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 – Computer Science

RULES AND REGULATIONS

SCHOLASTIC COURSES
AND
CO-SCHOLASTIC COURSES

For the candidates admitted from the Academic Year
2021-2022 and onwards
Under CBCS PATTERN

B.Sc Computer Science
Program Structure
CBCS – 2021-22& Onwards
(For courses offering Part – I and Part - II for two semesters)

CATEGORY	COMPONENTS	NO. OF COURSES	CREDIT(S)/ COURSE	TOTAL CREDITS	PROPOSED SEMESTER
Part – I	Tamil/Hindi/French/Kannada/ Malayalam/Sanskrit	2	4	8	I – II
Part – II	English	2	4	8	I – II
Part - III	Core Courses *(Core Theory /Core Practical/ Core Allied/ Elective/Open Elective/ Mini Project)*	28	1/2/3/4/5	104	I-VI
Part –IV	***A).Foundation Courses:***				
	i. Environmental Studies	1	2	4	I
	ii. Yoga and Ethics	1	2		II
	B)Ability Enhancement Courses:				
	i. Information Security	1	2	4	III
	ii. Consumer Rights	1	2		IV
	C).Skill Enhancement Courses:				
	i. Animation– Practical	1	2	5	IV
	ii. Life Skills	1	1		V
	iii. E-Commerce	1	2		VI
	D).Non-Major Elective:				
	i. Indian Women and Society / Advanced Tamil	1	2	2	III
Part – V	***A).Proficiency Enhancement(Self Study)***	1	2	5	V
	B).Competency Enhancement:				Semesters I to VI
	i.NSS/YRC/RRC/CCC/PHY.EDU/OTHERS	1	1		Semesters I to IV
	ii. Professional Grooming	1	1		Semesters I to VI
	iii. Students Social Activity	1	1		
	Total:3700 Marks & 140 Credits				

UG SCHEME OF EXAMINATIONS 2021-22

(For students admitted in 2021-22 & onwards)
(For branches offering Part-I and Part-II for two semesters)

P.K.R Arts College for Women (Autonomous), Gobichettipalayam
B.Sc. Computer Science 2021-2022

B. Sc Computer Science

Program Scheme and Scheme of Examinations

(For students admitted from 2021-22& onwards)

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

Scholastic Courses

Category / Part	Component	Course Code	Title of the Course	Hrs/ week	Exam hrs.	CIA	ESE	Total Marks	Credits
			SEMESTER–I						
I	Language: I	21LTU01/ 21LHU01/ 21LFU01/ 21LKU01/ 21LMU01/ 21LSU01	Tamil- I/ Hindi-I/ French-I/ Kannada-I/ Malayalam-I / Sanskrit-I	6	3	50	50	100	4
II	English: I	21LEU01	English- I	6	3	50	50	100	4
III	Core: I	21CSU01	Programming in C	4	3	50	50	100	4
III	Core: II Practical: I	21CSU02	Programming in C –Practical	3	3	50	50	100	2
III	Core: III	21CSU03	Computer Organization and Architecture	4	3	50	50	100	4
III	Core: IV Allied: I	21CSU04	Mathematical Structures for Computer Science	5	3	50	50	100	3
IV	Foundation: I	21FCU01	Environmental Studies(Curriculum as recommended by UGC)	2	3	-	50	50	2
			TOTAL	**30**				**650**	**23**
			SEMESTER –II						
I	Language: II	21LTU02/ 21LHU02/ 21LFU02/ 21LKU02/ 21LMU02/ 21LSU02	Tamil- II/ Hindi-II/ French-II/ Kannada-II/ Malayalam-II/ Sanskrit-II	6	3	50	50	100	4
II	English: II	21LEU02	English- II	6	3	50	50	100	4
III	Core: V	21CSU05	Programming in Java	5	3	50	50	100	5
III	Core: VI Practical: II	21CSU06	Programming in Java-Practical	4	3	50	50	100	2
III	Core: VII	21CSU07	Internet Programming	2	3	50	50	100	1
III	Core: VIII Allied: II	21CSU08	Discrete Mathematics	5	3	50	50	100	3
IV	Foundation: II	21FCU02	Yoga and Ethics	2	3	-	50	50	2
			TOTAL	**30**				**650**	**21**

P.K.R Arts College for Women (Autonomous), Gobichettipalayam
B.Sc. Computer Science 2021-2022

SEMESTER –III									
III	Core: IX	21CSU09	Data Structures	6	3	50	50	100	6
III	Core: X	21CSU10	Linux and Shell Programming	5	3	50	50	100	5
III	Core: XI Practical:III	21CSU11	Shell Programming – Practical	5	3	50	50	100	3
III	Core: XII	21CSU12	Software Engineering	6	3	50	50	100	5
III	Core: XIII Allied: III	21CSU13	Operation Research	4	3	50	50	100	3
IV	Ability Enhancement: I	21AEU01	Information Security	2	3	-	50	50	2
IV	Non - Major Elective: I	21NMU01A/ 21NMU01B	Indian Women and Society / Advanced Tamil	2	3	-	50	50	2
			TOTAL	**30**				**600**	**26**
SEMESTER –IV									
III	Core: XIV	21CSU14	Relational Database Management Systems	6	3	50	50	100	6
III	Core: XV Practical:IV	21CSU15	SQL and PL/SQL- Practical	6	3	50	50	100	3
III	Core: XVI	21CSU16	Operating System	6	3	50	50	100	4
III	Core: XVII Allied: IV	21CSU17	Computer Networks	5	3	50	50	100	3
IV	Skill Enhancement: I Practical: V	21SECSU01	Animation - Practical	4	3	50	-	50	2
IV	Ability Enhancement: II	21AEU02	Consumer Rights (Curriculum as recommended by UGC)	3	3	-	50	50	2
			TOTAL	**30**				**500**	**20**

P.K.R Arts College for Women (Autonomous), Gobichettipalayam
B.Sc. Computer Science 2021-2022

SEMESTER-V									
III	Core: XVIII	21CSU18	Programming in Python	6	3	50	50	100	6
III	Core: XIX Practical: VI	21CSU19	Programming in Python - Practical	6	3	50	50	100	3
III	Core: XX	21CSU20	Computer Graphics	6	3	50	50	100	4
III	Core: XXI	21CSU21	Mini Project	-	3	100	-	100	1
III	Core: XXII Elective: I	21CSU22A/ 21CSU22B/ 21CSU22C	Internet of Things / Web Programming with PHP / Artificial Intelligence	5	3	50	50	100	4
III	Core: XXIII Open Elective		(Offered for students of other UG Programmes / Departments	4	3	50	50	100	2
IV	Skill Enhancement: II	21SEU02	Life Skills (Jeevan Kaushal) (Curriculum as recommended by UGC)	3	3	50	-	50	1
V	Proficiency Enhancement	21PECSU01	Case Tools (Self-Study)	-	3	-	100	100	2
			TOTAL	**30**				**750**	**23**
SEMESTER –VI									
III	Core: XXIV	21CSU24	Data Mining	6	3	50	50	100	6
III	Core: XXV	21CSU25	Programming in VB.Net	6	3	50	50	100	5
III	Core: XXVI Practical: VII	21CSU26	Programming in VB.Net - Practical	6	3	50	50	100	3
III	Core: XXVII Elective: II	21CSU27A/ 21CSU27B/ 21CSU27C	Network Security/ Introduction to Compiler design/ Informatics	5	3	50	50	100	4
III	Core: XXVIII Elective: III	21CSU28A/ 21CSU28B/ 21CSU28C	Multimedia Systems/ Digital Image Processing/ Big data Analytics	5	3	50	50	100	4
IV	Skill Enhancement: III	21SECSU03	E-Commerce	2	3	50	-	50	2
			TOTAL	**30**				**550**	**24**
V	Competency Enhancement		NSS / YRC / RRC / CCC / PHYSICAL EDUCATION / Others	SEMESTERS I – VI					1
			Professional Grooming	SEMESTERS I – VI					1
			Students Social Activity (Related to the Curriculum)	SEMESTERS I -VI					1
Total Marks:3700				**Total Credits:140**					

NOTE: CREDIT TRANSFERABILITY FOR ALL COURSES FROM UGC SWAYAM MOOC COURSES.

P.H.e.h

Head, Department of Computer Science
P.K.R. Arts College for Women (Autonomous)
Gobichettipalayam - 638 476.

Syllabus

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: I	21CSU01	PROGRAMMING IN C	48	4

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
First	**I**	**50**	**50**	**100**

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	Recall the basics of CTokens, Operators, Array and Files	K1
CO2	Summarize the concepts of input and output functions, decision making and looping, string functions, and pointers	K2
CO3	Classify Arrays and functions	K3
CO4	analyze the concepts of Pointers, Structures and files	K4
CO5	Determine the usage of pointers and files	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**1**	**1**
CO 2	**9**	**9**	**9**	**9**	**9**	**1**	**1**
CO 3	**9**	**9**	**9**	**9**	**9**	**3**	**1**
CO 4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**9**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**39**	**14**	**9**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**3.85**	**1.34**	**0.88**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos .As per UGC Notification

COURSE CONTENT:

UNIT I **Overview of C** **(10 Hours)**

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 **Control structures** **(6 Hours)**

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

UNIT III **Arrays and Strings** **(10 Hours)**

Introduction – One Dimensional Arrays – Declaration of One-Dimensional Arrays - Initialization of One-Dimensional 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 **Function, Structure and Union** **(10 Hours)**

User Defined Functions – Need for User defined function – Elements of User Defined Functions – Definition of Function – Category of Functions-Recursion –Structure and Unions –Defining a Structure – Declaring a Structure Variables – Accessing Structure Members – Structure Initialization – Unions.

UNIT V **Pointers and Files** **(12 Hours)**

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

WEB REFERENCE:

1. https://www.tutorialspoint.com/cprogramming/index.htm
2. https://www.w3schools.com/c/
3. https://www.programiz.com/c-programming/online-compiler/
4. https://www.unf.edu/~wkloster/2220/ppts/cprogramming_tutorial.pdf
5. https://techniyojan.com/2019/12/c-programming-basics-notes.html

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: II PRACTICAL: I	21CSU02	PROGRAMMING IN C-PRACTICAL	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
First	**I**	**50**	**50**	**100**

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	**Define the basics of arithmetic operations using C tokens.**	**K1**
CO2	**Choose the True/ False statements for checking ODD / EVEN numbers.**	**K2**
CO3	**Calculate simple interest, Employee pay Bill, area of shapes and factorial value**	**K3**
CO4	**Experiment matrix addition**	**K4**
CO5	**Validating the file operations**	**K5**

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**3**	**9**	**9**	**3**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO 3	**9**	**9**	**9**	**9**	**9**	**3**	**9**
CO 4	**9**	**9**	**9**	**9**	**9**	**3**	**9**
CO 5	**9**	**9**	**9**	**9**	**9**	**3**	**9**
Total Contribution of COs to POs	**45**	**45**	**39**	**45**	**45**	**15**	**39**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.42**	**2.96**	**4.44**	**1.44**	**3.80**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

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

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: III	21CSU03	COMPUTER ORGANIZATION AND ARCHITECTURE	48	4

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
First	**I**	**50**	**50**	**100**

Preamble

To understand the fundamentals behind computer logic and the course includes fundamentals of Computer architecture, 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	Recall the arithmetic and logical operations	K1
CO2	Explain the basic computer organization and design	K2
CO3	Identify the input/output organization	K3
CO4	analyze the functions of the memory organization	K4
CO5	evaluate architectures and computational designs concepts related to architecture of memory organization	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO 4	**9**	**9**	**3**	**3**	**3**	**3**	**1**
CO 5	**9**	**9**	**3**	**3**	**3**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**33**	**33**	**27**	**25**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.05**	**2.17**	**2.67**	**2.40**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation;9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Data Representation** **(10 Hours)**

Data Types - Number Systems – Octal, Hexadecimal numbers, Decimal Representation, Alphanumeric Representation. Complements –Fixed-point Representation - Floating Point Representation – Other Binary Codes Gray Code. Other decimal codes, other alphanumeric codes. Digital Logic Circuits Logic Gates, Combinational Circuits: Half Adder, Full Adder.

UNIT II **Basic Computer Organization and Design** **(8 Hours)**

Instruction Codes – Computer Registers – Computer Instructions – Timing and control – Instruction Cycle – Memory Reference Instructions – Input-Output and Interrupt.

