mobile Computing through Telephone– IVR Applications.

### UNIT V (10 Hours) Cloud Computing

Introduction- From- Collaboration to cloud- Working of cloud computing-Pros and Cons-Benefits- Developing cloud computing services- Cloud service development-Discovering cloud services-Collaborating on schedules-Collaborating on calendars-Evaluating web conference tools- Creating groups on social networks- Understanding cloud storage- Evaluating on line file storage.

**TEXT BOOKS:**

1. Alexis Leon ,Mathews Leon,Introduction to Information Technology, 2nd Edition, ITL Limited ITL Education Solutions Limited,Publisher(s): Pearson Education India,ISBN: 9789332525146
2. Asoke K Talukder , Roopa R Yavagal,Mobile Computing, TMH, 2005
3. Anthony T. Velte, “Cloud Computing- A Practical Approach”, Tata McGraw Hill Education Private Limited, 1st Edition (2013).

**REFERENCE BOOKS:**

1. Alexis Leon ,Mathews Leon,Fundamentals of Information Technology, ITL Limited
2. KumkumGarg,Mobile Computing, Pearson Education, 2010.
3. Michael Miller, Cloud Computing, Pearson Education, New Delhi, First Edition, 2013



## Proficiency Enhancement - Self Study: (Part: V)

No lecture hours are provided for self study courses and the students are expected to prepare the courses on the prescribed syllabi by their own. Students have to appear for the ESE that would be conducted as per the curriculum specification of each department and scoring a passing minimum is mandatory for completion of the programme. The score obtained in these courses will also be accounted for CGPA calculation.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
PROFICIENCY ENHANCEMENT	20PEUIT1	SOFTWARE PROJECT MANAGEMENT	-	-	2

### Preamble

To inculcate the knowledge on how to manage a Software Project.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the importance of software product life cycle	K1,K2
CO2	Obtaining the knowledge thoroughly on software requirements gathering	K2, K3,K4
CO3	Gain detailed understanding on estimation concepts	K3,K5
CO4	Acquire familiarity on design and development phases	K4,K5
CO5	Accumulate and apply the knowledge on project testing phase	K4,K5

## SYLLABUS

### UNIT I Introduction to Software Product Life cycle

Product Life Cycle: Introduction –Idea Generation- Prototype Development Phase- Alpha Phase –Beta Phase- Protection Phase- Maintenance and Obsolescence Phase. Project Life Cycle Models: What is Project Life Cycle Model-A Frame Work for Studying Different Life Cycle Models- The Waterfall Model- The Prototype Model- The Rapid Application Development Model- The Spiral Model and its Variants.

### UNIT II Software Requirements Gathering

Inputs and Start Criteria for Requirements Gathering- Dimensions of Requirements Gathering- Steps to be Followed During Requirements Gathering Outputs and Quality Records from the Requirements Phase- Skill Sets Required During the Requirements Phase- Differences for a Shrink-Wrapped Software- Challenges During the Requirements Management Phase- Metrics for the Requirement Phase.

### UNIT III Estimation

What is Estimation - When & Why is Estimation Done – The Three Phases of Estimation - Estimation Methodology - Formal Models for Size Estimation –Translation Effort Estimated into



CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XXVIII	20ITU28	RESEARCH METHODOLOGY	72	-	4

### Preamble

To enhance the ethical conduct of research and to gain basic knowledge on research methodologies.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the basic concepts of research and its approaches	K1,K2
CO2	Acquire the deep knowledge on research problem and its design	K1,K2
CO3	Familiarize on the sampling design and its types	K2,K3
CO4	Give detailed understanding about data collection	K3,K4,K5
CO5	Gain the knowledge on interpretation and report writing	K5

## SYLLABUS

### UNIT I (12 Hours) Introduction to Research Methodology

An Introduction-Meaning of Research-Objectives of Research-Motivation in Research-Types of Research-Research Approaches-Significance of Research-Research Methods versus Methodology-Research and Scientific Method-Importance of Knowing How Research is Done-Research Process-Criteria of Good Research-Problems Encountered by Researchers in India.