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

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 **Interrupts and DMA** **(10 Hours)**

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

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

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 BOOK:

1. M. Morris Mano, Computer System Architecture, PHI.

REFERENCE BOOKS:

1. V.K. Puri, Digital Electronics Circuits and Systems, TMH.
2. M. Carter, Computer Architecture, Schaum's outline series, TMH.
3. Albert Paul Malvino, Donald P Leach, Digital principles and applications, TMH, 1996

WEB REFERENCE:

1. https://docs.google.com/file/d/0ByN6aMrh7fkSbDdKdV9vQURXRFU/edit?resourcekey=0-7OMoitUf4Divd09opqW6lA
2. https://poojavaishnav.files.wordpress.com/2015/05/mano-m-m-computer-system-architecture.pdf
3. http://www.scientificlib.com/en/Books/DigitalElectronicsCircuitsAndSystems.html
4. https://scilab.in/textbook_companion/generate_book/1238
5. https://www.shahucollegelatur.org.in/Department/Studymaterial/sci/it/BCA/FY/digielec.pdf

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – IV	FOUNDATION: I	21FCU01	ENVIRONMENTAL STUDIES	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
First	**I**	**-**	**50**	**50**

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	Define environment, ecosystem, biodiversity, environmental pollution and social issues.	K1
CO2	Explain the natural resources, types of ecosystem, geographical classification of India, causes of environmental pollution and the problems related to the society.	K2
CO3	Identify the information related to environment and the resources to protect it.	K3
CO4	Analyze the classification of natural resources, energy flow in the ecosystem, threats to biodiversity, disaster management and the role of information technology in environment and human health.	K4
CO5	Assess the environmental issues with a focus on sustainability.	K5

K1 – Remember; K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 2	**9**	**9**	**9**	**9**	**3**	**1**	**3**
CO 3	**9**	**9**	**9**	**9**	**1**	**1**	**3**
CO 4	**9**	**9**	**9**	**9**	**1**	**1**	**3**
CO 5	**9**	**9**	**3**	**3**	**1**	**1**	**3**
Total Contribution of COs to POs	**45**	**45**	**39**	**39**	**9**	**7**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.42**	**2.56**	**0.89**	**0.67**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Multidisciplinary Nature of Environmental Studies (4 Hours)

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 Ecosystems (5 Hours)

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 Biodiversity and its Conservation (5 Hours)

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 Environmental Pollution (5 Hours)

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 Social Issues and the Environment (5 Hours)

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.

REFERENCE BOOKS:

1. Agarwal, K.C. 2001 Environmental Biology, Nidi Publ. Ltd. Bikaner.
2. BharuchaErach, 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, Clanderson 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 TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: V	21CSU05	PROGRAMMING IN JAVA	60	5

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
First	II	50	50	100

Preamble

To understand the basic programming constructs of Java Language.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basic concepts of Java Programming Language	K1
CO2	Explain the concepts of tokens, control structures and looping, arrays, applet programming and Exception handling	K2
CO3	Classify various concepts of java programming that can be used for practical solutions	K3
CO4	Analyze wide range of Applications by using java programming	K4
CO5	Determine the usage of all given concepts in the development of programming solutions	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse;K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	9	9	9	9	9	9	9
CO 2	9	9	9	9	9	9	9
CO 3	9	9	9	9	3	9	9
CO 4	9	9	9	9	3	3	9
CO 5	9	9	9	9	9	3	3
Total Contribution of COs to POs	45	45	45	45	33	33	39
Weighted Percentage of COs Contribution to POs	2.59	2.71	2.79	2.96	3.26	3.16	3.80

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs.As per UGC Notification

COURSE CONTENT:

UNIT I Fundamentals of Object-Oriented Programming (10 Hours)

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 Control Structures (15 Hours)

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 Arrays, Strings and Vectors (10 Hours)

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

UNIT IV Programming with JAVA (10Hours)

Applet Programming – Graphics Programming.

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

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, 3rd Edition, TMH.
2. John R. Hubbard,Programmingwith Java, 2nd Edition, TMH.

WEB REFERENCES

1. https://www.javatpoint.com/java-basics
2. https://www.w3schools.com/java/
3. https://www.softwaretestinghelp.com/java-basics-and-core-java-concepts/
4. https://www.iitk.ac.in/esc101/share/downloads/javanotes5.pdf
5. https://www.cp.eng.chula.ac.th/books/wp-content/uploads/sites/5/2018/01/java101.pdf

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: VI PRACTICAL: II	21CSU06	PROGRAMMING IN JAVA-PRACTICALS	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
First	**II**	**50**	**50**	**100**

Preamble

To understand the basic programming constructs of Java Language.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basic concepts of Java Programming Language	K1
CO2	Explain the concepts of Arrays and String	K2
CO3	Summarizes the concepts of Inheritance	K3
CO4	Demonstrate the interface and threads.	K4
CO5	Applying the java programming techniques in graphics and applets.	K5

K1 – Remember; K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**3**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**9**
CO 5	**9**	**9**	**9**	**9**	**9**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**39**	**33**	**33**	**39**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.56**	**3.26**	**3.16**	**3.80**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

1. Design a Java Program to define a class, define instance methods for setting and Retrieving values of instance variables and instantiate its object

2. Demonstrate a Java Program to demonstrate use of subclass

3. Create a Java Program to implement array of objects

4. Construct a Java program to practice using String class and its methods

5. Apply a Java program to practice using String Buffer class and its methods

6. Design a Java Program to implement multilevel inheritance by applying various access controls to its data members and methods

7. Generate a program to demonstrate use of implementing interfaces

8. Apply a program to Implementing Thread based applications

9. Create a program using Applet to display a message in the Applet

10. Design an applet program working with Colors and Fonts

11. Construct a program using Applet for configuring Applets by passing parameters

12. Design 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 TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – III	CORE: VII	21CSU07	INTERNET PROGRAMMING	24	1

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
First	**II**	**50**	**50**	**100**

Preamble

To learn about the Internet programming concepts.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basics concepts of Internet, Web Browsers, XHTML, CSS and XML programming	K1
CO2	Explain the settings of Web Browsers and Programming aspects of CSS and XML	K2
CO3	Apply the programming concepts that can be used for practical solutions	K3
CO4	Analyze the wide range of application areas for the selection of appropriate internet programming language	K4
CO5	Determine the usage of all given concepts in the development of internet programming	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**7**	7	**9**
CO 5	**9**	**9**	**9**	**9**	**9**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**43**	**43**	**39**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**4.24**	**4.12**	**3.80**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Introduction to Computers and the Internet (4 Hours)

Introduction - What Is a computer? - Computer Organization- Machine Languages, Assembly Languages and High-Level Languages - History of the Internet and World Wide Web - World Wide Web Consortium (W3C)- Web 2.0- Personal, Distributed and Client/Server Computing- Hardware Trends - Key Software Trend: Object Technology - JavaScript: Object-Based Scripting for the Web - Browser Portability - C, C++ and Java- BASIC, Visual Basic, Visual C++, C# and .NET- Software Technologies.

UNIT II Web Browser Basics: Internet Explorer and Firefox (5 Hours)

Introduction to the Internet Explorer 7 and Firefox 2 Web Browsers- Connecting to the Internet - Internet Explorer 7 and Firefox 2 Features- Customizing Browser Settings - Searching the Internet - Keeping Track of Your Favorite Sites- File Transfer Protocol (FTP) - Online Help - Other Web Browsers.

UNIT III Introduction to XHTML (5 Hours)

Introduction - Editing XHTML - First XHTML Example - W3C XHTML Validation Service - Headings - Linking – Images- Special Characters and Horizontal Rules- Lists – Tables- Forms.

UNIT IV Cascading Style Sheets™ (CSS) (5 Hours)

Introduction- Inline Styles - Embedded Style Sheets - Conflicting Styles - Linking External Style Sheets - Positioning Elements - Backgrounds - Element Dimensions - Box Model and Text Flow -Media Types- Building a CSS Drop-Down Menu - User Style Sheets - CSS 3.

UNIT V XML (5 Hours)

Introduction - XML Basics - Structuring Data - XML Namespaces - Document Type Definitions DTDs) -W3C XML Schema Documents.

TEXT BOOK:

1. Deitel and Deitel and Nieto, Internet and World Wide Web – How to Program‖, Prentice Hall, 5th Edition, 2011.

REFERENCE BOOKS:

1. Alex Leon and Mathews Leon , “Internet for Everyone”, Leon TECHWorld.
2. ITL Education Research Wing , “Internet and Web Design”, MacMillam Publishers India Ltd.

WEB REFERENCE:

1.https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwj84Pv5n5P5AhUj4nMBHViKDxIQFnoECCsQAQ&url=https%3A%2F%2Fwww.geeksforgeeks.org%2Finternet-and-web-

2.https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjI6diaoJP5AhX31XMBHd6fD7wQFnoECAoQAQ&url=https%3A%2F%2Fwww.w3schools.com%2Fxml%2F&usg=AOvVaw08Z_qTmj_EHXAhjYLsOSx5

3.https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjI6diaoJP5AhX31XMBHd6fD7wQFnoECAcQAQ&url=https%3A%2F%2Fwww.tutorialspoint.com%2Fxml%2Fxml_overview.htm&usg=AOvVaw1ljgzugPrYKKKtV4HDyjSI

4.

https://www.google.com/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjohaTWoJP5AhVnlNgFHRq8D7cQFnoECDEQAQ&url=https%3A%2F%2Fsist.sathyabama.ac.in%2Fsist_coursematerial%2Fuploads%2FSIT1302.pdf&usg=AOvVaw0O3V-0MkVpPjyOBWKW7gwA

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART – IV	FOUNDATION: II	21FCU02	YOGA AND ETHICS	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
First	**II**	**-**	**50**	**50**

Preamble

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

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	recollect the basic terminologies in yoga and value education	K1
CO2	demonstrate the importance of yoga, mental exercises, principles of life and components of values.	K2
CO3	apply the techniques of dynamic & mental exercises and philosophical values in real life	K3
CO4	classify the different types of asanas, stages of mind, analysis of thought, ethical values and social values.	K4
CO5	evaluate how the yoga and value education make a person strong both physically and mentally	K4

K1 – Remember;K2 – Understand;K3 – Apply; K4 – Analyse;K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**3**	**1**	**1**	**3**
CO 2	**9**	**9**	**9**	**3**	**3**	**1**	**3**
CO 3	**9**	**9**	**9**	**3**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**3**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**3**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**15**	**13**	**11**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**0.99**	**1.28**	**1.05**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos .As per UGC Notification

COURSE CONTENT:

UNIT I **Yoga and Health** **(5 Hours)**

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 **Art of Nurturing the Mind** **(5 Hours)**

Theory:
Ten Stages of Mind-Mental Frequency – Methods for Concentration.Eradicationof Worries-Benefits of Blessings- Greatness of Friendship- Individual Peace and World Peace.
Practice: Worksheet**.**

UNIT III **Philosophy and Principles of Life** **(5Hours)**

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 **Value Education (Part-I)** **(5 Hours)**

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

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 TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE:IX	21CSU09	DATA STRUCTURES	72	6

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**III**	**50**	**50**	**100**

Preamble

This Paper offers the basic understanding and knowledge of different data structures, sorting algorithms and symbol tables.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall various data structures, algorithms and sorting methods	K1
CO2	Describe the basic concepts of data structures, sorting and symbol table	K2
CO3	Choose appropriate data structures for varied problems	K3
CO4	Examine different data structures and algorithms to find best solution for the real time applications	K4
CO5	Recommend a specific data structure and sorting algorithm for an application.	K5

K1 – Remember;K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	3	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	3	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	3	**3**	**9**
CO 4	**9**	**9**	**9**	**9**	3	**3**	**9**
CO 5	**9**	**9**	**9**	**9**	3	**3**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**27**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**2.59**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Elementary Data Structures (15 Hours)

Introduction - Data structure- Overview - Definition - How to create a program – Arrays - Ordered List –Sparse Matrices - Representation of Arrays - Stacks and Queues – Fundamentals - Evaluation of Expressions.

UNIT II Linked List and Tree (15 Hours)

Linked Lists - Singly Linked List - Linked Stacks and Queues – Polynomial Addition - Doubly Linked Lists and Storage Management. Trees: Basic Terminology - Binary Trees - Binary Tree Representation - Binary Tree Traversal.

UNIT III Graph and its applications (14 Hours)

Graphs-Introduction – Definition and Terminology - Graph Representation – Traversals - Connected components and spanning Trees - Shortest path - Transitive Closure.

UNIT IV Internal Sorting (14 Hours)

Internal Sorting- Insertion sort - Quick sort - Merge sort - Heap sort – Sorting on Several Keys.

UNIT V Symbol Tables (14 Hours)

Symbol Tables - Static Tree Tables - Dynamic Tree Tables - Hash Tables - Hashing Functions - Overflow Handling.

TEXT BOOK:

1. Ellis Horowitz, Sartaj Shani, (1994), Fundamentals of Data Structures, First Edition, Galgotia Publication.

REFERENCE BOOKS:

1. Seymour Lipschutz , Data Structures , Tata McGrawhill, Year 2006.
2. D. Samanta, “Classical Data Structure”, Prentice Hall India.
3. G A V PAI, Data Structures and Algorithms Concepts, Techniques Applications, McGraw Hill Education, New Delhi.