### UNIT II (18 Hours) Research Problem and Research Design

What is a Research Problem?-Selecting the Problem-Necessity of Defining the Problem-Techniques Involved in Defining a Problem-Research Design:Meaning of Research Design-Need for Research Design-Important Concepts Relating to Research Designs-Different Research Designs.

### UNIT III (18 Hours) Sampling Design

Census and Sample Survey-Implications of a Sample Design-Steps in Sampling Design-Criteria of Selecting a Sampling Procedure-Characteristics of a Good Sample Design-Different Types of Sample Designs-How to Select a Random Sample?- Random Sample from an Infinite Universe-Complex Random Sampling Designs.

### UNIT IV (12 Hours) Methods of Data Collection

Collection of Primary Data-Observation Method-Interview Method-Collection of Data Through Questionnaires-Collection of Data through Schedules-Difference Between Questionnaires and Schedules-Some Other Methods of Data Collection-Collection of Secondary Data-Selection of Appropriate Method for Data Collection-Case Study Method.

**UNIT V (12 Hours)****Interpretation and Report Writing**

Meaning of Interpretation-Why Interpretation?-Technique of Interpretation-Significance of Report Writing –Difference Steps in Writing Report-Layout of the Research Report-Types of Reports-Oral Presentation-Mechanics of Writing a Research Report-Precautions for Writing Research Reports.

**TEXT BOOK :**

1. C.R.Kothari, Research Methodology Methods and Techniques, New Age International Publishers.

**REFERENCE BOOK:**

1. John W.Creswell, Research Design: Qualitative, Quantitative and Mixed Methods Approaches.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XXIX	20ITU29	PROGRAMMING IN VB.NET	72	-	5

### Preamble

This course gives a detailed overview of .Net framework and helps students to enhance in depth knowledge in VB.net and to enable them to developing simple projects.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	State and understand the .Net framework features and to develop console applications in VB.Net	K1,K2
CO2	Describe the basic structure of a Visual Basic.NET project and use main features of the Integrated Development Environment (IDE)	K2,K3,K4
CO3	Solve simple real world problems using looping, branching and arrays and test the results	K3,K5
CO4	Construct solutions by assembling multiple forms, modules, and working with menus	K4,K5
CO5	Examine the complexity of problems and develop data-related solutions using database concepts	K3,K5

## SYLLABUS

### UNIT I (12 Hours) Introducing .NET

.NET Framework Overview – Namespace – Languages in .NET – Visual Studio .NET – Why VB.NET? – Objects and Properties – Constructors and Destructors – Interfaces – Free Threading – Delegates – Winforms - Console Applications – ADO.NET – VB.NET Program: The Solution Explorer Window – The Class View Window – Toolbox – Output Window – The Task List Window.

### UNIT II (15 Hours) Data Types, Operators and Control Statements

Literals – Variables – Data Types – Declaration of Variables – Constant – Statements – Operators – Arithmetic Operators – Concatenation Operators – Relational Operators – Compound Assignment Operator – Logical Operators – Bitwise Operators – Control Statements: IF Statement – Block-If – Nested If – Looping – Select-Case Statement – Goto Statement – Early Exit from Control Statements – Intrinsic Control List – Events – Label – Textbox – Group Box - Check Box – Radio Button – Scroll Bar – Timer – Picture Box – Working with Mouse Input – Date Time Picker – Month Calendar.

### UNIT III (15 Hours) Arrays, Procedures and Structures

One-Dimensional Array – Array Initialisation – Printing array elements using For Each..Next Loop – Redim Statement – Multi-dimensional array – Initialization of Two-dimensional array – Arrays of array – List Box Control – Checked List Box – Combo Box Controls – Procedures and Structures: Subroutine Procedures – Function Procedure – Property Procedure – Functions – Sub Procedure – Structures – Message Box Function – Input Box Function.

#### **UNIT IV (15 Hours) Creating Menus and Using Dialog Boxes**

Menu – MDI Forms – Context Menu – Rich TextBox – Color Dialog Control – Font Dialog Control – Object Oriented Concepts in VB.NET: Boxing and Unboxing – Read-Only and Write-Only Properties – Adding Methods to Classes – Classes with Constructor – Assemblies – Namespaces – Inheritance – Overriding Properties and Methods – Shadows Statement – Polymorphism.