WEB REFERENCES

1. **https://www.geeksforgeeks.org/data-structures/**
2. **https://www.javatpoint.com/data-structure-tutorial**
3. **https://www.youtube.com/watch?v=DFpWCl_49i0**

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	Core: X	21CSU10	LINUX AND SHELL PROGRAMMING	60	5

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**III**	**50**	**50**	**100**

Preamble

To learn about the Linux Operating System and Shell Programming

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic set of commands and utilities in Linux/UNIX systems	K1
CO2	Outline the file and its working	K2
CO3	Classify the Linux environment	K3
CO4	Inspect the Curses Terminology and its Concepts	K4
CO5	Examine terminals and termios structure	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**5**	**3**
CO 5	**9**	**9**	**9**	**9**	**9**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**33**	**35**	**33**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**3.26**	**3.36**	**3.21**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I An Introduction to UNIX (12 Hours)

Getting Started: An Introduction to UNIX, Linux, and GNU -What Is UNIX? -What Is Linux? -Programming Linux: Linux Programs -Text Editors-The C Compiler Shell Programming: Why Program with a Shell-A Bit of Philosophy-What Is a Shell? -Pipes and Redirection -The Shell as a Programming Language -Shell Syntax

UNIT II Working with Files (12 Hours)

Working with Files: Linux file structure-System Calls and Device Drivers -Library Functions -Low-Level File Access -The Standard I/O Library –Formatted input and output-File and Directory Maintenance -Scanning Directories -Errors

UNIT III The Linux Environment (12 Hours)

The Linux Environment: Program Arguments-Environment Variables-Time and Date -Temporary Files -User Information -Host Information –Logging-Resources and Limits

UNIT IV Terminals (12 Hours)

Terminals: Reading from and Writing to the Terminal-Talking to the Terminal -The Terminal Driver and the General Terminal Interface-The termios Structure-Terminal Output -
Detecting Keystrokes

UNIT V Managing Text-Based Screens with curses (12 Hours)

Managing Text-Based Screens with curses: Compiling with curses-Curses Terminology and Concepts-The Screen -The Keyboard -Windows -Sub windows -The Keypad -
Using Color

TEXT BOOK:

1.Neil Matthew, Richard Stones, Beginning Linux Programming, Fourth Edition, Wiley

REFERENCE BOOK:

1. Richard Blum and Christine Bresnahan, Linux Command Line and Shell Scripting BIBLE, Third Edition, Wiley

WEB REFERENCE:

1. https://www.geeksforgeeks.org/introduction-to-linux-operating-system/
2. https://www.w3resource.com/linux-system-administration/working-with-files.php
3. https://www.tutorialspoint.com/unix/unix-environment.htm
4. https://opensource.com/life/17/10/top-terminal-emulators
5. https://topic.alibabacloud.com/a/using-the-font-classtopic-s-color00c1decursesfont-library-to-manage-text-based-screens_8_8_31178831.html

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XI PRACTICAL: III	21CSU11	SHELL PROGRAMMING – PRACTICAL	60	3

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**III**	**50**	**50**	**100**

Preamble

To learn about the Linux Operating System and Shell Programming

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic set of commands and utilities in Linux/UNIX systems	K1
CO2	Outline the Binary search and its working	K2
CO3	Classify the Terminal Locking	K3
CO4	Inspect the File Terminology and its Concepts	K4
CO5	Examine Arithmetic and Logical Calculations	K5

K1 – Remember;K2 – Understand;K3 – Apply;K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**9**	**7**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**33**	**31**	**33**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**3.26**	**2.97**	**3.21**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

1. Create a Simple shell script for basic arithmetic and logical calculations.
2. Write a Shell script to Calculate the Factorial of a Number
3. Write a shell program to reverse the given string and check the given string is palindrome or not
4. Create a shell script to search an element from an array using binary searching
5. Design a Shell script to accept the valid login name, if the login name is valid then print its home directory else an appropriate message.
6. Write a Shell script to demonstrate Terminal locking.
7. Illustrate 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)
8. Construct a Shell script that displays list of all the files in the current directory to which the user has read, write and execute permissions.
9. Design a shell script to validate password strength
10. Create a Shell Script to Convert a File Content to Lower Case or Upper Case

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XII	21CSU12	SOFTWARE ENGINEERING	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**III**	**50**	**50**	**100**

Preamble

To enable the students to learn about Software Engineering concepts.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the software development life cycle and associated process models	K1
CO2	Illustrate Requirement modeling and design issues that are used in software development	K2
CO3	Explain the need in Planning, Software Cost Estimation, Documentation and Formal Verification	K3
CO4	Categorize various Design and testing techniques used for Software Development	K4
CO5	Examine dynamic design issues which are used in software development	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**45**	**27**	**27**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**4.44**	**2.59**	**2.63**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Software Engineering Development Process (15 Hours)

Introduction to Software Engineering: Introduction-Some definitions-Some Size Factors-Quality and Productivity Factors-Managerial Issues.**Planning a Software Project:** Introduction-Defining the Problem- Developing a Solution Strategy- Planning the Development Process-Planning an Organizational Structure- other planning activities.

UNIT II Software Cost Estimation and Requirement Specification (14 Hours)

Software Cost Estimation: Introduction- Software Cost Factors- Software cost Estimation Techniques- Staffing Level Estimation- Estimating Software Maintenance Costs.
Software Requirement Definition: Introduction- The Software Requirements Specification-Formal Specification Techniques- Languages and Processors for Requirements Specification.

UNIT III Software Design (14 Hours)

Software Design: Introduction- Fundamental Design Concepts- Modules and Modularization Criteria- Design Notations-Design Techniques-Detailed Design Considerations- Real-Time and Distributed System Design- Test Plans- Milestones, Walkthroughs, and Inspections- Design Guidelines.

UNIT IV Implementation Issues (14 Hours)

Implementation Issues: Introduction- Structured Coding Techniques- Coding Style- Standards and Guidelines- Documentation Guidelines.**Modern Programming Language Features:** Type Checking-Separate Compilation- User-Defined Data Types- Data Abstraction- Scoping Rules-Exception Handling- Concurrency Mechanisms.

UNIT V Verification & Validation Techniques and Software Maintenance (15 Hours)

Verification and Validation Techniques: Introduction- Quality Assurance- Walkthroughs and Inspections – Static Analysis- Symbolic Execution- Unit Testing and Debugging- System Testing- Formal Verification.**Software Maintenance:** Introduction- Enhancing Maintainability during Development- Managerial Aspects of Software Maintenance- Configuration Management- Source-code Metrics- Other Maintenance Tools and Techniques.

TEXT BOOK:

1. Richard Fairley, "Software Engineering Concepts", Tata McGraw-Hill Edition, 1997.
   (Unit-I : Chap 1&2, Unit-II: Chap 3&4, Unit-III: Chap 5, Unit-IV: Chap 6&7, Unit-V: Chap 8& 9)

REFERENCE BOOK:

1. RoggerS.Pressman, "Software Engineering- A Practitioner's Approach", Tata McGraw-Hill, Seventh Edition.

WEB REFERENCE:

1. https://www.javatpoint.com/software-engineering-tutorial
2. https://www.javatpoint.com/software-cost-estimation
3. https://www.javatpoint.com/software-engineering-software-design
4. https://www.powershow.com/view/2f8a9-YTdlY/Modern_Programming_Languages_powerpoint_ppt_presentation
5. https://www.javatpoint.com/software-engineering-software-maintenance

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: IV	ABILITY ENHANCEMENT: I	21AEU01	INFORMATION SECURITY	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**III**	**-**	**50**	**50**

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	Recall the fundamental concepts of Information Security, Risk and Security policies	K1
CO2	Discuss the concepts of Risks, vulnerabilities, ethical and privacy issues	K2
CO3	Apply the ideas in security planning and construct the policies	K3
CO4	Categorizethe Privacy, Ethical Issues, Laws, Software Issues and Crimes	K4
CO5	Summarize Cryptography, cipher text and threats in information security	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**27**	**16**	**19**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**2.67**	**1.53**	**1.85**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNITI Introduction to Information Security (5 Hours)

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 Information Risk (4 Hours)

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

UNITIII Security Planning (5 Hours)

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 Privacy and Ethical Issues in Information Security (5 Hours)

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 Cryptography (5 Hours)

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

TEXT BOOK:

1. Sumitra Kisan and D.ChandrasekharRao,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 ComputerSociety, 2008.

WEB REFERENCE:

1. https://www.imperva.com/learn/data-security/information-security-infosec/#:~:text=Information%20security%20protects%20sensitive%20information,financial%20data%20or%20intellectual%20property.
2. https://www.geeksforgeeks.org/what-is-information-security
3. https://www.techtarget.com/searchsecurity/definition/information-security-infosec
4. https://www.exabeam.com/information-security/information-security
5. https://www.sans.org/information-security

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: IV	NON-MAJOR ELECTIVE: I	21NMU01A	INDIAN WOMEN AND SOCIETY	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**III**	**-**	**50**	**50**

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	know women status in Indian society as an academic discipline	K1
CO2	interpret the various roles of women, challenges and issues faced by them in the society	K2
CO3	find out solutions to their legal issues and product themselves from the violence against women emphasize on women entrepreneurship for their empowerment	K3
CO4	critically analyze the lifestyle and challenges of women	K4
CO5	discuss the importance of women health and issues related to women in general	K5

K1 – Remember; K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**0**	**0**	**0**
CO 2	**9**	**9**	**9**	**9**	**3**	**0**	**3**
CO 3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 4	**3**	**3**	**3**	**9**	**9**	**9**	**9**
CO 5	**3**	**3**	**1**	**1**	**1**	**9**	**9**
Total Contribution of COs to POs	**33**	**33**	**31**	**37**	**22**	**27**	**30**
Weighted Percentage of COs Contribution to POs	**1.90**	**1.99**	**1.92**	**2.43**	**2.17**	**2.59**	**2.92**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos .As per UGC Notification

COURSE CONTENT:

UNIT I Historical Background (5 Hours)

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 Role of Women (Challenges & remedies) (5 Hours)

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

UNIT III Women and Health (5 Hours)

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

UNIT IV Issues of Women (5 Hours)

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 Women Empowerment (4 Hours)

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:

S.No	Authors	Title	Publishers	Year of Publication
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	TRowbotham, 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 TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XIV	21CSU14	RELATIONAL DATABASE MANAGEMENT SYSTEMS	72	6

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**IV**	**50**	**50**	**100**

Preamble

This course covers the basic concepts of database systems, relational database, queries and database design. It is designed to provide solutions related to the strategies for storing data and transaction management.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concepts of database system.	K1
CO2	Explain Normalization and Query language.	K2
CO3	Apply appropriate SQL queries and PL/SQL Programs for database application.	K3
CO4	Analyze different normal forms to design effective database design.	K4
CO5	Verify data in tables against appropriate constraints.	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 5	**9**	**9**	**9**	**9**	**3**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**4.31**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Introduction to Database System (12 Hours)

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 Oracle9i and Oracle Tables (15 Hours)

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 Working with Table (15 Hours)

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 PL/SQL (15 Hours)

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 PL/SQL Composite Data Types (15 Hours)

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

TEXT BOOK:

1. DATABASE SYSTEMS USING ORACLE – Nilesh Shah, 2nd Edition, PHI. (UNIT-I:Chapters 1 & 2, UNIT-II:Chapters 3 & 4, UNIT-III:Chapters 5 &6, UNIT-IV:Chapters 10 & 11, UNIT-VChapters 12, 13 & 14).

REFERENCE BOOKS:

1. Abraham Silberschatz, Henry F.Korth, S.Sudarshan, Database System Concepts, 5th Edition, TMH.
2. Alexis Leon, Mathews Leon, Fundamentals of Database Management Systems, Vijay Nicole Imprints Private Limited.

WEB REFERENCES:

1. https://www.astera.com/type/blog/relational-database-management-system/
2. https://docs.oracle.com/cd/A97630_01/server.920/a96524/toc.htm
3. https://www.youtube.com/watch?v=vs04JXcRwkY
4. https://www.oracletutorial.com/plsql-tutorial/
5. https://www.youtube.com/watch?v=xofpqdU3cD4

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XV PRACTICAL: IV	21CSU15	SQL AND PL/SQL-PRACTICAL	72	3

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**IV**	**50**	**50**	**100**

Preamble

This course covers the conception creation of relational databases, storing, retrieving, Updating and displaying data using Structured Query Language (SQL) integrated into Stored Procedures, Functions, Packages and Triggers (PL/SQL Programming).It is designed to provide hands-on experience to create database-level applications using Oracle SQL and PL/SQL.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concepts of database system.	K1
CO2	Demonstrate the use of Queries.	K2
CO3	Apply appropriate SQL queries and PL/SQL Programs for database application.	K3
CO4	Examine different looping structures to design effective program	K4
CO5	Assess the data in tables against appropriate constraints.	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 5	**9**	**9**	**9**	**9**	**3**	**9**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**4.31**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

1. Contruct a table Department with Dept Id as primary key , Dept name and Location name. Create a table Employee with Employee Id as primary key , Employee Name, Designation, Gender, Age, Date of Joining, Dept Id as foreign key and Salary and insert data in both the tables.