#### **UNIT V (15 Hours) Events Delegates Exception Handling and ADO.NET**

Events in Class – Delegates – Singlecast Delegate – Multicast Delegates – Exceptions – Try – Catch – Finally – End Try – Try-Catch – Multiple-Catch – Nested Try Statements – Try-Finally – Data Access with ADO.NET: Database – Relational Database – Table Creation – Record Insertion – Displaying Data – Deleting Data – Modifying – Drop Table – Special Features of ADO.NET – Differences between ADO and ADO.NET – Connection – Commands – Data Reader – Data Set – Using Data Grid – Using Data Adapter Configuration Wizard – XML and ADO.NET – Filtering Data using Data View – Complex Data Binding – Command Parameters Property and using Stored Procedures with a Command.

#### **TEXT BOOK:**

1.P.Radhaganesan,VB.NET , 1<sup>st</sup> Edition, Scitech Publications(India) Pvt Ltd, 2014.

#### **REFERENCE BOOKS:**

1. Jeffrey R.Shapiro, The Complete Reference – Visual Basic .NET, Tata McGraw-Hill, 2002.
2. Stevem Holzner, Visual Basic .Net Programming Black Book, Dreamtech Press, Reprint 2011.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE:XXX	20ITU30	PROGRAMMING IN VB. NET – PRACTICAL	-	60	4

**Subject Description:** This course provides hands on experience on VB.NET Programming and Oracle.

**Goal:** To enable the students to work effectively with VB.NET and Oracle.

**Objectives:** On successful completion of the course the students will be able to build real world applications using VB.NET and Oracle.

### Practical List

1. Demonstrate the looping statements in VB.NET using a console application
2. Develop a calculator application to perform Arithmetic operations
3. Write a VB.NET program to demonstrate the use of Arrays
4. Write a VB.NET program to create a Notepad application
5. Illustrate If statement and Switch statement with simple program.
6. Develop an application for deploying various built-in functions in VB.NET
7. Develop a windows application using Menus and Dialog Boxes
8. Write a VB.NET program to create and read a Text File
9. Develop a simple project for Student Database Management System using VB.NET as front end and Oracle as back end
10. Develop a simple project for Employee Database Management System using VB.NET as front end and Oracle as back end

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XXXI ELECTIVE: II	20ITU31A	BIG DATA ANALYTICS	60	-	4

### Preamble

To provide grounding in basic and advanced methods to big data technology and tools, including MapReduce, Hive, Apache Pig and Hadoop.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Obtain the basics of digital data and big data	K1, K2
CO2	Acquire the knowledge on big data analytics and challenges	K1, K2
CO3	Learn to build and maintain reliable, scalable, distributed systems with Hadoop and its architecture	K2, K3
CO4	Able to understand MapReduce Environment	K3, K4
CO5	Understand the basics of HIVE, Apache Pig and its usage	K2, K3, K4

## SYLLABUS

### UNIT I (12 Hours) Representation of Digital Data

Types of Digital data : Classification of Digital Data – Introduction to Big Data: Characteristics of Data –Evolution of Big Data – Definition of Big Data- Challenges with Big Data – What is Big Data?- Why Big Data – Tradition Business Intelligence (BI) versus Big Data-A typical Data Warehouse Environment – A typical Hadoop Environment – What is new today? – What is changing of Big Data.

### UNIT II (12 Hours) Big Data Analytics

Big Data Analytics: What is Big Data Analytics – What Big Data Analytics Isn't?- Why this sudden hype-Classification of Analytics – Greatest Challenges – Top Challenges – Why is Big Data Analytics important?- What kind of technologies? – Data Science – Terminologies used in Big Data Environment s- BASE.

### UNIT III(12 Hours) Hadoop Architecture

The Big Data Technology Landscape: Hadoop – Introduction to Hadoop : Introducing Hadoop – Why Had oop – History of Hadoop – Overview – Use Case – HDFS – Processing Data with Hadoop- Interacting with Hadoop Ecosystem.