2. Extract queries using Comparison, Logical, Set, Sorting and Grouping operators to retrieve required data from the Employee table created in Question1.

3. Write queries using aggregate functions to summarize the data from the Employee table created in Question1 .

4. Extract Query to

A. Display the Employee id, employee name for all employees who earn more than the average salary.
B. Display the employees who have the highest salary
C. Display all employees who belong to a particular location

5. Construct tables for the 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

6. Create a Student table with following fields and Constraints.

Regno - Primary key
Name - Not null
Marks - Check marks between 0 to 100
Gender - Default value of Female
Aadhar card number -Unique

7. Write a PL/SQL program

A. To check whether a given character is letter or digit.
B. To convert a temperature in scale Fahrenheit to Celsius and vice versa.

8. Create a program in PL/SQL

A. To check whether a number is prime or not using goto statement with for loop.
B. To print the prime numbers between 1 to 50.

9. Create a PL/SQL to update the rate field by 20% more than the current rate in the 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

10. Write a PL/SQL to split the student table into two tables based on result (One table for Pass and another for Fail). Use a cursor for handling records of the student table. Assume necessary fields and create a student details table

11. Create a database trigger on master and transaction tables which are based on an inventory management system for checking data validity. Assume the necessary fields for both tables

12. Construct a PL/SQL program to raise an Exception in the Bank Account Management table when the deposit amount is zero.

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	Core: XVI	21CSU16	OPERATING SYSTEM	72	4

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**IV**	**50**	**50**	**100**

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	Recall the fundamental concepts of operating system	K1
CO2	Demonstrate the function of Deadlock and storage management	K2
CO3	Utilise the policies of scheduling	K3
CO4	Analyse memory management	K4
CO5	Evaluate the concepts of storage management	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**1**
CO 4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**9**	**3**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**33**	**33**	**11**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**3.26**	**3.16**	**1.07**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Basics of Operating System** **(14 Hours)**

What is an Operating System? – Process Concepts – Introduction – Definition of Process – Process States – Process State Transitions – The Process Control Block – Operations on Process – Suspend and Resume – Interrupt Processing.

UNIT II **Deadlock** **(15 Hours)**

Introduction – Examples of Deadlock – Resource Concepts - Four Necessary Conditions for deadlock – Major Areas of Deadlock Research – Deadlock Prevention-Deadlock Avoidance and the Banker's Algorithm – Deadlock Detection – Deadlock Recovery.

UNIT III **Storage Management** **(14 Hours)**

Storage Organization – Storage Management – Storage Hierarchy – Storage Management Strategies-Contiguous vs. Noncontiguous Allocation- Single User Contiguous Allocation- Fixed Partition Multiprogramming – Variable Partition Multiprogramming – Multiprogramming with storage swapping.

UNIT IV **Virtual Storage Organization & Management** **(14 Hours)**

Virtual Storage:Basic Concepts – BlockMapping – Paging Basic Concepts- Segmentation-Virtual Storage Management Strategies – Page Replacement Strategies- Locality - Working Sets – Page Fault Frequency Page Replacement – Demang Paging – Page Release – Page Size.

UNIT V **Job and Processor Scheduling** **(15 Hours)**

Preemptive Vs. NonPreemptive Scheduling – Priorities – Deadlock Scheduling-First- In-First Out(FIFO)Scheduling-Round Robin Scheduling-Quantum Size – Shortest Job First (SJF) Scheduling - Shortest Remaining Time(SRT) Scheduling-HighestResponseRatioNext(HRN) Scheduling-Fair Share Scheduling.

TEXT BOOK:

1. H.M. Deitel, Operating Systems, 2nd Edition, Addision-Wesley Publishing Company 2003

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.

WEB **REFERENCES**

1.https://drive.uqu.edu.sa/_/mskhayat/files/MySubjects/2017SS%20Operating%20Systems/Abraham%20Silberschatz-Operating%20System%20Concepts%20(9th,2012_12).pdf
2. https://www.youtube.com/watch?v=mXw9ruZaxzQ
3.https://mrcet.com/downloads/digital_notes/CSE/II%20Year/OPERATING%20SYSTEMS%20%20NOTES%20R18.pdf
4. https://www.tutorialspoint.com/operating-system-design-and-implementation
5. https://github.com/dalmia/Operating-Systems

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XVII ALLIED: IV	21CSU17	COMPUTER NETWORKS	60	3

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**IV**	**50**	**50**	**100**

Preamble

To understand the concepts and design of Computer Networks

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts, reference models and various layers of computer networks	K1
CO2	Explain the principles, protocols and algorithms of different layers of OSI reference models	K2
CO3	Apply the error detection and correction techniques and routing algorithms for efficient and error free transmission in networks	K3
CO4	Analyze the various routing algorithms for handling internal traffic efficiently	K4
CO5	Evaluate the data transmission services and connection establishment on network	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**3**	**9**
CO 3	**9**	**9**	**3**	**9**	**3**	**3**	**9**
CO 4	**9**	**3**	**3**	**3**	**3**	**3**	**1**
CO 5	**9**	**3**	**3**	**3**	**3**	**1**	**1**
Total Contribution of COs to POs	**45**	**33**	**27**	**33**	**27**	**19**	**29**
Weighted Percentage of COs Contribution to POs	**2.59**	**1.99**	**1.68**	**2.17**	**2.67**	**1.82**	**2.82**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Introduction to Computer Networks** **(12 Hours)**

Network Hardware: LAN, Man, WAN, Wireless Networks, Home Networks, Internetworks. Network Software: Protocol Hierarchies, Design Issues for Layers – Connection Oriented and Connection less services – Service Primitives. Reference Models: OSI – TCP/IP – Comparison of OSI and TCP/IP Reference Models.

UNIT II **Physical Layer** **(12 Hours)**

Guided Transmission Media: Magnetic Media – Twisted Pair – Coaxial Cable – Fiber Optics. Wireless Transmission - Communication Satellites –Public Switched Telephone Networks – Mobile Telephone System.

UNIT III **Data Link Layer** **(12 Hours)**

Data link Layer Design Issues - Error Detection and Correction – Elementary data link protocols – Sliding Window Protocols. Multiple Access Protocols: ALOHA- Carrier Sense Multiple Access Protocols – Collision Free Protocols. Ethernet: Ethernet Cabling -Ethernet MAC sublayer protocol. Wireless LANS – Bluetooth: Bluetooth protocols stack.

UNIT IV **Network Layer Services** **(12 Hours)**

Networks Layer Design Issues – Routing Algorithm – The Network Layer in the Internet: The IP Protocol, IP Address, Mobile IP, IPV6.

UNIT V **Transport Layer & Application Layer** **(12 Hours)**

The Transport Service: Services Provided to the Upper Layer –Transport Service Primitives. Elements of Transport Protocols: Addressing- Connection Establishment – Connection Release – Flow Control and Buffering. Internet Transport Protocols: TCP and UDP. Application Layer: DNS – E-Mail – WWW.

TEXT BOOK:

1. Andrew S.Tanenbaum, Computer Networks, PHI Private Ltd, Fourth Edition.

REFERENCE BOOK:

1. Behrouz A Forouzan, Data Communications and Networking, Tata McGraw Hill, Fifth Edison, 2013.

WEB REFERENCE:

1. https://theswissbay.ch/pdf/Gentoomen%20Library/Networking/Prentice%20Hall%20-%20Computer%20Networks%20Tanenbaum%204ed.pdf
2. https://oms.bdu.ac.in/ec/admin/contents/171_16SCCCA8-16SCCCS6-16SCCIT6_2020051809575550.pdf
3. https://www.youtube.com/watch?v=VwN91x5i25g&list=PLBlnK6fEyqRgMCUAG0XRw78UA8qnv6jEx

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: IV	SKILL ENHANCEMENT: I PRACTICAL:V	21SECSU01	ANIMATION-PRACTICAL	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**IV**	**50**	**-**	**50**

Preamble

To understand the designing of Photoshop and flash

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts of image tools	K1
CO2	Explain the various effects in photoshop	K2
CO3	Identify appropriate steps for creating animation	K3
CO4	Analyze the techniques in flash	K4
CO5	Evaluate the special effects in flash	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**1**	**1**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**25**	**19**	**21**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**2.47**	**1.82**	**2.04**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

1. Design a text using blended option using photoshop
2. Design a text using fire effect using photoshop
3. Change the picture background using photoshop
4. Change black and white image into color image using photoshop
5. Create an image using crack effect in human face using photoshop
6. Create an animation effect to bounce a ball using flash
7. Design an animation effect for man walking using flash
8. Create an animation for eye blinking using flash
9. Design an animation for tree falling effect using flash
10. Create an animation for simple character head turn

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: IV	ABILITY ENHANCEMENT: II	21AEU02	CONSUMER RIGHTS	36	2

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
Second	**IV**	**-**	**50**	**50**

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	Memorize the procedure of redress of consumer complaints, andthe role of different agencies in establishing product and service standards	K1
CO2	Explain the Consumer Protection Law in India	K2
CO3	Impart sound practical grounding about the practice of consumer law and the procedure followed	K3
CO4	Evaluate the regulations and legal actions that helps to protect consumers	K4
CO5	Analyze the knowledge and skills needed for a career in this field	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**1**	**0**	**1**
CO 2	**9**	**9**	**9**	**9**	**1**	**0**	**1**
CO 3	**9**	**9**	**9**	**3**	**3**	**1**	**1**
CO 4	**9**	**3**	**1**	**1**	**3**	**3**	**3**
CO 5	**9**	**1**	**3**	**0**	**9**	**9**	**9**
Total Contribution of COs to POs	**45**	**31**	**31**	**22**	**17**	**13**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**1.87**	**1.92**	**1.45**	**1.68**	**1.25**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Conceptual Framework (8 Hours)

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 Behavior: Alternatives available to Dissatisfied Consumers; Complaint Handling Process: ISO 10000 suite

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

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

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 Role of Industry Regulators in Consumer (6 Hours)

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 Contemporary Issues in Consumer Affairs (6 Hours)

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
8. Empowering Consumers e-book,
9. ebook, www.consumeraffairs.nic.in
10. The Consumer Protection Act, 1986 and its later versions. 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.
4. Kapoor Sheetal (2013) "Banking and the Consumer" Akademos (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
www.consumeraffairs.nic.in
www.iso.org.
www.bis.org.in
www.consumereducation.in
www.consumervoice.in
www.fssai.gov.in
www.cercindia.org

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XVIII	21CSU18	PROGRAMMING IN PYTHON	72	6

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

Preamble

The Paper offers the understanding of basic principles in python and skills to create computer programs for small scale usage.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall syntax and semantics of various programming constructs.	K1
CO2	Illustrate the process of structuring data using lists, tuples, and dictionaries	K2
CO3	Identify appropriate programming structure for a given problem.	K3
CO4	Convert an algorithm into a python program	K4
CO5	Infer the object-oriented concepts in python	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**33**	**27**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**3.16**	**2.63**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Basics and Functions (12 Hours)

The way of the program: What is a program? - Running Python. - The first program. - Arithmetic operators - Values and types - Variables, expressions and statements: Assignment statements - Variable names - Expressions and statements - Script mode - Order of operations - String operations Comments – Debugging. Functions: Function calls - Math functions - Composition – Adding new functions – Definition and uses - Flow of execution - Parameters and arguments- Variables and parameters are local - Fruitful functions and void functions - Why functions?

UNIT II Conditionals, Recursion, Iteration, Strings (15 Hours)

Conditionals and Recursion: Floor division and modulus - Boolean expressions - Logical operators - Conditional execution - Alternative execution - Chained conditionals - Nested conditionals Recursion - Infinite recursion – Keyboard input. Fruitful functions: Return values Incremental development- Composition - Boolean functions. Iteration: Reassignment - Updating variables - The while statement - break -square roots - Strings: String is a sequence - Traversal with a for loop - String slices - Strings are immutable - Searching - Looping and counting -String methods- The in operator - String comparison.

UNIT III Lists, Dictionaries, Tuples (15 Hours)

Lists: A list is a sequence - Lists are mutable - Traversing a list - List operations - List slices - List methods - Map, filter and reduce Deleting elements - Lists and strings Objects and values - Aliasing - List arguments - Dictionaries: A dictionary is a mapping Dictionary as a collection of counters - Looping and dictionaries - Reverse lookup Dictionaries and lists - Memos - Global variables. Tuples: Tuples are immutable - Tuple assignment - Tuples as return values - Variable length argument tuples - Lists and tuples . Dictionaries and tuples.

UNIT IV Files, Classes and Objects (15 Hours)

Files: Persistence - Reading and writing - Format operator - Filenames and paths - Catching exceptions - Databases - Pickling - Pipes - Writing modules – Classes and objects: Programmer -defined types. Attributes - Rectangles - Instances as return values - Objects are mutable Copying - Classes and Functions: Time - Pure functions - Modifiers - Prototyping versus planning.

UNIT V Classes and Methods (15 Hours)

Classes and methods: Object-oriented features - Printing objects - Another example - A more complicated example - The init method- The_str_method - Operator overloading - Type-based dispatch - Polymorphism - Interface and implementation - Inheritance: Card objects - Class attributes Comparing cards. Decks Printing the deck, add, remove, shuffle and sort - Inheritance - Class diagrams - Data encapsulation.

TEXT BOOK :

1. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist ", 2nd Edition 2012, O'Reilly.

REFERENCE BOOKS:

1. Kenneth A. Lambert, "Fundamentals of Python First Programs", Second Edition
2. Rashi Gupta, "Makinf Use of Python", Willey publishing Inc,

WEB REFERENCES

1. https://www.w3schools.com/python/python_intro.asp
2. https://www.geeksforgeeks.org/python-programming-language/
3. https://www.programiz.com/python-programming

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XIX PRACTICAL: VI	21CSU19	PROGRAMMING IN PYTHON - PRACTICAL	72	3

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

Preamble

This course provides hands on experience on Python Programming.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the syntax and semantics of various programming constructs while writing simple programs	K1
CO2	Understand the basic programming concepts of python	K2
CO3	Organize data using lists, tuples, dictionaries and files and program using control structures, functions, class and objects	K3
CO4	Assume appropriate programming structure and data type to solve the given problem efficiently	K4
CO5	Interpret the given problem statement into a python program	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**222**	**45**	**45**	**45**	**15**	**33**	**33**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**3.16**	**3.21**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

1. Write a Program to find prime numbers between 1 to n.

2. Construct a Program to print the decimal equivalents of 1/2, 1/3, 1/4,.....1/n. code

3. Design a Program to check given number is Armstrong or not.

4. Simulate a basic calculator using various arithmetic operators.

5. Compute GCD and LCM of two numbers using functions

6. Develop a program to accept a line of text and find the number of characters, number of vowels and number of blank spaces in it.

7. Demonstrate various List operations.

8. Write a Program to create a List and split it into two lists for odd and even numbers.

9. Design a Program to create a tuple and perform various slicing operations,

10. Build a Program to display the file contents and copy the file contents from one file to another.

11. Develop a Program to create a dictionary, add a key-value pair , change and retrieve the values based on the key.

12. Device a Program to implement class and object concepts.

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	Core: XX	21CSU20	COMPUTER GRAPHICS	72	4

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

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	Describe the basics of computer graphics	K1
CO2	Explain applications, principles, commonly used and techniques of computer graphics and algorithms for Line-Drawing, Circle-Generating and Ellipse Generating.	K2
CO3	apply two dimensional Geometric Transformations	K3
CO4	Analyze the attributes of output primitives	K4
CO5	Examine and appraise the two-dimensional viewing	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**9**
CO 5	**9**	**9**	**9**	**9**	**9**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**33**	**33**	**39**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**3.26**	**3.16**	**3.80**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Overview of Graphics system** **(15 Hours)**

A survey of Computer Graphics – Overview of Graphics Systems: Video Display Devices – Raster-Scan Systems – Random-Scan Systems – Graphics Monitors and Workstations – Input Devices – Graphics Software.

UNIT II **Output Primitives** **(15 Hours)**

Points and Lines – Line-Drawing algorithms – Loading frame Buffer – Line function – Circle-Generating algorithms – Ellipse-generating algorithms.

UNIT III **Attributes of Output Primitives** **(15 Hours)**

Attributes of Output Primitives: Line Attributes – Curve attributes – Color and Grayscale Levels – Area-fill attributes – Character Attributes.

UNIT IV **Two Dimensional Geometric Transformations** **(15 Hours)**

Basic Transformations – Matrix Representations – Composite Transformations – Other Transformations.

UNIT V **Two-Dimensional Viewing** **(12 Hours)**

The Viewing Pipeline – Viewing Coordinate Reference Frame – Window-to-Viewport Co-ordinate Transformation - 2D Viewing Functions – Clipping Operations.

TEXT BOOK:

1. Donald Hearn and M. Pauline Baker, Computer Graphics C Version, Second Edition, Pearson Education, 2006.

REFERENCE BOOK:

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

WEB REFERENCE:

https://www.tutorialspoint.com/computer_graphics/line_generation_algorithm.htm
https://docs.microsoft.com/en-us/dotnet/desktop/winforms/advanced/matrix-representation-of-transformations
https://www.youtube.com/watch?v=D7jKO661adA
https://www.javatpoint.com/computer-graphics-clipping

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXI	21CSU21	MINI PROJECT	-	1

Contact hours per week: -

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**100**	**-**	**100**

Preamble

To expose the students to practice themselves and find solution the problems in the respective area.

Course Outcomes

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

CO NUMBER	CO Statement	Knowledge Level
CO1	Remember the thrust areas of project	K1
CO2	Demonstrate the problem pertaining to the domain	K2
CO3	Apply various algorithms in their relevant field	K3
CO4	Explorethe real time applications	K4
CO5	Evaluate demographic variables and factors influencing software development	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	9	9	9	9	9	9	9
CO 2	9	9	9	9	9	9	9
CO 3	9	9	9	9	9	9	9
CO 4	9	9	9	9	9	9	9
CO 5	9	9	9	9	9	9	9
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**45**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**4.44**	**4.31**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXII ELECTIVE: I	21CSU22A	INTERNET OF THINGS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

Preamble

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

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the general concepts of Internet of Things (IoT)	K1
CO2	Illustrate various IoT sensors and applications	K2
CO3	Apply design concepts to IoT solutions	K3
CO4	Compare various IoT architectures	K4
CO5	Evaluate Design issues in IoT applications	K5

K1 – Remember; K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 2	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 3	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 4	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 5	**9**	**9**	**9**	**9**	**5**	**5**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**25**	**25**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**2.47**	**2.40**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Fundamentals of IoT** **(12 Hours)**

Introduction – Characteristics - Physical Design - Protocols – Logical Design – Enabling Technologies – IoT Levels and deployment Templates

UNIT II **IoT Communication and Network Protocols** **(12 Hours)**

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

UNIT III **IoT Design Methodology** **(12 Hours)**

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

UNIT IV **Physical Devices and Endpoints** **(12 Hours)**

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

UNIT V **IoT Cloud offerings and Case Studies** **(12 Hours)**

Cloud Storage Models and Communication APIs –WAMP- Xively Cloud- Amazon Web Services for IoT- Various 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

WEB REFERENCE:

1.**https://www.oracle.com/in/internet-of-things/what-is-iot/**

2.**https://www.youtube.com/watch?v=uLbtexcw39Y**

3.**https://www.ibm.com/blogs/internet-of-things/what-is-the-iot/**

4.**https://www.youtube.com/watch?v=h0gWfVCSGQQ**

5.**https://youtu.be/PNsWWhllOJM**

6. **https://www.techtarget.com/iotagenda/definition/Industrial-Internet-of-Things-IIoT**

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXII ELECTIVE: I	21CSU22B	WEB PROGRAMMING WITH PHP	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

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
CO2	Acquire knowledge about control structures	K2
CO3	Examine PHP arrays	K3
CO4	Analyze about OOPS and File concepts	K4
CO5	Implement database connectivity and XML	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 2	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 3	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 4	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 5	**9**	**9**	**9**	**9**	**5**	**5**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**25**	**25**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**2.47**	**2.40**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Introduction to PHP** **(12 Hours)**

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 **Control Structures** **(12 Hours)**

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

UNIT III **Arrays** **(12 Hours)**

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 **OOPS and File Concepts** **(12 Hours)**

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 **Database and XML** **(12 Hours)**

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 BOOK:

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, 3rd Edition, Cengage Learning India Edition, 2009.

WEB REFERENCE:

1. https://www.tutorialspoint.com/internet_technologies/php.htm

2. https://www.youtube.com/watch?v=PGvrnas2_Pk

3. https://blog.devgenius.io/web-development-with-php-from-scratch-for-beginners-a8bed954e9f8

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXII ELECTIVE: I	21CSU22C	ARTIFICIAL INTELLIGENCE	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

Preamble

To learn about the concepts of artificial intelligence.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basic AI problems, techniques and knowledge representation issues	K1
CO2	Explain the AI problem designs and issues, heuristic techniques and knowledge representation methods	K2
CO3	Apply first order predicate logic rules to solve AI problems	K3
CO4	Analyse AI problems using various search techniques	K4
CO5	Compare procedural and declarative knowledge representation methods	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 2	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 3	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 4	**9**	**9**	**9**	**9**	**5**	**5**	**9**
CO 5	**9**	**9**	**9**	**9**	**5**	**5**	**9**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**25**	**25**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**2.47**	**2.40**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Introduction – Problems and Search (12 Hours)

What is Artificial Intelligence? The AI Problems – The Underlying Assumption – What is an AI Technique? – The Level of the Model – Criteria for Success. Problems, Problems Space and Search – Defining the Problem as a State Search – Production Systems – Problem Characteristics – Production System Characteristics – Issues in the Design of Search Programs.

UNIT II Heuristic Search Techniques (12 Hours)

Heuristic Search Techniques: Generate and Test – Hill Climbing – Best First Search. Problem Reduction – Constraint Satisfaction – Means – Ends Analysis.

UNIT III Knowledge Representation (12 Hours)

Knowledge Representation Issues: Representations and Mappings – Approaches to Knowledge Representation – Issues in Knowledge Representation – The Frame Problem. Using Predicate Logic: Representing Simple Facts in Logic – Representing Instance and Isa Relationships – Computable Functions and Predicates – Resolution.

UNIT IV Representing Knowledge Using Rules (12 Hours)

Representing Knowledge Using Rules: Procedural versus Declarative Knowledge - Logic Programming – Forward versus Backward Reasoning – Matching – Control Knowledge

UNIT V Statistical Reasoning (12 Hours)

Statistical Reasoning: Probability and Bayes Theorem – Certainty Factors and Rule Based Systems – Bayesian Networks – Dempster-Shafer Theory – Fuzzy Logic.

TEXT BOOK:

1. Elain Rich & Kevin Knight, Artificial Intelligence - Tata McGraw Hill – Second Edition, 1991.

REFERENCE BOOKS:

1. Stuart Russel, Peter Norvig, Artificial Intelligence: A Modern Approach,3rd Edition
2. David W. Rolston, Principles of Artificial Intelligence & Expert Systems Development – McGraw Hill.

WEB REFERENCES:

1. https://www.geeksforgeeks.org/artificial-intelligence-an-introduction/
2. https://www.javatpoint.com/artificial-intelligence-tutorial
3. https://www.youtube.com/watch?v=oV74Najm6Nc

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXIII OPEN ELECTIVE		INTERNET FOR EVERYONE	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

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.	K2
CO3	Understand How to email, tips for effective use of Email, Advantages and Disadvantages of Email.	K3
CO4	To illustrate the Possibilities of Social Networking. Learning discussion forum software & effective use of video conferencing.	K4
CO5	To learn Blogging & Making Money in the Internet.	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO 2	**9**	**9**	**9**	**3**	**3**	**3**	**1**
CO 3	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO 4	**9**	**3**	**3**	**1**	**1**	**0**	**1**
CO 5	**3**	**3**	**3**	**1**	**0**	**0**	**1**
Total Contribution of COs to POs	**39**	**33**	**27**	**17**	**10**	**7**	**5**
Weighted Percentage of COs Contribution to POs	**2.24**	**1.99**	**1.68**	**1.12**	**0.99**	**0.67**	**0.49**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

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

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 Searching the Web, Safety & Privacy (10 Hours)

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 E- Mail (10 Hours)

Introduction - How E-mail works? - Why uses 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 Social Networking and Discussion Forums (8 Hours)

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

UNIT V Making Money on the Internet and Blogging (10 Hours)

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 , 15th Anniversary Edition

REFERENCE BOOKS:

1. Keiko Pitter, Sara Amato,JohnCallahan,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

WEB REFERENCES

1.https://www.tutorialspoint.com/computer_concepts/computer_concepts_introduction_to_internet_www_web_browsers.htm
2.https://www.tutorialspoint.com/internet_technologies/e_mail_overview.htm
3.https://geekflare.com/make-money-with-blogging/

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXIII OPEN ELECTIVE		BASICS OF COMPUTER TECHNOLOGY	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

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	Recall the basics of Computer	**K1**
CO2	Illustrate the concepts of data communication and Computer networks	**K2**
CO3	Utilize Middleware and Gateways	**K3**
CO4	Analyze the concepts of Mobile Computing	**K4**
CO5	Examine the DBMS Architecture	**K5**