### UNIT IV (12 Hours) MapReduce Programming

Introduction to MapReduce Programming : Introduction – Mapper – Reducer – Combiner – Partitioner – Searching – Sorting – Compression.

### UNIT V (12 Hours) HIVE and Apache Pig

Introduction to Hive : What is Hive? – Hive Architecture – Hive Data Types – Hive file Format – Introduction to Pig: What is Pig? – Pig on Hadoop – Data types in Pig – Running Pig – Execution Mode of Pig.



**TEXT BOOKS:**

1. Seema Acharya, Subhashini Chellappan, Big Data and Analytics, Wiley,2017.
2. Chris Eaton, Dirk deroos et al., Understanding Big data, McGraw Hill, 2012.

**REFERENCE BOOKS:**

1. Jy Liebowitz, Big Data and Business analytics, CRC press, 2013.
2. Tom White, HADOOP: The definitive Guide, O Reilly, 2012.
3. Vignesh Prajapati, Big Data Analytics with R and Haoop, Packet Publishing, 2013.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XXXI ELECTIVE:II	20ITU31B	MOBILE COMPUTING TECHNIQUES	60	-	4

### Preamble

To learn about different technologies available in the mobile computing.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the emergence of Mobile technology and its architecture	K1,K2
CO2	Acquire the knowledge on mobile computing through telephony	K2,K3
CO3	Learn about GSM, RFID, Mobile IP	K2,K3
CO4	Provide the insight on GPRS	K3,K4
CO5	Acquire the knowledge on CDMA and 3G.Update to 4G and 5G technologies and apply it to develop applications	K4,K5

## SYLLABUS

### UNIT I (12 Hours) Introduction to Mobile Computing and its Architecture

Mobility of Bits and Bytes –Wireless The beginning –Mobile Computing –Dialogue Control – Networks –Middleware and Gateways –Application and Services-Developing Mobile Computer Applications –Security in Mobile Computing –Standards \_ Why is it Necessary –Standard Bodies. Mobile Computing Architecture: History of Computers and Internet –Architecture for Mobile Computing –Three-tier Architecture –Design Considerations for Mobile Computing – Mobile Computing through Internet –Making Existing Applications Mobile Enabled.

### UNIT II (12 Hours) Mobile Computing through Telephony

Evolution of Telephony – Multiple Access Procedures – Mobile Computing through Telephone – IVR Application – Voice XML – TAPI.

### UNIT III (12 Hours) Emerging Technologies

Blue Tooth – RFID – WiMAX – Mobile IP – IPv6 –Java Card. GSM : Global System for Mobile Communications – GSM Architecture – GSM Entities – Call routing in GSM – PLMN Interfaces – GSM Addresses and Identifiers – Network Aspects in GSM – GSM Frequency Allocations – Authentications and Security.

### UNIT IV (12 Hours) GPRS

GPRS – GPRS and Packet Data Network –GPRS Network Architecture –GPRS Network Operations –Data Services in GPRS –Application for GPRS-Limitations –Billing and Charging. WAP : MMS –GPRS Applications.

### UNIT V (12 Hours) CDMA and 3G

Spread Spectrum Technology –IS 95 –CDMA vs GSM –Wireless Data –Third Generation Networks –Applications on 3G, 4G and 5G technologies, EDGE.

**TEXT BOOK:**

1. Mobile Computing, Asoke K Talukder , Roopa R Yavagal, TMH, 2010

**REFERENCE BOOK:**

1. Mobile Computing, KumkumGarg, Pearson Education, 2010.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
Core: XXXI ELECTIVE -II	20ITU31C	BLOCKCHAIN TECHNOLOGY	60	-	4

### Preamble

To gain fundamental knowledge of blockchain and its related concepts and technologies.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Understand the structure and basic concepts of blockchain	K1
CO2	Know about decentralization using blockchain	K2, K3
CO3	Gain knowledge of cryptography and other technical aspects in blockchain environment	K3, K5
CO4	Be familiar with bitcoins and alternative coins	K2, K4
CO5	Acquire basic understanding of smart contracts and Ethereum blockchain	K3, K5