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

Pos / Cos	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO 2	**9**	**9**	**9**	**3**	**3**	**3**	**1**
CO 3	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO 4	**9**	**3**	**3**	**1**	**1**	**0**	**1**
CO 5	**3**	**3**	**3**	**1**	**0**	**0**	**1**
Total Contribution of Cos to Pos	**39**	**33**	**27**	**17**	**10**	**7**	**5**
Weighted Percentage of Cos Contribution to Pos	**2.24**	**1.99**	**1.68**	**1.12**	**0.99**	**0.67**	**0.49**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between Cos and Pos. As per UGC Notification

COURSE CONTENT:

UNIT I **Computer Basics** **(9 Hours)**

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 **Data Communication and Computer Networks** **(10 Hours)**

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 **Database Fundamentals** **(9 Hours)**

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

UNIT IV **Mobile Computing** **(10 Hours)**

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 **Cloud Computing** **(10 Hours)**

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 ,MathewsLeon,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 ,MathewsLeon,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

WEB REFERENCES

1.https://mrcet.com/pdf/Lab%20Manuals/IT/R15A0529_CloudComputing_Notes-converted.pdf

2.https://mjginfologs.com/mobile-computing-architecture/

3.https://www.guru99.com/dbms-architecture.html

4.https://www.tutorialspoint.com/data_communication_computer_network/index.htm

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXIII OPEN ELECTIVE		MACHINE LEARNING	48	2

Contact hours per week: 4

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**50**	**100**

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	Remember Machine Learning Fundamentals	K1
CO2	Understanding The Machine Learning Concepts	K2
CO3	Summarize The Impact of Machine Learning Applications	K3
CO4	Analyze How Machine Learning Support to Business Goals	K4
CO5	Evaluate The Knowledge of Machine Skills	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO 2	**9**	**9**	**9**	**3**	**3**	**3**	**1**
CO 3	**9**	**9**	**3**	**3**	**3**	**1**	**1**
CO 4	**9**	**3**	**3**	**1**	**1**	**0**	**1**
CO 5	**3**	**3**	**3**	**1**	**0**	**0**	**1**
Total Contribution of COs to POs	**39**	**33**	**27**	**17**	**10**	**7**	**5**
Weighted Percentage of COs Contribution to POs	**2.24**	**1.99**	**1.68**	**1.12**	**0.99**	**0.67**	**0.49**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Overview of Machine learning (9 Hours)

Understanding Machine Learning- What Is Machine Learning? - Defining Big Data- Big Data in Context with Machine Learning- The Need to Understand and Trust your Data- The Importance of the Hybrid Cloud- Leveraging the Power of Machine Learning- The Roles of Statistics and Data Mining with machine learning- Putting Machine Learning in Context- Approaches to Machine Learning.

UNIT II Machine Learning Techniques (10 Hours)

Getting Started with a Strategy- Understanding Machine Learning Techniques- Tying Machine Learning Methods to Outcomes- Applying Machine Learning to Business Needs.

UNIT III Machine Learning On Applications (10 Hours)

Looking Inside Machine Learning- The Impact of Machine Learning on Applications- Data Preparation- The Machine Learning Cycle.

UNIT IV Getting Started with Machine Learning (10 Hours)

Getting Started with Machine Learning- Understanding How Machine Learning Can Help- Focus on the Business Problem- Machine Learning Requires Collaboration- Executing a Pilot Project- Determining the Best Learning Model.

UNIT V Learning Machine Skills (9 Hours)

Learning Machine Skills- Defining the Skills That You Need- Getting Educated- Using Machine Learning to Provide Solutions to Business Problems- Applying Machine Learning to Patient Health- Leveraging IoT to Create More Predictable Outcomes- Proactively Responding to IT Issues- Protecting Against Fraud- Ten Predictions on the Future of Machine Learning.

TEXT BOOK:

1. Judith Hurwitz and Daniel Kirsch,Machine Learning for dummies, IBM Limited Edition,2018

REFERENCE BOOK:

1. EthemAlpaydin, Introduction to Machine Learning, Second Edition, The MIT Press Cambridge, Massachusetts London, England

WEB REFERENCE

1. https://www.sciencedirect.com/topics/computer-science/machine-learning#:~:text=Machine%20learning%20(ML)%20refers%20to,being%20programmed%20with%20that%20knowledge.
2. https://www.javatpoint.com/machine-learning-techniques
3. **https://www.simplilearn.com/tutorials/machine-learning-tutorial/machine-learning-applications**

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: IV	SKILL ENHANCEMENT: II	21SEU02	LIFE SKILLS	36	1

Contact hours per week: 3

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**50**	**-**	**50**

Preamble

To inculcate both personal and professional skills in the students in the areas of understanding of self and others, interpersonal skills, high performance teams, leadership potential, communication & presentation skills, techniques of problem solving, decision making, fostering creativity and innovationfor personal and professional excellence, stress management, time management and conflict management and inculcation of human values.

Course Outcomes

After completion of the course, the learners will be able to:

COs	Course Outcome	Knowledge Level(RBT)
CO1	Identify the common communication problems, what good communication skills are and what they can do to improve their abilities	**K1**
CO2	Demonstrate communication through the digital media	**K2**
CO3	Prepare themselves to situations as an individual and as a team.	**K3**
CO4	Analyse various leadership models, strengths and abilities to create their leadership vision	**K4**
CO5	Appraise their potential as human beings and conduct themselves properly in the ways of theworld.	**K5**

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**3**	**9**	**3**	**1**	**3**	**3**	**1**
CO 2	**1**	**9**	**3**	**1**	**3**	**9**	**1**
CO 3	**1**	**3**	**3**	**3**	**9**	**3**	**3**
CO 4	**1**	**3**	**3**	**3**	**9**	**9**	**3**
CO 5	**1**	**3**	**3**	**1**	**3**	**1**	**9**
Total Contribution of COs to POs	**7**	**27**	**15**	**9**	**27**	**25**	**17**
Weighted Percentage of COs Contribution to POs	**0.40**	**1.63**	**0.93**	**0.59**	**2.67**	**2.40**	**1.66**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **(8 Hours)**

Communication Skills: Listening, Speaking, Reading, Writing and different modes of writing

UNIT II **(7 Hours)**

Digital Communication and Presentation Skills: Digital Literacy, Effective use of social media, Non-verbal communication, Presentation Skills

UNIT III **(5 Hours)**

Team Skills: Trust and Collaboration, Listening as a Team Skill, Brainstorming, Social and Cultural Etiquettes, Internal Communication

UNIT IV **(8 Hours)**

Leadership and Management Skills: Leadership Skills, Managerial Skills, Entrepreneurial Skills, Innovative Leadership and Design Thinking

UNIT V **(8 Hours)**

Universal Human Values: Ethics and Integrity, Love & Compassion, Truth, Non-Violence, Righteousness, Peace, Service, Renunciation (Sacrifice)

TEXT BOOKS:

1. Sen Madhucchanda (2010), An Introduction to Critical Thinking, Pearson, Delhi
2. Silvia P. J. (2007), How to Read a Lot, American Psychological Association, Washington DC
3. Sinek S. (2009). Start with Why: How Great Leaders Inspire Everyone to Take Action. Penguin
4. Kelly T., Kelly D. (2014). Creative Confidence: Unleashing the Creative Potential Within Us

REFERENCE BOOKS:

1. Elkington, J., & Hartigan, P. (2008). The Power of Unreasonable People: How Social Entrepreneurs Create Markets that Change the World. Harvard Business Press

WEB REFERENCES:

1.Developing Soft Skills and Personality :https://www.youtube.com/playlist?list=PLzf4HHlsQFwJZel_j2PUy0pwjVUgj7KlJ

2.Course on Leadership - https://nptel.ac.in/courses/122105021/9

3.https://www.ugc.ac.in/e-book/SKILL%20ENG.pdf

4.Knowledge@Wharton Interviews Former Indian President APJ Abdul Kalam - . "A Leader Should Know How to Manage Failure" – www.youtube.com/ watch?v=laGZaS4sdeU

Martin, R. (2007). How Successful Leaders Think. *Harvard Business Review*, *85*(6): 60.

Fries, K. (2019). 8 Essential Qualities That Define Great Leadership. *Forbes*. Retrieved 2019-02-15

5.How to Build Your Creative Confidence, Ted Talk by David Kelly - https://www.ted.com/talks/david_kelley_how_to_build_your_creative_confidence

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: V	PROFICIENCY ENHANCEMENT	21PECSU01	CASE TOOLS **(Self-Study)**	-	2

Contact hours per week: Nil

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**V**	**-**	**100**	**100**

Preamble

To learn about the concepts of Case Tools Concepts and its Applications.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the concepts of data modeling and its tools	K1
CO2	Describe DFD, DDT, Ubridge, and UML	K2
CO3	Analyze real time problems and draw appropriate data modeling diagrams	K3
CO4	Apply the relevant modeling tools to represent the problem using diagrams	K4
CO5	Assess the software development life cycle with DFD and UML diagrams	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**21**	**27**	**21**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**2.07**	**2.59**	**2.04**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and Pos .As per UGC Notification

COURSE CONTENT:

UNIT I **Introduction to Data Modeling**

Business Growth-Organizational Model-Case Study of Student MIS-What is the Purpose of Such Models- Understanding the Business - Types of Models- Model Development Approach- The Case for Structural Development-Advantages of Using a Case Tool - System Analysis and Design- What is DFD-General Rules for Drawing DFD-Difference between Logical Data Flow Diagram and Physical Data Flow Diagram-Software verses Information Engineering-How Case Tools Store Information.

UNIT II **Approach to Solve the Problem Statement**

How to Deal with a Problem Statement-Data Flow Diagram for Payroll System-Presentation Diagram for Payroll System Schematics of the Model – Forms-Screens-Menu Screens-Data Entry Screens-Report Output Format-Utilities. Installation of Ubridge and Synthesis: How to use the Tools in Ubridge Synthesis for Case-Installation of Ubridge Synthesis-Computer Aided Software Engineering Getting Ubridge to Work – Setup – Assign – Housekeep-The Ubridge page.

UNIT III **Introduction to Ubridge**

Introduction: Main Flow of the System - Prototyping your Report – Introducing the Novice Model of the Operation - Introducing Synthesis - Synthesis Basic – Synthesis Menu Drawing the Screen-Requirement Definition – Diagram-Data Dictionary-Document-Synthesis Main Administration – Synthesis Reference - Importing and exporting screen.

UNIT IV **Diagram Definition Tool**

Introduction: Starting DDT-Drawing your own Icon - Defining the Connection Rules-Rebuilding your Icon – Object Oriented Methodologies -Rambaughet.al.‗s Object Modeling Techniques-The BoochMethodology–The Jacobson et.al. Methodologies – Pattern-Frame Works-The Unified Approach.

UNIT V **Introduction to UML**

UML Diagram-Class Diagram-Use Case Diagram-Interaction Diagram-Sequence Diagram-Collaboration Diagram-State Chart Diagram-Activity Diagram - Component Diagram-Deployment Diagram.

TEXT BOOKS:

1. Case Tools Concepts and Applications, Ivan N Bayross, BPB Publications
2.Object Oriented System Development using the Unified Modeling Language, McGraw Hill International edition.

REFERENCE BOOK:

1. Software Engineering: A Practitioner‘s Approach, Roger S Pressman, McGraw Hill International Edition.

WEB REFERENCE:

1. https://www.tutorialspoint.com/software_engineering/case_tools_overview.htm
2. https://www.freeprojectz.com/dfd/payroll-management-system-dataflow-diagram
3. https://www.youtube.com/watch?v=IFsItnRrFvM
4. https://iq.opengenus.org/rumbaugh-booch-and-jacobson-methodologies/
5. https://www.geeksforgeeks.org/unified-modeling-language-uml-introduction/

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXIV	21CSU24	DATA MINING	72	6

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

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	Remember the basics of Data Mining concepts	K1
CO2	Explain the techniques of Data Mining	K2
CO3	Classify algorithms for mining the data efficiently	K3
CO4	Analyze clustering techniques and algorithms	K4
CO5	Evaluate the challenges of data mining in real world applications	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**3**	**1**	**9**	**4**	**9**
CO 2	**9**	**9**	**3**	**1**	**9**	**4**	**9**
CO 3	**9**	**9**	**3**	**1**	**9**	**4**	**9**
CO 4	**9**	**3**	**3**	**1**	**9**	**4**	**9**
CO 5	**9**	**3**	**3**	**1**	**9**	**5**	**9**
Total Contribution of COs to POs	**45**	**33**	**15**	**5**	**45**	**21**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**1.99**	**0.93**	**0.33**	**4.44**	**2.01**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Introduction** **(15 Hours)**

Expanding universe of data – production factor – computer systems that can learn – data mining – data mining versus query tools – data mining in marketing – practical application. Learning – Self Learning Computer Systems – machine learning and the methodology of science – concept learning.

UNIT II **Data Warehouse** **(14 Hours)**

Data warehouse – need- designing decision support systems – integration with data mining- Client/Server and data warehousing–multi-processing machines – cost justification.

UNIT III **Knowledge Discovery Process** **(14 Hours)**

Knowledge discovery process – data selection – cleaning – enrichment – coding – data mining – preliminary analysis of the data set using traditional query tools – visualization techniques – likelihood and distance – OLAP tools – K-nearest neighbor – Decision trees – Association rules – Neural networks – Genetic algorithms – Reporting.

UNIT IV **Sitting up a KDD environment** **(14 Hours)**

Different forms of knowledge – Getting started – Data Selection – Cleaning – Enrichment – Coding – Data mining - Reporting – KDD environment – Ten golden rules.

UNIT V **Real-life application and learning algorithms** **(15 Hours)**

Customer Profiling – Predicting bid behavior of pilots – Discovering foreign key relationships- Results. Learning as compression of data sets – The information content of message – Noise and redundancy – significance of noise – Fuzzy databases – The traditional theory of the relational database – from relations to tables – from keys to statistical development Dependencies – Denormalization – Data Mining Primitives**.**

TEXT BOOK:

1. Peter Adrians and Dolf Zantinge, Data Mining, 4th Edition, Addition Wesley, 2002

REFERENCE BOOKS:

1.Jiawei Han & Micheline Kamber, Data Mining Concepts &Techniques,Academic Press, 2001.
2.Margaret H.Dunbam, Data Mining Introductory and Advanced Topics, Pearson Education, 2003.

WEB REFERENCES:

1.https://www.javatpoint.com/data-mining

2. https://www.tutorialspoint.com/data_mining/dm_overview.htm

3. https://www.guru99.com/data-mining-tutorial.html

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE:XXV	21CSU25	PROGRAMMING IN VB.NET	72	5

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To enable the students to learn about the .NET Framework and VB.NET programming.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Outline the basic concepts of .Net Frame work, class and objects	K1
CO2	Explain the concepts of data types, control statements, looping statements, arrays, structures, procedures and functions	K2
CO3	Illustrate the importance of windows form, interfaces, packages, inheritance and exception handling	K3
CO4	Analyse the various .NET controls and database controls	K4
CO5	Evaluate the use of ADO.Net connection	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**9**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**4.31**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Introducing .NET (12 Hours)

.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 Data Types, Operators and Control Statements (15 Hours)

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 Arrays, Procedures and Structures (15 Hours)

One-Dimensional Array – Array Initialization – 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 Creating Menus and Using Dialog Boxes (15 Hours)

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 Events Delegates Exception Handling and ADO.NET (15 Hours)

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.

TEXT BOOK:

1. P.Radhaganesan,"VB.NET" , 1st Edition, Scitech Publications(India) Pvt Ltd, 2014

REFERENCE BOOKS:

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

WEB REFERENCES:

1. https://www.tutorialspoint.com/vb.net/index.htm
2. https://www.javatpoint.com/vb-net
3. https://www.youtube.com/watch?v=HFWQdGn5DaU

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE:XXVI PRACTICAL:VII	21CSU26	PROGRAMMING IN VB. NET – PRACTICAL	72	3

Contact hours per week: 6

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

This course provides hands on experience on VB.NET Programming.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic concepts of class and objects using console application	K1
CO2	Illustrate the concepts of data types, control statements, looping statements, arrays, structures, procedures and functions using programs	K2
CO3	Build applications using windows form, interfaces, packages, inheritance and exception handling	K3
CO4	Analyze the usage of various .NET controls	K4
CO5	Examine the use of ADO.Net connection for real world applications	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**9**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**45**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**4.31**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

PRACTICAL LIST

1. Simulate a calculator with basic operation.
2. Implement Font Application.
3. Create a Notepad Application.
4. Illustrate If condition using console application.
5. Demonstrate the looping statements using a console application.
6. Develop an application for deploying various built-in functions in VB.NET.
7. Develop a windows application with Menus and Dialog Boxes.
8. Demonstrate file operations.
9. Develop a simple project for Student Database Management System.
10. Develop a simple project for Employee Database Management System.

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXVII ELECTIVE: II	21CSU27A	NETWORK SECURITY	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To provide grounding in basic and advanced techniques in network security and its effective algorithms.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Define the concepts of Symmetric Encryption	K1
CO2	Illustrate various public key cryptographic techniques	K2
CO3	Classify Secure Socket Layer	K3
CO4	Examine authentication applications	K4
CO5	Sketch IP Security and web Security	K5

K1 – Remember;K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**33**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**3.16**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I An Introduction to Network Security (12 Hours)

Introduction: The OSI Security Architecture-Security Attacks-Security Services-Security Mechanisms-A Model for Internetwork Security. Symmetric Encryption and Message Confidentiality: Symmetric Encryption Principles-Symmetric Block Encryption Algorithms-Stream Ciphers and RC4-Cipher Block Modes of Operation

UNIT II Public-Key Cryptography and Message Authentication (12 Hours)

Public-Key Cryptography and Message Authentication: Approaches to Message Authentication-Secure Hash Functions and HMAC-Public-Key Cryptography Principles-Public-Key Cryptography Algorithms-Digital Signatures-Key Management

UNIT III Authentication Applications (12 Hours)

Authentication Applications: Kerberos- X.509 Authentication Service-Public-Key Infrastructure Electronic Mail Security: Pretty Good Privacy- S/MIME

UNIT IV IP Securities and Web Security (12 Hours)

IP Security: IP Security Overview- IP Security Architecture. Web Security: Web Security Considerations-Secure Socket Layer (SSL) and Transport Layer Security (TLS)-Secure Electronic Transaction (SET)

UNIT V Intruders and Malicious Software (12 Hours)

Intruders: Intruders- Intrusion Detection- Password Management. Malicious Software: Viruses and Related Threats-Virus Countermeasures-Distributed Denial of Service Attacks-Firewalls-Firewall Design Principles

TEXT BOOK:

1. William Stallings, Network Security Essentials, 3rd Edition, Pearson. (Unit I: Chapter 1,2, Unit II: Chapter 3, Unit III: Chapter 4,5 Unit IV: Chapter 6,9 Unit V: Chapter 10,11

REFERENCE BOOK:

1.Atul Kahate , Cryptography and Network Security, 2nd Edition, Tata McGrawHill.

WEB REFERENCE:

https://www.geeksforgeeks.org/osi-security-architecture/

https://www.geeksforgeeks.org/digital-signatures-certificates/

https://www.tutorialspoint.com/internet_technologies/digital_signature.htm

https://www.geeksforgeeks.org/secure-socket-layer-ssl/

https://www.youtube.com/watch?v=402-fibaczk

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXVII ELECTIVE: II	21CSU27B	INTRODUCTION TO COMPILER DESIGN	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To understand the principles of compiler design.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall to understand the basics of compilers and lexical analysis	K1
CO2	Interpret the concept of syntactic specification of programming languages and parsing techniques	K2
CO3	Build knowledge on the syntax and symbol tables	K3
CO4	Analyze an insight on runtime storage and error recovery	K4
CO5	Interpret General introduction on code optimization	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**33**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**3.16**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Introduction to Compliers (12 Hours)

Compliers and Translator – Need of Translator – The structure of a Complier – Lexical analysis – Syntax analysis – Intermediate code generation – optimization – code generation. Finite automata and lexical Analysis: The role of the lexical analysis - Regular expressions to finite automata – Minimizing the number of states of a DFA.

UNITII The Syntactic specification of programming languages (12 Hours)

Context free grammars – derivations and parse trees – capabilities of context free grammars. Basic parsing techniques: Parsers –top-down parsing – predictive parsers.

UNIT III Syntax – directed translation (12 Hours)

Syntax-directed translation schemes – implementation of syntax-directed translators – intermediate code – postfix notation – parse trees and syntax trees – 3 address code – quadruples and triples– Boolean expressions – statements that alter the flow of control. Symbol tables: the contents of a symbol table – data structures for symbol table – representing scope information.

UNIT IV Run time storage administration (12 Hours)

Implementation of a simple stack allocation scheme – Implementation of block-structured languages – storage allocation in block structured languages**.** Error deduction and recovery: errors – lexical phase errors – syntactic phase errors – semantic errors.

UNIT V Introduction of code optimization (12 Hours)

The principle sources of optimization – loop optimization – the DAG representation of basic blocks – value numbers and algebraic laws. Code generation: Object programs – problems in code generation – a machine model– register allocation and assignment – code generation from DAG's – peepholes optimization.

TEXT BOOK :

1. V.Aho, Jeffrey D.Ullman, Principles of Complier Design by Alfred, Narosa Publishing House.

REFERENCE BOOK:

1. Alfred V. Aho, Ravi Sethi,Jeffry D. Ullman,Compliers, Principles. Techniques, and tools.

WEB REFERENCES:

1. https://www.askbooks.net/2022/02/pdf-compiler-principles-techniques-and.html
2. https://www.guru99.com/compiler-design-tutorial.html
3. http://hjemmesider.diku.dk/~torbenm/Basics/basics_lulu2.pdf
4. https://easyexamnotes.com/p/introduction-to-compiler.html
5. http://160592857366.free.fr/joe/ebooks/ShareData/Modern%20Compiler%20Design%202e.pdf

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXVII ELECTIVE: II	21CSU27C	INFORMATICS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To understand the basics of Informatics.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the Basics of Informatics	K1
CO2	Demonstrate strong understanding of security and Ethics issues related to informatics.	K2
CO3	Apply technology informatics skills to solve specific industry data and information management problems, with a focus on usability and designing for users.	K3
CO4	Ideate informatics products and services.	K4
CO5	Conduct informatics Analysis and visualization applied to different real-world fields.	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 2	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**9**	**3**
CO 4	**9**	**9**	**9**	**9**	**3**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**3**	**3**	**3**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**15**	**33**	**15**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**1.48**	**3.16**	**1.46**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Knowledge Skill** **(12 Hours)**

Data, Information and Knowledge – Internet Access Methods – Internet as a Knowledge Repository – INFLIBNET – Open Access Initiatives – IPR,Copyrights and Patents – Software License Agreement.

UNIT II **Social Informatics** **(10 Hours)**

Digital society – Digital Divide – Social Networks – IT NewThreats –Cybersecurity – Computer Harsh Realities

UNIT III **Bioinformatics and Immuno Informatic** **(12 Hours)**

Computational Biology and Bioinformatics – Scope of BioInformatics – Origin of Concept of Bioinformatics: History and Development – Importance of Bioinformatics – Applications of BioInformatics. Immuno Informatics

UNIT IV **Geoinformatics** **(14 Hours)**

Applications – Geographic Information Systems – Conceptualization of GIS – Remote Sensing – Global Positioning System – Geodesy – Cartography –Global Navigation Satellite System – WebMapping.

UNIT V **Futuristic IT** **(12 Hours)**

Artificial Intelligence – Expert Systems – DNA Barcoding –DNA Fingerprinting – Biocomputing – Biometrics.

TEXT BOOK:

1.Vijayakumaran Nair K, Vinod Chandra S S, “INFORMATICS”, PHI Learning Private Limited

REFERENCE BOOKS:

1.Claverie J. And Notredame C, Bio Informatics, Wiley India (P) Ltd- New Delhi
2 Evans and Others,.Informatics, Pearson - Delhi

WEB REFERENCES

1. **https://medium.datadriveninvestor.com/a-short-note-on-futuristic-technologies-based-on-ai-58fe5efe8157**
2. **https://www.geoinformatics.com/**
3. **https://www.udemy.com/course/bioinformatics-mastery-vaccine-design/**

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXVIII ELECTIVE: III	21CSU28A	MULTIMEDIA SYSTEMS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To understand the basic concepts of Multimedia.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recognize the basic concepts of multimedia	K1
CO2	Demonstrate different multimedia content	K2
CO3	Discover various effect in animated files	K3
CO4	Analyze multimedia processing techniques	K4
CO5	Determine multimedia requirements for designing	K5

K1 – Remember;K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**7**	**9**	**6**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 5	**9**	**9**	**9**	**9**	**6**	**9**	**9**
Total Contribution of COs to POs	**45**	**43**	**45**	**42**	**42**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.59**	**2.79**	**2.76**	**4.15**	**4.31**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Multimedia an overview** **(12 Hours)**

Introduction-Multimedia Presentation and Production-Characteristics of a Multimedia Presentation-Hardware and Software Requirements -Uses of Multimedia - Analog and Digital Representations –Digitization.

UNIT II **Text and Image** **(12 Hours)**

Text: Introduction -Types of Text -Unicode Standard -Font -Insertion of Text. Image: Introduction-ImageDataRepresentation-ImageAcquisition-ImageProcessing.

UNIT III **Audio and Video** **(12 Hours)**

Audio: Introduction-Acoustics-SoundWaves-Types and PropertiesofSounds-Psycho-Acoustics-Components of anAudioSystems. Video: Introduction-MotionVideo-AnalogVideoCamera-Analog VideoSignalRepresentation-Television Systems-VideoColorSpaces-DigitalVideo.