## SYLLABUS

### UNIT I (15 Hours) Introduction to Blockchain

Distributed systems - CAP Theorem – Byzantine Generals Problem – Consensus. The history of blockchain: Electronic Cash. Introduction to blockchain: Various technical definitions of blockchains – Generic elements of a blockchain – Features of a Blockchain – Applications of Blockchain technology – Tiers of blockchain technology. Types of blockchain - blockPublic blockchains – Private blockchains – Semi-private blockchains – Sidechains – Permissioned ledger – Distributed ledger – Shared ledger – Fully private and proprietary blockchains – Tokenized blockchains – Tokenless blockchains – Consensus in blockchain - CAP theorem and blockchain-Benefits and limitations of blockchain.

### UNIT II (10 Hours) Decentralization

Decentralization using blockchain - Methods of decentralization – Routes to decentralization - Blockchain and full ecosystem decentralization- Smart contract - Decentralized organizations- Decentralized autonomous organizations - Decentralized autonomous corporations - Decentralized autonomous societies- Decentralized applications-Platforms for Decentralization.

### UNIT III (13 Hours) Cryptography and Technical Foundations

Introduction – Cryptography - Confidentiality - Integrity – Authentication - Cryptographic primitives –Symmetric Cryptography – Data Encryption Standard – Advanced Encryption Standard – Asymmetric Cryptography - Public and private keys - RSA – encryption and decryption using RSA - Cryptographic primitives - Hash functions – Elliptic Curve Cryptography - Digital Signature Algorithm – How to generate a digital signature – Financial markets and trading.

### UNIT IV (12 Hours) Bitcoin and Alternative Coins

Bitcoin - Definition - Transactions - The transaction life cycle - The transaction structure - Types of transaction. Blockchain - The structure of a block -The structure of a block header -The genesis block - The bitcoin network -Wallets. Bitcoin payments - Bitcoin investment and buying and selling bitcoins - Alternative Coins – Bitcoin limitations - Privacy and anonymity - Namecoin - Litecoin -Primecoin – Zcash.

**UNIT V (10 Hours) Smart Contracts and Ethereum 101**

Smart Contracts – History - Definition – Rigardian contracts – Ethereum 101 – Introduction – Ethereum blockchain – Accounts – Types of accounts - The Ethereum network – Supporting protocols.

**TEXT BOOKS:**

1. Imran Bashir, “Mastering Blockchain Distributed ledgers, decentralization and smart contracts”, Packt Publishing 2017.

**REFERENCE BOOK:**

1. Arvind Narayanan, Joseph Bonneau, “Bitcoin and cryptocurrency technologies: a comprehensive introduction”, Princeton University Press, 2016.

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
CORE: XXXII ELECTIVE:III	20ITU32A	GRAPHICS AND MULTIMEDIA	60	-	4

### Preamble

To learn about reconstruction and visualization framework and to give introduction on basic algorithms and its techniques.

### Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Provide an insight of computer graphics and algorithms	K1,K2
CO2	Ability to understand the Transformations and its types	K2,K3,K4
CO3	Acquire knowledge on window transformations	K3,K4
CO4	Learn about Multimedia basics	K1,K2
CO5	Obtain basic fundamentals of image, audio and video	K5

## SYLLABUS

### UNIT I (12 Hours) Introduction to Computer Graphics

Introduction, Applications, Pixel, Frame Buffer, Raster and Random Scan display, Display Devices -CRT, Color CRT Monitors, Scan Conversion of Line - DDA Algorithm of Line Drawing, Scan Conversion of Circle-Bresenham's Circle and Ellipse Generating Algorithms.

### UNIT II (12 Hours) 2D and 3D Transformations

2-Dimensional Transformation, Translation, Rotation, Scaling, Homogeneous Coordinates, Reflection, Shear. 3-Dimensional Transformation, Translation, Rotation, Scaling, Reflection, Shear.

### UNIT III (12 Hours) Window Transformation

Window to View Port Transformation, Clipping, Line Clipping, Cohen –Sutherland Line Clipping, Polygon Clipping, Sutherland and Gary Hodgman Polygon Clipping Algorithm.