UNIT IV **Animation** **(12 Hours)**

Introduction-HistoricalBackground -UsesofAnimation -TraditionalAnimation - Principles of Animation -Computer-based Animation -Animation on the Web -3D Animation - Rendering Algorithms -Animation File Formats -Animation Software.

UNIT V **Compression and Virtual Reality** **(12 Hours)**

Compression: Introduction-Basic Concepts-Lossless Compression Techniques- Lossy Compression Techniques.

TEXT BOOK :

1. Ranjan Parekh, Principles of Multimedia, TMH, 2007.

REFERENCE BOOKS:

1. William M. Neuman, Robert R. Sprout, Principles of interactive Computer Graphics, McGraw Hill International Edition
2. Ashok Banerji, Ananda Mohan Ghosh, Multimedia Technologies, McGraw Hill Publication.

WEB REFERENCES:

1. https://www.tutorialspoint.com/multimedia/multimedia_introduction.htm
2. https://littlevision.files.wordpress.com/2013/12/multimedia-technology.pdf
3. https://www.studocu.com/in/document/bharathiar-university/bsc-computer-science/gm-full-notes-of-cs-in-graphics-and-multimedia-unit-2-bharathiyar-university/28544356

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXVIII ELECTIVE: III	21CSU28B	DIGITAL IMAGE PROCESSING	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To attain basic knowledge of digital image processing

Course Outcomes

On successful completion of the course the students should have:

CO Number	CO Statement	Knowledge Level
CO1	Recall the concepts of image processing	K1
CO2	Discuss the various image processing methods	K2
CO3	Illustrate sampling, filtering and detection methods	K3
CO4	Analyze the enhancement, segmentation, restoration and compression techniques	K4
CO5	Evaluate the different image processing techniques	K5

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**7**	**9**	**6**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 5	**9**	**9**	**9**	**9**	**6**	**9**	**9**
Total Contribution of COs to POs	**45**	**43**	**45**	**42**	**42**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.59**	**2.79**	**2.76**	**4.15**	**4.31**	**4.38**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.59**	**2.79**	**2.76**	**4.15**	**4.31**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Fundamentals of Image Processing (12 Hours)

Introduction – Steps in Image Processing – Building Blocks of a Digital Image Processing – Digital Image representation – Sampling and Quantization

UNIT II Image Enhancement (12 Hours)

Introduction – Spatial Domain and Frequency Domain approaches – Spatial Domain Techniques – Spatial Filtering

UNIT III Image Compression (12 Hours)

Introduction – Coding Redundancy – Inter-Pixel Redundancy – Psycho-Visual Redundancy – Image Compression Models – Classification – Huffman Coding – Lossy Compression Techniques

UNIT IV Image Segmentation (12 Hours)

Introduction –Detection of Isolated Points – Line Detection – Edge Detection – Edge Linking and Boundary Detection – Region – Oriented Segmentation

UNIT V Image Restoration (12 Hours)

Introduction – Degradation Model – Inverse Filter Approach – Least Mean Square Filter – Interactive Restoration – Constrained Least Squares Restoration

TEXT BOOK:

4. S.Annadurai,R. Shanmugalakshmi, "Fundamentals of Digital Image Processing", Pearson Education, 2007

REFERENCE BOOKS:

1. Rafael G. Gonzalez , Richard E. Woods, "Digital Image Processing", Pearson Education. 3rd Edition.
2. A.K. Jain, "Fundamental of Digital Image Processing", PHI Publications, 4th Edition 2011.
3. Chanda&Majumdar,"Digital Image Processingand analysis", PHI Publications, 2nd Edition 2007.

WEB REFERENCE:

1.https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjsx_2qqIf5AhWwwjgGHZjzBjwQFnoECAMQAQ&url=https%3A%2F%2Fwww.tutorialspoint.com%2Fdip%2Findex.htm&usg=AOvVaw3DVMoSrVZgs2RdBWkduC9t

2.https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjsx_2qqIf5AhWwwjgGHZjzBjwQFnoECCEQAQ&url=https%3A%2F%2Fpre-scient.com%2Fresources%2Fknowledge-center%2Fimage-processing%2Fimage-processing.html&usg=AOvVaw1F2TfBU53ebDSn3tWR-B-L

3.https://www.google.co.in/url?sa=t&rct=j&q=&esrc=s&source=web&cd=&cad=rja&uact=8&ved=2ahUKEwjsx_2qqIf5AhWwwjgGHZjzBjwQFnoECDkQAQ&url=https%3A%2F%2Fwww.geeksforgeeks.org%2Fdigital-image-processing-basics%2F&usg=AOvVaw3kBtF6MNsN5JgvyM2Rodgk

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: III	CORE: XXVIII ELECTIVE: III	22CSU28C	BIG DATA ANALYTICS	60	4

Contact hours per week: 5

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**50**	**100**

Preamble

To enable the students to learn the concepts of Big Data Analytics.

Course Outcomes

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

CO Number	CO Statement	Knowledge Level
CO1	Recall the Big Data and Data Analytics concepts	K1
CO2	Explain the NoSQL, Hadoop and Map Reduce Concepts with algorithms	K2
CO3	Illustrate Data Stream Management, Frequent Itemset Mining in clustering techniques	K3
CO4	Analyze Big Data Challenges, link analysis and Recommendation systems	K4
CO5	Summarize Hadoop architecture and types of Big Data approach	K5

K1 – Remember; K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**7**	**9**	**6**	**9**	**9**	**9**
CO 2	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 3	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 4	**9**	**9**	**9**	**9**	**9**	**9**	**9**
CO 5	**9**	**9**	**9**	**9**	**6**	**9**	**9**
Total Contribution of COs to POs	**45**	**43**	**45**	**42**	**42**	**45**	**45**
Weighted Percentage of COs Contribution to POs	**2.59**	**2.59**	**2.79**	**2.76**	**4.15**	**4.31**	**4.38**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I Big Data Analytics & Hadoop (12 Hours)

Big Data Analytics: Introduction to Big Data- Big Data Characteristics- Types of Big Data- Traditional Versus Big Data Approach – Technologies Available for Big Data- Infrastructure for Big Data- use of Data Analytics - Big Data Challenges- Desired Properties of a Big Data System-Case study for Big Data Solutions. Hadoop: Introduction- What is Hadoop?- Core Hadoop Components- Hadoop Ecosystem- Hive- Physical Architecture- Hadoop Limitations

UNIT II NoSQL & MapReduce (12 Hours)

What is NoSQL?: What is NoSQL?- NoSQL Business Drivers- NoSQL Case studies- NoSQL Data Architectural Patterns- Variations of NoSQL Architectural Patterns- using NoSQL to Manage Big Data. MapReduce: MapReduce and The New Software stack-MapReduce-Algorithms Using MapReduce.

UNIT III Finding analogous Items and Mining Data Streams (12 Hours)

Finding Similar Items: Introduction- Nearest Neighbour Search- Applications of Nearest Neighbour Search- Collaborative Filtering as a Similar– Sets Problem- Recommendation Based on User Ratings- Distance Measures.Mining Data Streams: Introduction- Data Stream Management Systems- Data stream Mining- Examples of Data Stream Applications- Stream Queries- Issues in Data Stream Query Processing- Sampling in Data Streams- Filtering Streams – counting Distinct Elements in a Stream- Querying on Windows- Counting ones in a Window-Decaying Windows.

UNIT IV Link Analysis and Frequent Itemset Mining (12 Hours)

Link Analysis: Introduction- History of Search Engines and Spam- PageRank- Efficient Computation of PageRank- Topic- Sensitive PageRank- Link Spam-Hubs and Authorities.
Frequent Itemset Mining: Introduction- Market-Basket Model- Algorithm for Finding Frequent Item sets- Handling Larger Datasets in Main Memory- Limited Pass Algorithms- Counting Frequent Items in a Stream.

UNIT V Clustering Approach and Recommendation Systems (12 Hours)

Clustering Approach: Introduction- Overview of Clustering Techniques- Hierarchical clustering-Partitioning Methods- the CURE Algorithm - Clustering Streams.Recommendation Systems: Introduction- A model For Recommendation Systems-Collaborative- Filtering system- Content-Based Recommendations.

TEXT BOOK:

1. Radha Shankarmani and M.Vijayalakshmi, **"Big Data Analytics"**, 2nd Edition, Wiley.
   (Unit I: Chap 1&2, Unit II: Chap 3&4, Unit III: Chap 5&6, Unit IV: Chap 7&8, Unit V: Chap 9&10)

REFERENCE BOOK:

1. Vignesh Prajapati, **"Big Data Analytics with R and Hadoop"**, PACKT publishing open-source community experience distilled, Mumbai. 2013.

WEB REFERENCE:

1. https://www.techtarget.com/searchdatamanagement/definition/big-data
2. https://www.techtarget.com/searchdatamanagement/definition/NoSQL-Not-Only-SQL
3. https://www.youtube.com/watch?v=nbBJ27XhEyM
4. https://www.youtube.com/watch?v=fL41WSVDunM
5. https://www.youtube.com/watch?v=a3It88zzbiA

CATEGORY	COURSE TYPE	COURSE CODE	COURSE TITLE	CONTACT HOURS	CREDIT
PART: IV	SKILL ENHANCEMENT: III	21SECSU03	E-COMMERCE	24	2

Contact hours per week: 2

Year	Semester	Internal Marks	External Marks	Total Marks
Third	**VI**	**50**	**-**	**50**

Preamble

To enable the students to learn the concepts of E-Commerce.

Course Outcomes

On successful completion of the course the students should have:

CO Number	CO Statement	Knowledge Level
CO1	Recall the basic technology of Ecommerce.	K1
CO2	Explain the Ecommerce Technologies.	K2
CO3	Identify benefits of online marketing	K3
CO4	Analyzethe security policies and digital certificates.	K4
CO5	Examine the risks in Online Payment methods in Online shopping	K5

K1 – Remember; K2 – Understand;K3 – Apply; K4 – Analyse; K5 – Evaluate.

CO-PO MAPPING (COURSE ARTICULATION MATRIX)

POs / COs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7
CO 1	**9**	**9**	**9**	**9**	**3**	**1**	**3**
CO 2	**9**	**9**	**9**	**9**	**9**	**1**	**3**
CO 3	**9**	**9**	**9**	**9**	**3**	**3**	**1**
CO 4	**9**	**9**	**9**	**9**	**9**	**3**	**3**
CO 5	**9**	**9**	**9**	**9**	**9**	**1**	**1**
Total Contribution of COs to POs	**45**	**45**	**45**	**45**	**33**	**9**	**11**
Weighted Percentage COs Contribution to POs	**2.59**	**2.71**	**2.79**	**2.96**	**3.26**	**0.86**	**1.07**

Level of correlation: 0 – No correlation; 1 – Low correlation; 3 – Medium correlation; 9- High correlation between COs and POs. As per UGC Notification

COURSE CONTENT:

UNIT I **Introduction** **(4 Hours)**

Introduction – Electronic commerce: The Second Wave – Electronic Commerce and Electronic Business-The Development and Growth of Electronic Commerce – Advantages and Disadvantages of Electronic Commerce.

UNIT II **E- Business Technology Basics** **(5 Hours)**

The Internet and the World Wide Web – Internet Protocols – Domain Names- Markup Language and the Web – Markup Languages- Hypertext Markup Language - HTML Tags - Scripting Languages and style sheets – Extensible Markup Language (XML).

UNIT III **Selling to Consumers Online** **(5 Hours)**

Introduction – Web Marketing Strategies – Product based Marketing Strategies – Customer Based Marketing Strategies – Communicate with different Market Segments – Trust, Complexity and Media Choice – Market Segmentation – Market Segmentation on the Web – Offering Customer a choice on the Web.

UNIT IV **Online Security** **(5 Hours)**

Online Security Issues Overview – Computers and Security: Brief History – Computer Security and Risk Management – Elements of Computer Security – Security Policy and Integrated Security – Security for Client Computers – Digital Certificates.

UNIT V **Online Payment Systems** **(5 Hours)**

Introduction – Online Payment Basics - Payment Cards – Advantages and Disadvantages of Payment Cards – Payment Acceptance and Processing - Electronic Cash - Electronic Wallets.

TEXT BOOK:

1. Gary P.Schneider ,"E-COMMERCE Strategy, Technology and Implementation" ,Ninth Edition, Tata McGraw-Hill, 2004. CENGAGE Learning.

REFERENCE BOOK:

1.Henry Chan,RaymondLee,TharamDillon,Elizabeth Chang "E-Commerce Fundamentals and Applications",WILEY Publications,2003.

WEB REFERENCE

1. https://www.tutorialspoint.com/e_commerce/index.htm
2. https://www.vssut.ac.in/lecture_notes/lecture1428551057.pdf
3. https://www.slideshare.net/kamalgulati7/full-notes-on-ecommerce-study-material-for-ecommerce
4. https://www.tutorialspoint.com/e_commerce/e_commerce_tutorial.pdf