### UNIT IV (12 Hours) Introduction to Multimedia

Multimedia in Use: Introducing Multimedia for Today and Tomorrow – What is Multimedia – Using Multimedia: Applications, Benefits and Problems– Technology: System Components – Multimedia Platforms.

### UNIT V (12 Hours) Multimedia Tools

Development Tools – Image – Audio – Video.

### TEXT BOOKS:

1. Donald Hearn and M.Pauline Baker, Computer Graphics C Version, Second Edition , Pearson Education, 2006.
2. Judith Jeffcoate, Multimedia in Practice: Technology and Practice, Pearson Education, 2007.

**REFERENCE BOOKS:**

1. William M. Neuman, Robert R. Sprout, Principles of interactive Computer Graphics, McGraw Hill International Edition.
2. Buford J. F Koegel, Multimedia Systems, Twelfth Indian Reprint, Pearson Education.

<b>CATEGORY</b>	<b>COURSE CODE</b>	<b>TITLE</b>	<b>C</b>	<b>P</b>	<b>CREDIT</b>
CORE: XXXII ELECTIVE:III	20ITU32B	GREEN COMPUTING	60	-	4

### **Preamble**

To acquire knowledge to adopt green computing practices to minimize negative impacts on the environment, skill in energy saving practices in their use of hardware, examine technology tools that can reduce paper waste and carbon footprint by user, and to understand how to minimize equipment disposal requirements.

### **Course Outcomes**

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Obtain the fundamentals of green computing and its metrics	K1,K2
CO2	Learn about green assets and need for modeling the enterprise	K2,K3
CO3	Acquire knowledge on green enterprise transforming	K2,K3
CO4	Understand the concept of green compliance and issues	K2,K3
CO5	Work with case studies	K5,K6

## **SYLLABUS**

### **UNIT I (12 Hours) Fundamentals of Green Computing**

Green IT Fundamentals: Business, IT, and the Environment – Green IT Strategies: Drivers, Dimensions, and Goals – Environmentally Responsible Business: Policies, Practices, and Metrics.

### **UNIT II (12 Hours) Green Assets and Process Management**

Green Assets: Buildings, Data Centers, Networks, and Devices – Green Business Process Management: Modeling, Optimization, and Collaboration – Green Enterprise Architecture – Environmental Intelligence and Green Supply Chains.

### **UNIT III (12 Hours) Green Enterprise Transforming**

Green Information Systems: Design and Development Models - Socio-Cultural aspects of Green IT – Green Enterprise Transformation Roadmap: Green Enterprise Transformations, Transforming the Individual, Organizational and Collaborative Processes, A Green ICT Framework

### **UNIT IV (12 Hours) Green Compliance**

Green Compliance: Protocols, Standards, and Audits: Protocols and Standard, Green IT Audits, Audit Types – Emergent Carbon Issues: Technologies and Future.



**UNIT V(12 Hours)****Case Studies**

The Environmentally Responsible Business Strategies (ERBS) – Case Study Scenarios for Trial Runs – Case Studies – Applying Green IT Strategies and Applications to a Home, Hospital, Packaging Industry and Telecom Sector.

**TEXT BOOKS:**

1. Bhuvan Unhelkar: Green IT Strategies and Applications-Using Environmental Intelligence,CRC Press, June 2011

**REFERENCE BOOKS:**

1. Carl speshocky, Empowering Green Initiatives with IT, John Wiley & Sons, 2010.
2. John Lamb, The Greening of IT, Pearson Education, 2009.
3. Jason Harris, Green Computing and Green IT- Best Practices on regulations & industry, Lulu.com, 2008.

<b>CATEGORY</b>	<b>COURSE CODE</b>	<b>TITLE</b>	<b>C</b>	<b>P</b>	<b>CREDIT</b>
CORE: XXXII ELECTIVE:III	20ITU32C	WEB SERVICES	60	-	4

### **Preamble**

To learn about the web services technologies

### **Course Outcomes**

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

<b>CO Number</b>	<b>CO Statement</b>	<b>Knowledge Level</b>
CO1	Learn the basics of Web Services	K1,K2
CO2	Acquire the knowledge on application of Web Services and learn the basics of XML	K1, K2,K3,K4
CO3	Learn the structure of SOAP and WSDL	K2,K3
CO4	Study about UDDI and Message	K2,K3,K4
CO5	Case studies for Web Services	K3,K4.K5

## **SYLLABUS**

### **UNIT I (12 Hours)**

#### **Introduction**

Introduction: Background–Services-Web Services-Web Services Application Opportunities. Emergence of Web Services: Background-Server Side Architecture Progression-Client Side Architecture Progression-Service Oriented Architecture Future and Web Services

### **UNIT II (12 Hours)**

#### **Web Service Application and XML**

Web Service Application Scenario: Background-Web Services Hype and the Industry-Web Services and the Industry Acceptance. XML: Background-History of Markup Language- What Is XML? - Validation of XML Data-Advanced XML-Document Constraining.

### **UNIT III(12 Hours)**

#### **SOAP and WSDL**

Simple Object Access Protocol: Background-What Is SOP?-SOAP Interaction-SOAP Modeling-SOAP Encoding-SOAP Binding. Web Services Description Language: Background-What Is WSDL?-Web Services Invocation and WSDL-Web Services Description Details-Services Description through WSDL.

### **UNIT IV (12 Hours)**

#### **Registries and RPC**

Registries: Background- What Is UDDI?-UDDI Nomenclature-Core UDDI-Service Publication-Service Discovery. Remote Procedure Call and Messaging: Background-Synchronous Web Services-Asynchronous Web Services-Remote Procedure Call or Messaging?

### **UNIT V (12 Hours)**

#### **Case Study**

Web Services: Industry Adoption: Background-Adoption of Web Services By Financial Services and Banking Industry-Factors Affecting the Adoption of Web Services Technology. Context Setting: Background-Focus Areas of Case Study-The Case of Infybank.

**TEXT BOOK:**

1. B.V.Kumar, S.V.Subrahmanya, Web Services an Introduction, Tata McGraw-Hill Publishing Company Limited

**REFERENCE BOOK:**

1.Stephen Potts, Mike Kopack, Sams Teach Yourself Web Services in 24 Hours

CATEGORY	COURSE CODE	TITLE	C	P	CREDIT
SKILL ENHANCEMENT COURSE: III	20SEUIT03	PROGRAMMING IN 3D MAX-PRACTICAL	-	36	2

**Subject Description:** This course provides hands on experience on 3D Max Programming.

**Goal:** To enable the students to equip them with graphics and multimedia skills.

**Objectives:** On successful completion of the course the students will understand the concept of 3D Max and expertise in using graphics and multimedia.

### Practical List

1. Create a Flag animation with 3ds max
2. Create a realistic winter scene with motion blurred snow particles and a night render as well
3. Polygon :- Selection, Creation, combining, separating, Splitting and Editing
4. Working with Nurbs Modeling
5. Nurbs :- Creating curves, Creating Surfaces, Editing , Trimming, Stitching and Sculpting surface meshes
6. Subdivision :-surface conversion, Editing surface, Editing Uvs
7. Create Various Basic 3D geometrical shapes
8. Create Basic Polygon inorganic objects (lamp, Mobile, computer, Bike, Car)
9. Create basic architectural polygon modeling
10. Create Interior with polygon and Subdivision
11. Create Cartoon and semi cartoon characters with poly
12. Create environment modeling (tree, Mountain, road, Planet, forest)

**Part III - COMPREHENSION IN COMPUTER SCIENCE (Courses I, II, III, IV, V & VI)**

**(For those admitted in June 2020-21 & onwards)**

The Comprehension in Computer Science examination will be conducted at the end of each semester I, II, III, IV, V, VI for a maximum of 50 marks which consists of

**Comprehension (Multiple Choice Questions) (50x1=50) 50 marks**

The students are examined on Core, Core Allied, Core Elective papers studied in I, II, III, IV, V & VI Semester. In the comprehension component, the students are tested on their grasping ability of the subjects of study.

**Extension Activity:**

Participation of a student in the extension activities conducted by the department between I and VI semesters evaluated under Part :V is mandatory for completion of the programme.